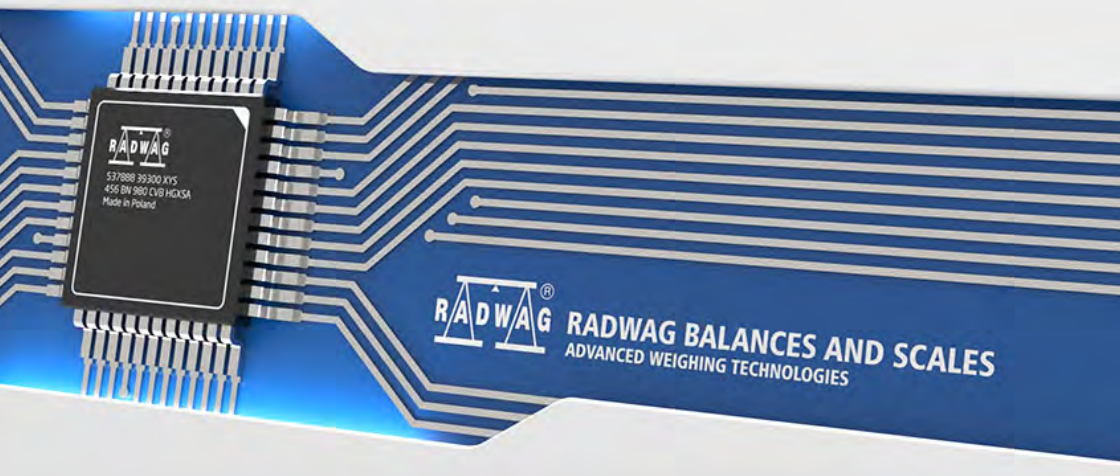
PUE C/31

WEIGHING INDICATOR

PUE C/31 Indicator
PU C/31H Indicator
PUE C/31H/Z Indicator

USER MANUAL

ITKU-17-02-08-16-EN



AUGUST 2016

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1. INTENDED USE

PUE C/31 designed for quick and precise measurements of weighed loads masses. Tarring in full weighing range enables to determine net mass of weighed loads. Optional additional display enables observing of weighing process by another person.

Functions:

- backlight of display
- level of filtration
- autozero function
- setting baud rate of transmission
- continuous data transmission for RS 232
- automatic operation for RS 232
- designed printouts
- designation minimum mass for function operating
- counting pieces
- +/- mass control
- percentage deviation from standard mass
- latch of maximum scale indication
- automatic tare
- memory of tare
- Memory of 9 tare values
- inscribing tare value
- automatic scale switch-off
- user calibration
- Totalizing
- Weighing animals

User functions may have attribute of accessibility. For this reason it is possible to adjust scale to individual needs to provide access to only these functions which are currently needed. Attribute determination accessible / inaccessible is possible in user menu and described in further part of manual.

2. PRECAUTIONS

2.1. Maintenance

A. Please, read carefully this user manual before and use the device according to its intended use.

B. Devices that are to be withdrawn from usage should be sent back to the producer or in case of own utilization do it according to the law.

2.2. Accumulator / battery pack

The device connected to mains inteligently monitors the battery state and charges it if possible. After sudden lack of power supply from the mains the device automatically switches to accumulator without breaking operation.

- Weighing indicators **PUE C/31** (plastic casing) are devices designed to be supplied from **NiMH** batteries (nickel-metal-hydrogen) with rated voltage of **1.2V**, size **R6** and capacities from **1800** to **2800mAh** charged while connected to mains without stopping operation.

- **PUE C/31H** and **PUE C/31H/Z** weighing indicators (stainless steel housing) are devices designed to be supplied from **SLA** accumulators (*Sealed lead acid type*) **6V** o and capacity **3** to **4Ah** charged while connected to mains without stopping operation.

In case of an elongated storage period in low temperatures, it is not allowed the full discharge of the accompanied batteries.

The equipment including accumulators does not belong to your regular household waste. The European legislation requires that electric and electronic equipment be collected and disposed separately from other communal waste with the aim of being recycled.

Notice:
Some symbols on accumulators identify harmful elements/compounds:
Pb = lead,
Cd = cadmium,
Hg = mercury.

2.2.1. Power supply of weighing indicators in plastic casings

Indicators in plastic casing are intended to be supplied from a power adapter or from NiMH rechargeable battery pack (standard equipment). New rechargeable batteries should be formatted according to the description in the chapter 14.4.4. of this manual.

Alternatively, you can use to power the device R6 size standard non-rechargible batteries. If you want to use normal batteries instead of rechargeable ones,
proceed as follows:

- Before installing non-rechargeable batteries turn on the device and set **<5.5.CHr6>** to **<no>**, to switch off charging,
- Then install the batteries.

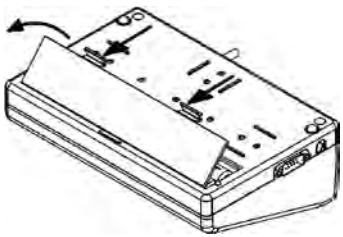
Installing batteries without changing <5.5.CHr6> to <no> may cause damage of batteries and the indicator.

2.2.2. Replacement of worn batteries

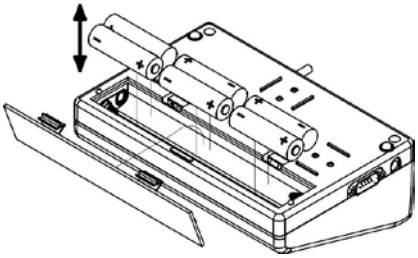
Users have the ability to replace worn out batteries to new ones in weighing indicators **PUE C/31** (plastic casing).

Procedure:

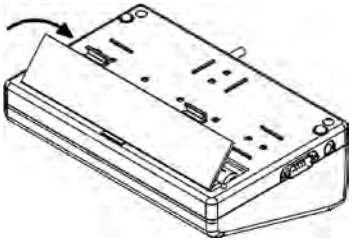
- Open the lid of the chamber for batteries placed in the bottom of the indicator casing:



- Remove discharged and then insert new batteries into the chamber, according to given polarity (+/-):



- Close the lid of the chamber for batteries:



In PUE C/31H and PUE C/31H/Z weighing indicators (stainless steel housing) the worn out accumulator can be exchanged to a new one by the authorized service of the manufacturer.

2.3. Operation in a strong electrostatic field

If the device is about to operate in a strong electrostatic field (e.g. printing houses etc.) it should be connected to the earthing.

Connect it to the clamp terminal signed ⏚.

3. WARRANTY CONDITIONS

A. RADWAG is obliged to repair or change those elements that appears to be faulty because of production and construction reason,

B. Defining defects of unclear origin and outlining methods of elimination can be settled only in participation of a user and the manufacturer representatives,

C. RADWAG does not take any responsibility connected with destructions or losses derives from non-authorized or inappropriate (not adequate to manuals) production or service procedures,

D. Warranty does not cover:

- Mechanical failures caused by inappropriate maintenance of the device or failures of thermal or chemical origin or caused by atmospheric discharge, overvoltage in mains or other random event,
- Inappropriate cleaning.

E. Loss of warranty appears after:

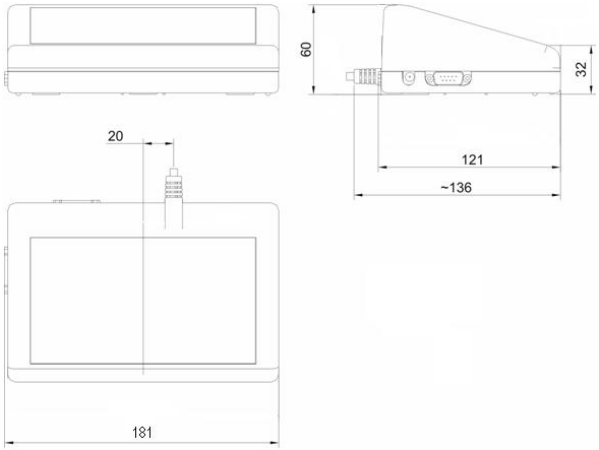
- Access by an unauthorized service,
- Intrusion into mechanical or electronic construction of unauthorized people,
- Removing or destroying protection stickers.

F. Warranty conditions outline the warranty period for rechargeable batteries attached to the device for 12 months.

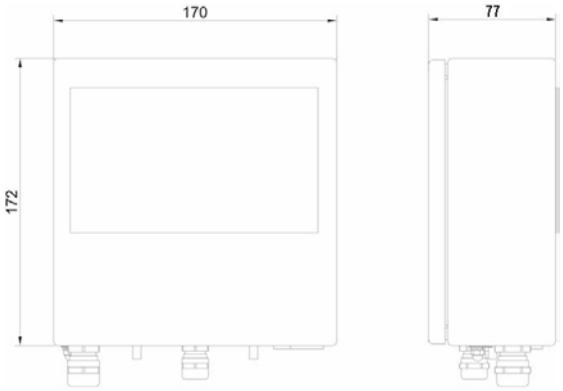
G. The detailed warranty conditions one can find in warranty certificate.

H. Contact with the central authorized service:
+48 48 384 88 00 ext. 106 or 107.

4. MAIN DIMENSIONS



Main dimensions of PUE C/31



Main dimensions of PUE C/31H, PUE C/31H/Z

5. GETTING STARTED

- After connecting platform to a PUE C/31 indicator put the platform on a flat stable ground far away from sources of heat. Level out the platform.

- Turn the device on using the  key – keep pressing the key for about 0.5 sec,
- Wait for the test completion,
- Then you will see **zero indication** and pictograms:

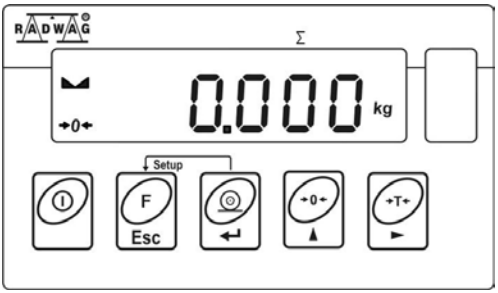
  -0- - zero indication

  - stable result

  kg - weight unit

- If the indication is not zero press **zero** key.

6. KEYPAD



7. KEYS' FUNCTIONS

 Switching on/off

 Function key (operation mode selection)

 Sending a weighing result to RS232

 Zeroing

 Tarring

***Notice**:*

After pressing  *+*  *keys' functions changes. The way of operation in this mode is described in details further in this manual.*

8. INSCRIPTIONS ON THE DISPLAY

No	Text string	Description
1.	**FIL**	Filter level
2.	**bAud**	Transmission baud rate
3.	**PCS**	Piece counting
4.	**HiLo**	+/- control according to a standard mass
5.	**rEPL**	Automatic printout
6.	**StAb**	The condition of printing data
7.	**Auto**	Autozero correction
8.	**t1**	Power save – time to switch off while no operation
9.	**toP**	Latch of the max measurement
10.	**Add**	Totalizing
11.	**AnLS**	Weighing animals
12.	**tArE**	Memory of 9 tare values
13.		Indication in autozero zone (indication = exact zero)
14.		Stable result (ready to read)
15.	**PCS**	Operation mode –**counting pieces**
16.	**kg (g)**	Operation mode – **weighing**
17.		Rechargeable battery pack or battery discharged (BAT-LO)
18.	**Net**	Tare function has been used
19.	**Min**	+/- control with reference to the standard mass : setting the lower threshold or mass below the first threshold
20.	**OK**	+/- control with reference to the standard mass: load masa between the thresholds
21.	**Max**	+/- control with reference to the standard mass: setting the upper threshold or mass over the second threshold

9. USER MENU

9.1. Submenus

User's menu is divided into **6** basic submenus. Each group has its own characteristic name preceded by the letter **P** and a number.

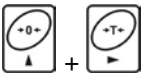
P1	**rEAd**		
	P 1.1	Fil	2
	P 1.2	Auto	YES
	P 1.3	tArA	no
	P 1.4	Fnnd	no
P2	**Prnt**		
	P2.1	Pr_n	StAb
	P2.2	S_Lo	
	P2.3	bAud	9600
	P2.4	S_rS	8d1SnP
P3	**Unit**		
	P3.1	StUn	kg
P4	**Func**		
	P4.1	FFun	ALL
	P4.2	Funi	no
	P4.3	PcS	no
	P4.4	HiLo	no
	P4.5	PrcA	no
	P4.6	Prcb	no
	P4.7	AtAr	no
	P4.8	toP	no
	P4.9	Add	no
	P4.A	AnLS	no
	P4.b	tArE	no
P5	**othr**		
	P5.1	bL	Auto
	P5.2	bLbt	70
	P5.3	bEEP	YES
	P5.4	t1	Auto
	P5.5	CHr6	YES
P6	**CAL**		
	P6.1	St_u	* FUNCTION *
	P6.2	uCAL	* FUNCTION *

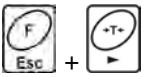
9.2. Browsing user menu

Use scale's keys to move inside the menu.

9.2.1. Keypad


Entering main menu


Inscribing tare value
Increasing a digit value by „1"
moving down in the menu


Battery / accumulator state monitoring


Toggling between gross / net values


Selecting the parameter or changing the value of a selected parameter


Entering the selected submenu or activating a parameter for changes


Confirmation (enter)


Leaving without changes or reaching a higher level of the menu

9.2.2. Return to the weighing mode

The changes that have been introduced should be saved in order to keep them in the memory for good.

While leaving parameters press  key until the text **<SAuE?>** appears on the display. Then press: 

– to save changes or  – to leave without changes.

10. WEIGHING

Put a load you want to weigh on the weighing pan. When the ◣◢ pictogram appears it means that the result is stable and ready to read.

10.1. Tarring

In order to determine the net mass put the packaging on the pan.

After stabilising press -  (**Net** pictogram will be displayed in the left upper corner and zero will be indicated).

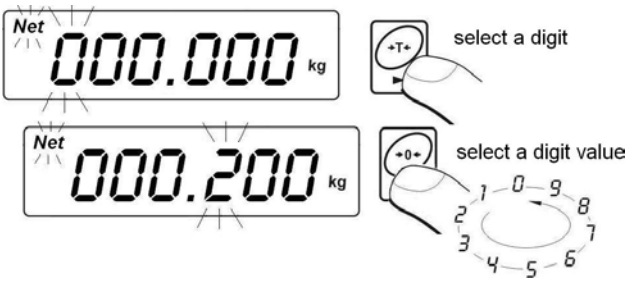
After placing a load on the weight pan net mass will be shown. Tarring is possible within the whole range of the scale. After unloading the pan the display shows the tarred value with minus sign.

Notice:
Tarring cannot be performer when a negative or zero value is being displayed. In such case ***<Err3>*** *appears on the display and short audible signal will be emitted.*

10.2. Inscribing tare value

You can also inscribe a tare value. While in weighings mode press:

- Press simultaneously  and  ,
- You will see :



- Using [→0←] and [→T←] set **the tare value**,
- Press [↵],
- Program returns to weighings mode. The inscribed tare value can be seen on the display with **„–”** sign,
- Tare can be inscribed anytime in weighings mode.

Notice:

1. *You cannot inscribe a new tare value when the tare value in memory is greater than zero. In the case of trying this the **<Err3>** message will be displayed and short audible signal will be emitted.*
2. *Users can also enter up to 9 tare values to the scale memory (see 14.10 of his manual).*

10.3. Zeroing

To **ZERO** the scale press: [→0←].

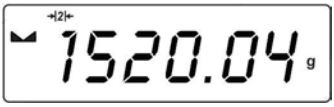
The scale will display zero and following pictograms: →0← and ◣◢. Zeroing is only possible within the scope of **±2%** of full scale. While zeroing outside the scope of **±2%** you will see **<Err2>**. Zeroing is possible only in stable state.

Notice:
*Zeroing is possible only within the **±2%** interval of the maximal range. If zeroing is performed beyond this range the **<Err2>** message and short audible signal will be emitted.*

10.4. Weighings in two ranges

Switching between the **I range** and the **II range** happens automatically (exceeding Max of the **I range**). Weighings in the second range is signalled by a pictogram in the top left corner of the display.

Then weighings is done with the accuracy of the **II range** to the moment of returning to zero (autozero range →0←**)** where the scale switches back to the **I range**.

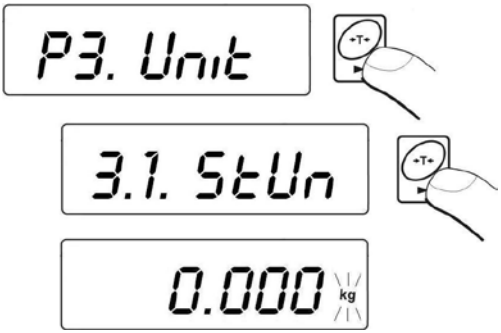


10.5. Selection of basic weight unit

This function is used to set weight unit the scale will start with.

Procedure:

- Enter the submenu **<P3.Unit>** and then:



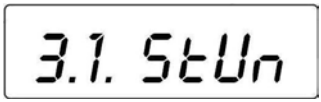
- press  **,** until the expected unit appears on the display:

Options:

A. When the basic unit is [kg], users can toggle between: [kg, lb, N], *for verified scales [lb] is not accessible*,

B. If the basic unit is [g], users can toggle between: [g, ct, lb], *for verified scales [lb] is not accessible*,

- After you select the unit press  , the scale returns to:



- Return to weighing according to chapter - 9.2.2.

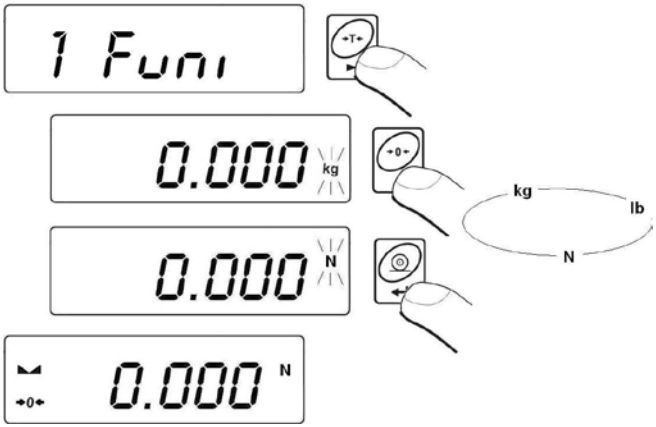
Notice:
After turning on the scale always sets the basic unit.

10.6. Temporarily selected unit

This function is used to set weight unit the scale will use temporarily until the next power off or next selection.

Procedure:

- Press  and then:



- After you select the unit you want come back to weighing procedure.

Options:

A. When [kg] is a basic unit, users can select following units: [kg, lb, N], *[lb] is not accessible for verified scales.*

B. When [g] is a basic unit, users can select following units: [g, ct, lb], *[lb] is not accessible for verified scales.*

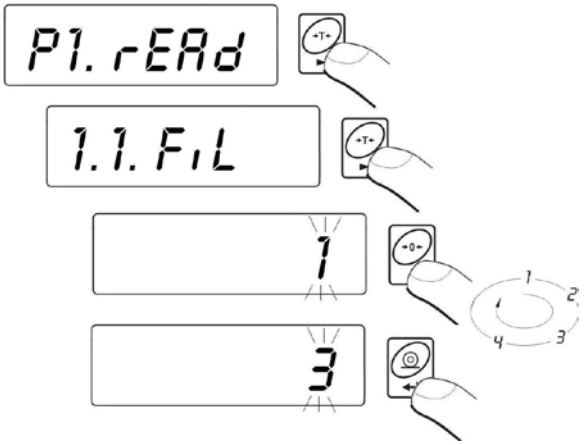
11. MAIN PARAMETERS

Users can adjust the scale to external ambient conditions (filtering level) or particular needs (autozero operation, tare memory). This parameters are placed in **<P1.rEAd>** submenu.

11.1. Setting a filtering level

Procedure:

- Enter the submenu **<P1.rEAd>** and then:



1 - 4 - level of filtering

- By pressing  select the filtering level you need.

Notice:
Filtering level influences the time of stabilization. The higher the filtering level is the longer stabilization time is needed.

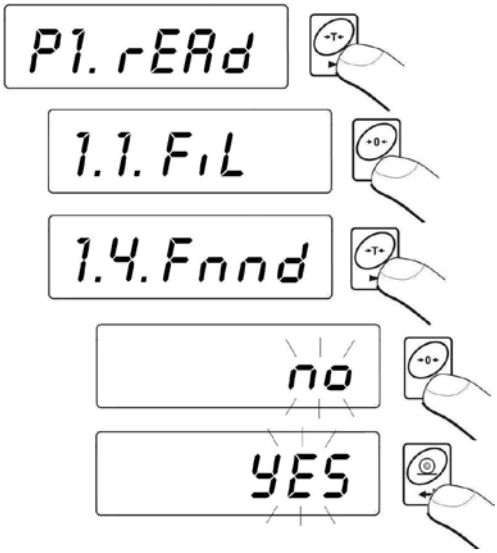
Return to weighing:
See - 9.2.2.

11.2. Median filter

This filter eliminates short changes (impulses) of measure signal (e.g. shocks).

Procedure:

- Enter the submenu **<P1.rEAd>** and then:



Fnnd **no** - filter disabled
Fnnd **YES** - filter enabled

Return to weighing:
See - 9.2.2.

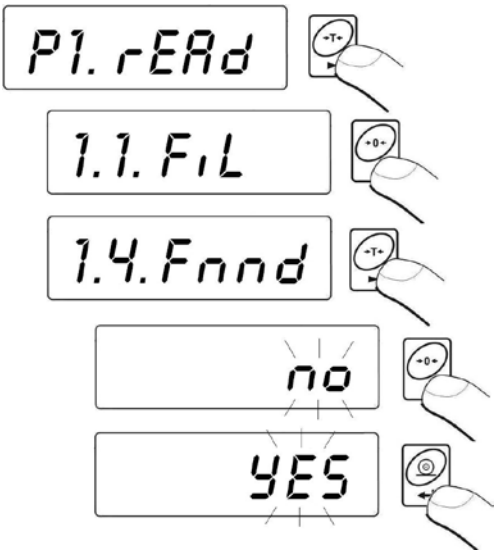
11.3. Autozero function

The autozero function has been implemented in order to assure precise indications. This function controls and corrects **„0”** indication. While the function is active it compares the results continuously with constant frequency. If two sequentional results differ less than the declared value of autozero range, so the scale will be automatically zeroed and the pictograms ▁▂ and →0← will be displayed.

When AUTOZERO is disabled zero is not corrected automatically. However, in particular cases, this function can disrupt the measurement process e.g. slow pouring of liquid or powder on the weighing pan. In this case, it is advisable to disable the autozero function.

Procedure:

- Enter the submenu **<P1.rEAd>** and then:



Fnnd **no** - filter disabled
Fnnd **YES** - filter enabled

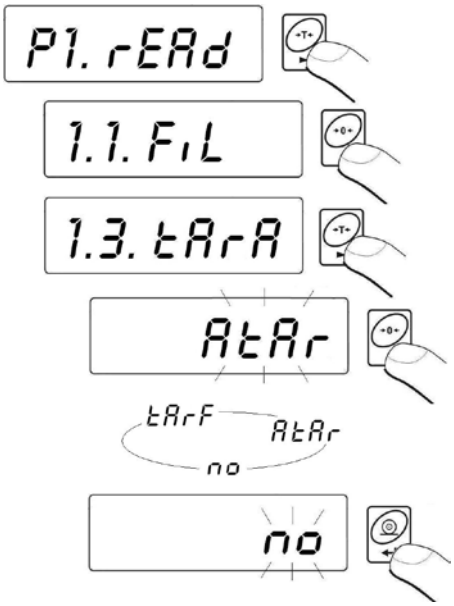
Return to weighing:
See - 9.2.2.

11.4. Tare function

This parameters enables users to configure a tare function.

Procedure:

- Enter the submenu **<P1.rEAd>** and then:



tArA AtAr - **automatic tare function on** and is stored in balance memory after unplugging it from mains (Description of function operating point 14.6 automatic tare)

tArA no - **automatic tare function off** (user can turn on operating of automatic tare F6 AtAr – till unplugging the balance from mains)

tArA tArF - **tare memory function** – stores last value of tare in balance memory. It is automatically displayed after starting the balance. Value of tare is displayed with minus sign, and there is **Net** symbol indicated on the display. (user can turn on operating of automatic tare **F6 AtAr** – till unplugging the balance from mains)

Return to weighing:

See - 9.2.2.

12. RS 232 PARAMETERS

External devices connected to RS 232C have to be supplied from the same mains and common electric shock protection. It prevents from appearing a potential difference between zero leads of the two devices. This notice does not apply to the devices that do not use zero leads.

Transmission parameters:

- Baud rate - 2400 – 38400 bit / s
- Data bits - 7,8
- Stop bits - 1,2
- Parity control - no, even, odd.

There are four ways of sending data via RS232 interface:

- **Manually** – after pressing  ,
- **Automatically** – after stabilizing the indication over **LO** threshold
- **Continuously** – after it is activated in parameter or by a command sent via RS232
- **On external request** - see - „List of scale - computer commands".

The indication can be sent as:

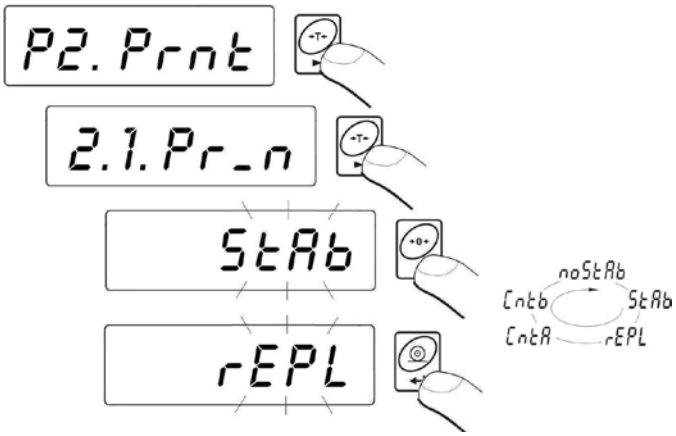
- **stable –** the indication is sent after the scale stabilizes.
- **any** – the indication is sent immediately after pressing the  key, this state is assign with **<?>** in the printout.

12.1. Printout type

This parameter is to select the type of printout.

Procedure:

- Enter the submenu **<P2.Prnt>** and then:



Pr_n	**noStAb**	-	immediate printout (not accessible in verified scales)
Pr_n	**StAb**	-	sending stable results
Pr_n	**rEPL**	-	automatic operation
Pr_n	**CntA**	-	continuous transmission in basic unit
Pr_n	**Cntb**	-	continuous transmission in present unit

Return to weighing:
see 9.2.2.

12.2. Minimal mass threshold

This function is necessary while working with **automatic tare** or **automatic operation or weighing animals**.

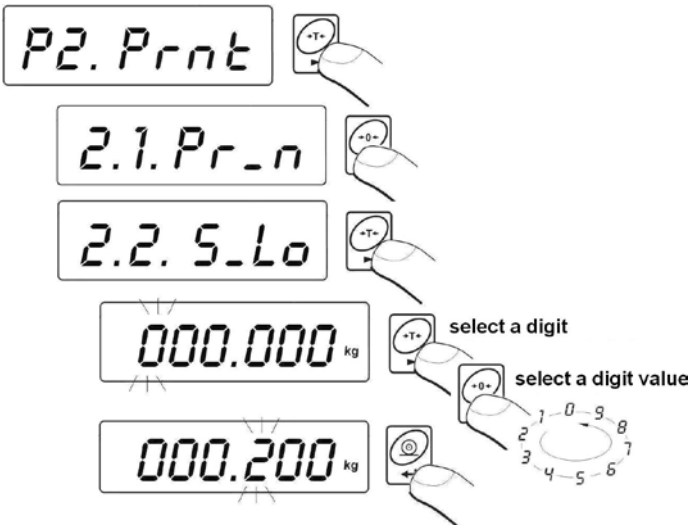
Automatic tarring will not be applied until the indication (gross) is lower than the value inscribed in **S_Lo** parameter.

In automatic operation measurements (net) are sent via RS232 when the indication is equal or greater than the value inscribed in **S_Lo** parameter.

Weighings animals is performer when the indication is equal or greater than the value inscribed in **S_Lo** parameter.

Procedure:

- Enter the submenu **<P2.Prnt>** and then:



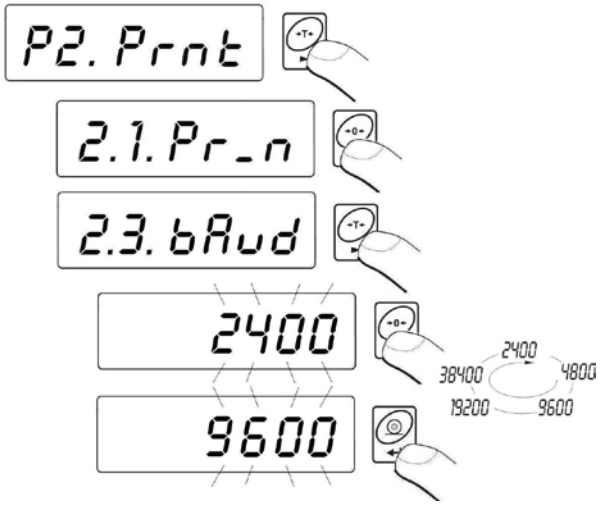
Return to weighing:

see 9.2.2.

12.3. Baud rate

Procedure:

- Enter the submenu **<P2.Prnt>** and then:

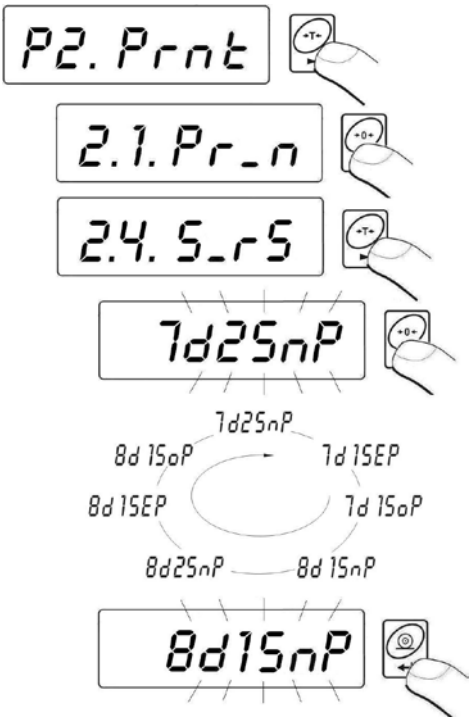


Return to weighing:
see 9.2.2.

12.4. Serial transmission parameters

Procedure:

- Enter the submenu **<P2.Prnt>** and then:



7d2SnP - 7 data bits; 2 stop bits, no parity control
7d1SEP - 7 data bits; 1 stop bit, EVEN parity control
7d1SoP - 7 data bits; 1 stop bit, ODD parity control
8d1SnP - 8 data bits; 1 stop bit, no parity control
8d2SnP - 8 data bits; 2 stop bits, no parity control
8d1SEP - 8 data bits; 1 stop bit, EVEN parity control
8d1SoP - 8 data bits; 1 stop bit, ODD parity control

Return to weighing:
See 9.2.2.

13. OTHER PARAMETERS

The user can set parameters which influence the scale operation. They are gathered in the submenu **<P5.othr>** e.g. backlight and beep signal. Enter this submenu **<P5.othr>** according to chapter 11.2.

13.1. Backlight function

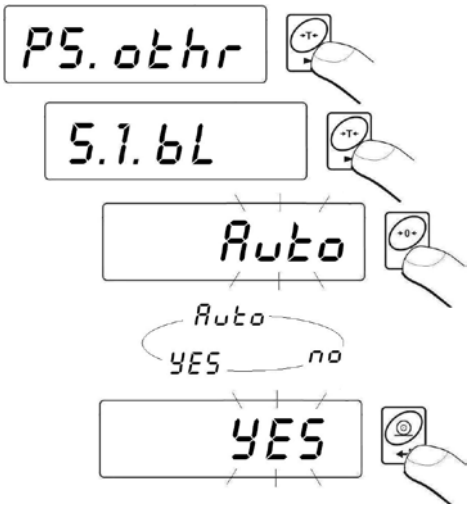
Program recognises the way the scale is supplied (mains, battery) and automatically selects the way of operating on the backlight:

bl – for mains,
blbt – for batteries or rechargeable battery pack.

13.1.1. Backlight for supplying from mains

Procedure:

- Enter the submenu **<P5.othr>** and then:



bL no - backlight switched off
bL YES - backlight switched on
bL Auto - backlight switched off automatically if indication becomes stable for about 10s

Return to weighing:
See 9.2.2.

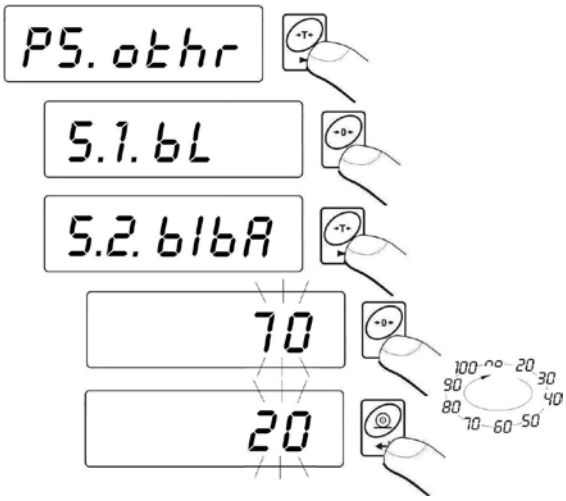
Notice:
When bl=Auto, and the indication has not changed for 10s, the backlight is automatically switched off. The backlight is switched on again automatically after the result changes.

13.1.2. Backlight for supplying from batteries

The user can change the intensity of backlight from 0% to 100%. The lower the intensity is the longer the scale operates without recharging or exchanging batteries. When the intensity is set this function works as AUTO (described above).

Procedure:

- Enter the submenu **<P5.othr>** and then:



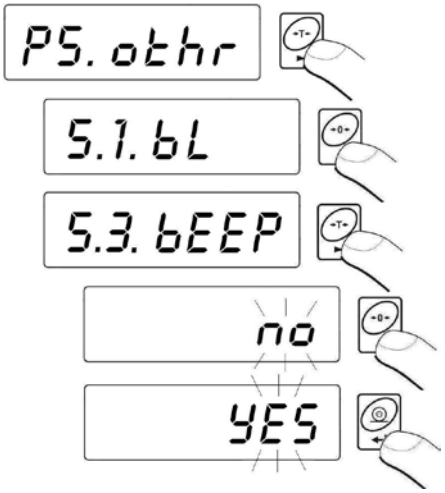
Return to weighing:
See 9.2.2.

Notice:
The more intense the backlight is the shorter the scale operates on batteries.

13.2. “Beep” signal – after pressing a key

Procedure:

- Enter the submenu **<P5.othr>** and then:



bEEP **no** - switched off
bEEP **YES** - switched on

Return to weighing:
See 9.2.2.

13.3. Automatic switch-off

This function is essential to save the battery power. The scale is switched off automatically when (function **t1 = YES**) no weighing appears in 5 minutes. (no changes on the display). In case when this function disrupts the operation (e.g. long time weighing procedures) or while working with connection to mains, switch off this function.

Operation according to the power supply:

Setting	Operation	
	Mains	Batteries/accumulator
t1 = 0	disabled	disabled
t1 = YES	enabled	enabled
t1 = Auto *	disabled	enabled

***** automatic enabling/disabling according to the source of power.

Procedure:

- Enter the submenu **<P5.othr>** and then:

Returnto weighing:
See 9.2.2.

13.4. Battery voltage level check

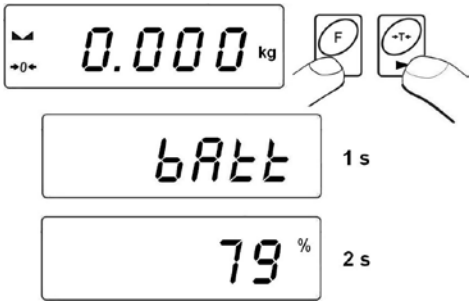
While supplying from batteries too low level of voltage is measured by software the pictogram is displayed. It means that charging or exchanging batteries is required.

13.4.1. Checking the batteries

This function is to check the level of battery supply. It works only if:

- Weighing mode is set,
- Battery supply is set in parameters.

Procedure:



After displaying the level of batteries (in per cents) the program returns to weighing.

13.4.2. Battery discharge pictogram

The symbol (bat low) switches on when the voltage level drops to 18% of the accepted level of voltage. It means that charging or exchanging batteries is required.

Low level of batteries:

- Pictogram on the display,
- After one time the device will automatically switch off to protect the batteries from distructable discharging,
- Charging is signalled by (blinking period about 2 seconds) on the display.

13.4.3. Accumulator charging option

This function allows to switch on charging algorithm for a **NiMH** battery pack (for indicators in plastic casings) or a gel cell **SLA** accumulator (for indicators in metal housings):

a) Parameter **<CHr6>** set to **<no>:**

- Pictogram does not appear, charging disabled,
- During software initializing, after turning on **<bAtt>**.

b) Parameter **<CHr6>** set to **<YES>:**

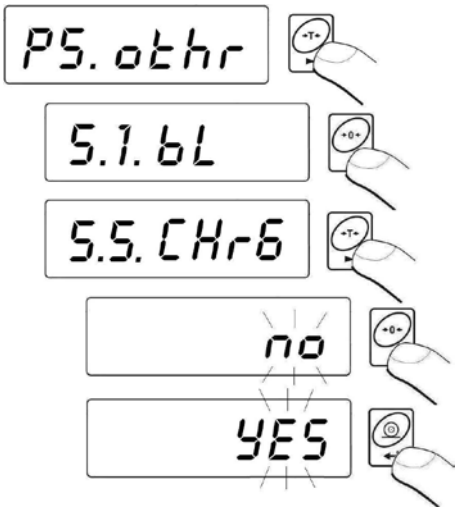
- Pictogram blinks slowly (period about 2 seconds), charging is enabled,

- Message **<nImh>** appears on the display (for indicators in plastic casings) or **<SLA>** (for indicators in metal housings).
- In case of damaging accumulators or lack of it the pictogram + - blinks quickly (period about 0.5 sec).

Notice:
*Indicators in plastic casings are equipped with the set of rechargeable batteries **NiMH R6 (AA)** and power adapter.*

Procedure:

- Enter the submenu **<P5. othr>** and then:



CHr6 YES - enabled
CHr6 no - disabled

Return to weighing:
See 9.2.2.

13.4.4. Formatting rechargeable battery packs

Every plastic indicator is equipped with a brand new NiMH R6 (AA) battery pack and a power adapter. They need formatting after first powering up. It is crucial for batteries lifetime to undertake this process. Formatting consist in charging and total discharging (without meantime charging).

Procedure:

1. Supply the indicator from mains.
2. Charge batteries for 12 hours (time of charging 2200mAh batteries).
3. After 12 hours unplug from mains.
4. Use the device up to the moment of self powering down.
5. Repeat the process of charging starting from point 1.

Notice:
They reach their optima capacity after three cycles of full charging and discharging.

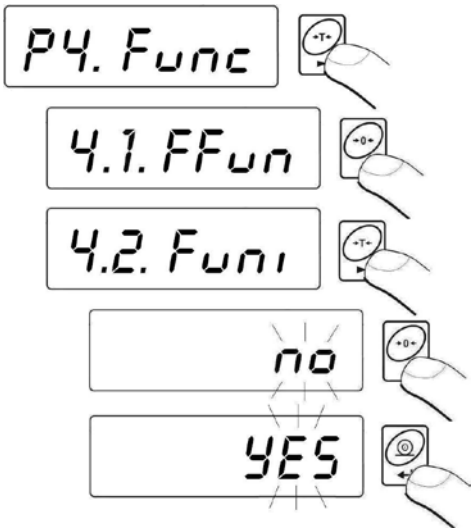
14. WORK MODES

14.1. Setting accessibility of operation modes

In this parameter group users can disable/enable accessibility of functions after pressing Esc key.

Procedure:

- Enter the submenu **<P4.Func>** and then:



no – mode is disabled
YES – mode is enabled

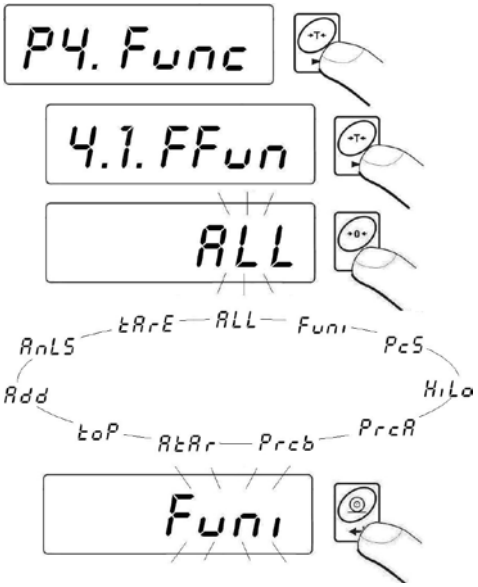
Return to weighing:
See 9.2.2.

14.2. Selecting quantity of operation modes

This function enables user to set if ,after pressing Esc key, all operating modes will be accessible (**ALL**) or only one from the list chosen and used by operator.

Procedure:

- Enter the submenu **<P4.Func>** and then:



After choosing setting press key. The program will return to displaying name of submenu **<P4.1.FFun>**.

Return to weighing:
See 9.2.2.

14.3. Counting pieces of the same mass

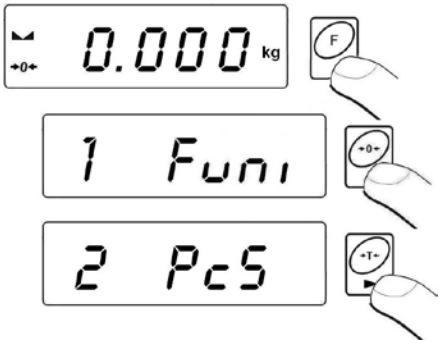
Standard solution is equipped with option of counting small pieces of the same mass. It is possible to execute a tare function in this operating mode in order to tare a container value.

Notice:

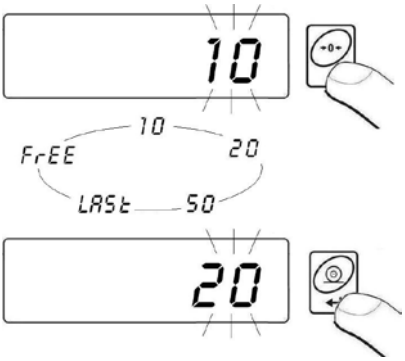
1. *Counting pieces does not work together with other scale functions,*
2. *The counting pieces function is not saved as a default start function so it is not remembered after restarting.*

Procedure:

- Enter to **<PcS>** function:



- You will see a blinking value of sample quantity.
- Press key to start setting quantity of sample, you have a few options to chose from:

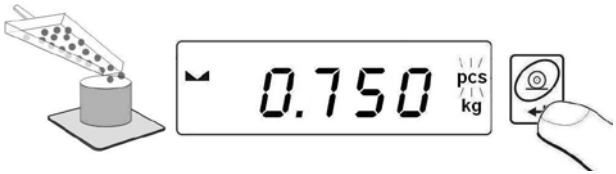


- If option **<LASt>** is choosen in the scale program displays estimated unit mass of the last piece (about 3 sekonds) and then goes to **Counting pieces** automatically setting the previously displayed value as valid for the procedure.

- If the **<FrEE>** option is selected you will see:

- Using and enter the required sample quantity,
  where: - selection of digit position, - setting the digit,
- Confirm the value by pressing ,
- You will see **<LoAd>** on the display and then:

- If weighing is performed in a container put the container on the pan first and then tare it. Then put the declared quantity of pieces on the pan and confirm it when stable (signalled by ◣◢):



- The program will automatically calculate the mass of a single piece and go on to the **Piece Counting** mode (**pcs**). You will see the following display:

Notice:

1. *If a user presses the*  *key when load is not present on the pan, the message* ***-Lo-*** *will be indicated for a few seconds and the scale will automatically return to weighing.*
2. *In order to comply with the rules of appropriate counting pieces put as many pieces as possible during unit mass adjustment. Single piece mass should not be less than 5 divisions.*
3. *If a single piece mass is lower than a reading interval d the display will show the* ***<Err5>*** *message (see ch. 19. Error messages) and short audible signal will be emitted than the scale returns to weighing.*

Return to weighing:

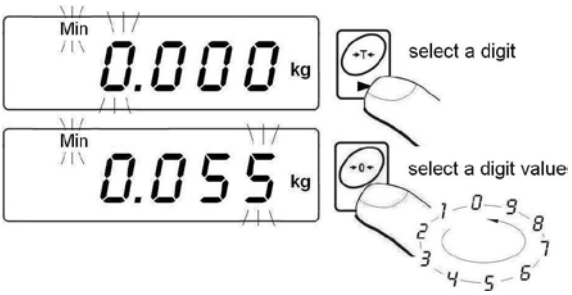
- *Press the*  *key twice.*

14.4. +/- control referring to the inscribed standard mass

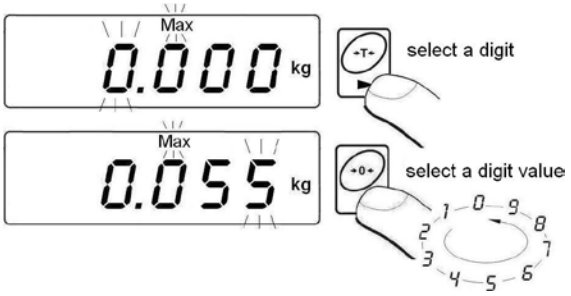
Procedure:

- Enter to **<HiLo>** function:

- The program enters the window of setting the lower threshold of weighing (**Min**):

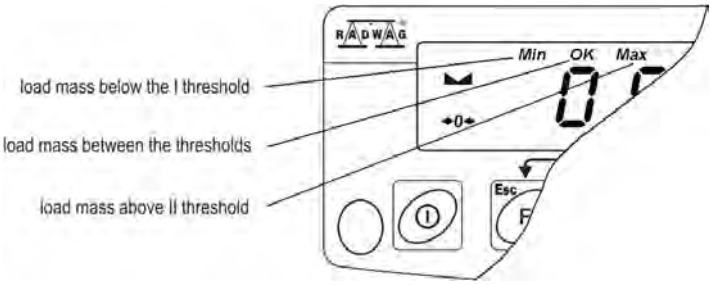


- The inscribed value confirm by pressing , the program will automatically go to the higher threshold of weighing (**Max**):



- The inscribed value confirm by pressing , the program will automatically go to the main window.

- During setting threshold values following cases take place:



Notice:
If a user erroneously enters a value of the lower threshold higher than the upper one, the scale will indicate an error message and will return to weighing.

Return to weighing:

- *Press the*  *key twice.*

14.5. Control of % deviation referring to the inscribed standard mass

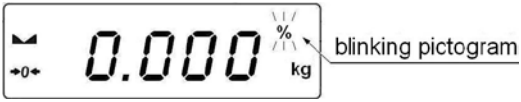
Scale software enables control of deviation (in %) of weighed loads mass referring to the inscribed standard mass. Mass of standard can be determined by its weighing (**PrcA** function) or entered to the scale memory by an user (**PrcB** function).

14.5.1. Standard mass determined by its weighing

Procedure:

- Enter to **<PrcA>** function:

- You will see **<LoAd>** on the display and then:



- place an load on the pan which mass will be accepted as standard
- press  to confirm this operating mode
- after few seconds the indication **100,00%** will be displayed
- From this moment display will not indicate mass of weighed load but deviation of load mass placed on the pan referring to the mass of standard (in %).

Return to weighing:

- *Press the*  *key twice.*

14.5.2. Mass of standard inscribed to scale memory

Procedure:

- Enter to **<PrcB>** function:

- The program goes to the weight display window:

- Using  and  set **standard mass**,
  where:  - digit selection,  - digit setting.
- Confirm the entered value by pressing  ,
- You will see the indication equal to **0,000%**,
- From this moment display will not indicate the mass of weighed load but deviation of the load mass placed on the pan referring mass of standard (in %).

Return to weighing:

- *Press the*  *key twice.*

14.6. Automatic tare

This function is useful for fast net mass determination of weighed load in case when tare value of is different for each load. In case when the function is active the cycle of scales operating looks as follows:

- press zeroing key when the pan is empty,
- place the container for pieces,
- when indication is stable **automatic tarring** of the container mass will be performed (**Net** marker will appear in the upper part of the display),
- place a sample into the package,
- display will indicate net mass of sample,
- remove the sample together with the container,
- display will indicate tare mass with minus sign,
- place a container for the next sample. When indication is stable automatic tarring will take place (**Net** marker will appear in the upper part of the display),
- place next sample into the package.

Procedure:

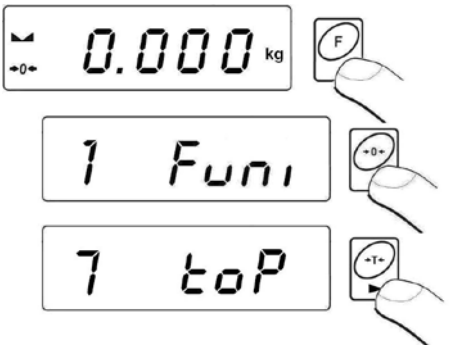
Return to weighing:

- *Press the*  *key twice.*

14.7. Measurement max force on the pan – latch

Procedure:

- Enter to **<toP>** function:



- Confirmation of choice of **<toP>** function is indication of the **Max** pictogram:

- Apply a force to the weighing pan.
- The display of scale will latch the maximum value of the force remove loads from the pan
- Before the next measurement press the  key.

Return to weighing:

- *Press the*  *key twice.*

14.8. Totalizing

Scale software is equipped in a totalizing function of single weighings. The totalizing procedure can be documented on the printer connected to the indicator.

14.8.1. Enabling the work mode

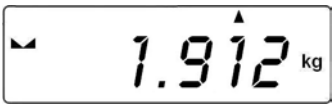
Procedure:

- Enter to **<Add>** function:

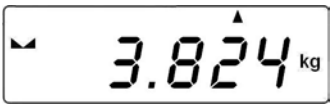
- A letter „**P”** in the left side of the display is a confirmation that **<Add>** function have been selected:

14.8.2. Totalizing procedure

- Enter **<Add>** function according to ch. 14.8.1,
- Put the first load on the pan. If the weighing procedure is performed in a container put the container on the pan first and tare it. Then put the first load on the pan and confirm it by pressing when stable (signalled by ◣◢),
- You will see a sum of weighings on the display, the „▲” pictogram in the upper right corner will be displayed and the weighing result will be printed on the printer connected to the indicator.



- Take off the load from the pan, indication returns to **ZERO** and the letter „**P**” in the left part of the display appears,
- Put the next load on the pan,
- After stabilizing press , the sum of first and second weighing will appear on the display, the „▲” pictogram in the upper right corner will be displayed and the second weighing result will be printed on the printer connected to the indicator:



- Press to complete the procedure (with the loaded or unloaded pan), a sum of all weighings will be printed:

```
 (1) 1.912 kg
 (2) 1.912 kg
------------------------
TOTAL: 3.824 kg
```

- In case of pressing one more time with loaded pan, you will see the **<unLoAd>** message. Unload the pan, the scale will return to **ZERO** and the letter „**P**” in the left part of the display will appear. The scale is ready for the next procedure.
- In case of pressing one more time with loaded pan, you will see the letter „**P**” in the left part of the display will appear. The scale is ready for the next procedure.

14.8.3. Memory of the last value of sum of weighed goods

After interrupting (e.g. switching off) the totalizing procedure, it is possible to restart the procedure without loosing data. In order to do it just enter the totalizing procedure:

- Enter **<Add>** function again according to the ch. 14.8.1 of the manual,
- You will see the last memorized sum of weighings on He display.

- In order to continue the procedure press  , the indication returns to **ZERO** and the letter „**P**" appears in the left part of the display. The scale is ready for weighing.

- In order to terminate the previous totalizing procedure press  key,  , or  . You will see the letter „**P**" in the left part of the display. The scale is ready for weighing.

14.8.4. Return to weighing

- Press  key, you will see:

- Before leaving the **<Add>** function it is possible to print out subsequent weighings and the sum of weighings on the connected printer (press  to print, press  to cancel).
- The following message will appear on the display:

- Press  key to return to weighing,
- Press  to return to totalizing.

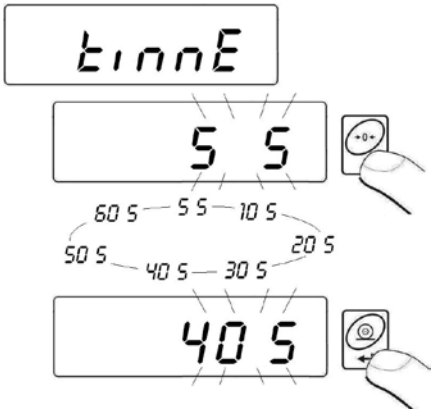
Notice:
In case of overflow of the range of the display in totalizing you will see ***<5-FULL>*** *message in the display. In that case unload the pan and press*  *to complete the procedure with a printout of sum of all weighings or put a lower mass on the pan which does not cause the overflow error.*

14.9. Weighing animals

Procedure:

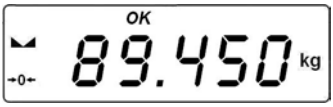
- Enter to **<AnLS>** function:

- The **<tinnE>** message appears on the display for **1s**, and then the program goes to the window of setting the duration time (in seconds) of the animal weighing process:



- Confirm the selected value by pressing  ,
- You will see the following window:

- Load an animal to the platform,
- After exceeding the **-LO-** value (see 12.2), program starts the weighings process. The appearance of subsequent hyphens **< - - - - - - - >** showing the progress,
- After completing the process of weighings the result is latched on the display and additionally the **OK** pictogram is shown in the upper part of the display:



- You can start the procedure of weighing animals again by pressing  ,
- After removing the animal from the platform program returns to the window:

Return to weighing:

- *Press*  *.*

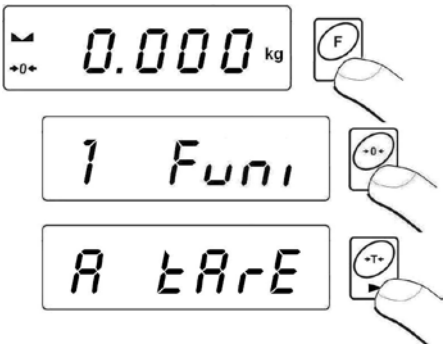
14.10. Tare memory

Users are allowed to Enter Up to 9 tare values to the memory.

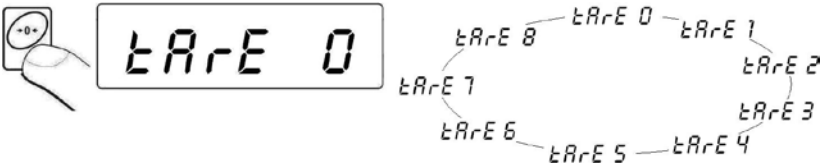
14.10.1. Entering the tare value to the scale memory

Procedure:

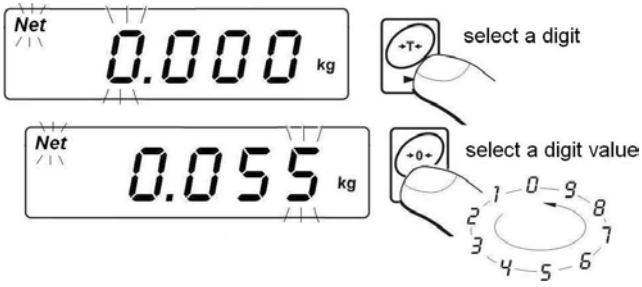
- Enter to **<tArE>** function:



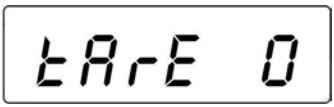
- The program goes to displaying the first value from the selection of tare values **<tArE 0>** (press ⊙0⊙ to chose different values):



- After selecting the right position press →T← and you will see an editing field:



- Enter the selected **tare value** to the scale memory ↵,
- The program returns to the following window:

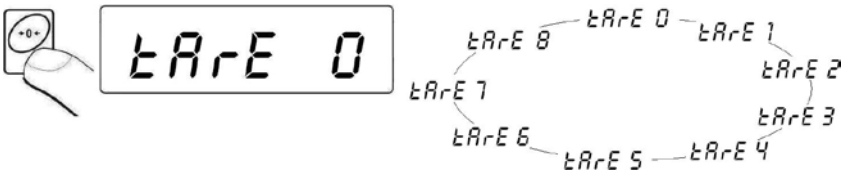


Return to weighing:

- *Press* .

14.10.2. Selecting a tare value from the memory

- Enter **<tArE>** function according to the ch. 14.10.1 of the manual,
- The program goes to displaying the first value from the selection of tare values **<tArE 0>** (press to chose different values):



- To use an entered tare value press , you will see the tare value on the display preceded by the „-„ sign and the **Net** pictogram:

Caution:
A tare value from the memory is not remembered after powering off and on the scale.

15. USER CALIBRATION

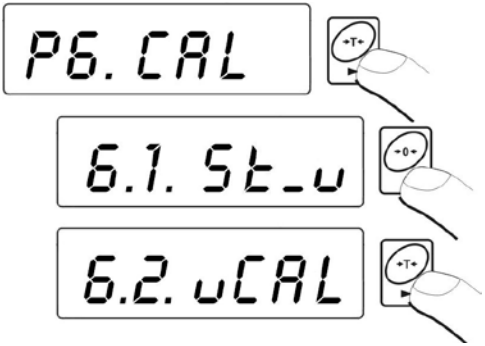
Only for non-verified scales

Confirmation of high accuracy of weighing requires periodical correcting of calibration factors in the scale memory – this is adjustment of the scale. Calibration should be performed when we start weighing or dynamic change of temperature occurs. Before starting calibration remove loads from the pan.

15.1. Calibration

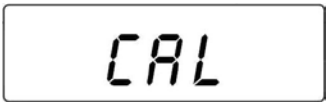
Procedure:

- Enter the submenu **<P6.CAL>** and then:



- Following inscriptions will appear

- A new start mass is adjusted during this period of time.
  After that a mass of calibration weight is shown (e.g. 3 000kg).
- Put a weight of the displayed mass value on the pan and press  .
  The calibration process will start which is signalled by the message:



- After completion of the process of calibration the following screen will appear

- Take off the weight , then the following sequence of screens will appear

- Calibration process can be terminated anytime by pressing Esc F which is signalled by the following message on the display:

- Return to weighing with saving changes that have been made.

Caution:
If the calibration process (span adjustment) lasts longer than 15 the ***<Err8>*** *message will be displayed and short audible signal will be emitted. Press Esc F to perform calibration again with more stable ambient conditions!*

15.2. Start mass adjustment

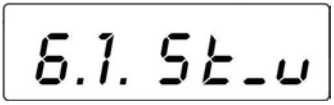
If the scale does not require the full calibration process sit is possible to adjust only a new start mass.

Procedure:

- Enter the submenu **<P6.CAL>** and then:

- The display will show the following information

- After the completion of the start mass adjustment the following screen will appear:



- The process of start mass adjustment can be terminated by pressing Esc (F), which is signalled on the display:

- Return to weighing performing the procedure of saving parameters.

Caution:

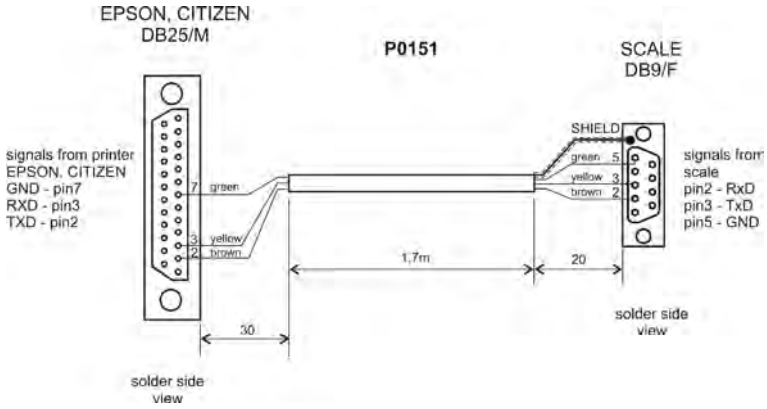
If the start mass adjustment lasts longer than 15 the ***<Err8>*** *message will be displayed and short audible signal will be emitted. Press Esc to perform calibration again with more stable ambient conditions!*

16. COOPERATION WITH PRINTER

Each time the key is pressed a current mass value together with mass units is sent to RS 232 interface.

Depending on setting of **STAB** parameter it can be printed out with temporary or stable value. Depending on setting of **REPL** parameter, printout will be automatic or manual.

Cable diagrams:



Scale – printer cable diagram for plastic casing

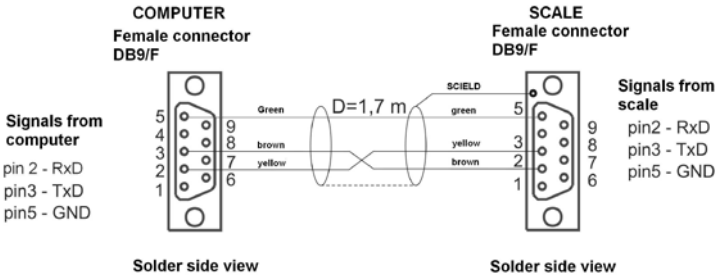
17. COOPERATION WITH COMPUTER

Sending weighing results to the computer can be done:

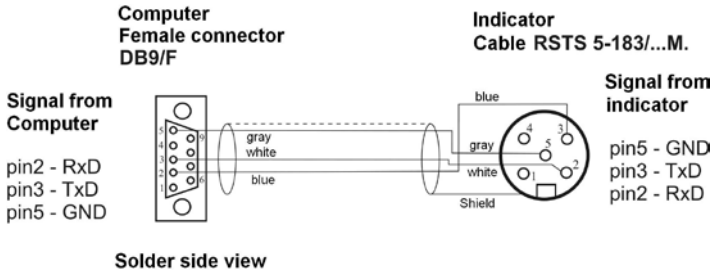
- manually	- after pressing key,
- in continuous way	- after function activating or sending an appropriate command,
- automatically	- After stabilizing the indication
- on the request from the computer	- After sending a control command

These scales can cooperate with **„EDYTOR WAG”** program. The indicator window comprises the most important information from the scale display. The program allows to configure easily, e.g. design printouts, edit parameters. A precise description is issued in the „Help” file that accompanies the program.

Cable diagrams:



Scale – computer cable diagram for plastic casing



Scale – computer cable diagram for metal housing

18. COMMUNICATION PROTOCOL

18.1. General information

A. A character protocol scale-terminal has been designed for communication between RADWAG scales and external devices via RS-232 interface.
B. It consists of commands sent from an external device to the scale and a responses from a scale.
C. Responses are sent every time after receiving a command (reaction for any command).
D. Using commands allows users to receive some information about the state of scale and/or influence the operation e.g.: requesting weighing results, display control.

18.2. A set of commands for RS interfaces

Commands	Description of commands
Z	Zeroing
T	Tarring
OT	Get tare
UT	Set tare
S	Send the stable result in basic unit
SI	Send the result immediately in basic unit
SU	Send the stable result in current unit
SUI	Send the result immediately in current unit
C1	Switch on continuous transmission in basic unit
C0	Switch off continuous transmission in basic unit
CU1	Switch on continuous transmission in current unit
CU0	Switch off continuous transmission in current unit
K1	Lock the scale keyboard
K0	Unlock the scale keyboard
NB	Give serial number
PC	Send all implemented commands

Notice:

1. *Each command have to be terminated in CR LF;*
2. *The best Policy for communication is not sending another command until the former answer has been received.*

18.3. Respond message format

After sending a request message you can receive:

XX_A CR LF	command accepted and in progress
XX_D CR LF	command completed (appears only after XX_A)
XX_I CR LF	command comprehended but cannot be executed
XX _ ^ CR LF	command comprehended but time overflow error appeared
XX _ v CR LF	command comprehended but the indication below the
XX _ OK CR LF	Command done
ES_CR LF	Command not comprehended
XX _ E CR LF	error while executing command – time limit for stable result exceeded (limit time is a descriptive parameter of the scale)

XX - command name
_ - substitutes spaces

18.4. Command's description

18.4.1. Zeroing

Syntax **Z CR LF**

Possible answers:

Z_A CR LF - command accepted and in progress
Z_D CR LF - command completed

Z_A CR LF - command accepted and in progress
Z_^ CR LF - command comprehended but zero range overflow appeared

Z_A CR LF - command accepted and in progress
Z_E CR LF - time limit for stable result exceeded

Z_I CR LF - command comprehended but cannot be executed

18.4.2. Tarring

Syntax: **T CR LF**

Possible answers:

T_A CR LF - command accepted and in progress
T_D CR LF - command completed

T_A CR LF - command accepted and in progress
T_v CR LF - command comprehended but tare range overflow appeared

T_A CR LF - command accepted and in progress
T_E CR LF - time limit for stable result exceeded

T_I CR LF - command comprehended but cannot be executed

18.4.3. Get tare value

Syntax: **OT CR LF**

Possible answers:

OT_TARA CR LF - command executed

Frame format:

1	2	3	4	5-6	7-15	16	17	18	19	20	21
T	O	space	stability	space	tare	space	unit			CR	LF

Tare - 9 characters with decimal point justified to the right
Unit - 3 characters justified to the left

18.4.4. Set tare value

Syntax: **UT_TARE CR LF**, where **TARE** – tare value

Possible answers:

UT_OK CR LF - command executed
UT_I CR LF - command comprehended but cannot be executed
ES CR LF - command not recognised (possible wrong tare format)

Notice:
This protocol uses the dot character as a decimal point for separating the decimal fraction part.

18.4.5. Send the stable result in basic unit

Syntax: **S CR LF**

Possible answers:

S_A CR LF - command accepted and in progress
S_E CR LF - time limit for stable result exceeded
S_I CR LF - command comprehended but cannot be executed
S_A CR LF - command accepted and in progress
MASS FRAME - mass value in basic unit is returned

Frame format:

1	2-3	4	5	6	7-15	16	17	18	19	20	21
S	space	stability	space	sign	mass	space	unit			CR	LF

Example:

S CR LF – computer command
S _ A CR LF - command accepted and in progress
S _ _ _ _ - _ _ _ _ _ _ 8 . 5 _ g _ _ CR LF – command done,
mass value in basic unit is returned.

18.4.6. Send the result immediately in basic unit

Syntax: **SI CR LF**

Possible answers:

SI_I CR LF - command comprehended but cannot be executed at the moment
MASS FRAME - mass value in basic unit is returned

Frame format:

1	2	3	4	5	6	7-15	16	17	18	19	20	21
S	I	space	stability	space	sign	mass	space	unit			CR	LF

Example:

S I CR LF – computer command
S I _ ? _ _ _ _ _ _ _ 1 8 . 5 _ k g _ CR LF - command done, mass value in basic unit is returned immediately.

18.4.7. Send the stable result in current unit

Syntax: **SU CR LF**

Possible answers:

SU_A CR LF - command accepted and in progress
SU_E CR LF - timeout while waiting for stable results

SU_I CR LF - command comprehended but cannot be executed

SU_A CR LF - command accepted and in progress
MASS FRAME - mass value in current unit is returned

Frame format:

1	2	3	4	5	6	7-15	16	17	18	19	20	21
S	U	space	stability	space	sign	mass	space	unit			CR	LF

Example:

S U CR LF – computer command
S U _ A CR LF - command accepted and in progress
S U _ _ _ - _ _ 1 7 2 . 1 3 5 _ N _ _ CR LF - command done, mass value in current unit is returned.

18.4.8. Send the result immediately in current unit

Syntax: **SUI CR LF**

Possible answers:

SUI_I CR LF - command comprehended but cannot be executed

MASS FRAME - mass value in current unit is returned immediately

Frame format:

1	2	3	4	5	6	7-15	16	17	18	19	20	21
S	U	I	stability	space	sign	mass	space	unit			CR	LF

Example:

S U I CR LF – computer command
S U I ? _ - _ _ _ 5 8 . 2 3 7 _ k g _ CR LF - command executed and mass returned

18.4.9. Switch on continuous transmission in basic unit

Syntax: **C1 CR LF**

Possible answers:

C1_I CR LF - command comprehended but cannot be executed

C1_A CR LF - command comprehended and in progress
MASS FRAME - mass value in basic unit is returned

Frame format:

1	2	3	4	5	6	7-15	16	17	18	19	20	21
S	I	space	stability	space	sign	mass	space	unit			CR	LF

18.4.10. Switch off continuous transmission in basic unit

Syntax: **C0 CR LF**

Possible answers:

C0_I CR LF - command comprehended but cannot be executed

C0_A CR LF - command comprehended and executed

18.4.11. Switch on continuous transmission in current unit

Syntax: **CU1 CR LF**

Possible answers:

CU1_I CR LF - command comprehended but cannot be executed

CU1_A CR LF - command comprehended and in progress
MASS FRAME - mass value in current unit is returned

Frame format:

1	2	3	4	5	6	7-15	16	17	18	19	20	21
S	U	I	stability	space	sign	mass	space	unit			CR	LF

18.4.12. Switch off continuous transmission in current unit

Syntax: **CU0 CR LF**

Possible answers:

CU0_I CR LF - command comprehended but cannot be executed

CU0_A CR LF - command comprehended and executed

18.4.13. Lock the scale keyboard

Syntax: **K1 CR LF**

Possible answers:

K1_I CR LF - command comprehended but cannot be executed

K1_OK CR LF - command executed

Caution:
This command is not remembered after restart

18.4.14. Unlock the scale keyboard

Syntax: **K0 CR LF**

Possible answers: **K0_OK CR LF** – command in progress

18.4.15. Give serial number

Syntax: **NB CR LF**

Possible answers:

NB_A_"Factory number" CR LF - command comprehended, scale serial number is given in return

NB_I CR LF - command comprehended but cannot be executed

"Factory number" – parameter specifying scales serial number, it is returned in between inverted comas.

Example:

NB CR LF – command from a computer
NB_A_"123456" CR LF – scales serial number - 123456

18.4.16. Send all implemented commands

Syntax: **PC CR LF**

Possible answers:

PC_->_Z,T,S,SI,SU,SUI,C1,C0,CU1,CU0,K1,K0,OT,UT,NB,PC
– command executed, the indicator have sent all the implemented commands.

18.5. Manual printouts / automatic printouts

Users can general manual or automatic printouts from the scale.

- Manual printouts can be performed after loading the pan and stabilizing indication by pressing  .

- Automatic printouts can be performed only after loading the pan and stabilizing indication.

Notice:
If a scale is verified printouts of immediate values are blocked.

Format frame:

1	2	3	4 -12	13	14	15	16	17	18
stability	space	sign	mass	space	unit			CR	LF

Stability character	[space] if stable [?] if not stable [^] if an indication over the range [v] if fan indication below the range
sign	[space] for positive values or [-] for negative values
mass	9 characters justified to the right
unit	3 characters justified to the left
command	3 characters justified to the left

Example 1:

_ _ _ _ _ _ **1 8 3 2 . 0** _ **g** _ _ **CR LF –** the printout generated from the scale after pressing ENTER/PRINT.

Example 2:

? _ **-** _ _ _ _ **2 . 2 3 7** _ **l b** _ **CR LF -** the printout generated from the scale after pressing ENTER/PRINT.

Example 3:

^ _ _ _ _ _ _ **0 . 0 0 0** _ **k g** _ **CR LF** - the printout generated from the scale after pressing ENTER/PRINT.

18.6. Continuous transmission

The indicator can work in a continuous transmission mode. It can be switched on or off in parameters or using RS232 commands.

The frame format sent by the indicator in case of setting **<P2.Prnt>** to **CntA**:

1	2	3	4	5	6	7-15	16	17	18	19	20	21
S	I	space	stability	space	sign	mass	space	Unit			CR	LF

Stability character	[space] if stable [?] if not stable [^] if an indication over the range [v] if fan indication below the range
sign	[space] for positive values or [-] for negative values
mass	9 characters justified to the right
unit	3 characters justified to the left
command	3 characters justified to the left

The frame format sent by the indicator in case of setting **<P2.Prnt>** to **Cntb**:

1	2	3	4	5	6	7-15	16	17	18	19	20	21
S	U	I	stability	space	sign	mass	space	unit			CR	LF

18.7. Configuring printouts

General information

If some information included are redundant or not sufficient and there is a necessity of changes one can design their own protocol format in **EDYTOR WAG** computer program. This piece of software is accessible in: http://www.radwag.com

19. ERROR COMMANDS

Err2	-	Value beyond the zero range
Err3	-	Value beyond the tare range
Err4	-	Calibration mass or start mass beyond the acceptable range (±1% for weight, ±10 for start mass)
Err5	-	Mass of a single piece lower than the scale division
Err8	-	Exceeded the time for tarring, zeroing, start mass adjustment or span adjustment
Err9	-	Time for internal weight lifting/dropping down exceeded (refers to WLC…/C/2 scales)
NULL	-	Zero value from the AD converter
FULL2	-	Measurement range overflow
LH	-	Start mass error, the mass on the weighing platform is beyond the acceptable range (-5% to +15% of start mass)
5-FULL	-	Display range overflow in totalizing

Notice:

1. *Errors: **Err2**, **Err3**, **Err4**, **Err5**, **Err8**, **Err9**, **null**, that appear on the display are also signalled by a short beep sound (about 1 sec.);*
2. *Error **FULL2** that appears on the display is also signalled by a continuous sound until the cause of error disappears.*

20. TROUBLE SHOOTING

Problem	**Cause**	**Solution**
Turning on does not work	Discharged batteries.	Connect to mains or change batteries
	No batteries (not installed or improperly installed)	Check the correctness of installation (polarization)
The scale turns off automatically	„t1” set to „YES” (Power save)	In „othr” submenu change „5.4 t1” to „no”
After turning on „LH” message on the display	Loaded weight pan during powering up	Unload the pan. Then the scale will indicator zero.

21. TECHNICAL PARAMETERS

21.1. Housing

	PUE C/31	PUE C/31H	PUE C/31H/Z
Housing type	Plastic	Stainless steel	
IP rating	IP 43	IP 68 (1h max) / 69	
Display	LCD (backlit)		
Keyboard	Microswitch		

21.2. Metrological parameters

	PUE C/31	PUE C/31H	PUE C/31H/Z
Class (OIML)	III		
Max. Number of A/D converter divisions	838860 x10		
Number of verification divisions	6 000		
Max. Increment of signal	19.2 mV		
Max. Voltage per 1verificated division	3.2 μV		
Min. Voltage per 1verificated division	1.0 μV		
Max. Temperature of work	+40°C		
Min. Temperature of work	-10°C		
Min. Impedance of load cell	80 Ω		
Max. Impedance of load cell	1200 Ω		
Power voltage on load cell	5V		
Load cells connection	4 or 6 cables + screen		
Output RS232	Standard		
Additional display	Option		

21.3. Ambient conditions

These scales are intended to operate in extended ambient conditions.

- Operation temperature: -10°C / to +40°C
- Maximal relative humidity: 85% in 40ºC
- Mains voltage tolerance: -10% to +10%

21.4. Power supply

	PUE C/31	PUE C/31H	PUE C/31H/Z
Standard power supply	External supplier 100-240V/12VDC and 6×NiMH AA or 6×battery AA	200-240VAC 50/60Hz 0,04A and SLA 6V/3,4Ah	External supplier 100-240V/12VDC and SLA 6V/3,4Ah
		100-120VAC 50/60Hz 0,07A and SLA 6V/3,4Ah	
Optional Power supply	10 -15VDC Imax=600mA	-	10 -15VDC Imax=600mA
Methods of supplying	External supplier, rechargeable batteries NiMH 6×AA	mains, in-built gel cell accumulator SLA	External disconnectable supplier for accumulator charging, in-built gel cell accumulator SLA
Average operation time (accumulators /batteries)	35 hours	45 hours	

22. ADDITIONAL EQUIPMENT

Accessories:

- Computer cable for PUE C/31 - **P0108**,
- Computer cable for PUE C/31H, PUE C/31H/Z - **P0259**,
- EPSON printer cable for PUE C/31 - **P0151**,
- EPSON printer cable for PUE C/31H, PUE C/31H/Z - **P0261**,
- Power cord for car lighter 12V DC for PUE C/31 - **K0047**,
- Power cord for car lighter 12V DC for PUE C/31H/Z - **K0042**,
- Thermal printer - **EPSON**,
- Dot matrix printer - **EPSON**,
- Additional display in plastic casing for PUE C/31- **WD- 4/1** (accessible with balance as complete set only),
- Additional display in stainless metal housing for PUE C/31H, PUE C/31H/Z - **WD- 4/3** (accessible with balance as complete set only),
- Large size display (2") for PUE C/31H, PUE C/31H/Z - **WWG-2**,
- Current loop in plastic casing for PUE C/31 - **AP2-1**,
- Current loop in metal housing PUE C/31H, PUE C/31H/Z - **AP2-3** (accessible with balance as complete set only),
- RS232 / RS485 converter for PUE C/31 – **KR-01**,

- RS232 / Ethernet converter for PUE C/31 - **KR-04**,
- A rack for PUE C/31, PUE C/31H or PUE C/31H/Z indicator,
- Handle for measuring indicator in plastic version,

Computer programs:

- “EDYTOR WAG” computer program,
- "RAD-KEY" computer program,
- "PW-WIN" computer program.

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