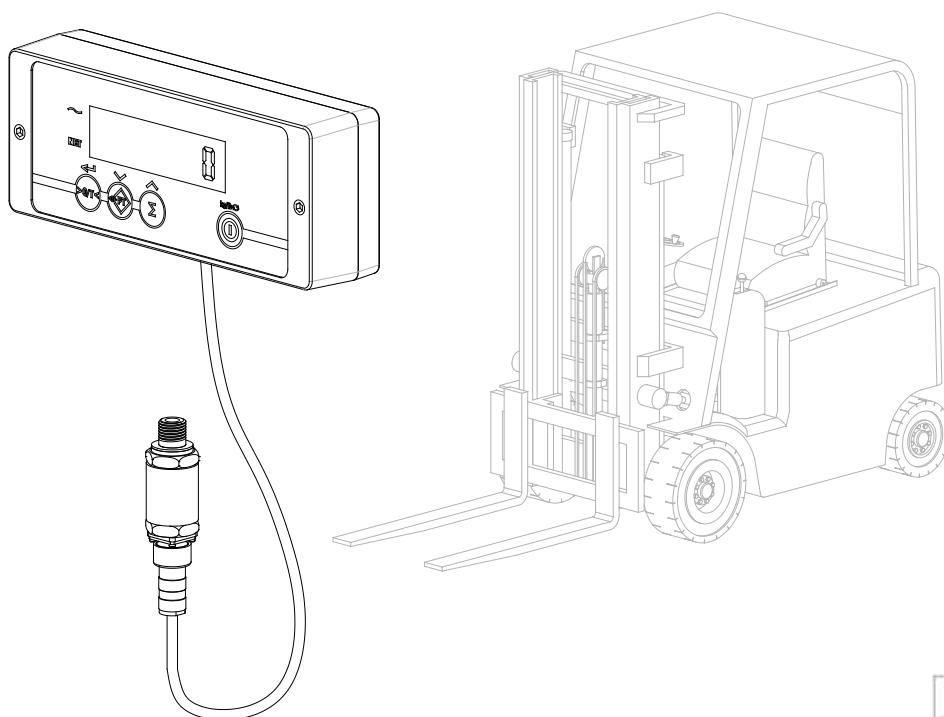




## INSTALLATION AND USER MANUAL RCS



We would like to inform you about the fact that this RAVAS product is 100 % recyclable on the basis that the parts are processed and disposed off in the right manner.

Rev.20181031

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**MH**SIGNAL®



**www.mhsignal.com**

**PLEASE RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE**

If you have any queries concerning the duration and terms of the guarantee, please contact your supplier. We would also refer you to our General Sale and Supply Conditions, which are available on request.

The manufacturer accepts no liability for any damage or injury caused by failure to follow these instructions, or from negligent operation or assembly, even if this is not expressly stated in this instruction manual.

In light of our policy of continuous improvement, it is possible that details of the product may differ from those described in this manual. For this reason, these instructions should only be treated as guidelines for the installation of the relevant product. This manual has been compiled with all due care, but the manufacturer cannot be held responsible for any errors or the consequences thereof. All rights are reserved and no part of this manual may be reproduced in any way.

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## 1. Introduction

This manual describes the installation and use of the RCS. The RCS is a hydraulic measuring system for forklift trucks and stackers. The installer must be informed of the contents of this manual.

Follow the contents of the manual precisely. This manual should be kept on a safe and dry place. In case of damage or loss the user may request a new copy of the manual from RAVAS.

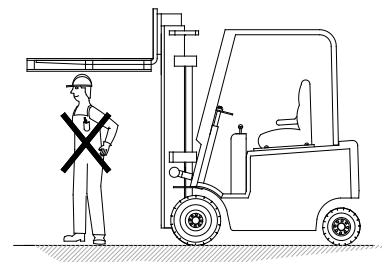
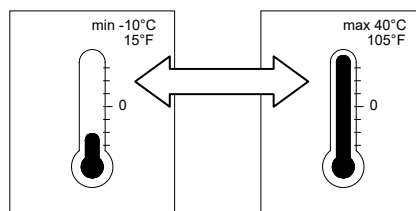
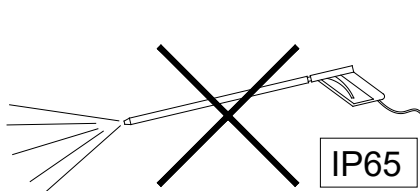
## 2. Warnings & Safety measures

When installing the RCS please observe the instructions and guidelines in this manual carefully. Always perform each step in sequence. If any of the instructions are not clear, please contact RAVAS.



**READ  
CAREFULLY**

- All safety regulations that apply on the truck remain valid and unchanged;
- No weighing operations are allowed if any persons or objects are in the vicinity; around, under or close to the load;
- Any modifications done to the system must be approved in writing from the supplier, prior to any work being completed;
- It is the sole responsibility of the purchaser to train their own employees in the proper use and maintenance of this equipment;
- Do not operate this unit unless you have been fully trained of its capabilities;
- Check the accuracy of the scale on a regular basis to prevent faulty readings;
- Only trained and authorized personnel are allowed to service the scale;
- Always follow the operating, maintenance and repair instructions of this truck and ask the supplier when in doubt;
- RAVAS is not responsible for errors that occur due to incorrect weightings or inaccurate scales;
- Weightings should not be carried out if there are persons or objects near, next to or below the forks/weighing last.
- A weighing is performed by slowly lowering the forks, this movement can be stopped at any time by pressing the on/off button on the indicator.



Should you have any further questions after reading this manual, please contact us at:

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### 3. Parts in the RCS-Kit



**Sensor**



**Protective cover for the sensor cable**



**Indicator**



**Stickers to mark the reference height**



**Penlight batteries  
model AA**



**Machine stickers**

## 4. Principles

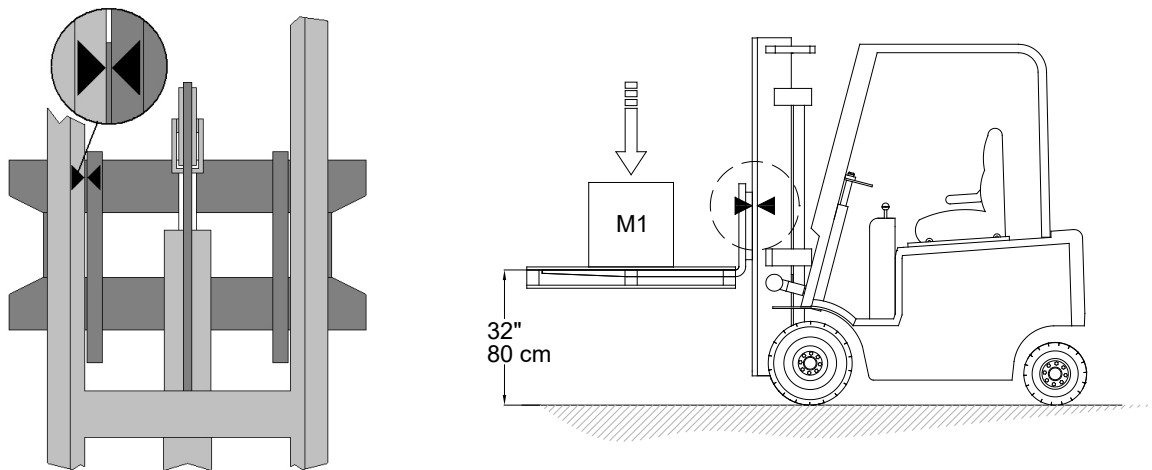
### 4.1 How the hydraulic system works

The RCS is an hydraulic weighing system for forklift trucks and stackers. The load measurement system measures the oil pressure with an oil pressure sensor. The pressure in the lifting system depends on the load on the fork lift system. By measuring the oil pressure in the cylinder, you will get an indication of the weight that you are lifting.

### 4.2 The reference height

To reduce the influence of the condition of the mast and the cylinder, the weighing is always performed at the same height. To ensure this, stickers are placed on the mast and carriage plate to clearly mark the reference height at which the weighing should occur.

First lift the forks past the reference point and then lower the load to the point where the stickers are opposite each other. This results in the optimal accuracy.



### 4.3 Accuracy

Measuring the oil pressure is a very precise job, but mechanical parts in the lifting mechanism and the position of the mast can adversely affect the accuracy.

The friction/resistance of the rollers with which it moves in the mast is a major influence on the weighing. The resistance of the rollers by dirt or bad bearings increase the inaccuracy caused by:

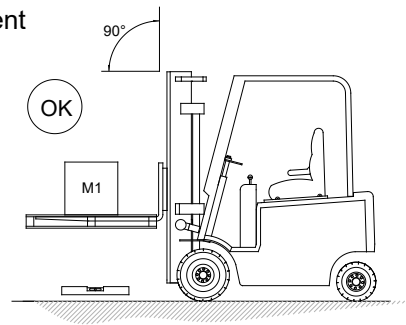
- internal leakage in the oil circuit;
- eccentric load of the forks (the load is not centered on the forks);
- the difference at slow or fast approaching of the reference altitude.

With more 'stick and slip effect', there is less repeatability, so less accuracy. Repeatability means that when you measure the same weight in succession, every time about the same weight appears in the display.

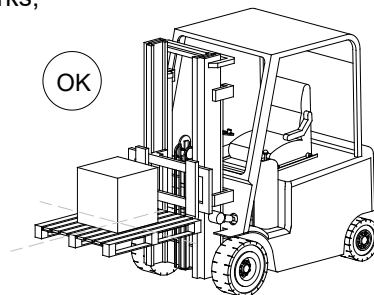
#### 4.4 Recommendations to increase the accuracy

By using the following points, you can ensure that the system works as precisely as possible.  
(see also chapter 10.1)

- By keeping the mast vertical during the load measurement  
(An angle of 2 to 3 degrees has almost no influence);



- By putting the centre of gravity in the middle of the forks;



- Friction in mechanical parts such as the mast, the precision rollers and bearings influence the accuracy of the weighing. Therefore it is important that these parts are in good condition:
  - No local wear
  - Clean
  - Well lubricated mast and chains
  - Regular maintenance
- Use the lift truck at least for 5 minutes or move the forks up and down several times (5 x) before the zero weighting and/or the first weighing is carried out;
- Weigh on a fixed height;
- Do not rise the forks to the reference point too fast. The best way is to raise the forks above the reference point (the point where the stickers on the fork carriage and the mast are opposite of each other) and then lower them down to the reference point. Do this slowly, without sudden stop;
- When reaching the reference height, the weight will be fixated on the display. The weight is not secured at loads below 20 reading steps;
- Make sure the system is relieved before beginning a new weighting;
- If the RCS system is installed on a new lift truck, it is recommended that you perform a recalibration after 3 months and 1 year.

The hydraulic weighing system has a tolerance of max. 2% of the capacity of the weighing system. At a capacity of 2500 kg that is a difference of 50 kg! When used properly the accuracy is usually significantly higher.

## 5. Overview of the parts

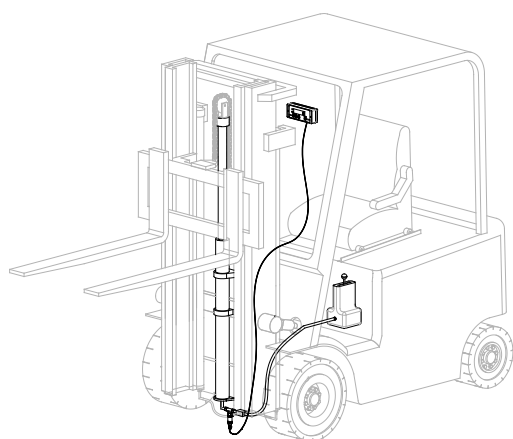
The RCS weighingsystem exists of two main parts:

1. Indicator
2. Sensor

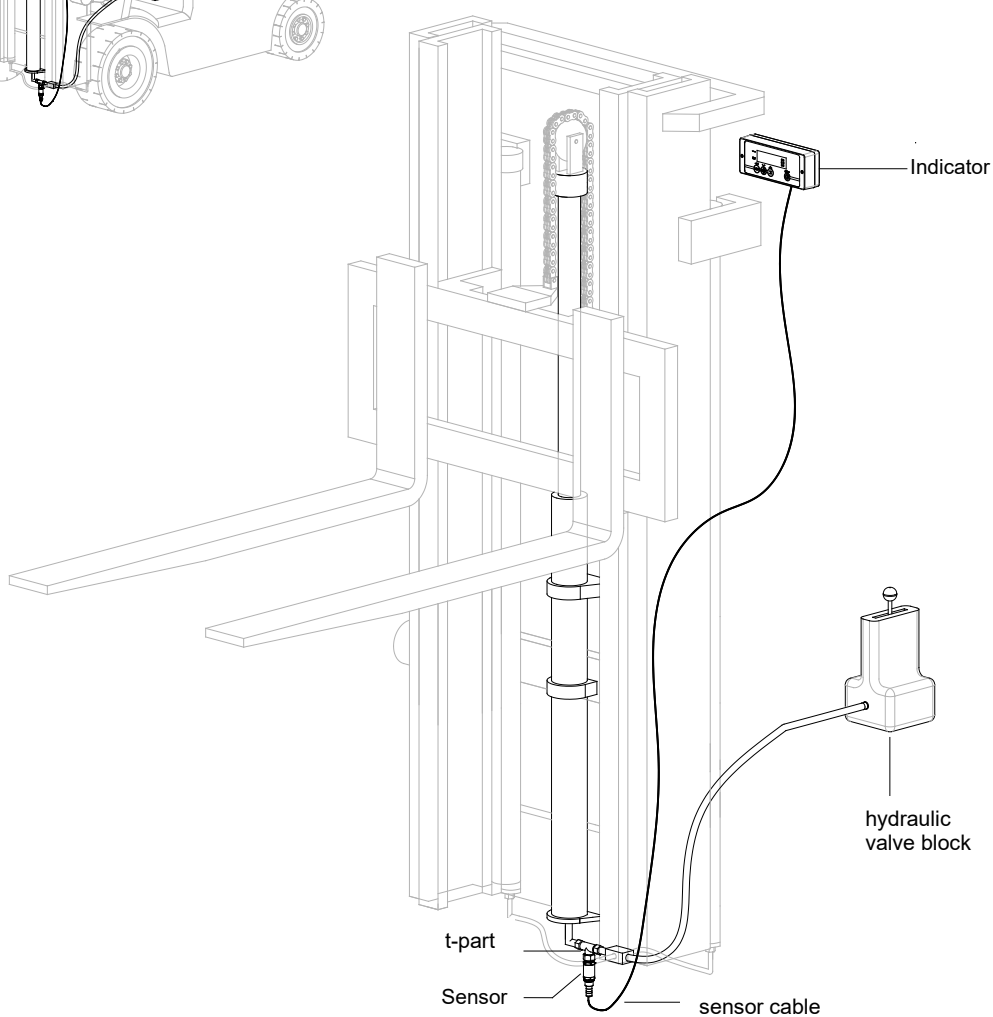
The sensor has to be connected to a T-link on the hydraulic system of the forklifttruck. The indicator, the controlpanel, runs on 6 Volt batteries. On the drawing below you can find the parts of this sytem.



We recommend to have the installation of the sensor in the hydraulic system of the forklift performed by an authorized lift truck dealer.

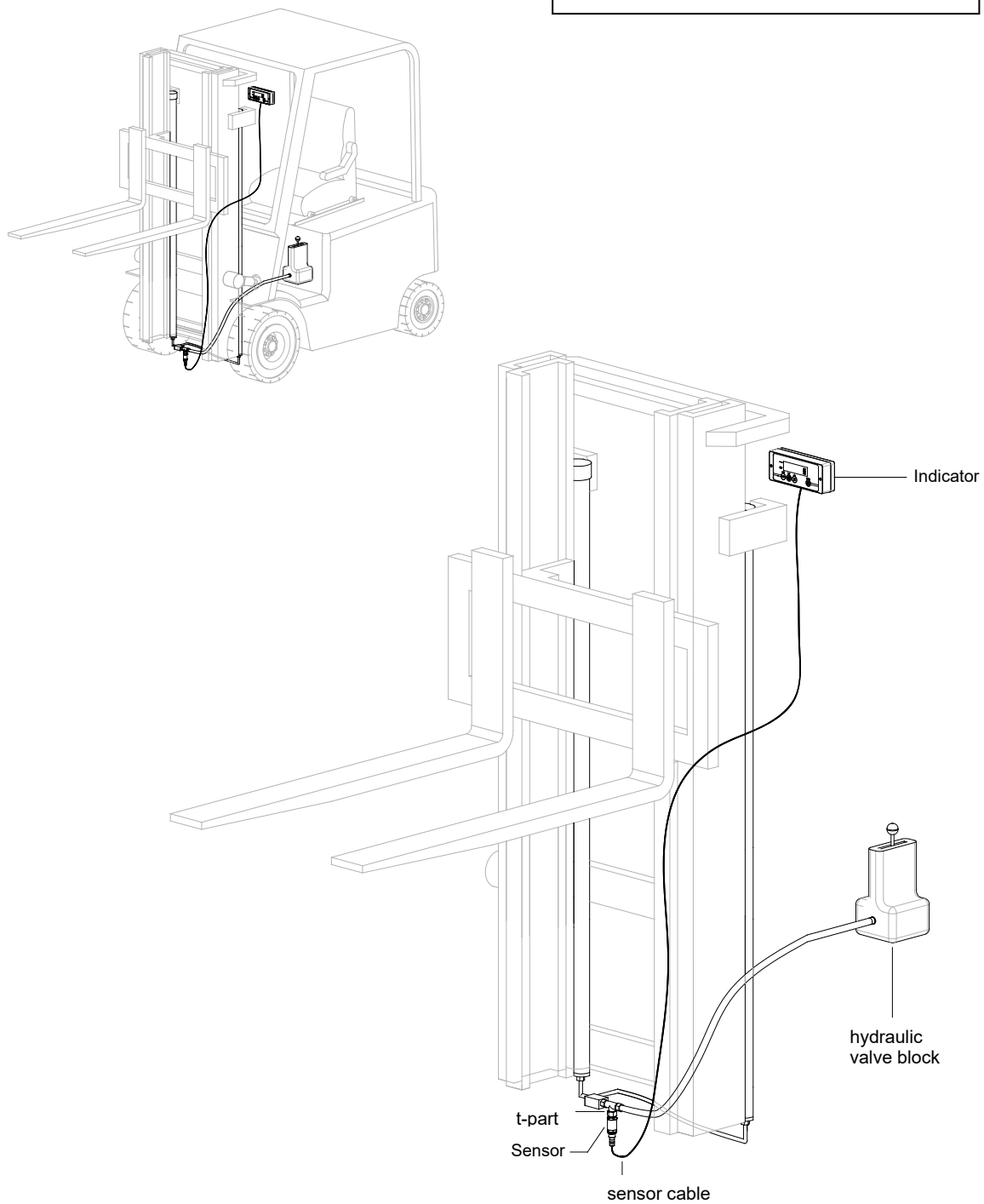


**Type A: 1 central cylinder**





**Type B: 2 cylinders on both sides**



## 6. Before setup

Check the forklift truck on the following points before you begin the installation:

### 6.1 Capacity of the forklift truck

The RCS system can be installed on a forklift truck with a maximum capacity of 99 ton.

### 6.2 Maximum pressure in the hydraulic system

The RCS works optimally at an oil pressure up to 350 bar.

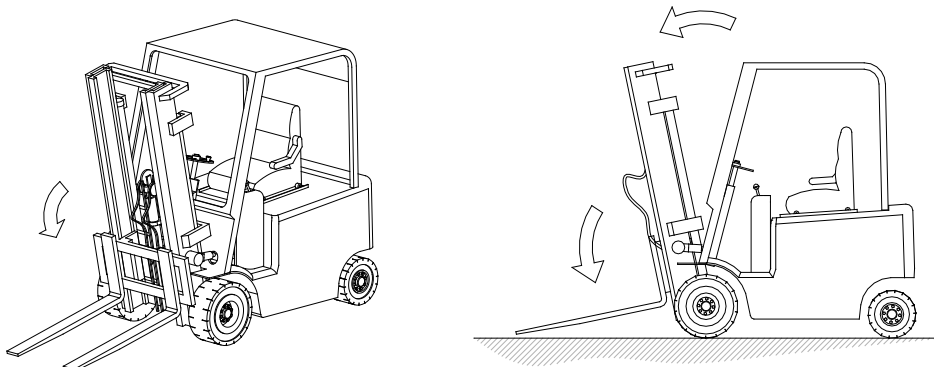
### 6.3 Battery voltage

By default, the indicator is equipped with 4 AA batteries (6Vdc). Optionally, the power supply of the indicator can be connected to the battery of the forklift. The most common voltages for fork-lift trucks are 12, 24, 48 and 80 V. In cases where the battery voltages are higher than 12 VDC, the system demands a DC-DC voltage converter with an output of 12 Vdc.

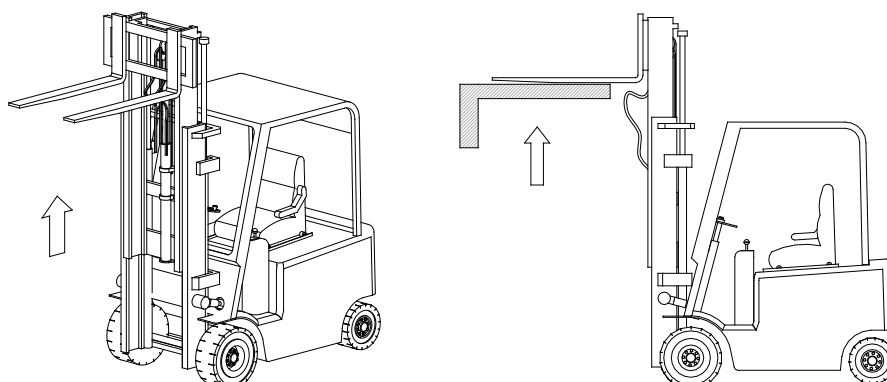
### 6.4 Make the system free of oil pressure

The forklift truck has to be free of oil pressure. There are two ways to do this:

Option 1: Lower the forks to the ground in the lowest position and make sure the system is without oil pressure, you can do this by tending the mast forwards. Make sure the chain hangs loose.



Option 2: Raise the forks and place them on a pallet or another stable object. Make sure the system is without oil pressure by putting the cylinder in the lowest position. Make sure the chain hangs loose.

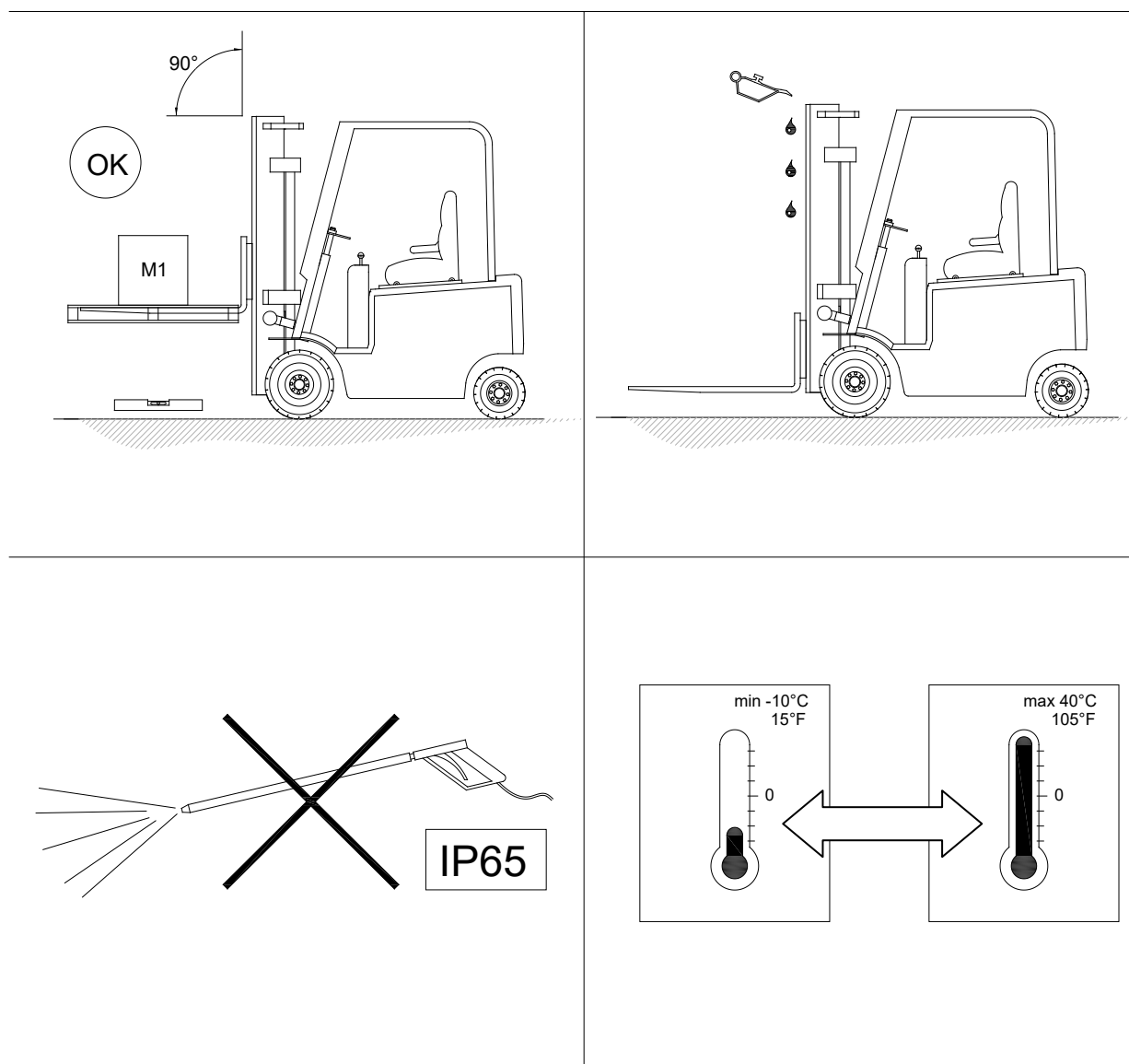


## 6.5 The condition of the mechanical parts of the fork-lift truck

After you have installed the RCS on the forklift truck, the truck will be part of the weighing system. Especially the mechanical parts of the forklift truck, such as the mast, the mast rollers and the ball bearings can influence the accuracy of the weightings.

Because of this it is important to keep the parts in good condition;

- make sure there is no local friction in the mast of the forklift;
- keep the system clean;
- make sure you get a good lubrication of the mast and the chains;
- take care for regular maintenance so that the condition of the system is constant;
- lifting and lowering of the forks should be as silent as possible.



## 7. System setup

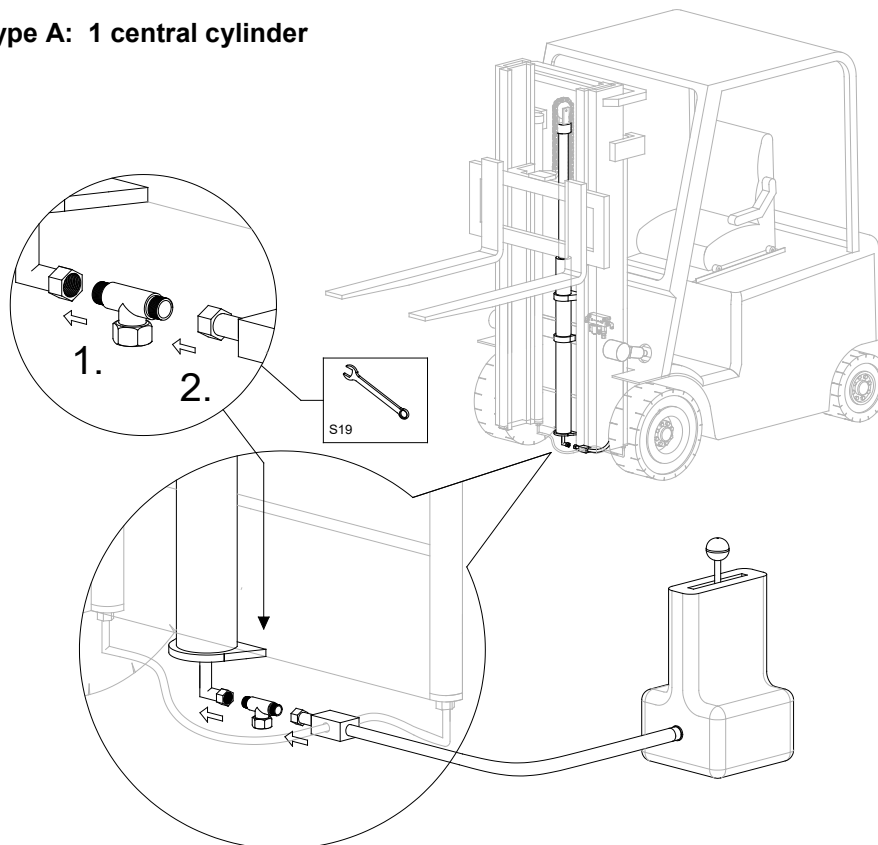
### 7.1 Installing the T-part

- Ensure that there is no pressure on the high-pressure hose.
- The sensor is mounted with a T-piece in the high-pressure hose, between the valves and the cylinder.
- The connection on the sensor is G $\frac{1}{4}$ " BSP male.
- Mount the T-piece so that the sensor and the cable connection are pointing downwards. This will prevent air getting into the sensor.
- Protect the cable against moving, sharp or warm parts with the supplied protective cover.

#### Choose a place where you can mount the sensor:

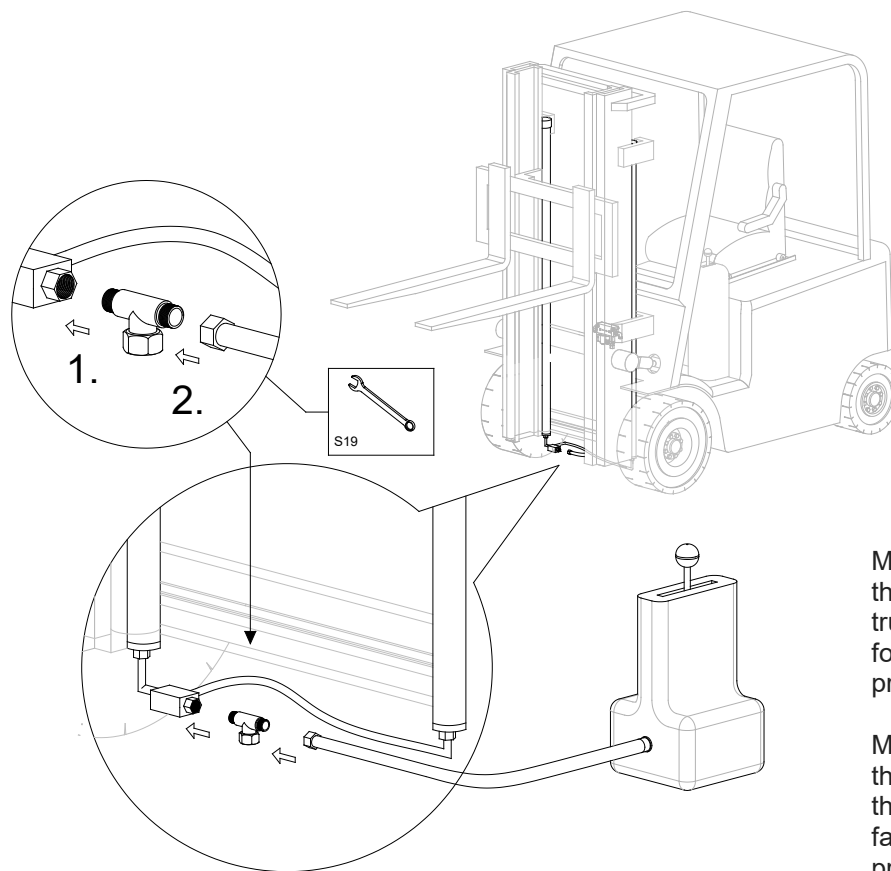
- Mount the sensor in the pressure hose that steers the cylinder. In most cases there is one cylinder which moves the carriage plate. The sensor is mounted as close to the cylinder as possible.
- When the pressure hose splits to multiple cylinders, the sensor has to be mounted before the split.
- Do not mount the sensor too close to the engine. Large differences in temperature can influence the accuracy of the system.
- If the truck is used intensively, a piece of pipe or hose of  $\pm 50$  cm can be mounted between the sensor and the T-piece. The sensor is sensitive to temperature differences. If the moving oil becomes warm, the standing oil in this pipe or hose will remain cool. The sensor will not be effected by temperature differences.
- Place the sensor close to the cylinder. There is often more room there and it is easier to reach.
- Choose, if possible, a place to mount the sensor where there are the least steering and safety valves between the sensor and the cylinder.

#### Type A: 1 central cylinder



Mount the T-piece into the delivery pipe of the truck near the cylinder for the diversion of the pressure to the RCS.

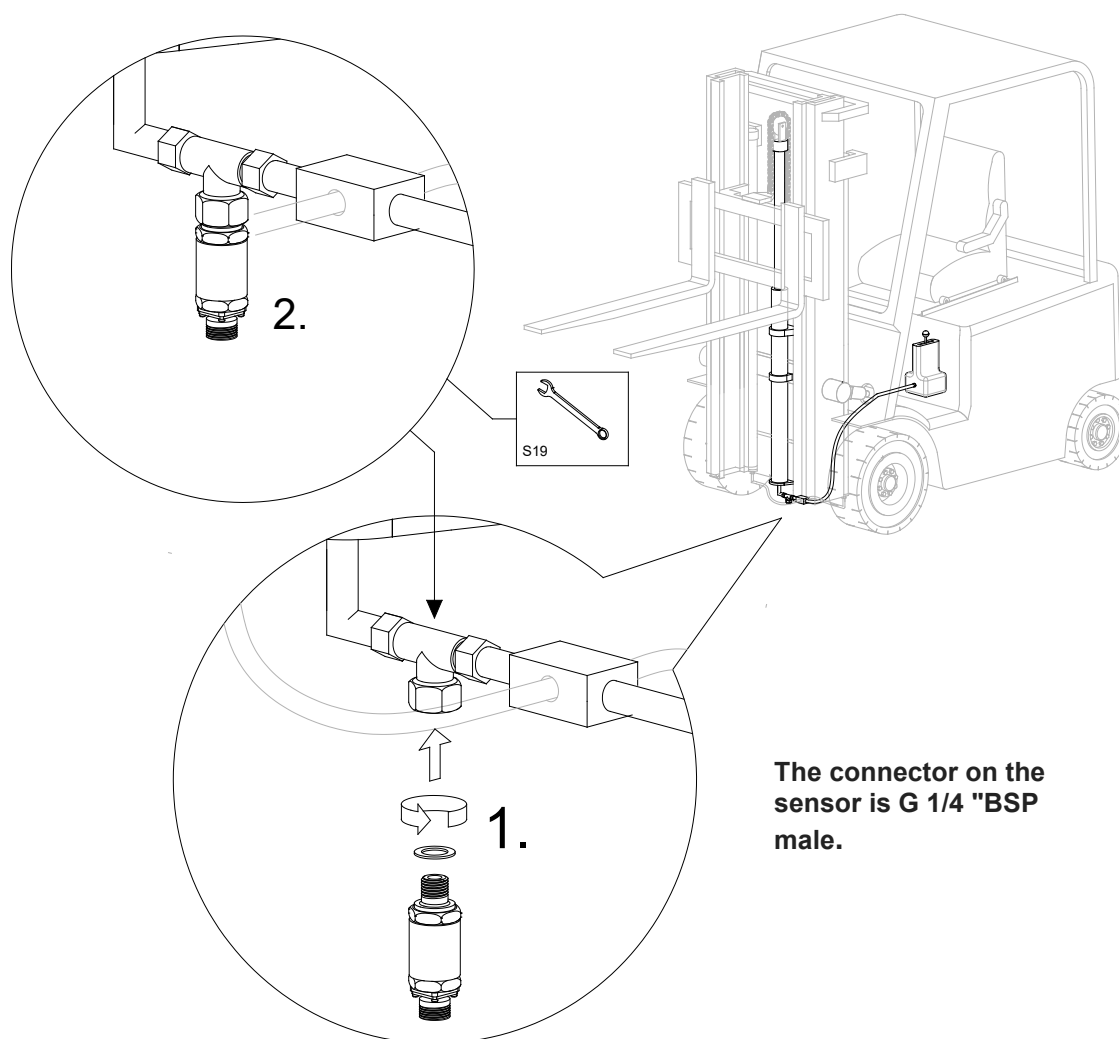
## Type B: 2 cylinders on both sides



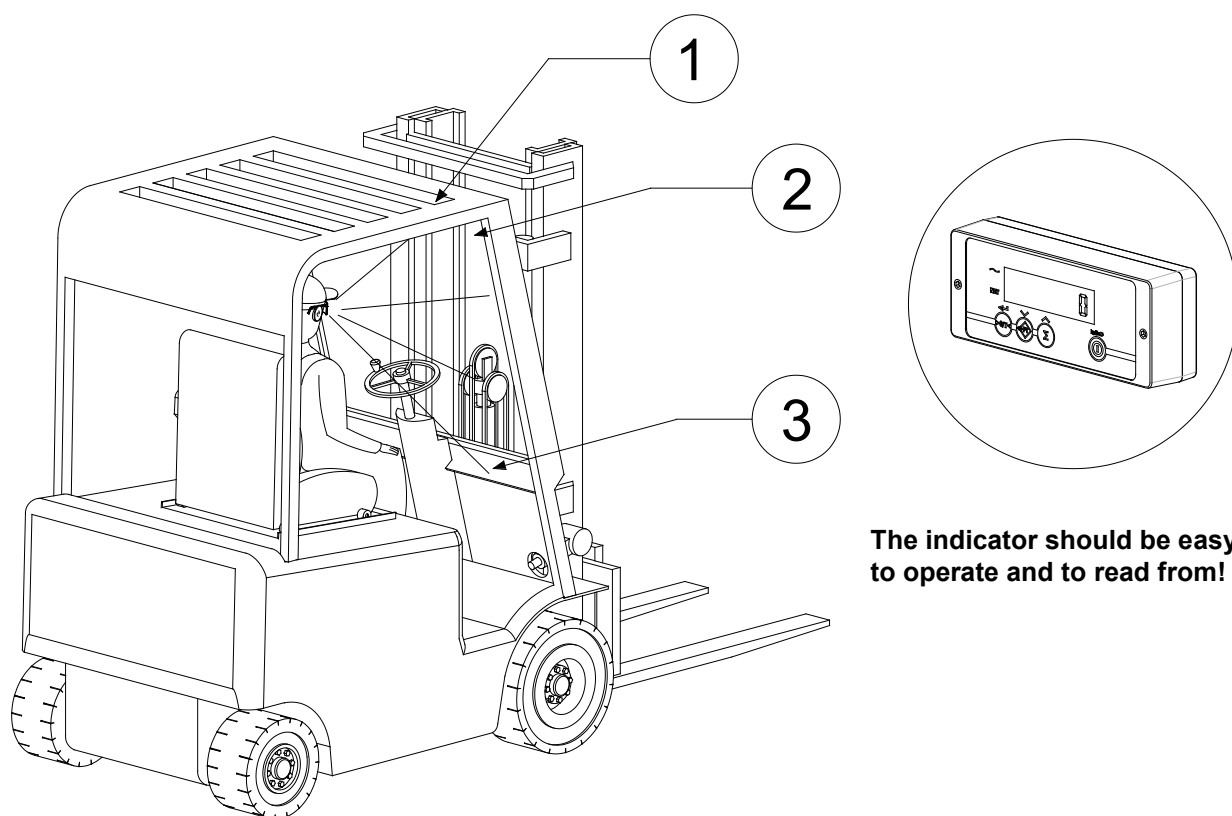
Mount the T-piece into the delivery pipe of the truck near the cylinder for the diversion of the pressure to the RCS.

Mount the T-piece so that the sensor with the cable connector is facing down. This is to prevent that there remains air in the sensor.

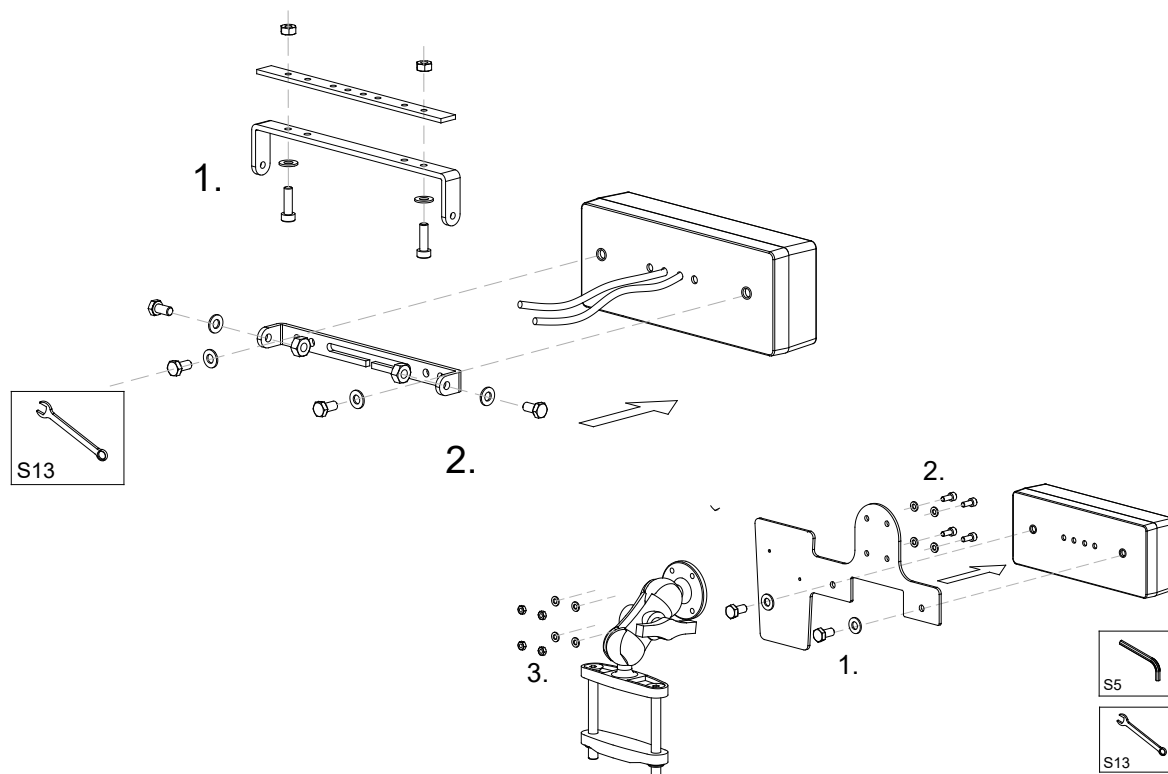
## 7.2 Mounting the sensor



### 7.3 Position of the indicator



### 7.4 Installing the indicator bracket and the indicator



*Indicator with RAM mounting bracket (option)*

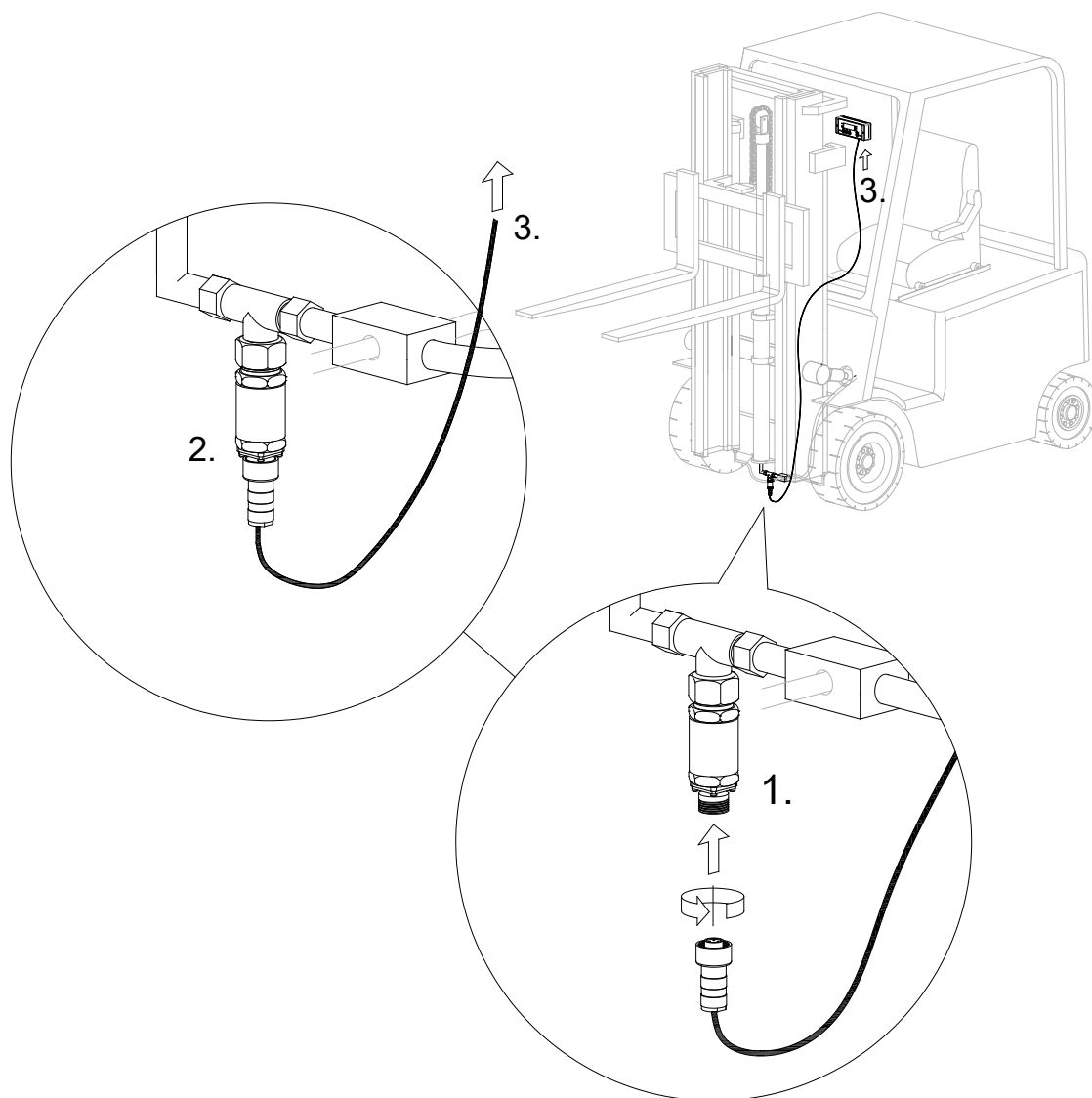
## 7.5 Mounting the sensor cable

When mounting the cable, it is important that the cable is kept tidy and protected. Keep the cable out of sight as much as possible, this makes that the whole looks tidy and it minimizes the possibility of damage to the cable.

It may be necessary to thread the cable through small openings, openings through which the 18mm connector does not fit. In that case it may be necessary to dismount the cable and the connector, you have to dismount the cable at the indicator.

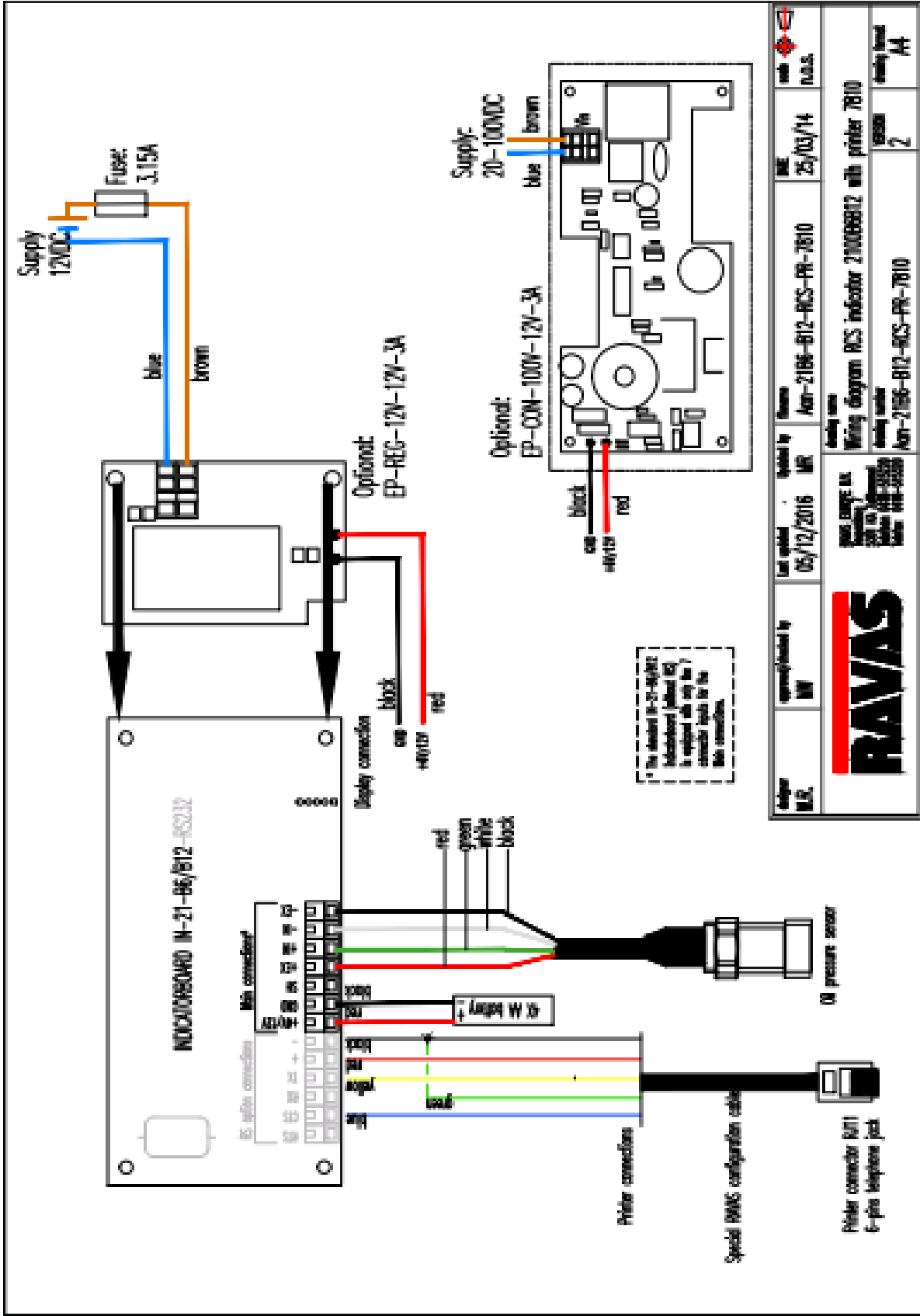
The system is supplied with a protective cover for the cable. This can be used where:

- the cable is near parts of the lift truck that become hot;
- the cable is mounted near moving parts.



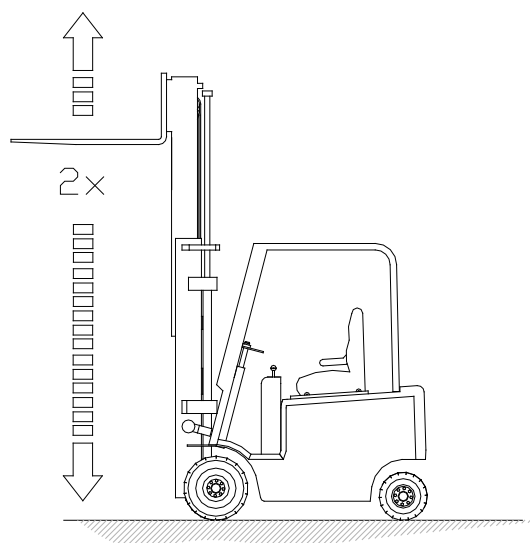


7.6 Connecting the system wiring



## 7.7 Remove any air from the hydraulic system

**Bring the forks to maximum height twice to remove any remaining air from the hydraulic system.**

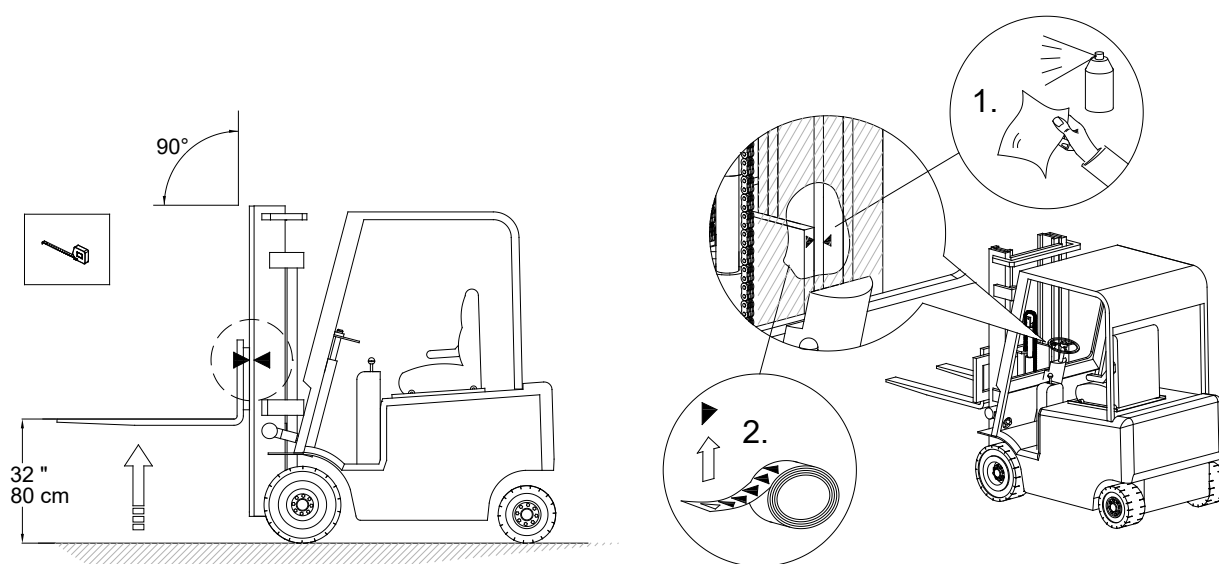


## 7.8 Placing stickers, marking the reference altitude

Two stickers are supplied with this kit. One of the stickers is placed on the mast and one on the carriage plate. The arrow stickers are used to show the reference height.

### Attention:

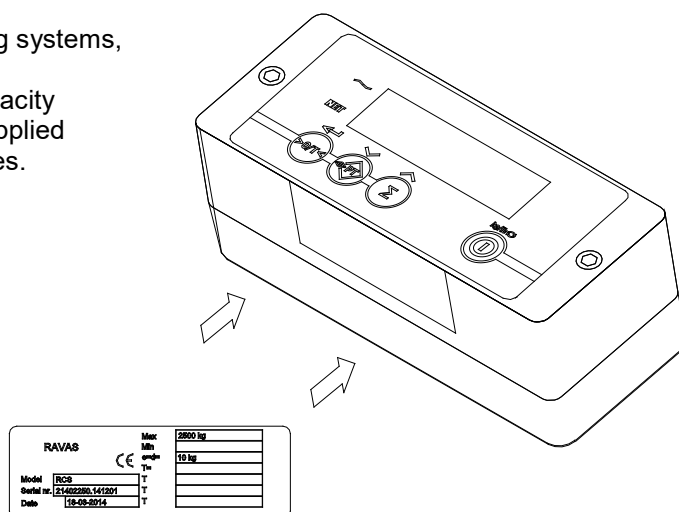
- Make sure that the chauffeur can see the stickers;
- Make sure that there is minimal distance between the two arrows. The larger the distance, the more difficult it will be to gauge the height accurately;
- Choose a practical height: not too high, because then lifting will take more time. Moreover, it may be dangerous to lift heavy loads too high.



**Attention:**  
In a dirty operating environment it is better to mark the reference altitude permanently.

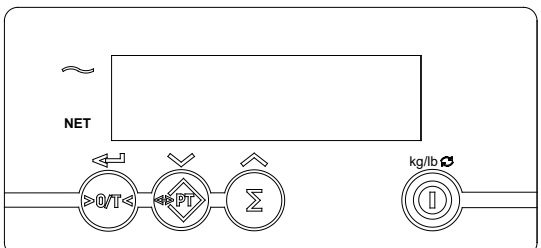
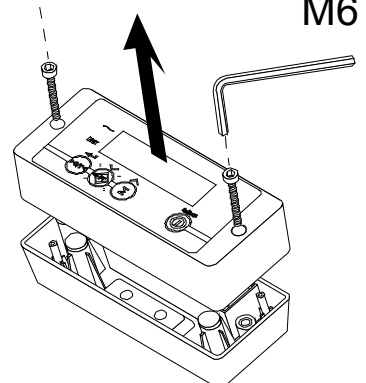
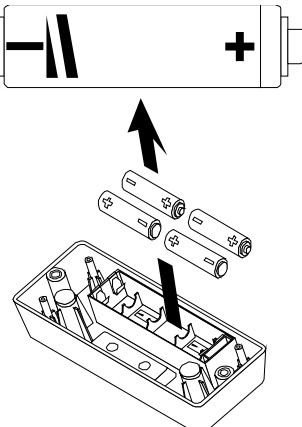
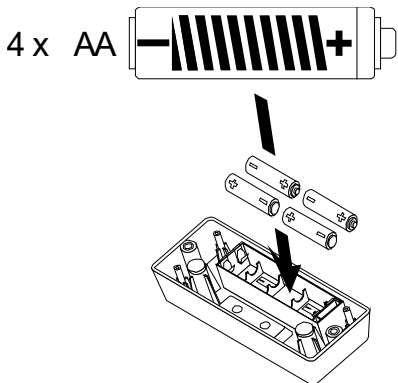
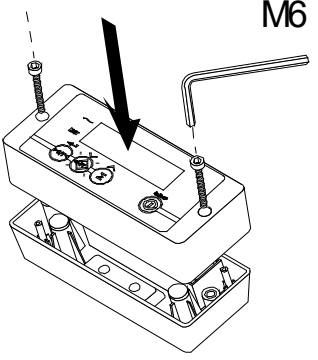
## 7.9 Placing the machine sticker on the indicator

As described in the CE directive for weighing systems, a machine sticker has to be applied to the weighing system. The sticker shows the capacity and the graduation. The stickers that are supplied with the kit are suitable for different capacities. Apply the correct sticker as shown:



## 7.10 Replacing the batteries of the indicator (before 2013)

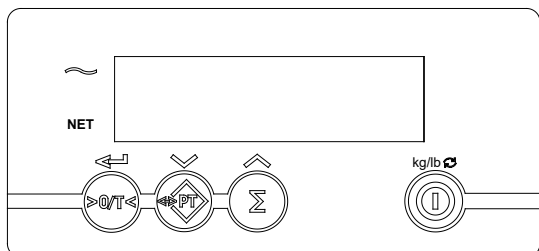
The indicator is equipped with 4 AA batteries.

- |   |   |
|---|---|
| <p>1</p>  <p>Replace the batteries as soon as the LO-BA indication will blink.<br/>As the LO-BA indication starts to flash while printing (option), replace the batteries.</p> | <p>2</p>  <p>M6</p> <p>Remove the M6 Allen screw with an Allen key and open the housing of the indicator.</p>               |
| <p>3</p>  <p>Remove the top side of the housing and remove the batteries.</p>   | <p>4</p>  <p>4 x AA</p> <p>Insert the new batteries in the housing. Place the batteries correctly. Check the polarity!</p> |
| <p>5</p>  <p>M6</p> <p>Fit the housing of the indicator and tighten the M6 Allen screws with an Allen wrench.</p>  |   |

## 7.11 Replacing the batteries of the indicator (2013)

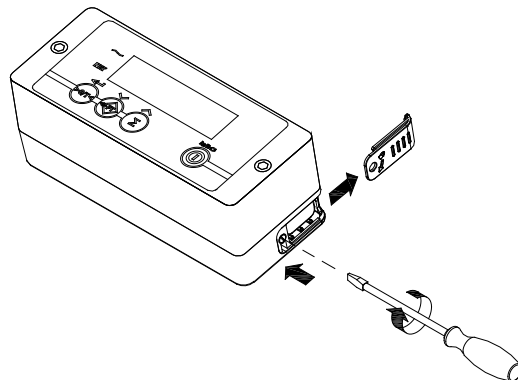
The indicator is equipped with 4 AA batteries.

1



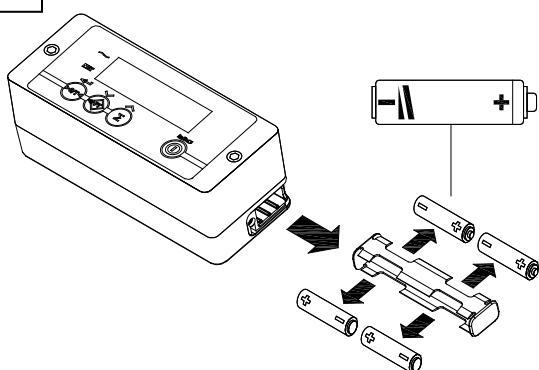
Replace the batteries as soon as the LO-BA indication will blink.  
As the LO-BA indication starts to flash while printing (option), replace the batteries.

2



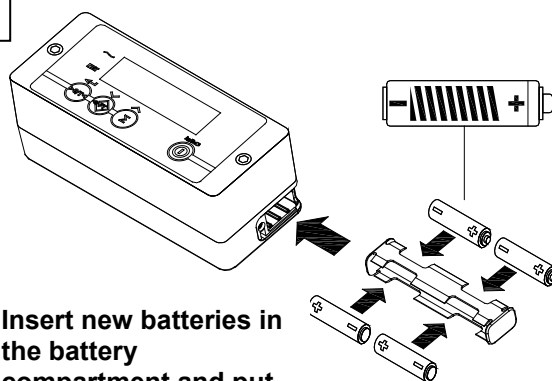
Remove the lid of the batteries from the indicator housing by turning the screw clockwise.

3



Take the battery holder out and remove the empty batteries.

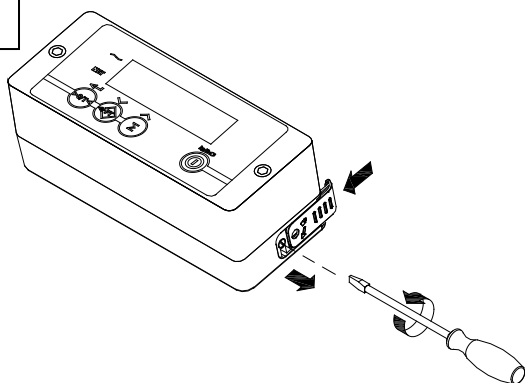
4



Insert new batteries in the battery compartment and put the battery holder back into the housing.

Insert the batteries correctly into the battery holder, check the polarity.

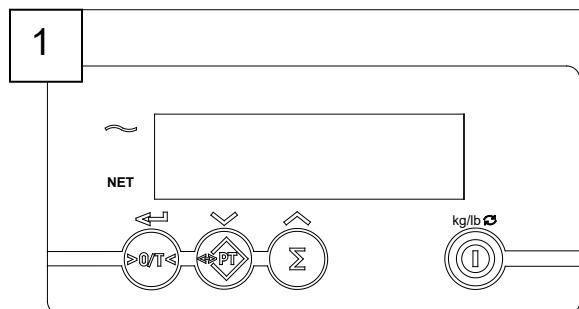
5



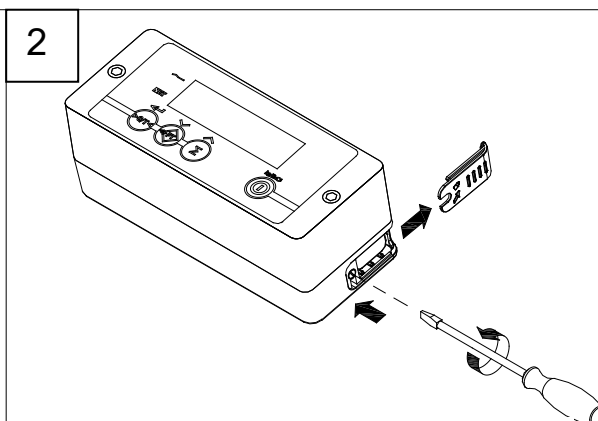
Put the lid back on the indicator housing and tighten the screw counter-clockwise.

## 7.12 Changing the batteries of the indicator (after XX/XX/2014)

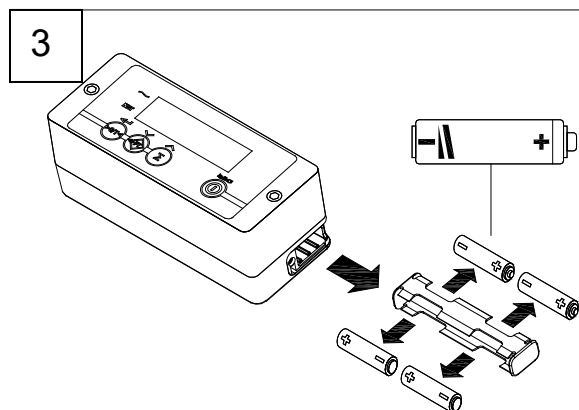
The indicator is equipped with 4 AA batteries.



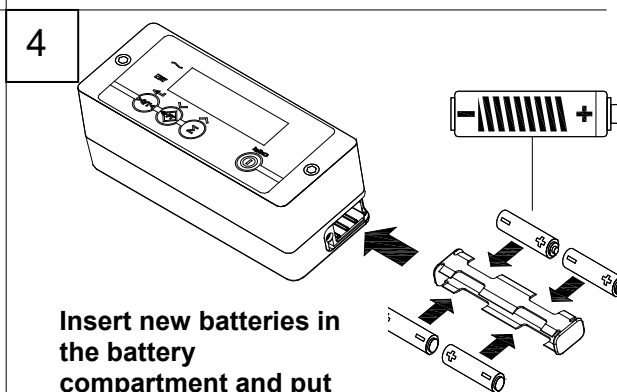
Replace the batteries as soon as the LO-BA indication will blink.  
As the LO-BA indication starts to flash while printing (option), replace the batteries.



Remove the lid of the batteries from the indicator housing by turning the screw counter-clockwise.

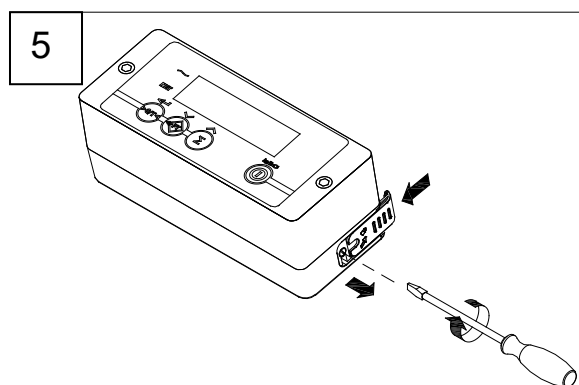


Take the battery holder out and remove the empty batteries.



Insert new batteries in the battery compartment and put the battery holder back into the casing.

Insert the batteries correctly into the battery charger, check the polarity.



Put the lid back on the indicator housing and tighten the screw clockwise.

## 8. Settings

### 8.1 Determining the capacity of the truck

The graduation of the indicator depends on the capacity of the lift truck.  
The European directives for weighing systems state that the machine stickers should show the producer, the capacity and the graduation. The kit contains a number of stickers with different capacities and graduations.

- For a capacity of 2500 kg the weight is shown in 10 kg steps;
- For a capacity of 5000 kg the weight is shown in 20 kg steps;
- For a capacity of 10000 kg the weight is shown in 50 kg steps.

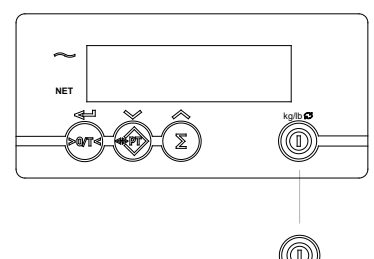
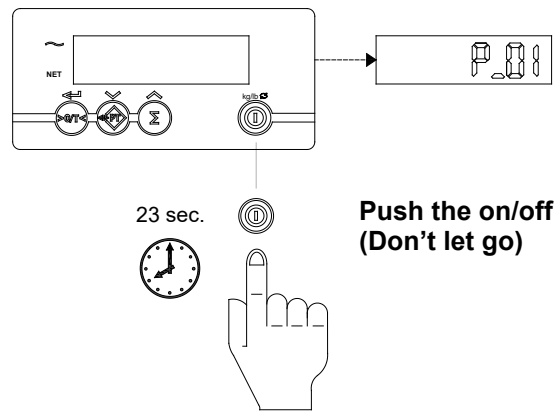
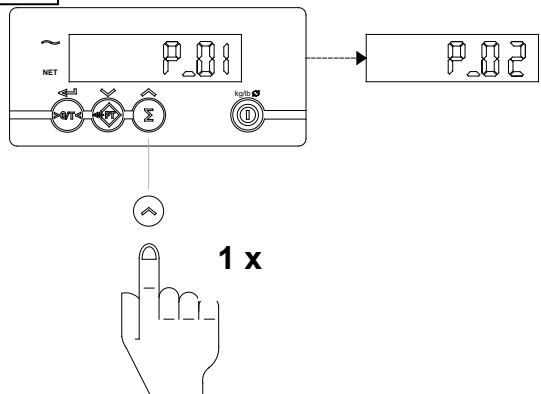
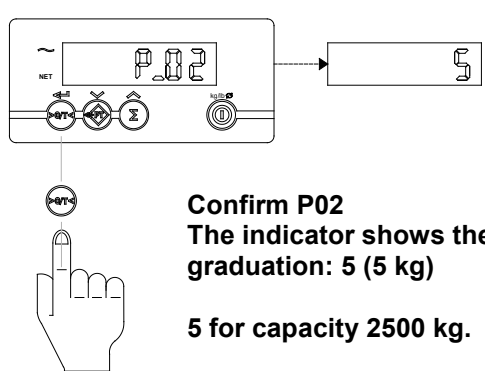


#### Important !

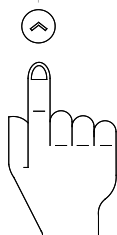
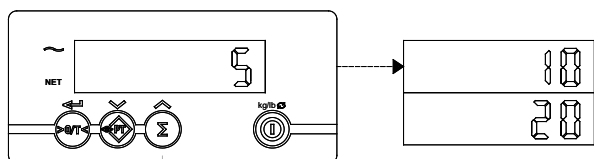
If the lifting capacity of the forklift truck is different then the above-mentioned e.g. 1500 kg or 3000 kg, a higher capacity should be chosen. For 1500 kg the capacity will be 2500 kg; for 3000 kg it will be 5000 kg. If you choose a setting and machine sticker with a smaller capacity, and therefore a smaller graduation, then the measurement range and accuracy will not be in accordance with the specifications.

The standard setting of the indicator is a capacity of 2500 kg and a graduation of 5 kg. The following procedure should be followed to change the settings.

### 8.2 Interval setting

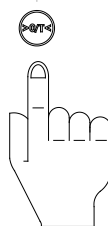
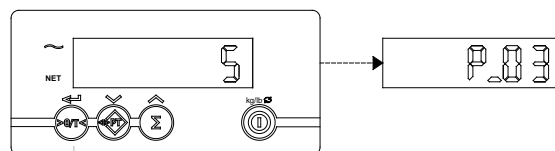
<div data-bbox="180 1012 263 1097">1</div>  <p data-bbox="215 1400 518 1467"><b>Switch off the indicator with the on/off key.</b></p>	<div data-bbox="798 1012 885 1097">2</div>  <p data-bbox="981 1310 1061 1355">23 sec.</p> <p data-bbox="1204 1310 1476 1377"><b>Push the on/off key. (Don't let go)</b></p>
<div data-bbox="180 1590 263 1668">3</div>  <p data-bbox="422 1892 470 1937"><b>1 x</b></p>	<div data-bbox="798 1590 885 1668">4</div>  <p data-bbox="1045 1870 1364 1971"><b>Confirm P02 The indicator shows the graduation: 5 (5 kg)</b></p> <p data-bbox="1045 1993 1348 2038"><b>5 for capacity 2500 kg.</b></p>

5



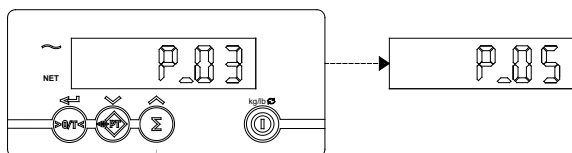
Change the values of the reading steps with the keys  $\wedge$  and  $\vee$ .  
10 for capacity 3000-5000 kg.  
20 for capacity > 5000 kg.

6



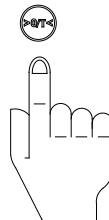
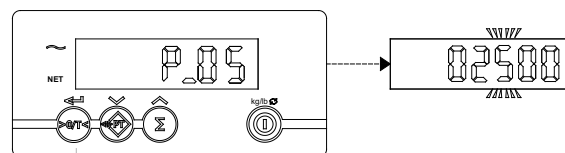
Insert the value.

7



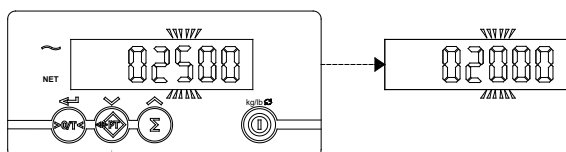
Use the  $\wedge$  and  $\vee$  keys and go to P05 for setting the appropriate capacity.

8



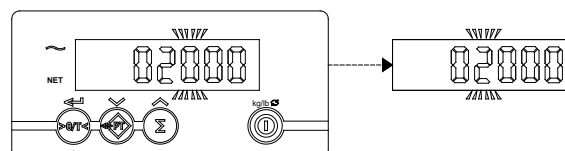
Confirm P05.  
The indicator shows the capacity 2500 kg.

9



5 x

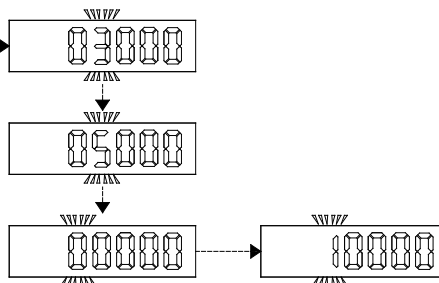
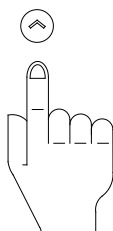
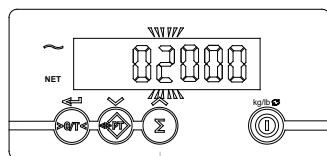
10



1 x

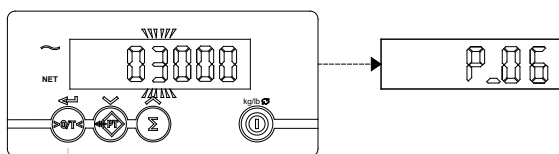


11



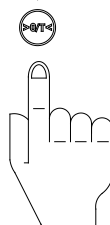
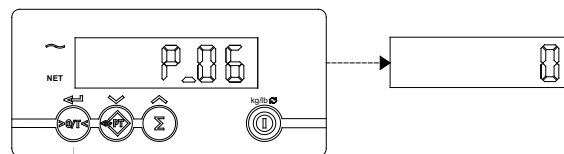
Use the keys  $\vee$  and  $\wedge$  and change the value to:  
3 for 3000 kg  
5 for 5000 kg  
10 for 10000 kg

12



Confirm the value of the capacity.

13

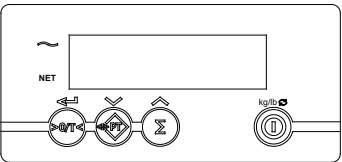
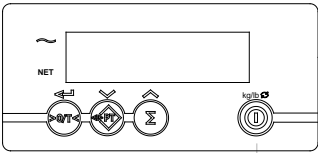
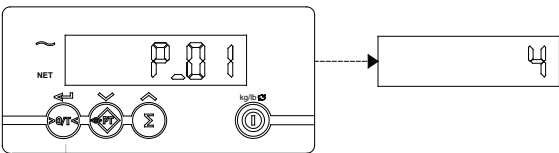
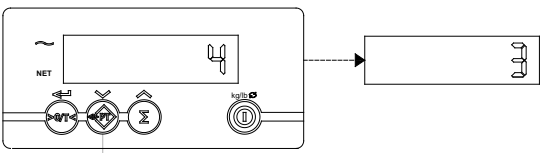
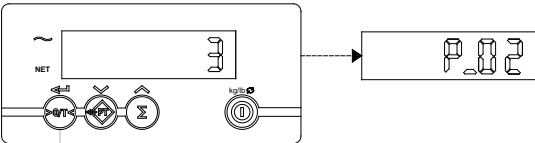
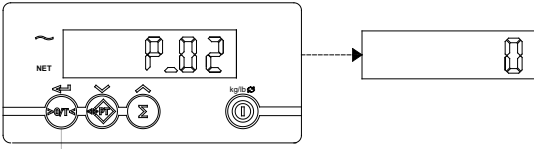


3 sec.



Press Enter to return to the normal weighing mode.

### 8.3 Change the delay-time

<p><b>1</b></p>  <p>Turn the indicator off.</p>	<p><b>2</b></p>  <p>23 sec.</p> <p>Press on the on/off button for 23 seconds until the indicator shows P01 (don't let go !)</p>
<p><b>3</b></p>  <p>Confirm with the → button. The indicator shows a delay time 4 (sec.)</p>	<p><b>4</b></p>  <p>1x</p> <p>Change the value to 3 seconds using the ^ and v button.</p> <p>Delay time: 0–7 sec. Depending on the type of pallet truck.</p>
<p><b>5</b></p>  <p>Confirm with the → button. The indicator now shows P02.</p>	<p><b>6</b></p>  <p>3 sec.</p> <p>Push the → button for 3 seconds to return to the weighing mode.</p>

## 8.4 Parameter settings

Open the parameter menu as shown below:

- Turn the indicator on by pressing on the On/Off button for 30 sec.
- After 30 seconds the indicator automatically shows: P\_\_00

P Nr.	Function	Possible settings	advised settings per option		Default setting after P90
			Standard 6V	Option 12V Printer	
P 01	Delay time RCS	0 / 7	4	4	0
P 02	smallest division step	0.1/0.2/0.5/1/2/5/10/20/50/100	10 (20/50)	10 (20/50)	1
P 03	largest division step*1	0.1/0.2/0.5/1/2/5/10/20/50/100	10 (20/50)	10 (20/50)	1
P 04	Multi interval window adjustable per 100 divisions	0000-9900	-----	-----	-----
P 05	overload (full scale) adjustable per 100 divisions	00000-99900	2500 (5000/10000)	2500 (5000/10000)	2000
P 06	motion detection in div/sec.	0=0.5, 1=1, 2=2, 3=4	1	1	-----
P 07	not defined				-----
P 08	auto shut-off time in minutes	0 t/m 99 (0 = off)	3	0	3
P 09	number of loadcell wires	4 of 6	4	4	4
P 10	Zerotrack on/off	0 = off en 1 = on	1	1	1
P11	read out display for service purposes	0-3 0=basic , 1=mV/V, 2= 5x higher resolution , 3= 10x higher resolution	0	0	-----
P 12-	power-up and calibration units	0 = kg (units toggle switch not activ)	0	0	0
		1 = lb (units toggle switch not activ)			
		2 = kg/lb (units toggle switch activ)			
		3 = lb/kg (units toggle switch activ)			
P 13	not defined				-----
P 14	not defined				-----
P 15	not defined				-----
P 16	not defined				-----
P 17	Peakhold on/off	0/1	1	1	0
P18-P19	not defined				-----
P20	Baudrate	1200,2400,4800,9600,19200,38400	9600	9600	9600
P21	Databits	7/8	8	8	8
P22	parity	E(ven), -(None), O(dd)	-	-	-
P23	Stopbits	1/2	1	1	1
P 24-	not defined				-----
P25	application RS-232	0 = Standard (remote display output via RS)	0	1	0
		1 = Standard with printer			
		2-7 not used			
P26	number of linefeeds	0-7	5	5	5
P27 - P89	not defined				-----
P 90	reset to default settings				FP
P 91	not defined				-----
P 92	Low Batt.	0 = off (no LO-BA in the display, with blinking battery sign, no automatic power off after 2 minutes), 1 = on ( LO-BA in the display, with blinking battery sign , indicator is powered off after 2 minutes).	1	1	1
P 93	disabling function keys	0 = all keys activated	0	0	0
		1 = PT-key deactivated			
		2 = Σ-key deactivated			
		3 = PT-and Σ-key, all pointers and motion indicator deactivated			
P 94	not defined				-----
P 95-P98	not defined				
P 99	software version	754	754	754	754

When in the parameter menu and you want to exit:

Press short on ON/OFF key and the display will show a parameter in the display – for instance: P01

Exit the parameter menu by push and hold the >0/T< button - to go out of the parameter menu then perform a reboot ( see: important notes )

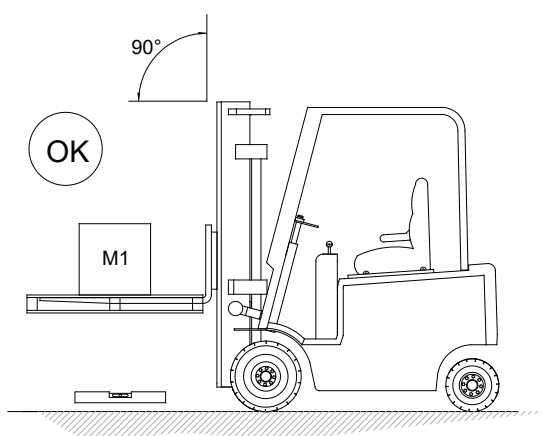
### **IMPORTANT NOTES:**

After changing parameters the indicator needs a reboot by turning the indicator OFF and ON using the ON/OFF button of the touch-panel

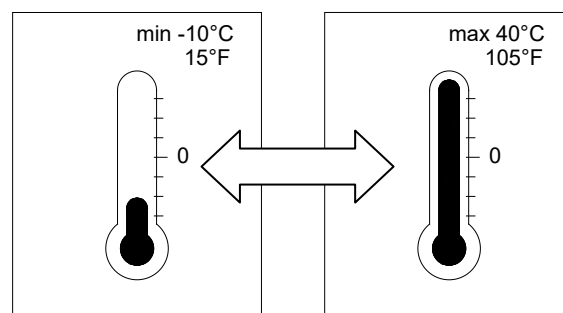
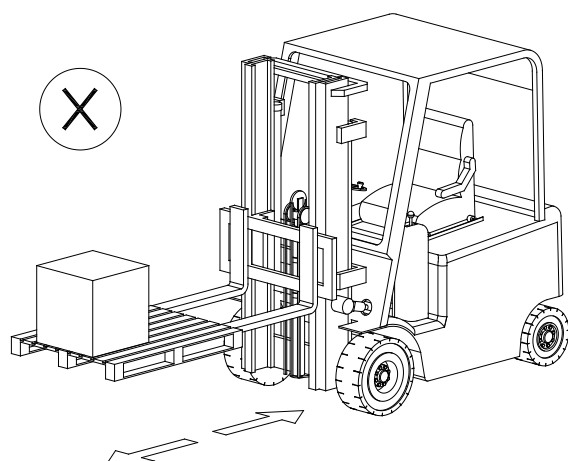
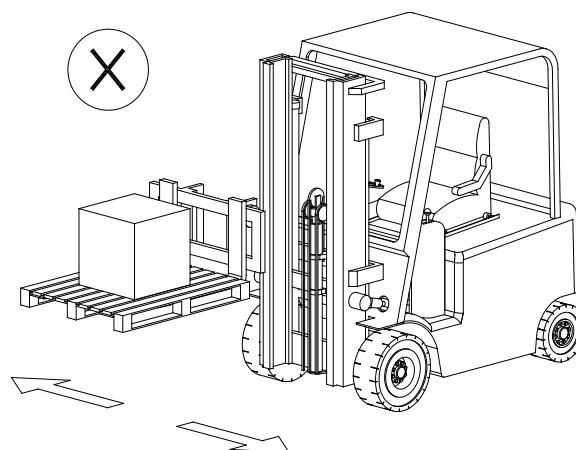
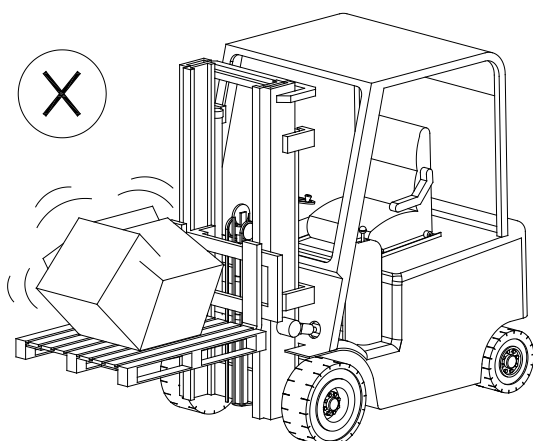
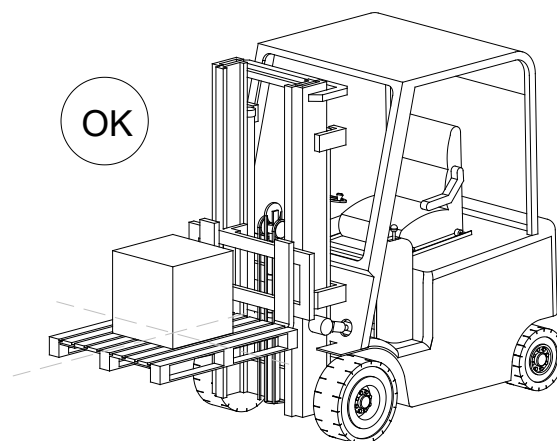
After changing the Peak Hold (parameter 17) - many other parameters will change as well – please double check all settings

## 9. Calibration

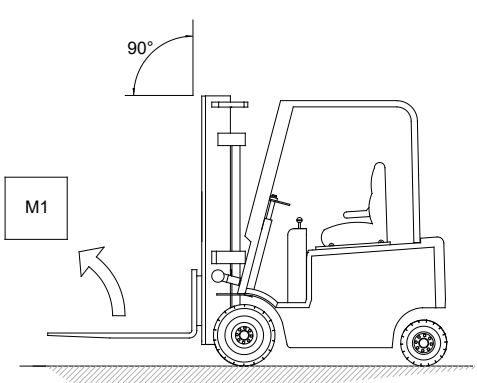
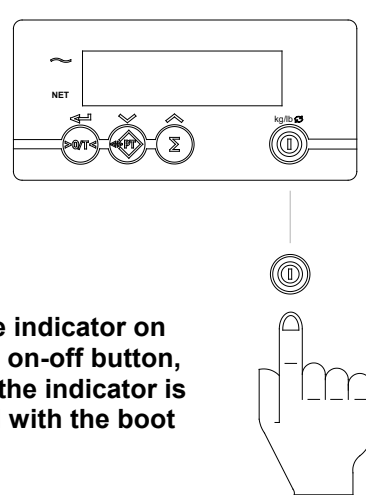
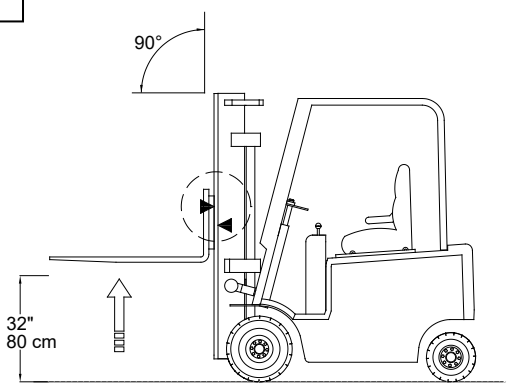
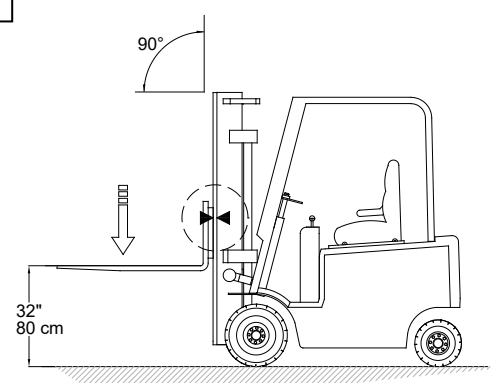
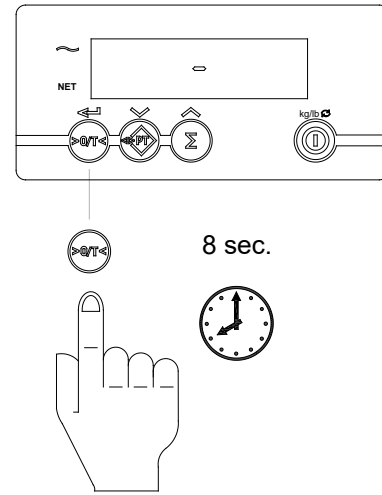
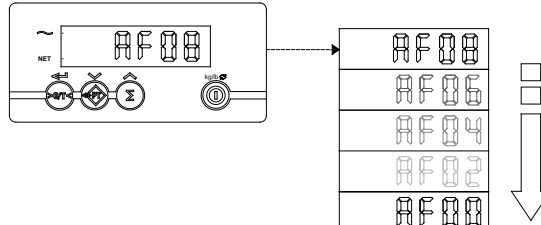
### 9.1 Preparing for calibration



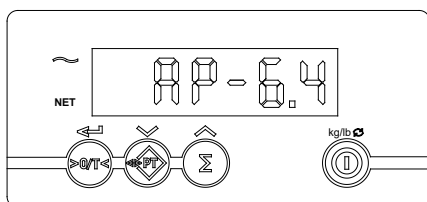
**Recommended calibration weight:  $M1 = \pm 2/3$  of the trucks lift capacity.**  
**Example#1: 2.2t truck  $\Rightarrow M1 = 1500$**



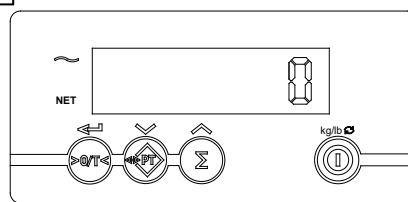
## 9.2 Correcting the zero point

<p><b>1</b></p> 	<p><b>2</b></p>  <p>Turn the indicator on with the on-off button, wait till the indicator is finished with the boot routine.</p>
<p><b>3</b></p>  <p>Lift the system beyond the reference altitude</p>	<p><b>4</b></p>  <p>Lower the forks till the reference altitude.</p>
<p><b>5</b></p>  <p>8 sec.</p>	<p><b>6</b></p> 

7



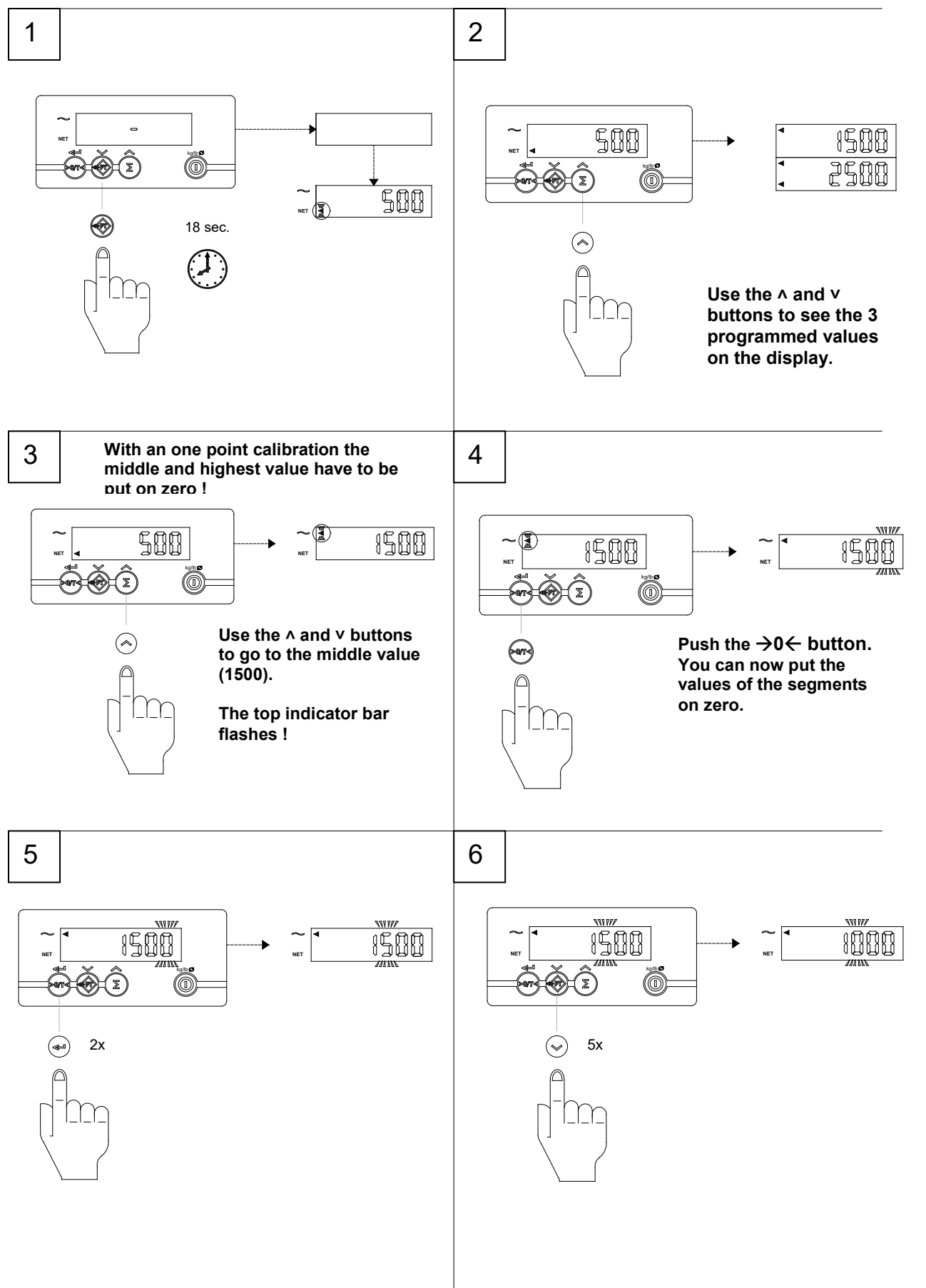
8



**Zero-calibration is finished!**

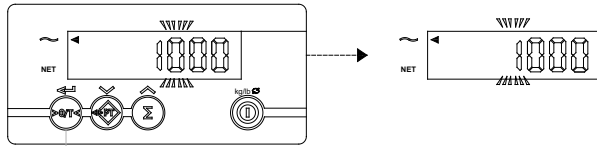
**The indicator returns to the weighing-mode automatically.**

### 9.3 Weight calibration (single point)

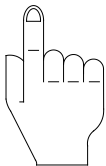




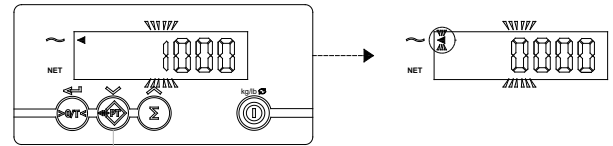
7



1x



8

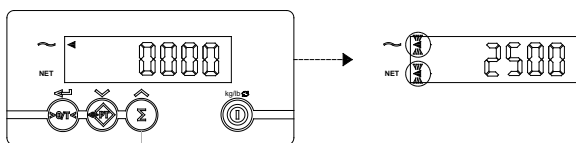


1x



Put all segments on zero until the top indicator bar flashes.

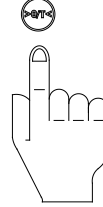
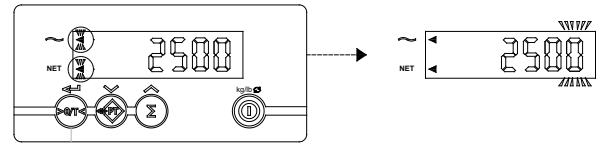
9



Use the  $\wedge$  and  $\vee$  buttons to go to the highest value (2500).

Both indicator bars are flashing.

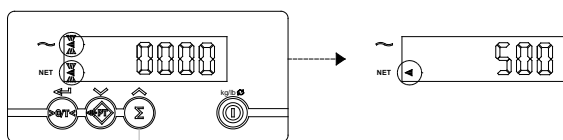
10



Push the  $\rightarrow 0 \leftarrow$  button. Repeat this procedure until all values are on zero.

11

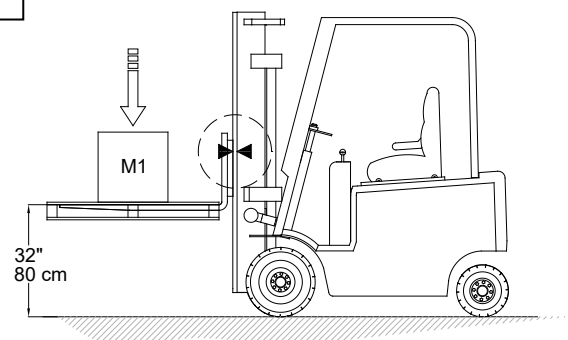
One point calibration



Use the  $\wedge$  and  $\vee$  buttons to go to the lowest value (500).

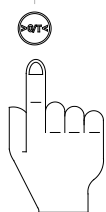
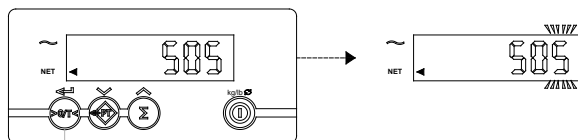
The lower indicator bar flashes.

12



Place a known weight on the forks.  
(M1 = 500kg)

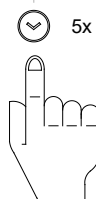
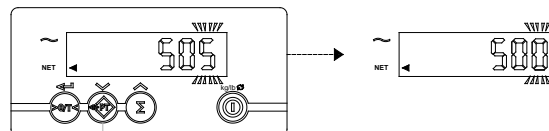
13



The indicator shows the weight.

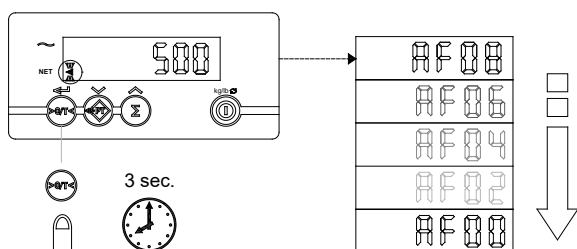
Push the  $\rightarrow 0 \leftarrow$  button briefly. The first segment starts flickering.

14



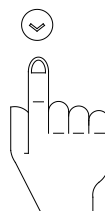
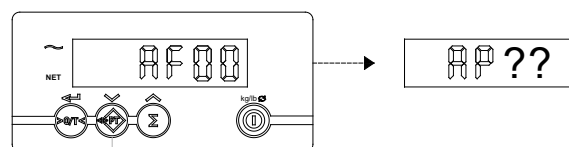
Use the  $\wedge$  and  $\vee$  buttons to enter the right values.

15



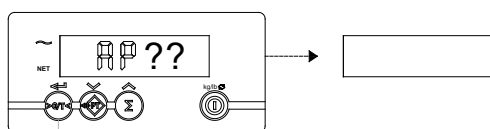
Confirm the entered weight by pushing the  $\rightarrow 0 \leftarrow$  button for 3 seconds. The display counts down and the first calibration-point is entered.

16



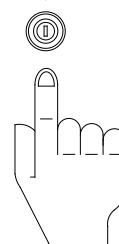
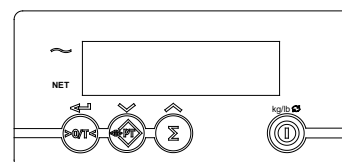
Push the  $\wedge$  or  $\vee$  button until AP XX appears to leave the calibration-menu.

17



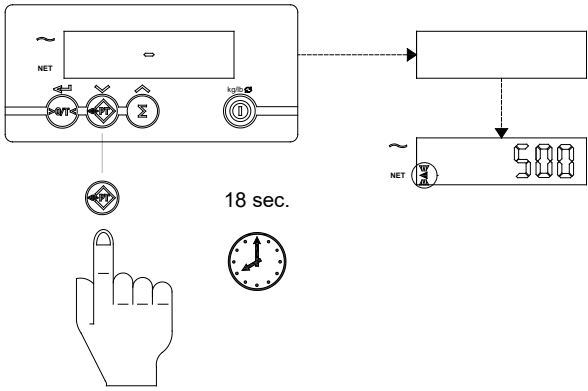
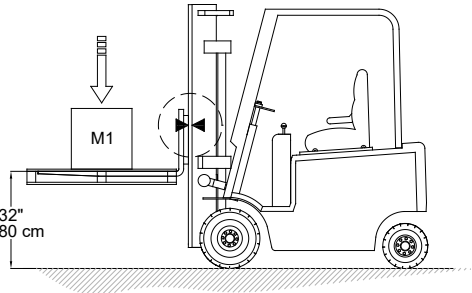
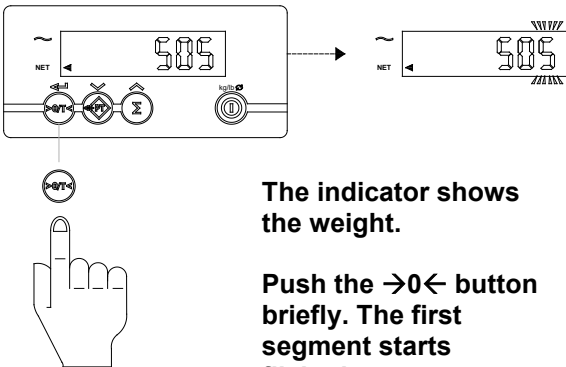
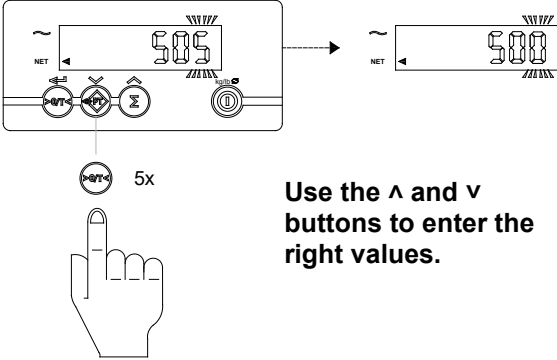
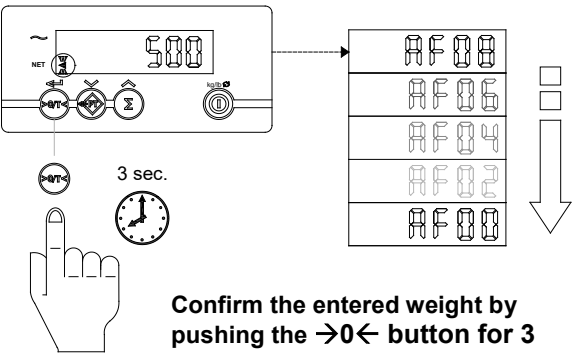
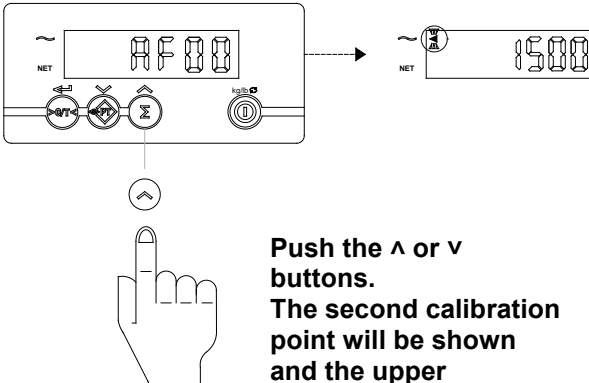
Push the  $\rightarrow 0 \leftarrow$  button until the screen shuts itself down.

18

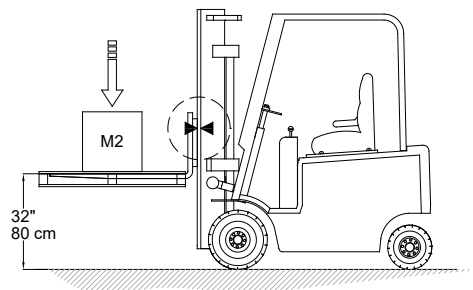


Turn the indicator off and restart it.

## 9.4 Weight calibration (multiple points)

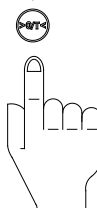
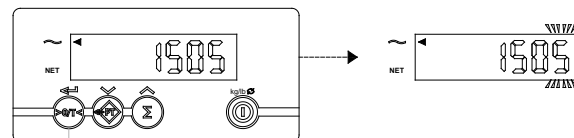
<p><b>1</b></p>  <p>18 sec.</p>	<p><b>2</b></p>  <p>Place a known weight on the forks. (M1 = 500kg)</p>
<p><b>3</b></p>  <p>The indicator shows the weight.</p> <p>Push the <math>\rightarrow 0 \leftarrow</math> button briefly. The first segment starts flickering.</p>	<p><b>4</b></p>  <p>5x</p> <p>Use the <math>\wedge</math> and <math>\vee</math> buttons to enter the right values.</p>
<p><b>5</b></p>  <p>3 sec.</p> <p>Confirm the entered weight by pushing the <math>\rightarrow 0 \leftarrow</math> button for 3 seconds. The display counts down and the first calibration-point is entered.</p>	<p><b>6</b></p>  <p>Push the <math>\wedge</math> or <math>\vee</math> buttons. The second calibration point will be shown and the upper</p>

7



Place a known weight on the forks. (M2 = 1500kg)

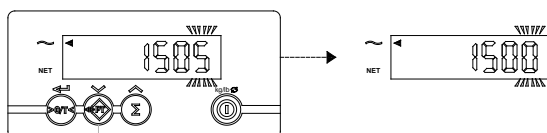
8



The indicator shows the weight.

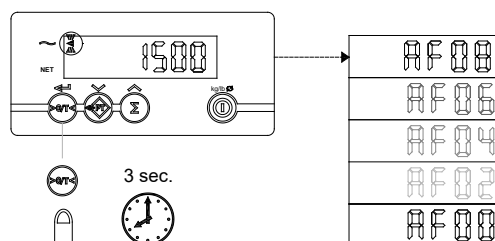
Push the >0< button briefly. The first segment starts flickering.

9



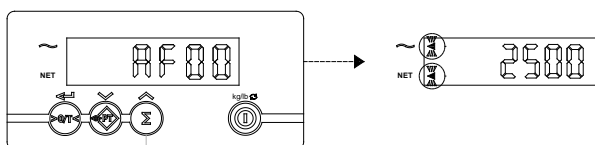
Use the ^ and v buttons to enter the right values.

10



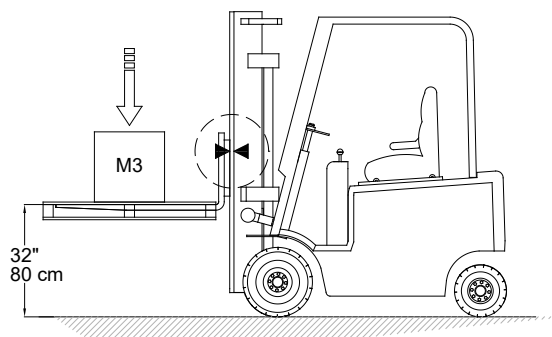
Confirm the entered weight by pushing the >0< button for 3 seconds. The display counts down and the second calibration-point is entered.

11



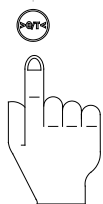
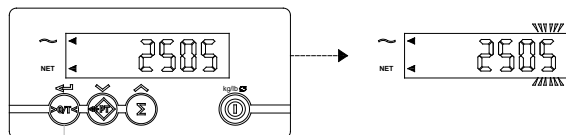
Push the ^ or v buttons. The 3rd calibration point will be shown and both indicator bars are flashing.

12



Place a known weight on the forks. (M3 = 2500kg)

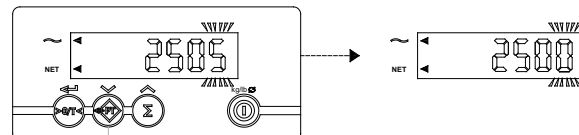
13



The indicator shows the weight.

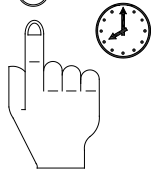
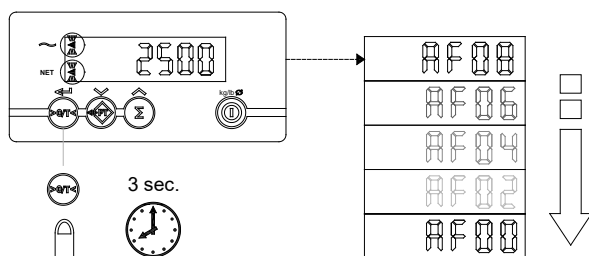
Push the  $\rightarrow 0 \leftarrow$  button briefly. The first segment starts flickering.

14



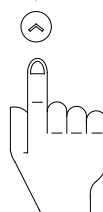
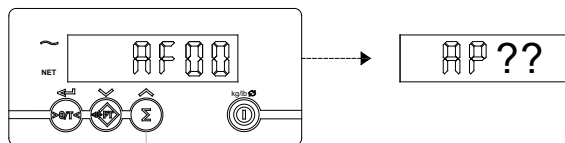
Use the  $\wedge$  and  $\vee$  buttons to enter the right values.

15



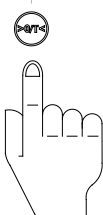
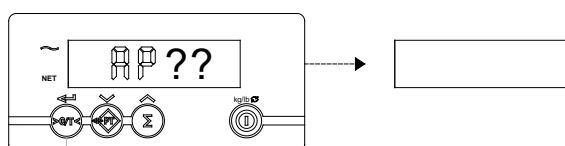
Confirm the entered weight by pushing the  $\rightarrow 0 \leftarrow$  button for 3 seconds. The display counts down and the third calibration-point is entered.

16



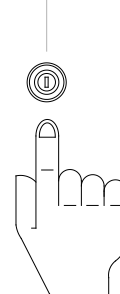
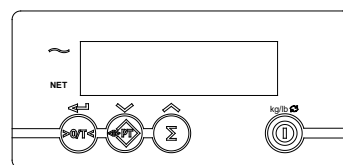
Push the  $\wedge$  or  $\vee$  button until AP XX appears to leave the calibration-menu.

17



Push the  $\rightarrow 0 \leftarrow$  button until the screen shuts itself down.

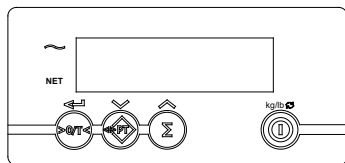
18



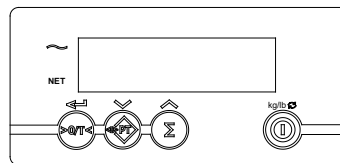
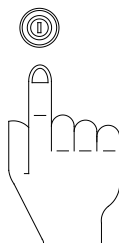
Turn the indicator off and restart it.

## 10. Bringing the system into service

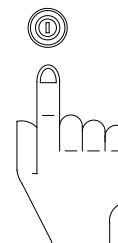
### 10.1 Turning the system on or off



Turn the indicator  
**on** with the  
ON/OFF button.



Turn the indicator  
**off** by pressing the  
OF/OFF button for  
3 seconds.



The system will turn off after 3 minutes, this saves the power of the batteries.

When the batteries are empty, LO-BA will flash in the screen of the indicator. It is still possible to perform a number of weighing's before the system turns off completely.

**Attention!** It is only possible to press a key when the weight in the display is stable, the “load stable” indication can be seen in the indicator display. If the load is not stable the keys will not react, this to prevent mistakes. Weighing or adding a moving load is not accurate.

### 10.2 Using the reference height

Lift the forks a little bit higher than the point at which the stickers are on the carriage plate and lower them to the reference height. For more information on the reference height see chapter 4.2

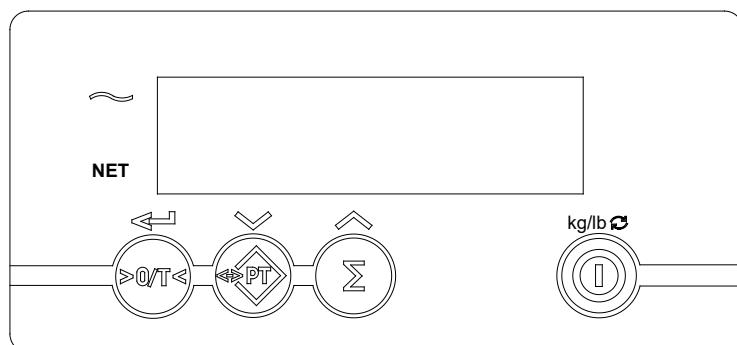
### 10.3 How can I weigh as accurately as possible?

As explained, the hydraulic measuring is very precise but the accuracy is influenced by the mechanical parts, for example, through dirt, bad bearings in the mast or internal leaks in the oil circuit. It can also be influenced when the load which has to be weighed is not in the middle of the forks. Another cause is that the system is not used correctly.

It is possible to increase the accuracy. How?



- By keeping the mast vertical during the load measurement. (An angle of 2 to 3 degrees has almost no influence);
- By putting the centre of gravity in the middle of the forks;
- By measuring the load at a fixed height;
- By not taking the forks to the reference height too fast. It is best to lift the forks past the reference height (the height of the stickers on the carriage plate and mast) and then lower them to the reference height. This should be done slowly, without sudden stops;
- When raising- or lowering the load takes relatively long you have to raise parameter 1. Raising this parameter increases the measuring time. Standard P01 is set on 4 sec. (in most cases the correct configuration)

## 10.4 The indicator



### Display indications

By means of three pointer bars the display of the indicator shows:









-  ◀ The load measurement system (including load) is stable.
-  The weight shown is negative.
- NET ◀ The display shows the net weight.

The following indications can be shown in the display:

- |        |   |
|--------|---|
| HELP 1 | The load measurement system has been overloaded.  |
| HELP 2 | The zero point is below the originally calibrated zero point. See load measurement system calibration.                        |
| HELP 3 | Negative signal from the sensor.  |
| HELP 4 | The tare value entered (manually) is too high. Press key ↔PT again to delete this help message and key in a lower tare value. |
| HELP 7 | Signal from the sensor is too high.   |
| LO-BA  | The batteries are (almost) empty.   |

## 10.5 The touch panel

Every button has an operational and an entry function.

Operational function		Entry function	
	zero-setting and automatic tare		confirm and digit to the left
	tare entry		decrease flashing digit
	totalling		increase flashing digit
	on/off		Setting up kg or lb

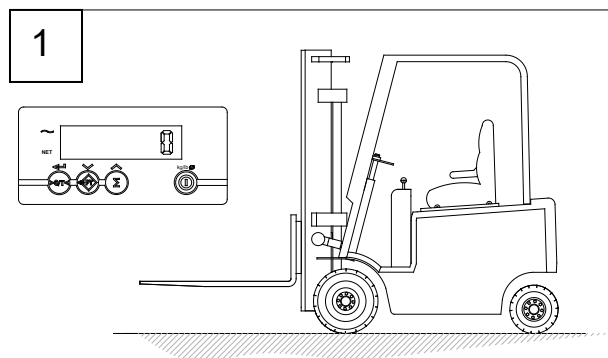
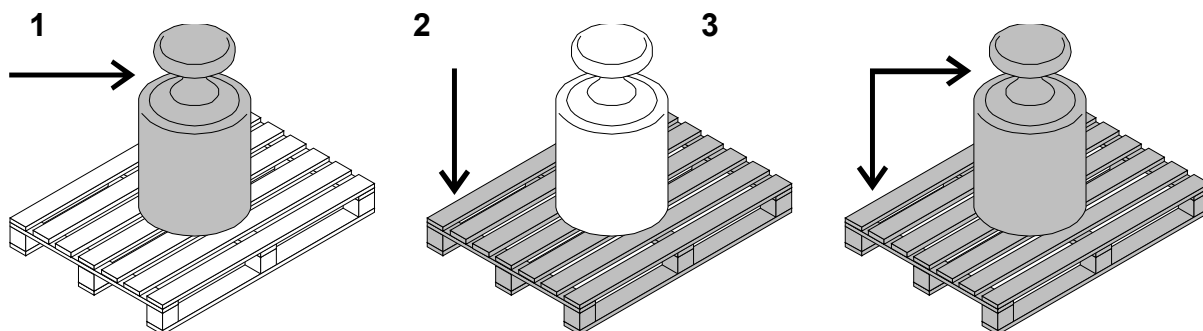
Operation of a key is not accepted unless the load measurement system is stable (and the “load stable” sign lights up). This means that the indicator only executes commands with a stable load.





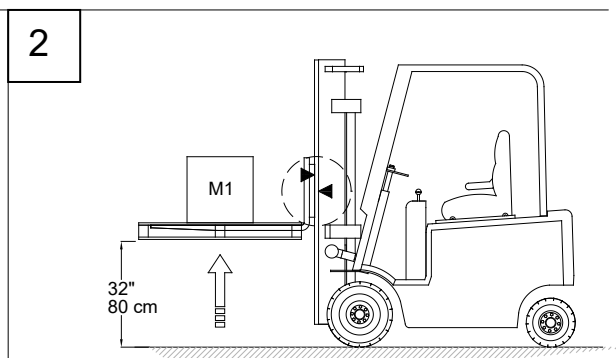
## 11.2 Gross weighing

UITLEG:  $Net(1) + Tare(2) = Bruto (3)$

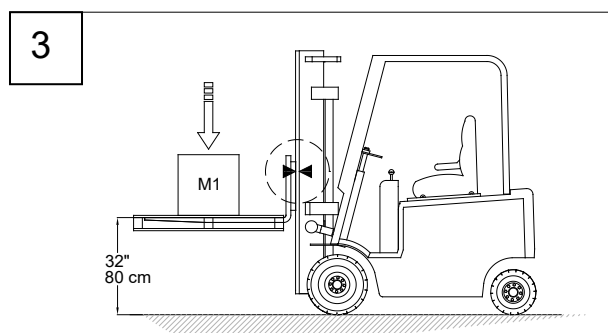


Before starting a new weighing, make sure that there is nothing on the forks!

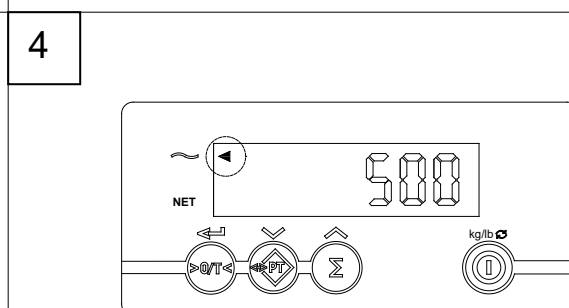
Check whether 0 kg is still shown on the display!



Lift the load past the reference height.



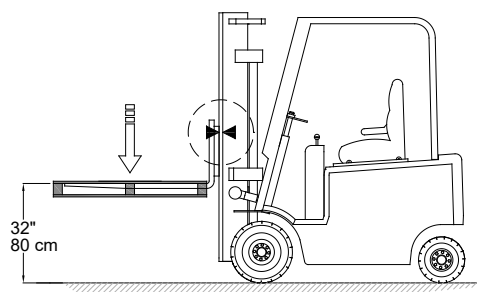
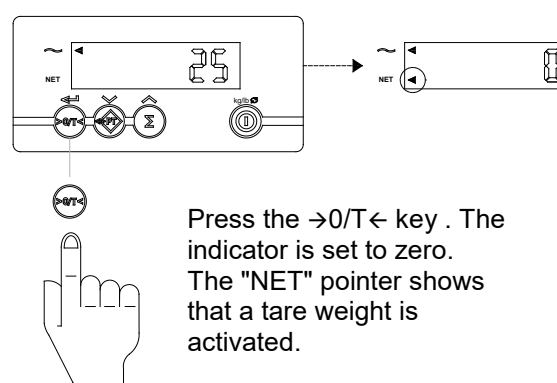
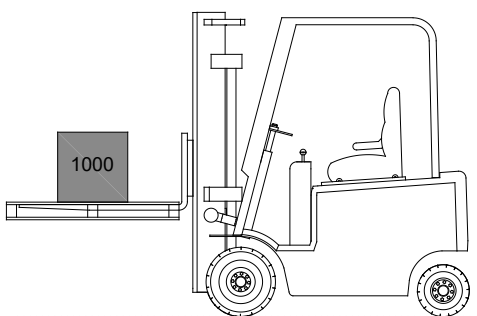
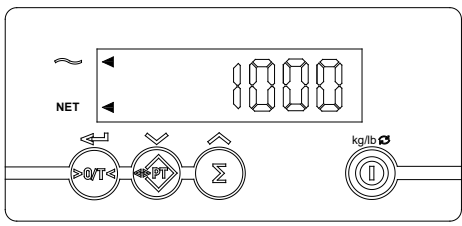
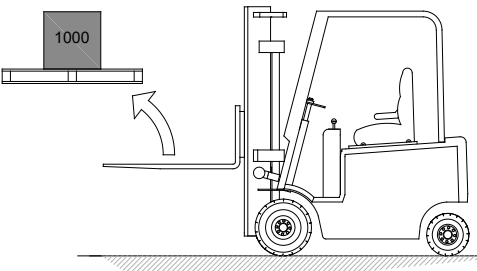
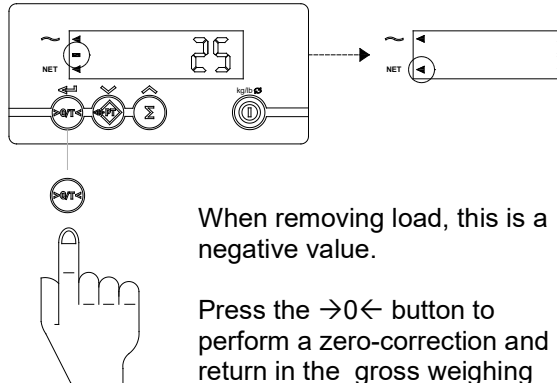
Then lower the forks calmly to the point at which the reference height arrows are opposite each other.



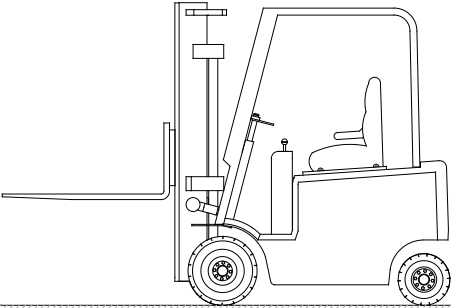
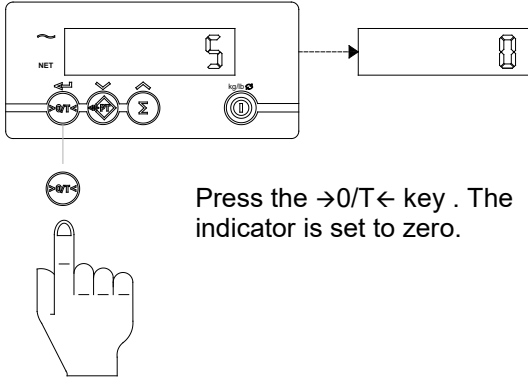
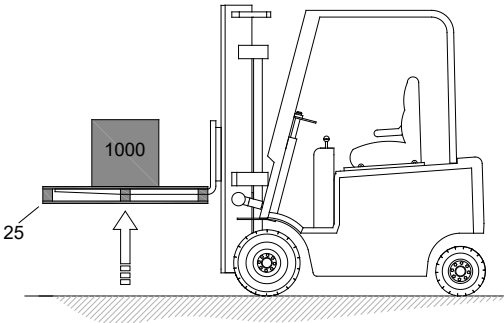
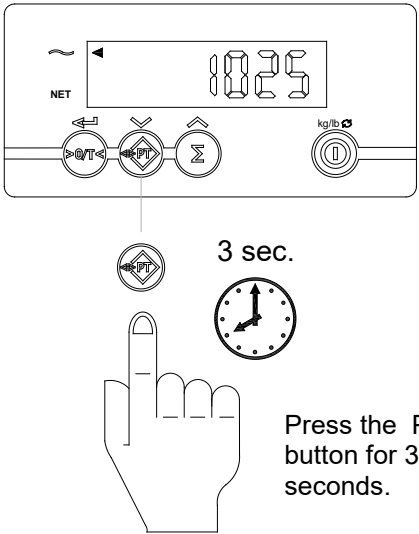
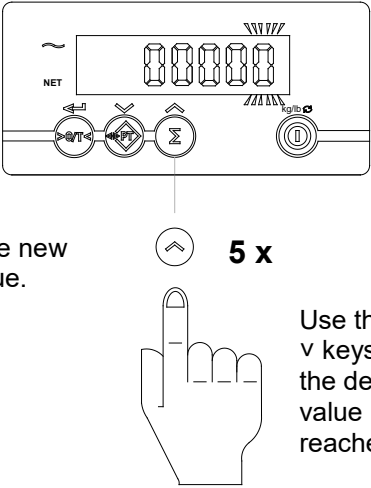
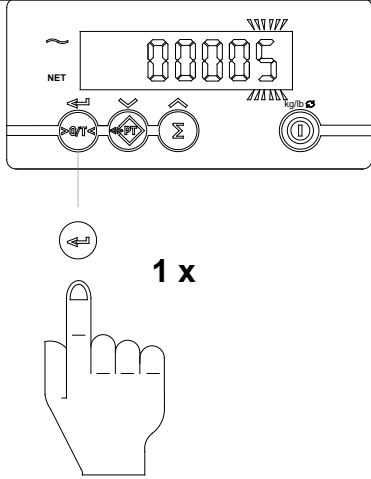
After a short time the display will show the 'load stable' indication.

### 11.3 Net weighing: automatic tare

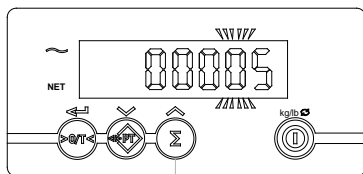
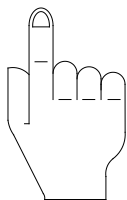
The indicator offers the possibility to reset tare weights to zero automatically. This way added or subtracted weights can be determined:

<p><b>1</b></p>  <p>Lower the load to reference height.</p>	<p><b>2</b></p>  <p>Press the <math>\rightarrow 0/T \leftarrow</math> key. The indicator is set to zero. The "NET" pointer shows that a tare weight is activated.</p>
<p><b>3</b></p>  <p>Place or remove the net load.</p>	<p><b>4</b></p>  <p>The display shows the net value of the weighed load.</p>
<p><b>5</b></p> 	<p><b>6</b></p>  <p>When removing load, this is a negative value.</p> <p>Press the <math>\rightarrow 0 \leftarrow</math> button to perform a zero-correction and return in the gross weighing mode.</p>

## 11.4 Net weighing: manual tare entry

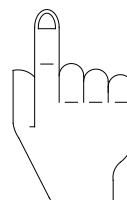
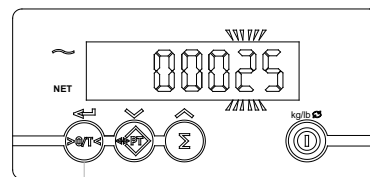
<p><b>1</b></p>  <p>Make sure that the forks are unloaded.</p>	<p><b>2</b></p>  <p>Press the →0/T← key . The indicator is set to zero.</p>
<p><b>3</b></p> 	<p><b>4</b></p>  <p>3 sec.</p> <p>Press the PT button for 3 seconds.</p>
<p><b>5</b></p>  <p>Enter the new tare value.</p> <p>5 x</p> <p>Use the ^ and v keys until the desired value is reached.</p>	<p><b>6</b></p>  <p>1 x</p>

7

**2 x**

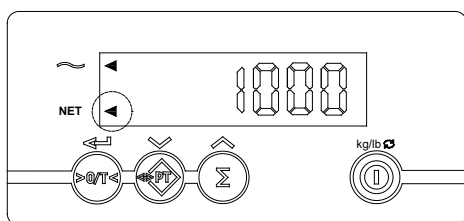
Use the  $\wedge$  and  $\vee$  keys until the desired value is reached.

8



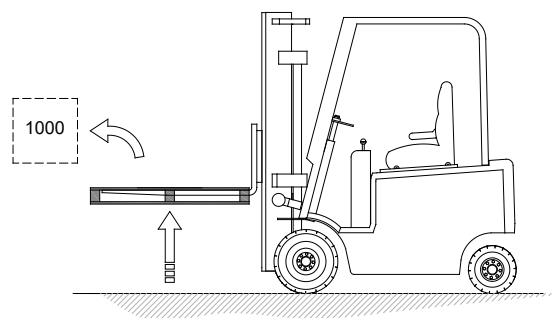
Press Enter to activate the tare weight.

9

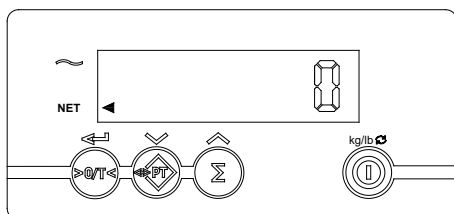


The indicator bar "NET" lights up. The net weight appears on the display.

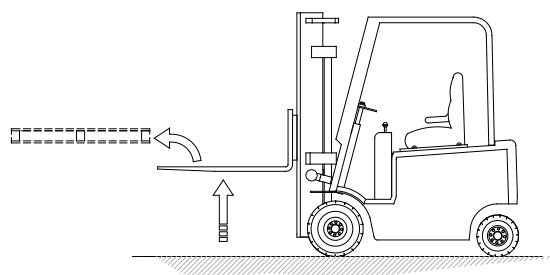
10



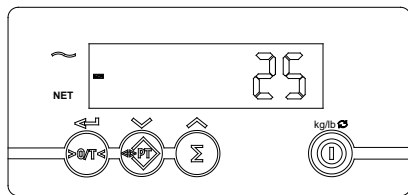
11



12

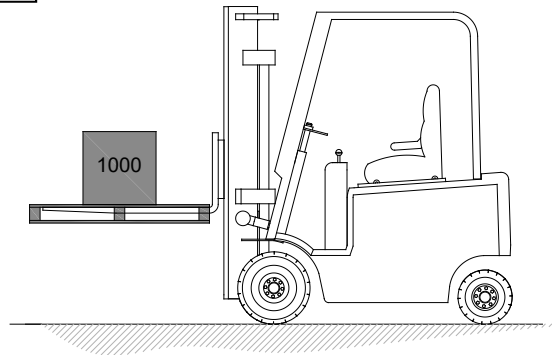


13

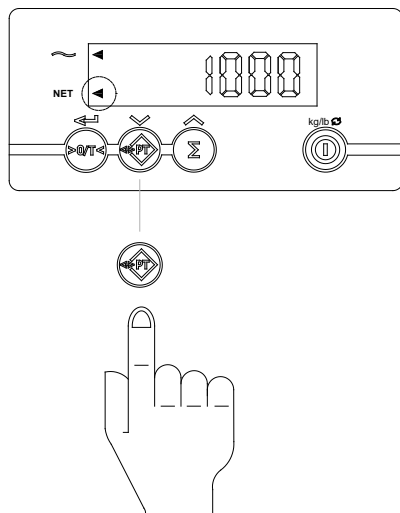


When removing the total weight,  
the value is negative !

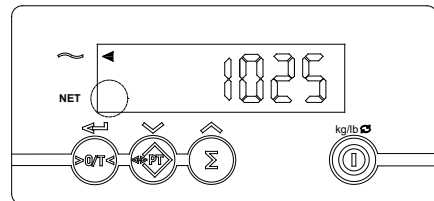
14



15



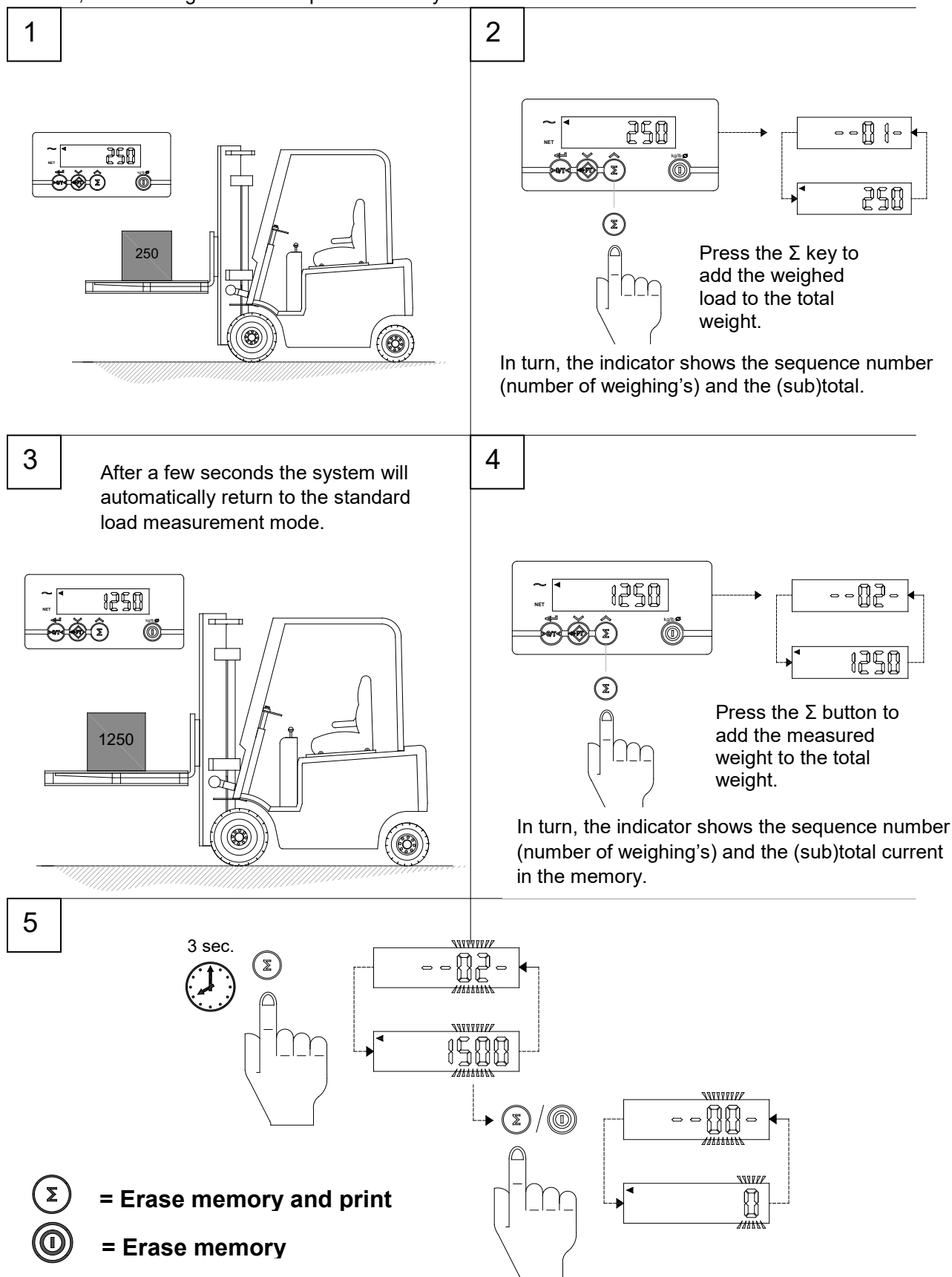
16



The gross weight is displayed.

## 11.5 Totaling

The indicator offers the possibility to add up weighing's and show the total weight. When a tare weight is active, the net weight is added up automatically.



## 12. Options

**These options can not be added once the system is mounted and can only be bought with a new system.**

### 12.1 Power supply by the trucks battery

The indicator is installed in the cabin of the forklift truck. Optionally, the power supply of the indicator can be connected to the battery of the forklift truck. The most common voltages for forklift trucks are 12, 24, 48 or 80.

In cases where the battery voltage is higher than 12 Vdc, the system requires a DC-DC voltage converter with an output voltage of 12 Vdc and possibly a filter.

In addition, the power cable of the indicator with a floating fuse holder with 3 .15A safety fuse.

#### 12.1.1 Guidelines to connect the power supply

- Make sure that the fuse is as close to the power source as possible.
- The fuse must be mounted safely and in an accessible location.
- On electric forklifts:  
Connect the power supply to the battery as close as possible, do not mount it directly on the battery or in front of a fuse.
- On petrol, diesel or propane forklifts:  
Connect the power supply as close to the battery as possible, and avoid the use of existing wiring.

#### 12.1.2 Guidelines for installation

**Please note:** always turn off the power supply before installation !

The installer should be familiar with the brands and models of equipment on which this converter is installed. The installer should also be trained and have experience in electrical systems of forklifts.

Follow the guidelines and the installation procedures as well as the guidelines of the forklift manufacturer to guarantee a safe and reliable installation.

- Make sure that the power supply is connected safely;
- Make sure the mounting surface is firm;
- Make sure the mounting surface can dissipate the heat from the power supply good;
- Make sure that the fuse is close to the battery of the forklift and matched with related weighing equipment;
- Keep the cables as short as possible, fixate it at least every 45 cm. (18 inch).

Make sure you become familiar with the requirements of the lift truck manufacturer and make sure you have the right qualifications to perform the installation of the power supply.

The converter must be installed in a suitable location.

See installation steps below:

Step 1 . Plan the installation and get the hardware

Step 2 . Install the indicator

Step 3 . Install the converter ( if necessary )

Step 4 . Install the further options such as printers, mobile computer and connections

Use only an approved and properly tuned power supply suitable for the country of operation. Use of alternative power supplies will void the system's warranty and can be dangerous.

**WARNING!** Only qualified personnel should perform an installation to a forklift. Improper installation can injure the operator or cause damage to the system, inverter, and/or the other options!



### 12.1.3 Connection to electric forklifts

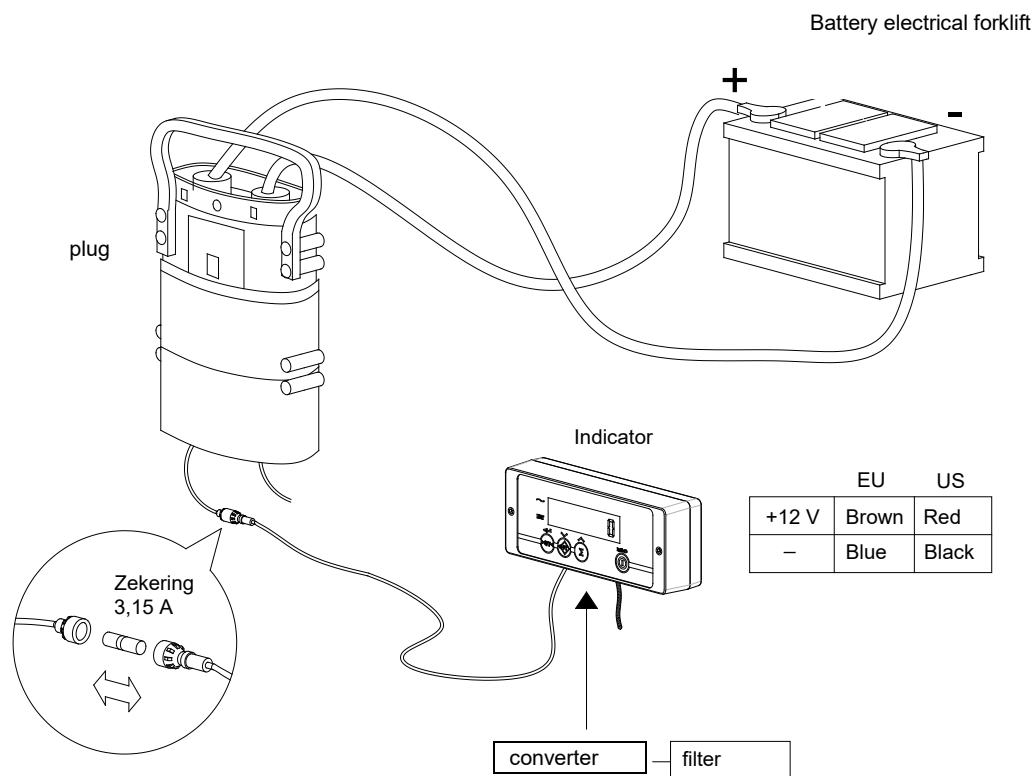
Connect the power supply to the battery as close as possible to, but not directly on, the battery and not in front of a main breaker.

Connect the red wire (indirectly: with plug in between) with the positive energy source (plus pole of the battery) of the forklift.

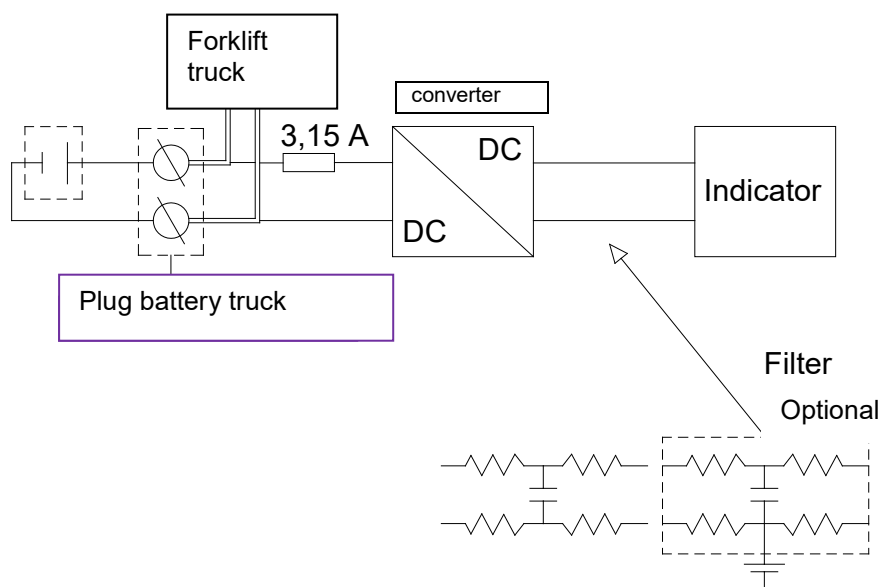
Connect the black wire (indirectly: with plug in between) to the negative power source (negative pole of the battery) of the lift truck.

Make sure the wire connectors are sufficiently isolated from each other.

Connect the battery back on the fork-lift truck.



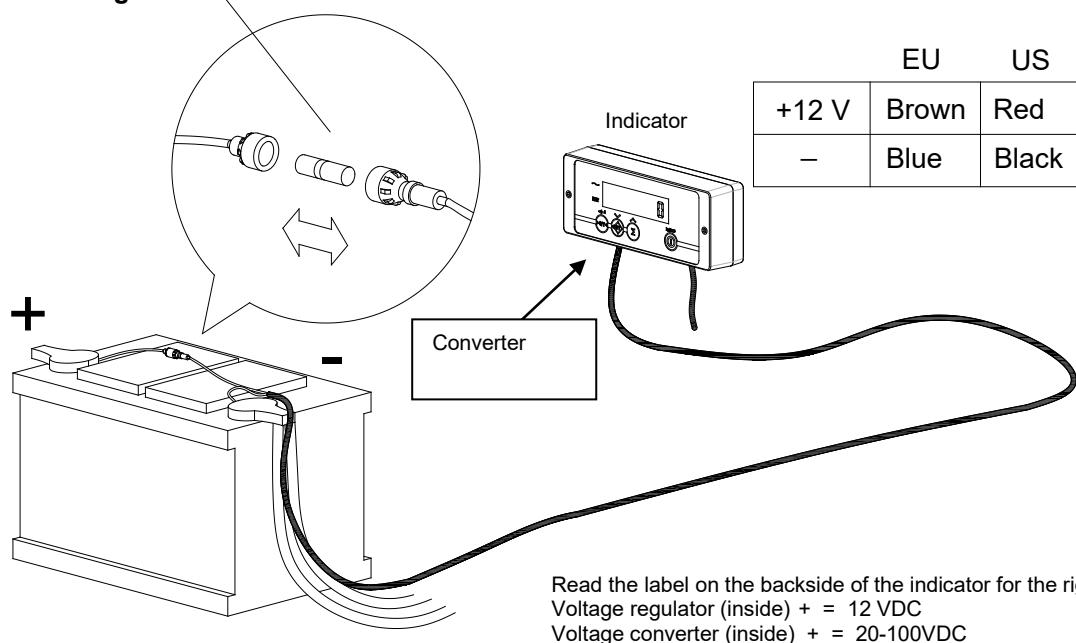
Electrical forklift



#### 12.1.4 Connection to gasoline, diesel or propane forklifts

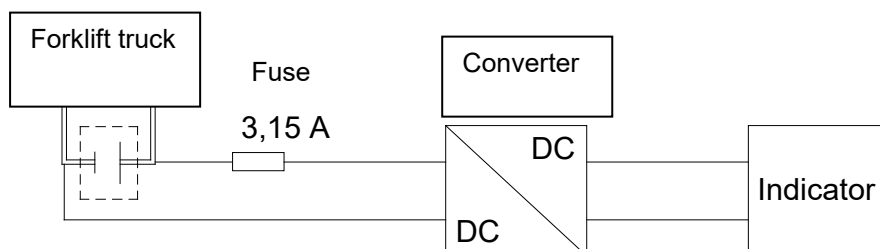
Connect the power supply as close as possible to the battery and avoid the use of the existing wiring. Connect the red wire to the positive energy source (plus pole of the battery) of the pallet truck. Connect the black wire to the negative energy source (negative pole of the battery) of the pallet truck. Make sure the wire connectors are sufficiently isolated from each other. Connect the battery back on the fork-lift truck.

**3.15A safety fuse in  
12 V wiring**



#### Forklift battery power supply

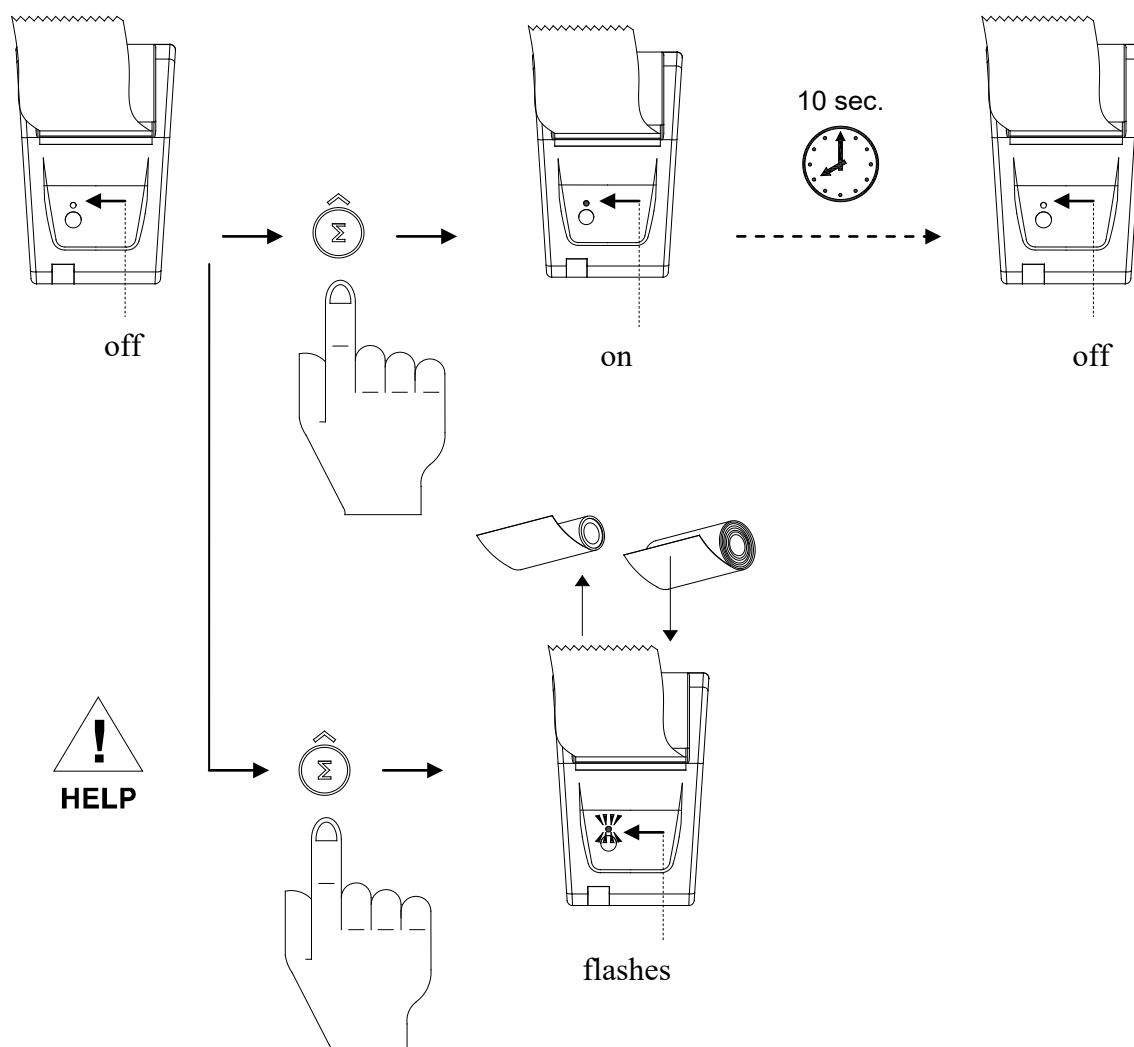
Combustion truck



## 12.2 Printer (option)

### 12.2.1 On/off printer

Turn the printer on by pushing the  $\Sigma$  button. After 10 sec. the printer shuts down automatically.



print example:

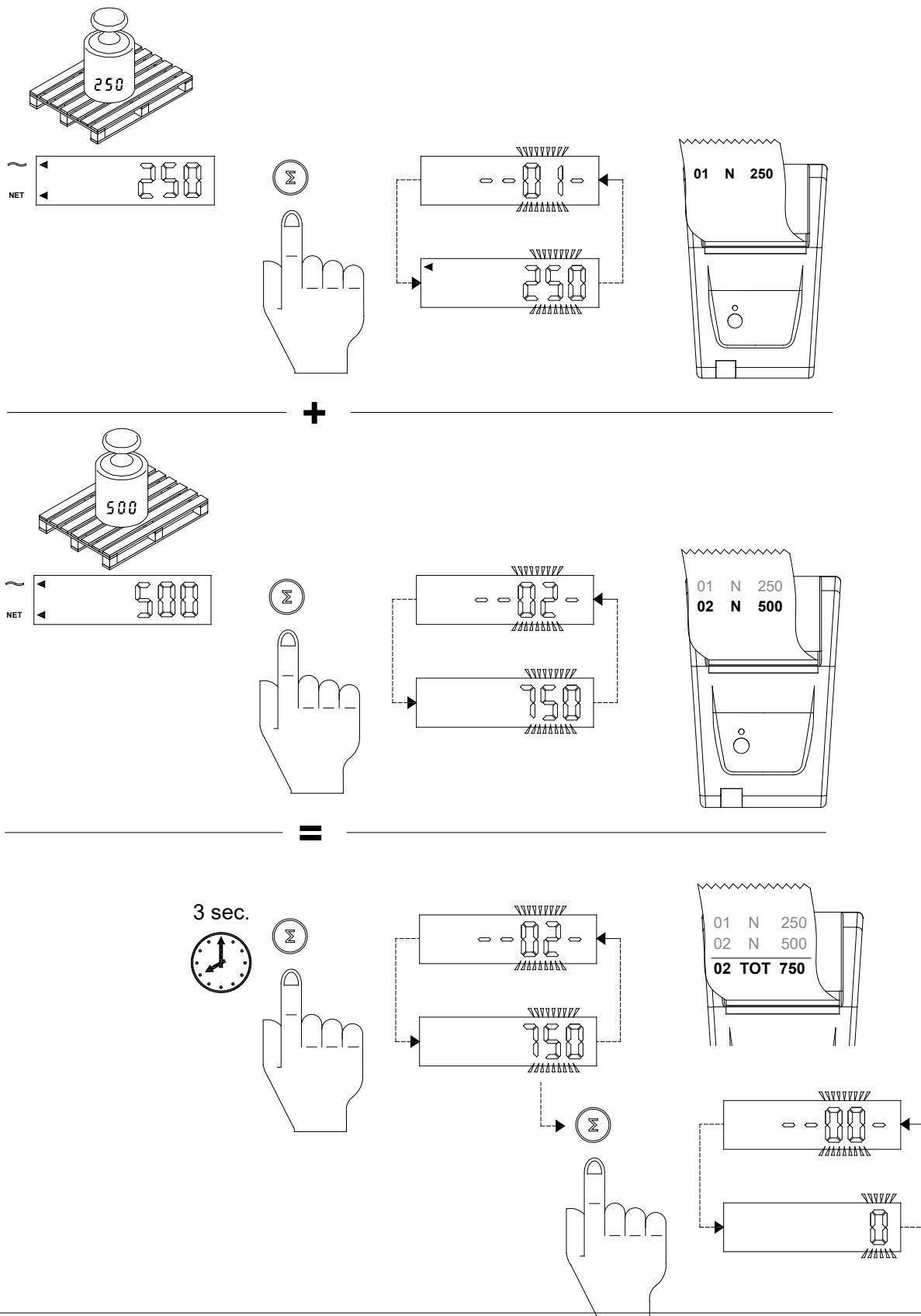
01 B/G*	6.8 kg
02 B/G	158.2 kg
03 N	426.5 kg
04 N	1200.0 kg
04 PT	150.0 kg
04 TOT	1791.5 kg

On the print a gross weight will be displayed with the letters "B/G" and a net weight with the letter "N".

The gross weight will be displayed with the letters "TOT".

### 12.2.2 Making a print (option)

Current weighing data can be printed as individual weights and as a total weight.



### 12.2.3 Replace printer paper

