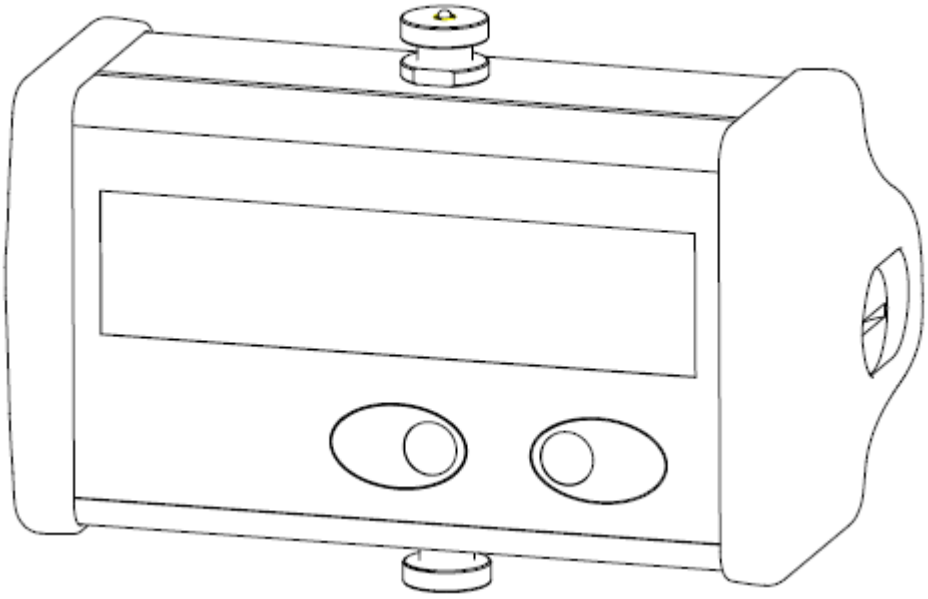
MANUAL

Crane Scale
(NAWI)

SLS...



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Content Page

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Safety instructions

In cases where a breakage would cause injury to persons or damage to equipment, the user must take appropriate safety measures (such as fall protection, overload protection, etc.). For safe and trouble-free operation, weighing modules must not only be correctly transported, stored, sited and installed but must also be carefully operated and maintained.

It is essential to comply with the relevant accident prevention regulations. In particular you should take into account the limit loads quoted in the specifications.

Use in accordance with the regulations
The SLS... crane scale is conceived for weighing applications. Use for any additional purpose shall be deemed to be **not** in accordance with the regulations.

In the interests of safety, the crane scale should only be operated as described in the Mounting Instructions. It is also essential to observe the appropriate legal and safety regulations for the application concerned during use. The same applies to the use of accessories.

The crane scale is not safety element within the meaning of its use as intended. Proper and safe operation of this crane scale requires proper transportation, correct storage, assembly and mounting and careful operation and maintenance.

In the case of legal for trade use, the national legal and safety regulations must be complied with.

General dangers due to non-observance of the safety instructions

The SLS... crane scale correspond to the state of the art and are fail-safe. The crane scale can give rise to residual dangers if they are inappropriately installed and operated by untrained personnel.

Everyone involved with the installation, commissioning, maintenance or repair of a crane scale must have read and understood the Mounting Instructions and in particular the technical safety instructions.

Residual dangers
The scope of supply and performance of the crane scale covers only a small area of weighing technology. In addition, equipment planners, installers and operators should plan, implement and respond to the safety engineering considerations of weighing technology in such a way as to minimise residual dangers. Prevailing regulations must be complied with at all times. There must be reference to the residual dangers connected with weighing technology.

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In these mounting instructions residual dangers are pointed out using the following symbols:

Symbol:  **DANGER**

Meaning: **Highest level of danger**

Warns of **a directly** dangerous situation in which failure to comply with safety requirements **will** lead to death or serious physical injury.

Symbol:  **WARNING**

Meaning: **Possibly dangerous situation**

Warns of **a potentially** dangerous situation in which failure to comply with safety requirements **can** lead to death or serious physical injury.

Symbol:  **ATTENTION**

Meaning: **Possibly dangerous situation**

Warns of **a potentially** dangerous situation in which failure to comply with safety requirements **could** lead to damage to property, slight or moderate physical injury.

Symbols indicating application notes and useful information:

Symbol:  **NOTE**

Refers to the fact that important information is being given about the product or its use.

Symbol: 

Meaning: **CE mark**

The CE mark signals a guarantee by the manufacturer that his product meets the requirements of the relevant EC directives.

Symbol: 

Meaning: **Statutory marking requirements for waste disposal**

National and local regulations regarding the protection of the environment and recycling of raw materials require old equipment to be separated from regular domestic waste for disposal.

For more detailed information on disposal, please contact the local authorities or the dealer from whom you purchased the product.

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Environmental conditions
In the context of your application, please note that all materials which release chlorine ions will attack all grades of stainless steel and their welding seams. In such cases the operator must take appropriate safety measures.

Prohibition of own conversions and modifications
The scale electronic unit must not be modified from the design or safety engineering point of view except with our express agreement. Any modification shall exclude all liability on our part for any damage resulting therefrom.

Qualified personnel
This weighing electronic is only to be installed by qualified personnel strictly in accordance with the technical data and with the safety rules and regulations which follow. It is also essential to observe the appropriate legal and safety regulations for the application concerned. The same applies to the use of accessories.
Qualified personnel means persons entrusted with the installation, fitting, commissioning and operation of the product who possess the appropriate qualifications for their function.

Accident prevention
Although the specified nominal capacity in the destructive range is several times the full scale value, the relevant accident prevention regulations from the trade associations must be taken into consideration.

1 Introduction and appropriate use
The SLS... crane scale is a non-automatic weighing instrument (NAWI).

The nominal (rated) load and the parameters relevant to calibration are specified on the identification plate on the back of the device.

The scale can be used in applications subject to mandatory calibration up to 2000d=e.

Power is supplied by 4 batteries (AA cells).

The scale has an LCD display and 3 push-buttons. One button is used to adjust the scale (hidden button) and in the case of applications subject to mandatory calibration, is sealed with a calibration seal. Partial load adjustment is also possible.

A counting scale function can be activated via the operator menu.

Special features:
- Operating voltage 3.6 ...6 V
- Adjustable digital filtering and scaling of the measurement signal
- Display value range monitoring
- Power fail safe parameter storage
- Zero balancing (_2 % of full scale)
- Automatic zero tracking (gross / net value, 0.5 d/s, _2 %)
- Automatic zero on startup (_2 %..._20 % of full scale)
- Taring
- Gross / net selection
- kg <−−> lbs selection (not legal for trade)
- Verification switch with calibration counter
- Automatic cut-off, adjustable (off, 30 s, 60 s)
- Counting scale function

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2 Information on verified scales

2.1 Initial verification

The initial verification by HBM is documented on the scales by the following stickers:

- **Green M:** Initial verification has already been performed on this device

- **CE seal:**
  CE: EC mark of conformity
  06: Year in which the initial verification was performed (here 2006)
  0109: As a nominated European Community station, registration number 01.02–04, HBM has been authorized by the Verification Directorate of the State of Hesse to perform initial verification.

- **HBM Sealing:**
  During the initial verification, this seal is used to protect scales of Accuracy Class III from unauthorized influence being exerted on the metrological data.
  If this seal is violated, the verification is no longer valid.
  The scales may then no longer be used for legal-for-trade operation.

NOTE

So please check the state of this sealing mark on your scales!

2.2 Using verified scales in legal-for-trade operation

Type approval for verification only applies to non-automatic scales.
For automatic operation with or without additional devices built on, please observe the national standards applicable to the place of installation.

The national legal standards for legal-for-trade use must be observed whenever the scale has to be re-adjusted, for example following repair, if the seal is broken, etc.

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2.3 Declarations of conformity

Scales for use in legal metrology:

Directive 90/384/EEC ”Non-automatic weighing instruments” regulates the determination of mass in legal metrology.
It also regulates the performance of EC verification by the manufacturer, provided there is EC type approval and the manufacturer has been accredited for these activities as a station nominated by the Commission of the European Communities.
The above EC Directive, applicable in the harmonized European single market since 01.01.1993 and official recognition from the Verification Directorate of the State of Hesse in 10.02.2006 that the requisite quality management system is in place at HBM, are the legal basis for performing EC verification at HBM.

Re-verifications in Germany
The validity period for initially scales verified for use in the medical sector expires after the fourth calendar year and for other industrial applications on expiry of the next but one calendar year to the year indicated on the initial verification sticker. Re-verifications must be performed by a weights and measures officer or by a station authorized for this purpose. A re-verification performed in due time must be registered at the local weights and measures office or authorized station. Please observe any changes made by the legislators, where applicable.

Re-verifications elsewhere in Europe
The period of validity of verification complies with the national standards applicable to the country in which the scale is being used. For information about the currently applicable legal standards in your country, please contact your local weights and measures office.

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3 Operating the crane scale
3.1 Display and control functions

The display is an LCD with numbers 20 mm high:

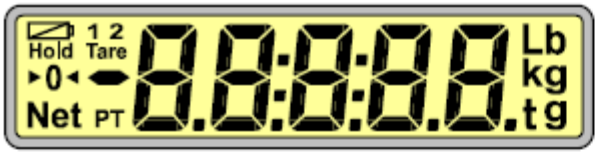

Fig.2.1: LCD display

Description of symbols:

	The battery symbol indicates that the battery needs to be changed
▸0◂	Gross value in the accurate zero range (±0.25 d)
Net	Net measurement display
PT	Interactive mode (parameters / adjustment menu)
1 2	**Adjustment mode:** **1**=Zero balance, **2**=Sensitivity adjustment
	Weighing mode (for multi-range scale): **1**=Measuring range 1, **2**=Measuring range 2
Lb kg t g	The weight unit is displayed when the scale is at rest (standstill)

The scale is operated by means of two push-buttons:

Fig.2.2: Control push-buttons

The following scale functions are controlled by the push-buttons:

Push-button(s)	Short keypress (standard function)	Long keypress (>10 s)
ON 	ON / OFF switch	kg <--> lbs selection (only when not legal for trade)
G/N 	Gross / net selection or tare and net display	Set to zero (±2 %)
ON + G/N (simultaneously) 	Interactive mode	---

In the interactive mode (setting up the scale), the function of the push-buttons are different. This is described in chapter 4 “Setup dialog” and chapter 5 “Standard dialog / extended standard dialog”.

Hidden button for scale adjustment:

The scale has a hidden push-button (remove the left-hand cover of the housing), which is immobilized by the calibration seal for applications subject to mandatory calibration. This push-button is used to adjust the scale.

Fig.2.3: Hidden push-button (symbolic representation)

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3.2 Initial activation

Also refer to the section on "Gravitational factor for the place of installation (Gd)"

Also refer to the section on "Gravitational factor for the place of installation (*Gd*)"

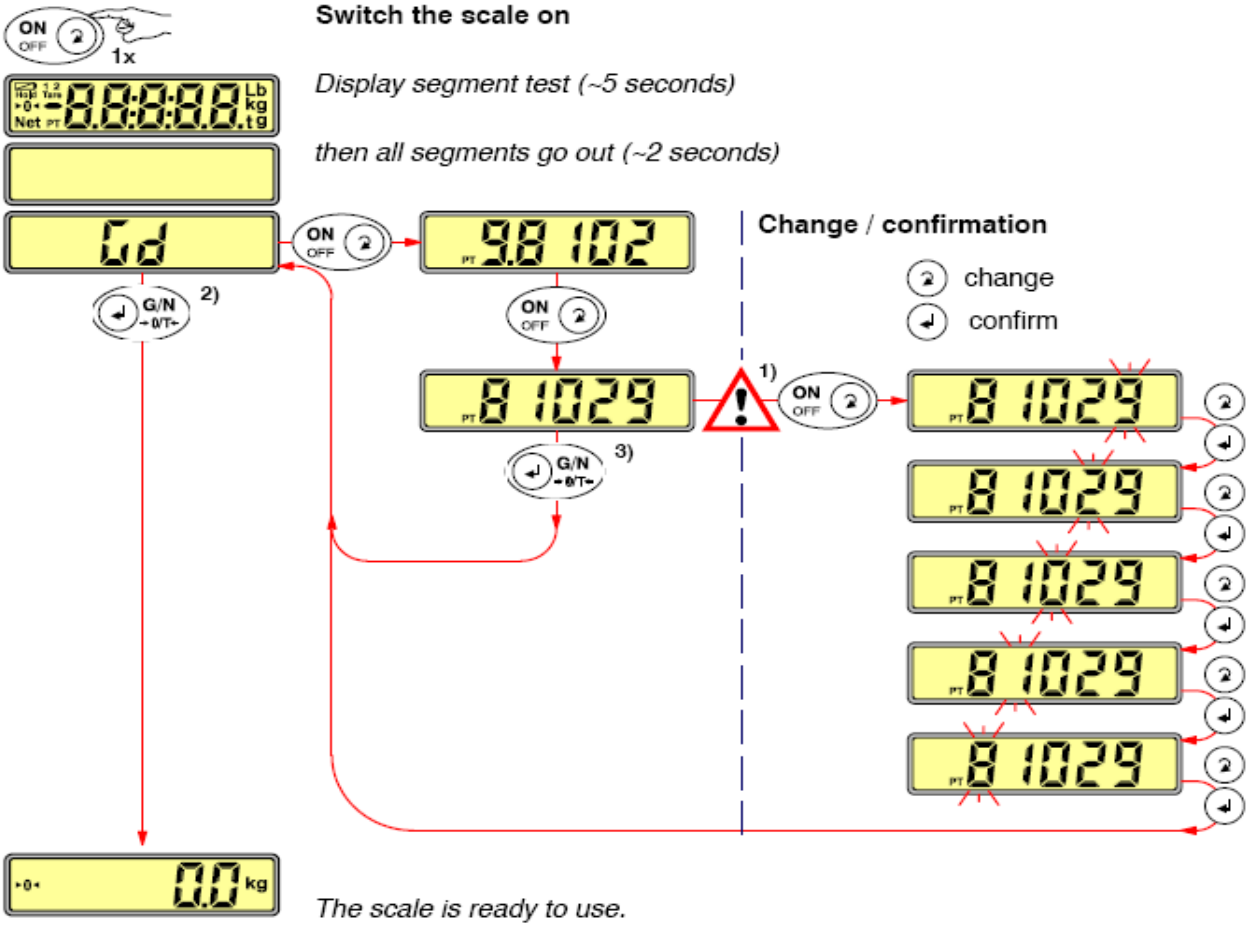
CAUTION

The following **change** / **confirmation** of ***Gd*** can be made **once only** !!!

The responsibility of ensuring that the ***Gd*** value is correct lies with the lifter manufacturer and the service engineer they appoint to set up the scale at the place of installation !!!

Scale verification is invalid if an incorrect value is entered at this point !!!

Even if the scale has already been verified and given a calibration seal, you still have this single opportunity to change or confirm the value for gravitational acceleration at the **place of installation** of the scale (***Gd*** = ***G****ravity at* ***d****estination*) without affecting the standard meter.



The scale is ready to use.

1) If you press the **ON**/**OFF** button at this point, you will **no longer be able to cancel** "change/ confirm"!
The individual numbers for ***Gd*** can be changed and / or confirmed. **The next time the scale is activated, *Gd* will not be displayed**: see "Activation".
2) If you press the **G**/**N** button without calling the **Change** / **confirm** sub-menu, ***Gd*** will be displayed again the next time the scale is activated.
3) At this point, you can cancel the process by pressing the **G**/**N** button ! The next time the scale is activated, ***Gd*** will again be displayed.

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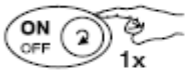
3.3 Activation

The scale is ready to use about 10 seconds after it has been switched on. ***Do not move the scale or load it during this time !***



Switch the scale on

Display segment test (~5 seconds)

then all segments go out (~2 seconds)

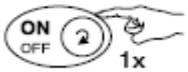
Automatic zeroing [1] (~3 seconds)

The scale is ready to use.

[1] If the initial loading of the scale (tare) exceeds 20 % of the weighing range, automatic zeroing does ***not*** *take place. In this case, taring must be performed manually (see the "Gross / net selection and taring" section).*

3.4 Deactivation

Factory setting: auto off = off



Press the ON/OFF button to switch the scale off.

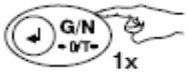
The factory default is for the unloaded scale not to switch itself off automatically after 60 seconds. In interactive mode (see "Power Off + Amplifier Filter") it is possible to modify the deactivation characteristic.

3.5 Gross / net selection and taring

When the scale is ready to use, add the weight to be tared (e.g. the sling, weight 6.7 kg).

The gross weight is displayed
(when the scale is at rest, the weight unit is displayed)

Taring



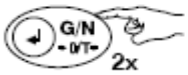
The scale zero setting is displayed

Press the G/N button again to toggle between the scale zero setting and the gross weight.

Add any additional weight for taring (e.g. weight 3.1 kg).

The gross weight is displayed
(when the scale is at rest (standstill), the weight unit is displayed)

Taring



The scale zero setting is displayed

The first time the G/N button is pressed, the current total (gross) weight is displayed. Press the G/N button again to tare. You can repeat this process any number of times until the maximum weighing range of the scale is reached.

When the scale is switched off, the tare weight is cleared.

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3.6 Zeroing

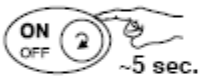
Zeroing (G/N button, long keypress) is only performed when the scale is at rest (standstill) and unloaded. The gross value must be within ±2 % of the nominal load of the scale.

3.7 Changing the unit (kg <-> Lb)

> > > Only possible for scales not subject to mandatory calibration. < < <

When the scale is ready for use, press the ON button and keep it pressed for ~5 seconds

*Unit **kg***



keep it pressed for ~5 seconds

*Unit **Lb** (American pound)*

*Proceed in the same way to change from **Lb** to **kg**.*

Whichever unit is set is retained even when the scale is switched off.

3.8 Automatic zero tracking

This function prevents the scale zero point drifting and is only performed when the scale is at rest and unloaded (gross or net value = 0 ±0.5 d). The maximum zeroing range is ±2 % of the nominal load of the scale.

*Zero tracking is switched **off** at the factory (**Zt = 0**, see "Extended standard dialog").*

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3.9 Monitoring functions

Battery status

The batteries are flat and must be replaced !
(battery voltage < 4 V)

If the scales are not subject to mandatory calibration, they can still be used to weigh for some time after the battery symbol appears. But to avoid measurement errors, the batteries should be replaced immediately.

Standstill

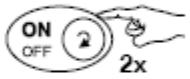
The weight unit lights up when the scale is at rest (±1 d/s).
e.g. 100,0 kg

Overload

Please keep to the nominal load for the scale
(see the identification plate on the back of the device)

Underload

Switch the scale off and then on again.



Overload / underload limits:

Settings	Underload	Overload
Standard	Gross < –120 %	Gross > 120 %
OIML	Gross < –5 %	Gross > MAX +9 d
NTEP	Gross < –5 %	Gross > MAX +5 %

The percentages relate to the relevant nominal load.

3.10 Display values (factory defaults)

The scale is set to the following display values for nominal load at the factory:

calibratable			
	SLSC2	**SLSC2-MR**	
Mode	**Nominal load (E_{max}) = 200 kg**	**Nominal load (E_{max}) = 320 kg**	
OIML / NTEP	200.0 kg Increment = 1 d (= 100 g)	Max 1	200 kg d1=e1=100 g
		Max 2	320 kg d2=e2=200 g
not calibratable			
	SLS		
Mode	**Nominal load (E_{max}) = 200 kg**	**Nominal load (E_{max}) = 250 kg**	
Standard	200.00 kg Increment = 10 g	250.0 kg Increment = 100 g	

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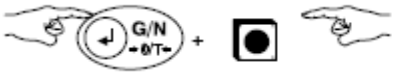
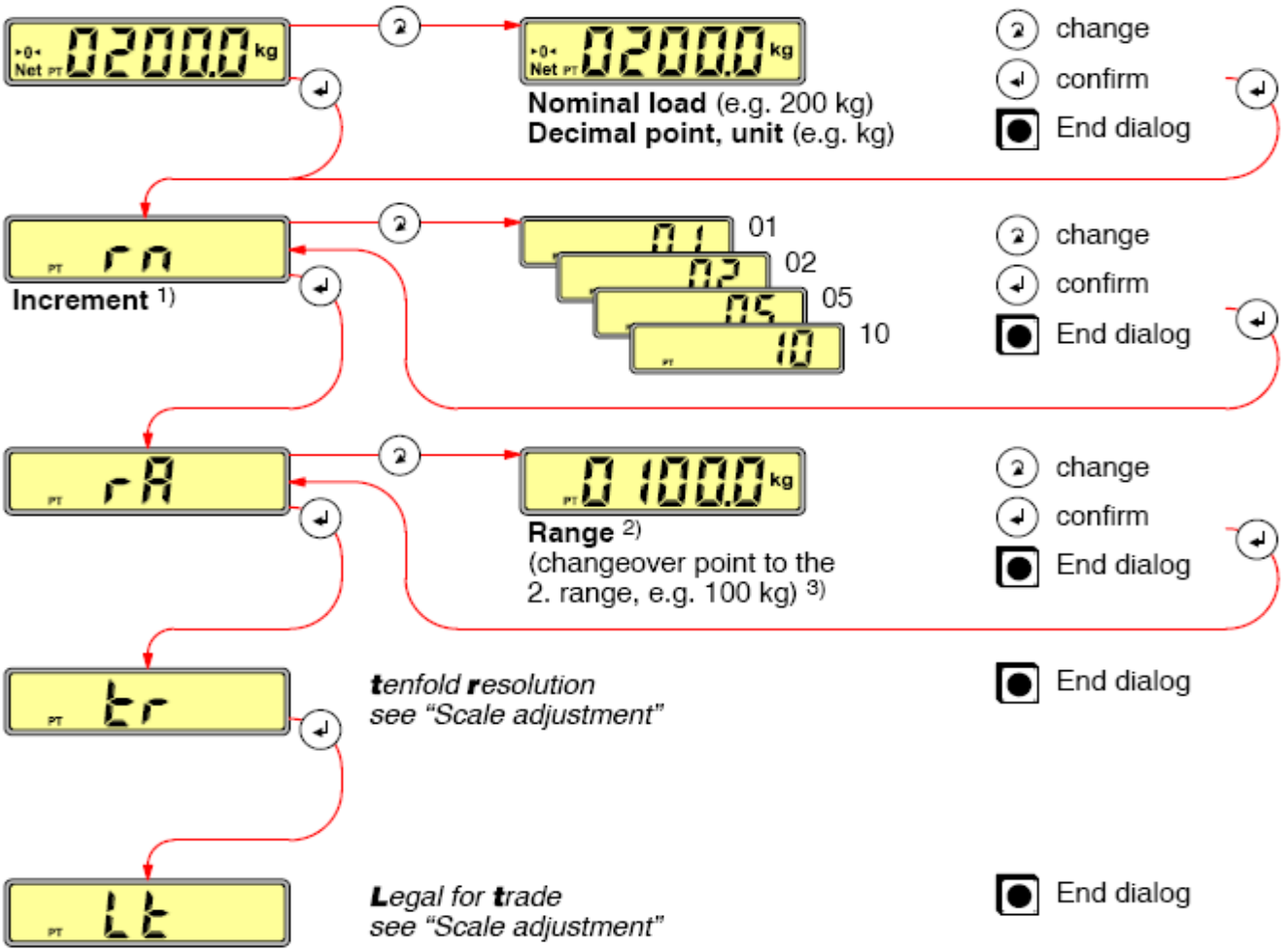
4 Setup dialog
4.1 Basic scale settings

Nominal load, decimal point, unit / increment / range (1 or 2-range scale)

The scale has a hidden button (remove the left-hand cover of the housing), which is immobilized by the calibration seal for applications subject to mandatory calibration. This button is used to adjust the scale.



Keeping the G/N button pressed, operate the hidden button



1) *With dual-range scales, the setting **rn** applies to the first range. The increment for the second range is automatically the next-highest level !*
*Examples: if the **rn** setting = **01**, the increment in the second range is **02***
*if the **rn** setting = **05**, the increment in the second range is **10***

The scale stays in the second range even if the value falls below the changeover point between the first and second ranges. It will only change back to the first range once the scale is fully unloaded.

2) *With single-range scales:*

3) *Once the scale has changed over to the second range, it will stay there even if the value falls below the changeover point between the first and second ranges. It will only change back to the first range once the scale is fully unloaded.*

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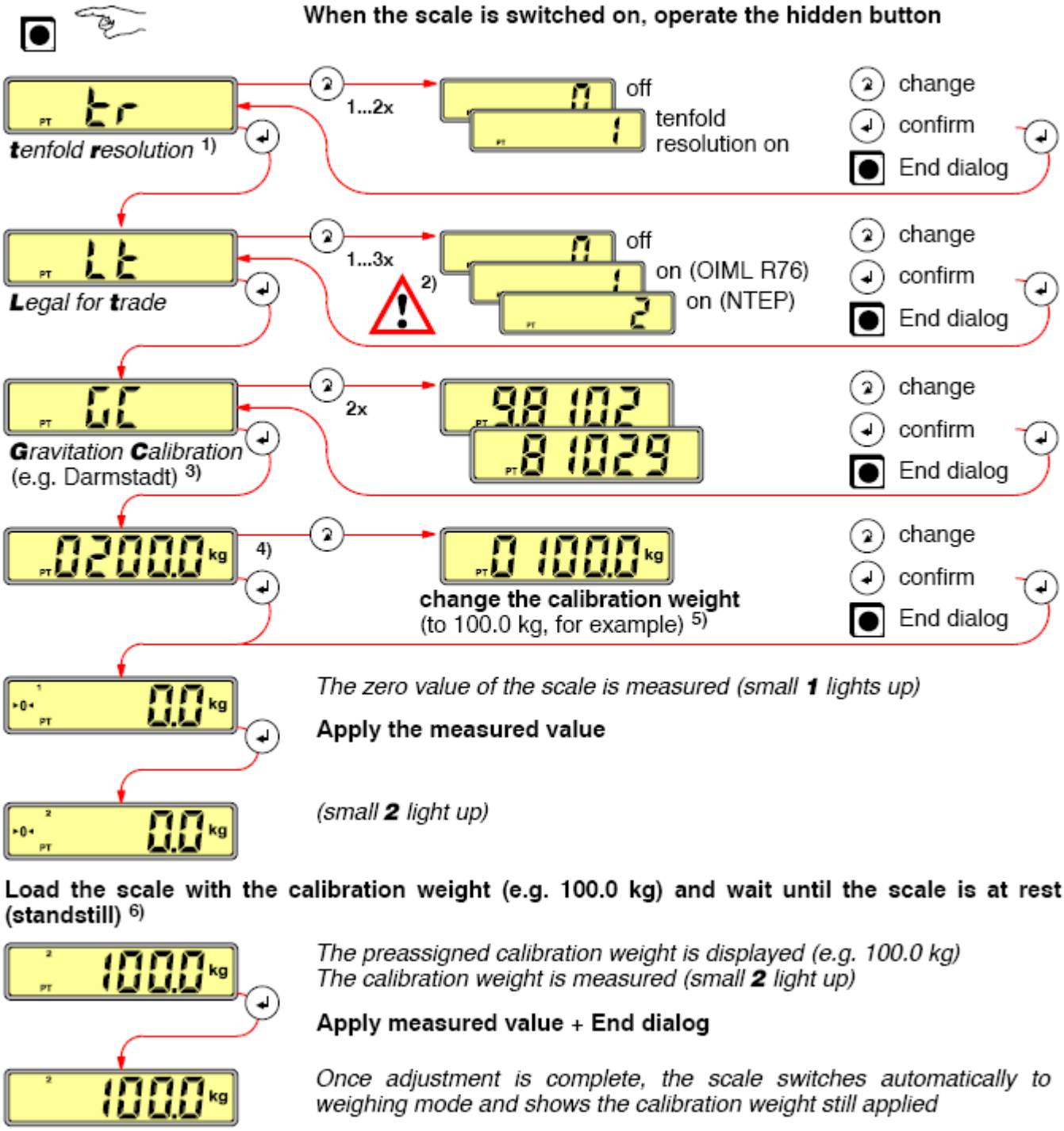
4.2 Scale adjustment (Calibration in a partial load range)

The scale has a hidden button (remove the left-hand cover of the housing), which is immobilized by a calibration seal for versions subject to mandatory calibration. This button is used to adjust the scale with a calibration weight of > 20 % ... < 120 %.



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1) To bypass the time-consuming process of gradually adding weight during verification, it is possible to activate 10-fold resolution of the measured value to allow direct reading of the analog measurement error [tr = 1]. But this is only possible for nominal values ≤9999 d (4 digits on the display), as 10-fold resolution cannot be displayed if they are any larger.

This setting is only used to simplify the verification process and cannot be stored. When the scale is switched off, this increased resolution is reset back to what it was. As access to the hidden button is protected by the verification seal, once verification is complete, this increased resolution can no longer be activated without destroying the seal.

2) Before activating ***L**egal for **t**rade*, you must first make all the settings that can no longer be changed once ***Lt** = **1** or **2*** (see "Extended standard dialog")!

3) The gravitational acceleration at the place of calibration (see also "Gravitational acceleration at the place of installation" = Extended standard dialog: ***Gd G**ravity at **d**estination*).

4) The last calibration weight to be entered is displayed and can also be applied without being changed. In this situation, the following displays are not the same as in the example shown.

5) The partial load value can be entered in the range 20 % to 120 % of the nominal load. If the input value is outside this range, **Err: 1** is displayed and you exit the menu. The incorrect value is not applied. Use the hidden button to call the menu again.
The nominal load is specified on the nameplate (MAX1 or MAX2 with a dual-range scale).

6) If the calibration weight has been forgotten, **Err: 1** is displayed and you exit the menu. The parameters previously set are not applied. The old setting is retained. Use the hidden button to call the menu again.

The scale does not switch off automatically if a menu is active.

Once the scale is adjusted, refit the cover on the left-hand side and immobilize with the calibration seal for versions subject to mandatory calibration.*)

NOTE

***) ...it is essential that the required settings have already been made in the standard dialog / extended standard dialog !!!**

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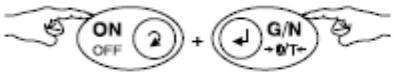
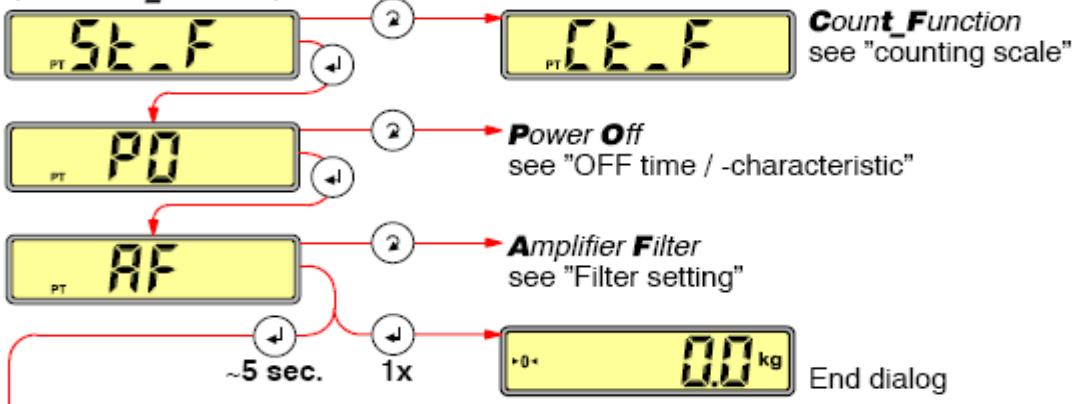
5 Standard dialog / extended standard dialog



Activate interactive mode
(Parameter menu / adjustment menu)

Standard dialog:

*(**St**andard_**F**unction)*



Count_Function
see "counting scale"

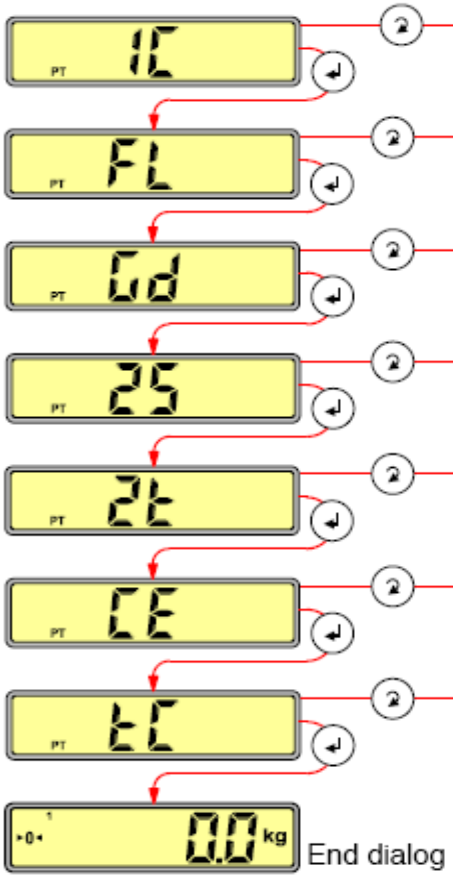
Power Off
see "OFF time / -characteristic"

Amplifier Filter
see "Filter setting"

End dialog

Keeping the G/N pressed for ~5 seconds activates the extended standard dialog

Extended standard dialog:



Internal Conversion rate *1)*: *2#)*
(mean-value calculation)
1, 2, 3, 4, 5, 6

Fast SettLing: *40#)*
see "Automatic filter selection"

Gravity at destination **)*
The gravitational accel. factor at the place where the scale is installed, also see "Scale adjustment" (**GC** = ***Gravitation Cal.***)

Zero Setting **): 4#)*
see "Zero on startup (**Z**ero **S**etting)"

Zero tracking **): 0#)*
1 = activated (factory default) / **0** = deactivated
see "Automatic zero tracking"

Counting scale Enable: 1#)
Counting scale function: enable (**1**) / disable (**0**)

trade Counter (standard meter count)
(display only)

End dialog

) In legal for trade mode (Lt** = **1** or **2**, see "Legal for trade"), it is not possible to change the value for **Gd** in the extended standard dialog. Display only.*

#) Factory setting

*1) see Section 5.3 "Mean-value calculation (**I**nternal **C**onversion rate)"*

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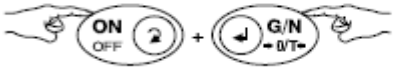
5.1 Counting scale

(Standard dialog)

*The counting scale function must be enabled for the following dialog (**CE=1**, **see "Extended standard dialog"**)!*

*As the zero point of the scale is measured automatically, any tare load (e.g. container, pan, etc.) must have been added to the scale **before this dialog**.*



Activate interactive mode

(**St**andard_**F**unction)

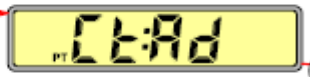
(**C**ount_**F**unction)

Counting scale **OFF**

End dialog

Counting scale **ON**

End dialog



Counting scale **Adjustment** (***Ct:Ad**justment*)

*The zero point of the counting scale is measured **automatically** (the colon flashes during measurement). **Do not move the scale or modify the tare load during this time !***

Put on the reference.

Enter the piece number (1 ... 999, e.g. 050) manually via the **ON** button, confirm each flashing digit with the **G/N** button.

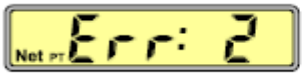
*Once the third digit has been entered or confirmed, the reference weight is **automatically** measured (the colon flashes during measurement). **Do not move the scale or modify the load during this time !***

The scale then switches back to display mode.

Remove the reference.

*Display when the counting scale is **unloaded**.*
The dot on the right of the display indicates that the scale is at rest.

Possible error message:



Reference weight invalid

30 sec. no standstill

Possible causes:

1. The counting scale adjustment (***Ct:Ad**justment*) was not performed properly or was not performed at all

>> **Activate interactive mode again (*CT_F*) and perform *Ct:Ad* first.**

2. Scale not at rest when the zero point was measured

>> **Repeat the process; do not move the scale or modify the tare load while the zero point is being measured !**

3. Reference weight too low (<0.25 e)

>> **Repeat the process with a permissible reference weight (≥ 0.25 e)**

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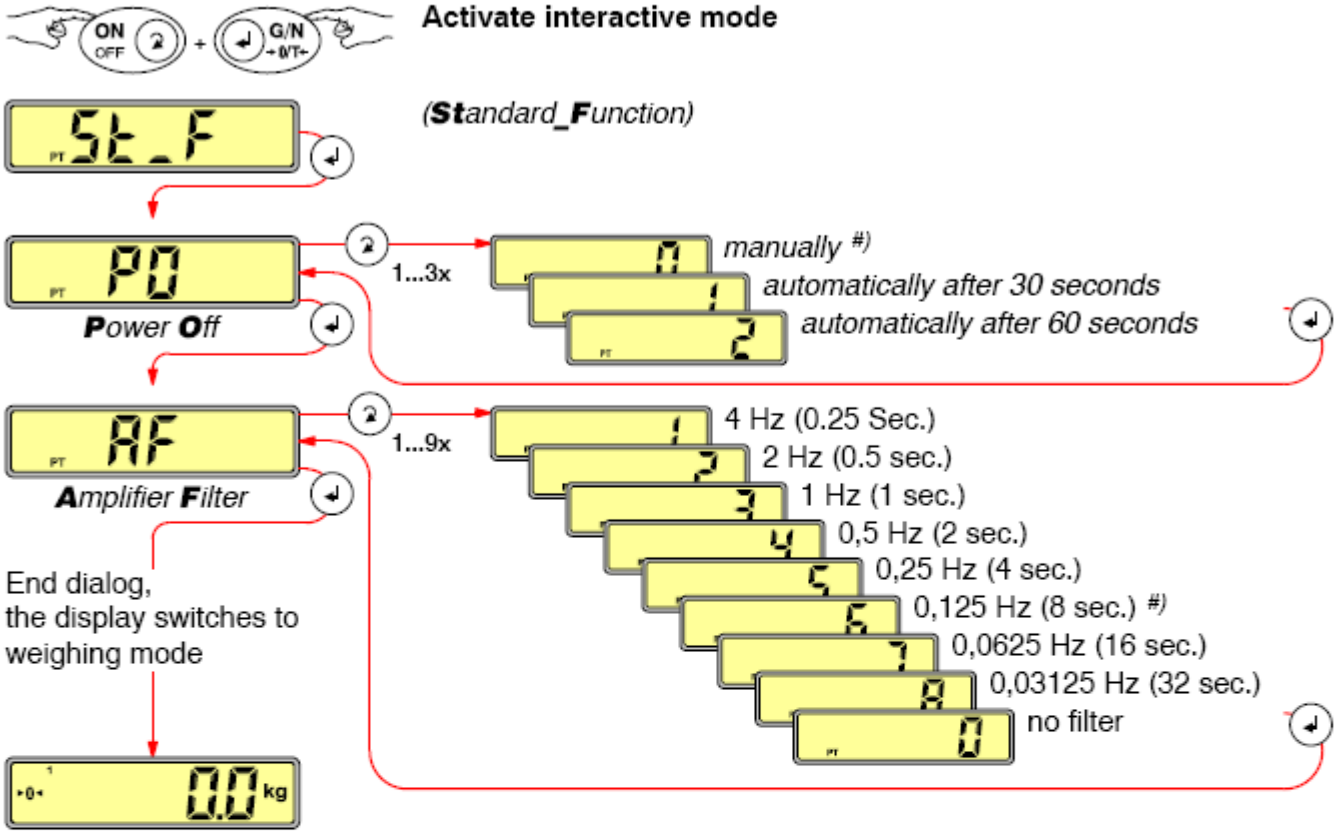
5.2 Power Off + Amplifier Filter

(standard dialog)

The following functions can also changed / adapted at any time for scales that are verified / subject to mandatory calibration:

***P**ower **O**ff* (OFF time / -characteristic) + ***A**mplifier **F**ilter* (Filter setting)



***PO** = **P**ower **O**ff* (OFF time / -characteristic)

***PO*=0**: *manual deactivation only (with the **ON/OFF** button)*
***PO*=1**: *Automatic deactivation after 30 seconds (only when scale is unloaded)*
***PO*=2**: *Automatic deactivation after 60 seconds (only when scale is unloaded)*
*The scale only switches off automatically when it is in weighing mode and unloaded (gross value <2 % of the nominal load). The **ON/OFF** button can be used at any time in weighing mode to switch off the device.*

***AF** = **A**mplifier **F**ilter* (Filter setting)

Transient response:
*The SLS has automatic filter selection that shortens the settling time of the **AF** filter. If a change in the measured value exceeds a set threshold [1], **AF**=1 operates first. After a settling time of about 250 ms, the filter set with **AF** is selected. Filter **AF**=1 quickly sets the internal filter status variables to the current measured value. The filter selected by **AF** then needs less time to settle to this measured value.*

The filter setting needs to be such that the measurement display is steady (standstill) for the particular application. The scale has 9 filter levels (0...8). The higher the filter level selected, the steadier the display – although if the load is unsteady, it also takes longer for the measured value to come to a standstill.

#) Factory setting

*1) see "Automatic filter selection (**FL** = **F**ast Sett**L**ing)" = Extended standard dialog*

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5.3 Mean-value calculation (Internal Conversion rate)

(Extended standard dialog)

This function can be used in addition to the filter setting (see ***AF*** = ***A****mplifier* ***F****ilter*), to stabilize the measurement display.

IC	**Internal sampling rate** Measured values / sec.	**Mean-value calculation** over n measured values	**Display rate** Measured values / sec.
0	100	n = 0 *(factory default) *)*	6
1	50	n = 2	6
2	25	n = 4	6
3	12	n = 8	6
4	6	n = 16	6
5	3	n = 32	3
6	1	n = 64	1

**) = mean value calculation deactivated*

5.4 Automatic filter selection (***F***ast Sett***L***ing)

(Extended standard dialog)

The function FL can reduce the settling time, whichever filter is chosen, to ~ 2 s (=typical value).
For automatic filter selection, a value from ***00*** ... ***99*** can be chosen. When ***FL*** = ***00***, the function is deactivated. The factory default is ***FL*** = ***40***.

The ***FL*** function sets the threshold for the automatic filter selection. The filter selected by ***AF*** then needs less time to settle to the measured value (standstill).

If the change between two measured values is greater than the set threshold, ***AF*** = ***1*** operates. After a settling time of 250 ms, the filter set with ***AF*** is selected.

Function :
If there is a sudden load change that exceeds the switching threshold, the selected filter is switched off and back on again once the load value is reached. The switching threshold set with ***FL*** changes when the filter switches.

Selection :
Before you select the suitable ***FL*** setting, choose the necessary filter levels for the particular application (see "***AF*** = ***A****mplifier* ***F****ilter"*). You must deactivate ***FL*** for this (***FL*** = ***00***).

Procedure :
1 Deactivate fast settling (***FL*** = ***00***).
2 Select the filter. Adapt ***AF*** to the operating conditions with regard to the mechanical vibrations. Steady measurement display despite mechanical disturbance.
3 Select a switching threshold for fast settling. Read off the required switching threshold from the table and enter ***FL*** = ***xx***.

Important :
If too low a switching threshold is selected, mechanical disturbances can, under certain circumstances, cause the filter to switch constantly (filter ON/OFF). As a result, the display will be extremely unsteady.

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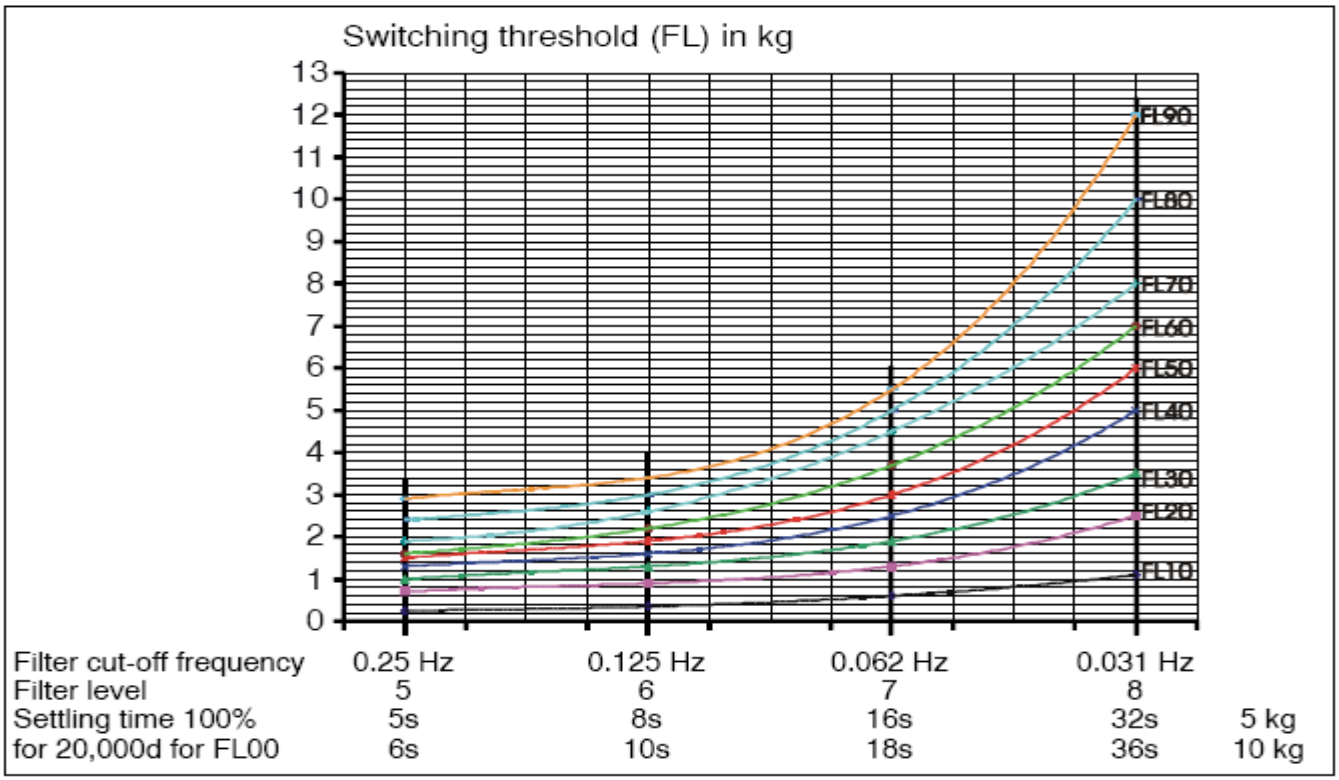

Fig. 4.1:: Switching threshold (FL) depending on the Filter Setting (AF)

The switching threshold (FL) must therefore be selected such that it is higher than the load caused by the vibratons of the test system. The self dynamics must not exceed the adjusted threshold.

5.5 Gravitational acceleration at the place of installation

(Extended standard dialog)

The ***Gd*** = ***G****ravity at* ***d****estination* function is used to enter the gravitational acceleration at the place where the scale is installed. Together with the gravitational acceleration at the place of calibration (***GC***=***G****ravitation* ***C****alibration*), a correction factor is determined to compensate for measurement error as a result of different gravitational accelerations.

Example:

Gravitational acceleration at the place of calibration (e.g. Darmstadt, g= 9.81029): ***GC*** = ***9.81029***
Gravitational acceleration at the place of installation (e.g. Tokyo, g= 9.7977): ***Gd*** = ***9.79770***
The correction factor from this example (***GC*** / ***Gd*** = 1.001285) is used internally by the SLS and ensures that the correct weight is displayed at the place where the scale is installed.

Notes:

- In the extended standard dialog, the gravitational acceleration factor ***Gd*** only has to be entered if the gravitational acceleration at the place of calibration and at the place where the scale is installed are different.
- The value for ***Gd*** is automatically (re)set to the value entered under ***GC***,
  - when the scale is readjusted (see "Scale adjustment")
  - when ***GC*** is re-entered or modified
- In legal for trade mode (***Lt*** = ***1*** *or* ***2***, see *"****L****egal for* ***t****rade"*), it is not possible to change the value for ***Gd*** in the extended standard dialog.
- When setting up the scale at the place of installation, there is only one opportunity to enter ***Gd*** without affecting the legal-for-trade counter (also refer to "Initial activation").
- When the gravitational factor at the place of installation is known, it can be entered at the factory, before the scale is delivered. In this situation, the "Initial activation" section is not relevant and the scale is started up as described under "Activation".

5.

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6 Zero on startup (Zero Setting)

(Extended standard dialog)

In legal for trade mode (***Lt*** = ***1*** *or* ***2***, see *"**L**egal for **t**rade"*), it is not possible to change the value for ***ZS*** in the extended standard dialog.

Ranges for automatic zeroing after activating the scale:

ZS = ***0*** The function is deactivated
ZS = ***1*** Zeroing range ±2 % [1)]
ZS = ***2*** Zeroing range ±5 % [1)]
ZS = ***3*** Zeroing range ±10 % [1)]
ZS = ***4*** Zeroing range ±20 % [1)]

If there is no standstill or if the gross value falls outside the selected limits, zero is not set. If the gross value at standstill falls within the selected range, the gross value is accepted into the zero memory.

Scale standstill is fixed at 1 d/s.

[1)] *of the nominal value of the scale*

6 Replacing the battery

If the battery symbol is visible in the display, the batteries should be replaced as soon as possible.

Remove the right-hand cover (unscrew to release) to gain access to the battery holder for the 4 AA cells. Make sure that the batteries are inserted into the holder correctly (see the drawing inside the right-hand cover of the scale housing).

Flat batteries must not remain in the device and must be disposed in accordance with local regulations.

7 Attaching load application parts

The crane scale must be suspended by suitable components in such a way that its measurement shaft can automatically align to the center of the earth without moment.

This is achieved by using components that can move in all directions, so-called “universal joints”, that must be attached above and below the scale. These parts must swivel freely at extremely low-friction without any noticeable "stick-slip effect", in a range of at least 5°.

The mechanical construction of the load application parts used in the scale has not been designed for the transfer of torsional moments in the axial direction. If such moments cannot be avoided when using the scale, these must be absorbed by means of appropriate additional swivel bearings in the lifter construction.

In addition to this, the manufacturer of the patient lifter or the operator of the scale must ensure that the system can carry safely and is stable under load. It is essential to comply with the relevant standards and guidelines for use.

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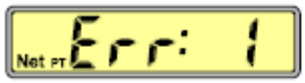
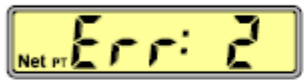
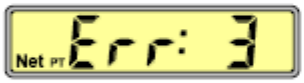
8 Error messages

Display	Comment
	**Scale adjustment:** 1. The value entered for the calibration weight is incorrect: 20 % to 120 % of the nominal load of the scale 2. Incorrect or no calibration weight put on • **Exit the dialog and re-perform the scale adjustment**
	**Counting scale:** 1. The counting scale adjustment (***Ct:Ad****justment*) was not performed properly or was not performed at all • **Activate interactive mode (*Ct_F*) again and perform *Ct:Ad* first.** 2. Scale not at rest when the zero point was measured • **Repeat the process; do not move the scale or modify the tare load while the zero point is being measured !** 3. Reference weight too low (<0.25 e) • **Repeat the process with a permissible reference weight (≥ 0.25 e)**
	**Counting scale:** 1. No standstill while the zero point is measured.
	• **Replace the battery**
Negative display when the scale is unloaded	• **Run set to zero** *(see "Set to zero")* or • **Tare** *(see "Gross / net selection and taring")*
	• **Scale overloaded > Remove weight** or • **Perform scale adjustment**
	• **Switch the scale off and then on again** or • **Perform scale adjustment**
No standstill (weight unit not visible / the counting scale dot not visible)	• **Increase the filter setting** and / or • **avoid mechanical vibrations at the place of installation**

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9 Specifications

Type		SLS	SLS	SLSC2	SLSC2-MR
Accuracy class according to OIML R76		–	–	C2	C2/C1,6
Maximum number of scale intervals	$d_1=e_1$ $d_2=e_2$	20 000	2500	2000	2000 1600
Maximum capacity (E_{max}) Max 1 Max 2	kg	200	250	200	200 320
Minimum verification interval e_1 e_2	g	10	100	100	100 200
Safe load limit (E_L)	kg	500			
Breaking load (E_d)	kg	1000			
Display		5 digits			
Battery		4 x AA cells			
Battery life (AA cell with 1600 mAh)	h	270			
Battery voltage	V	3.6 ... 6V			
Current consumption, active mode	mA	< 6			
Quiescent current, stand-by mode	mA	< 0.001			
Nominal temperature range (B_T)	°C [°F]	–10 ... +40 [+14 ... +104]			
Operating temperature range (B_{tu})	°C [°F]	–20 ... +60 [–4 ... +140]			
Storage temperature range (B_{tl})	°C [°F]	–40 ... +85 [–40 ... +185]			
Dimensions (W x H x D)	mm	164 x 87 x 70			
Weight	kg	approx. 0.7			
Protection class acc. to DIN 40050 (IEC529)		IP54			

The scale is not sensitive to HF irradiation and conducted interference in accordance with OIML R76, EN45501 and EN55011B (noise emission) and EN50082–2.

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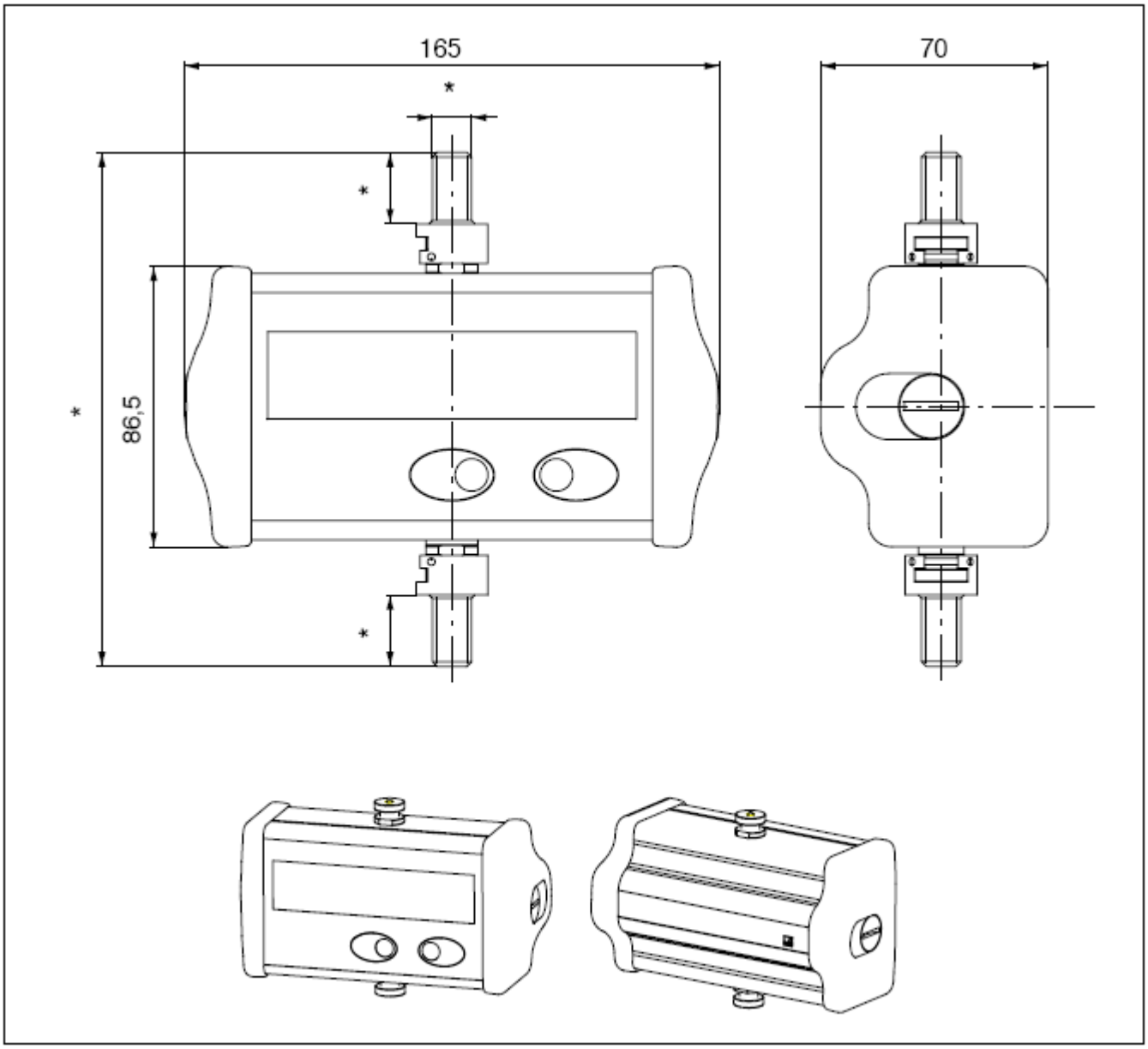
10 Dimensions



* *The measurements will depend on the (customized) components being used*

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11 Gravitational acceleration factors

The parameters ***GC*** (***G****ravitation* ***C****alibration*) and ***Gd*** (***C****alibration* ***d****estination*) can take into account the different gravitational accelerations at the place where the scale is calibrated and the place where it is installed. The values apply to a height of 100 m above sea level.
(Source: Table: from IGSN71, factor gravitational acceleration in ms−2)

Europe

Location	Factor		Location	Factor
Darmstadt	9.81029		Madrid	9.7999
Hamburg	9.8137		Rome	9.8039
Stuttgart	9.8104		Milan	9.8055
Munich	9.8074		Marseilles	9.8048
Bergen	9.8195		Barcelona	9.8031
Oslo	9.8193		Valencia	9.8008
Stockholm	9.8182		Catania	9.8003
Copenhagen	9.8155		Seville	9.7988
London	9.8120		Malaga	9.7995
Paris	9.8096		Bordeaux	9.8060

Asia, Africa

Location	Factor		Location	Factor
Beirut	9.7968		Casablanca	9.7963
Tehran	9.7940		Cairo	9.7929
Tokyo	9.7977		Accra	9.7808
Delhi	9.7912		Addis Abeba	9.7745
Hong Kong	9.7876		Nairobi	9.7753
Aden	9.7831		Kinshasa	9.7793
Bangkok	9.7831		Salisbury	9.7812
Manila	9.7835		Cape Town	9.7963
Colombo	9.7812			
Singapore	9.78065		Arctic, Antarctic	9.82492

America

Location	Factor		Location	Factor
Vancouver	9.8092		Mexico City	9.7794
Winnipeg	9.9098		Panama	9.7823
Montreal	9.8063		Bogota	9.7739
Denver	9.7961		Lima	9.7829
Chicago	9.8027		Belem	9.7802
Washington	9.8009		Rio de Janeiro	9.7876
San Francisco	9.7997		Buenos Aires	9.7970
Houston	9.7928		Central America	9.78635
Miami	9.7902		USA (South)	9.79496
Anchorage	9.8191		USA (North)	9.80269

Australia, Oceania

Location	Factor		Location	Factor
Darwin	9.78301		Melbourne	9.7995
Perth	9.7940		Wellington	9.8027
Alice Springs	9.7865			
Brisbane	9.7914		Oahu – Honolulu	9.7893

If the location is not listed in the tables, use the following equation to calculate the gravitational acceleration value: $g = 9.780318 * (1 + 0.0053024 * \sin^2(br) - 0.0000058 \sin^2(2 * br)) - 0.000003085 * h$

g = gravitational acceleration [m/s²]
br = degree of latitude for the location [degrees]
h = height above sea level [m]
*Note: Conversion br [rad] = Pi * br [degree of angle] / 180*

This equation is valid for Class III scales (≤3000 d).

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