Installation information
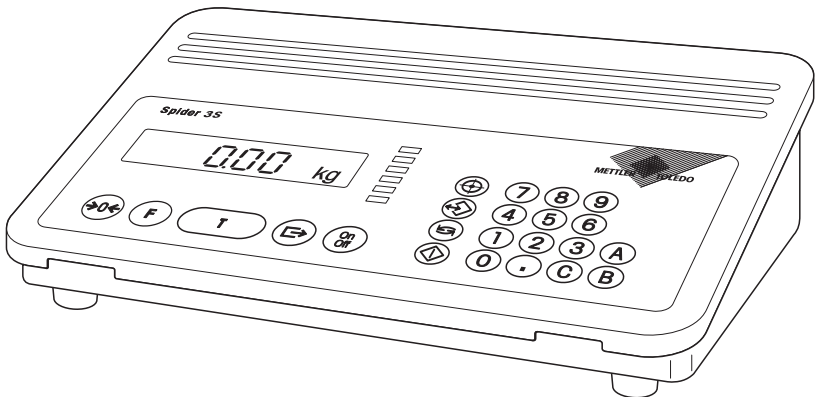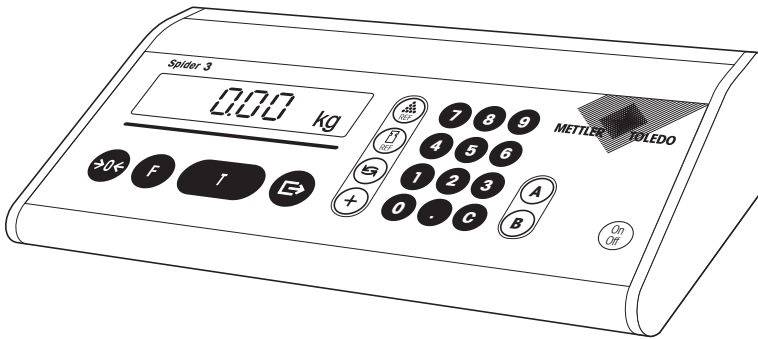# METTLER TOLEDO
Spider and Spider S Terminals

Contents

1. Important information before you start

Thank you for purchasing a Spider or Spider S terminal from METTLER TOLEDO. This section provides you with basic information regarding your terminal. Please read through this section carefully and be sure to comply with the directions in the cautionary notes!

1.1 Introducing the Spider and Spider S terminals

All terminals have the following features in common:

– Compact and rugged, industrial construction with built-in RS232C serial interface. The S terminals have IP67 degree of protection.

– Convenient to use keypad and large, easily readable display (with illumination for Spider S terminals).

– Simple configuration possibilities via the integrated menu (service mode).

– Universal expandability thanks to an extensive range of optional equipment.

Your terminal has a CE declaration of conformity (see operating instructions supplied with the Spider or Spider S scale) and METTLER TOLEDO as the manufacturer has been awarded ISO 9001/EN 29001 certification.

1.2 What you should know about these instructions

This installation information describes only the **installation of the Spider and Spider S terminals** and matching them to the weighing platforms used. Operation of the terminal, matching to the working and ambient conditions as well as the special functions are described in the **Operating instructions**, which are also enclosed with the terminal.

While the illustrations in these instructions are based on the Spider 2 and Spider 2S terminal, they are representative of all terminals of the Spider and Spider S line.

1.3 Safety has priority

Please comply with the following instructions to ensure safe and problem-free operation of your terminal:

– Carefully read through this installation information and the operating instructions supplied with the Spider or Spider S scales.

– The terminals may not be operated in an environment subject to explosion hazards. The admissible ambient temperature is -10 … +40 °C.

– **Spider** terminals must not be operated in wet areas. **Spider S** terminals are admissible in wet areas as they are provided with IP67 degree of protection.

– **Spider terminals**: use only the AC adapter supplied with your terminal and ensure that the voltage value printed on it matches the local line voltage. **Spider S terminals**: Ensure that the voltage value printed on the model plate of the terminal matches the local line voltage before you connect the terminal to the power supply.

2.   Setting up a weighing system

Before you set up a weighing system with your Spider or Spider S terminal, its basic data must be determined. These data are then entered in the service mode of the terminal (section 4).

2.1   Determining configuration data

To set up a weighing system, the following crucial data must be available: desired weighing range, preload, capacity of the weighing cell(s) and the desired resolution. This section explains these terms and helps you determine the relevant data.

Weighing range

The weighing range denotes the effective load of the weighing system, in other words that range available to the user for the weighing of loads. The value for the weighing range proposed by the software of the terminal is 60% of the total capacity of the weighing cell(s). In exceptional cases, a weighing range of up to 120% of the total capacity of the weighing cell(s) can be defined (100% with certified scales). The value determined for the weighing range must be entered in the "Range" block of the service mode (section 4.7).

Preload

The preload includes the total weight of all parts which are loaded on the weighing cell. These include the top part of the weighing platform, the weighing pan and all built-on accessories, such as a roller track and permanently mounted weighing containers.

Total capacity of the weighing cell(s)

To avoid overloading the weighing cell(s), a safety margin must be included when their capacity (nominal load) is selected. A safety margin is particularly recommended when the weighing cell(s) have small nominal loads or if the weighing platform does not have any overload stops.

Total capacity of weighing cell(s) = Weighing range + preload + safety margin

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The determined capacity must be entered in the "Cell" block of the service mode (section 4.6). The maximum admissible total capacity is 100 metric tons.

In the case of **systems with several weighing cells**, the sum of the weighing range, preload and safety margin must be divided by the number of cells (max. 4) to determine the capacity of a single cell. A sufficient safety margin is particularly important if the scale will be heavily loaded in the region of its corners resulting in the load no longer being evenly distributed on all cells. The total capacity of all cells must be entered in the service mode.

In **systems with a lever system**, the sum of the weighing range, preload and safety margin must be divided by the transmission ratio of the lever mechanism to determine the capacity of the cell. The sum of the weighing range, preload and safety margin (= capacity of the weighing cell multiplied by the lever transmission ratio) must be entered in the "CELL" block of the service mode.

Maximum resolution

In the "Resolution" block of the service mode (section 4.8), you can select the desired resolution (display increments). The maximum possible resolution of your weighing system depends on the total capacity of the weighing cell(s). You can determine the maximum resolution (1 d/1 e) using the following formula:

Total capacity of the weighing cell(s)
50 000 (5000 with certified scales)

The software of the terminal calculates the possible display increments on the basis of the inputted total capacity of the weighing cell(s) and the information regarding whether or not the weighing system is certified. In the service mode you can select the appropriate value from the display increments available. Note: The software rounds off the determined maximum resolution to the next value of 1, 2, or 5 x (10^x) (note examples):

Examples

max. resolution	min. display incr.
0.007 kg	0.01 kg
0.014 kg	0.02 kg
0.023 kg	0.05 kg
0.06 kg	0.1 kg
0.12 kg	0.2 kg
0.37 kg	0.5 kg

The above remarks refer to measuring cells with a sensitivity of 2 mV/V. With a sensitivity of 3 mV/V, a maximum resolution of 70 000 d (7000 e) can be attained. The following table elucidates the relationships:

| Sensitivity	2 mv/V	3 mv/V
Supply voltage	5 V	5 V
Max. weighing signal[1]	10 mV	15 mV[2]
Max. weighing signal per display increment	0.2 µV/d 2 µV/e	0.2 µV/d 2 µV/e
Max. resolution[3]	50 000 d 5000 e	70 000 d 7000 e

[1] Max. weighing signal = supply voltage multiplied by the sensitivity.

[2] Only 14 mV measurable by A/D converter, the weighing range can therefore be max. 93% of the cell capacity.

[3] Max. resolution = max. weighing signal divided by max. weighing signal per display increment.

6

2.2   Measurement ranges of the Spider and Spider S terminals

When a weighing system is set up, your consideration of the measurement ranges of the Spider and Spider S terminals should be based on the following overview.
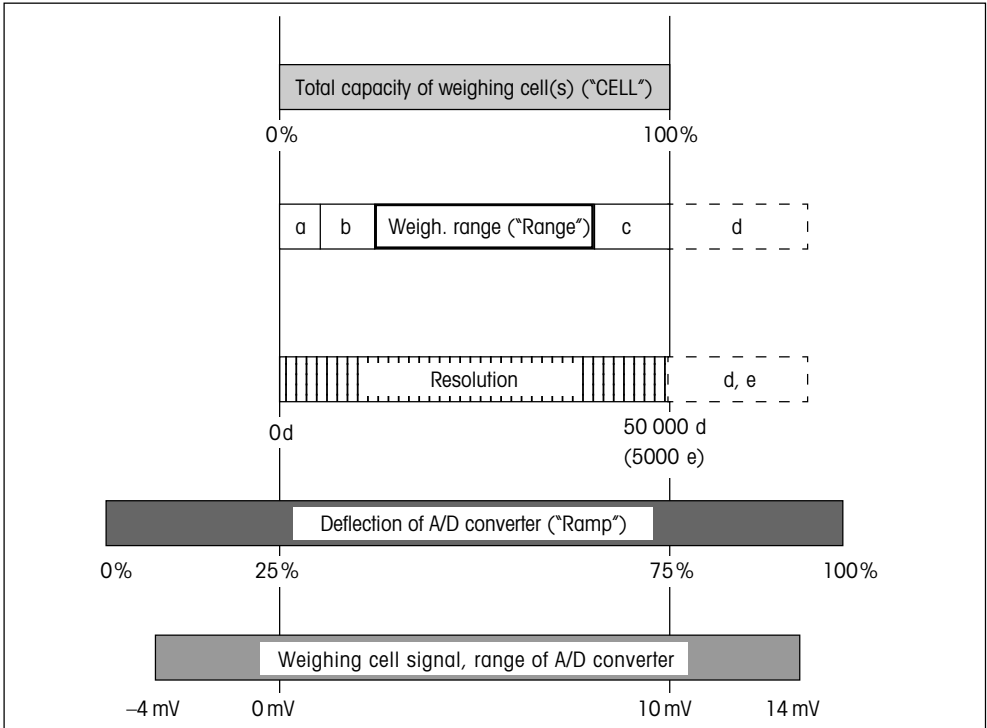
a: Total preload loaded on weighing cell in calibration (top part of platform, weighing pan, roller track, etc.)

b: Zero setting range when switching on:
  – 18% of the weighing range for certifiable and noncertifiable scales or
  – **with certified scales**: 2% of the weighing range if this is more than 80% of the capacity of the weighing cell(s)

c: Safety margin (explanations, see section 2.1)

d: Range occupied in the case of:
  – Large preloads. In this case the weighing range is shifted to above 100% of the cell capacity .
  – Weighing ranges from 100% to 120% of the weighing cell capacity. Any preloads shift the weighing cell capacity further into range d.

e: If this range is used, the number of display increments (max. resolution) increases to 60 000 d.

# 3. Attaching the weighing platform to the terminal

All weighing platforms which meet the required specifications can be attached to the Spider and Spider S terminals. Up to four weighing cells can be attached to one terminal. Please consult section 6 for the specifications.

## 3.1 Opening the terminal

Spider terminals
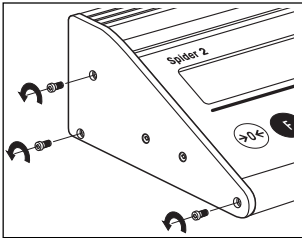
- Unscrew the 3 fastener screws of the cover on the left side of the terminal.
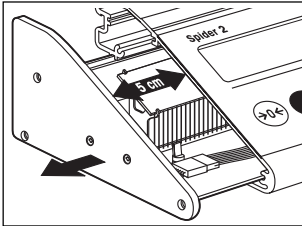
- Pull the cover until about 5 cm of the board are visible. As the board is connected to the keypad by a ribbon cable, pull it **carefully** out of the terminal ensuring it does **not project beyond the above distance**. The **Spider 3 terminal** has daughter boards which are attached to the mother board by connectors. When withdrawing the mother board, push the daughter boards at the same time to ensure maintenance of the electrical connection and continued operational reliability of the terminal.

Spider S terminals

Warning: The integrated power supply unit carries a voltage of 230 V! It is thus essential to disconnect the terminal from the power supply before disassembly!
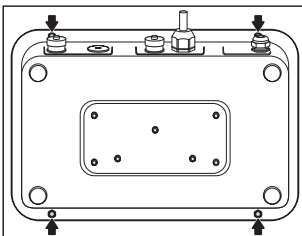
- Place the terminal with the display facing downward on a stable work surface. Undo the 4 cap nuts using a 7 mm socket wrench.
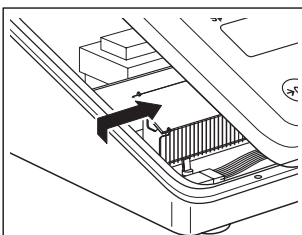
- Turn the terminal to the normal position (display upward) and pull the cover up and off on all sides uniformly. Depending on the model, the terminal cover is connected to the board by one or more ribbon cables. You should thus detach the cover very carefully to avoid damaging the cables or connectors. After you have loosened the cover, push it about 5 cm to the right and position it carefully on the terminal housing.

Important information:

– The cover must not be tilted when it is detached as this could lead to damage to the seal. Pull it slowly and evenly to overcome the seal resistance.

– On no account use a screwdriver or a similar tool to loosen the cover!

3.2 Attaching the weighing cell
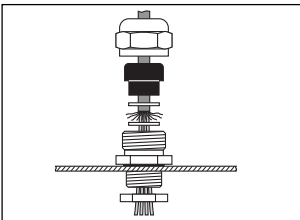
• Undo the gland nut of the heavy gauge gland and remove it together with the black crimping ferrule and the two washers. Slide the gland nut, the crimping ferrule and the washer with the larger hole over the connection cable of the weighing platform. Flange the shield of the cable slightly and place the second washer over it. Insert the cable through the heavy gauge cable gland in the rear cover of the terminal and tighten the gland nut.
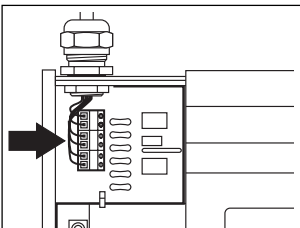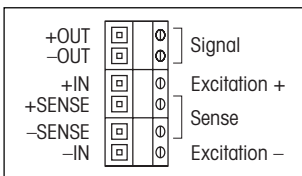

• Attach the individual leads of the connection cable to the connection terminal on the terminal board. The illustration opposite shows the position of the connection terminal and the terminal assignment. Please also note the information and illustrations on the following page for the attachment of one or more weighing cells.
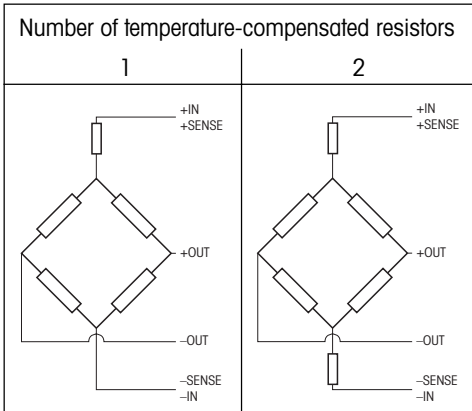
Note:

After attaching the weighing cell, leave the terminal open; you need access to the board for the configuration (section 4).

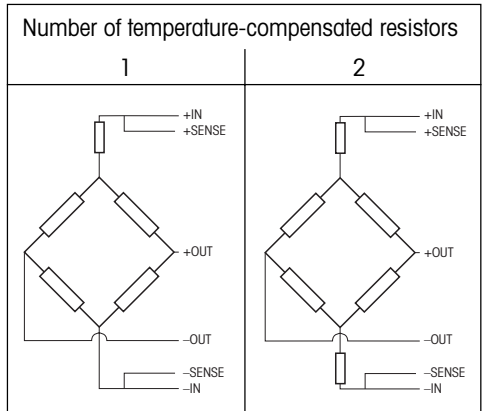Install the terminal only after you have completed the configuration.

Attaching a single weighing cell

Cells without SENSE lines

Number of temperature-compensated resistors	
1	2
+IN +SENSE +OUT −OUT −SENSE −IN	+IN +SENSE +OUT −OUT −SENSE −IN

Cells with SENSE lines

Number of temperature-compensated resistors	
1	2
+IN +SENSE +OUT −OUT −SENSE −IN	+IN +SENSE +OUT −OUT −SENSE −IN

In the case of cells without SENSE lines, the connections "+IN" and "+SENSE" and "−IN" and "−SENSE" must be short circuited at the connection terminal in the Spider terminal.

Attaching several weighing cells

Up to 4 weighing cells can be **connected in parallel** to a terminal. A junction box is normally used to attach several weighing cells.

Please comply with the following instructions when attaching several weighing cells:

$$N_1 + N_2 \ldots + N_n = N_{tot.}$$

– **The sum of the rated capacities of the individual cells (in kilograms) corresponds to the total capacity of the weighing system**. The calculated total capacity must be entered in the service mode (see section 4.6).
 You also use the service mode to specify the weighing range (see section 4.7). **We advise you choose a weighing range which ensures that the individual cells can not be overloaded!** Please also note section 2 for determination of the configuration data.

– **You will find information on configuration of the terminal in section 4**.

3.3 Closing the terminal

Install the terminal only after you have completed the configuration (section 4).
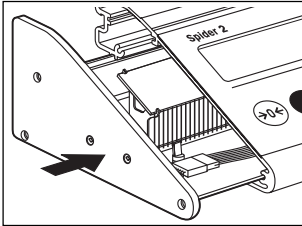
Spider terminals

• Push the board back into terminal and fasten the cover with the three screws.

Spider S terminals

• Check the seal is correctly seated on the terminal housing: The flange of the housing must lie in the groove of the seal all the way around, the seal must lie flat along its entire length and the openings must be exactly aligned with the drill holes in the housing.

• Ensure that all ribbon cables of the terminal housing are connected to the corresponding connections on the scale board (and the daughter board in the case of Spider 2S and 3S).

• Place the terminal cover on the housing and turn the terminal over (display facing downward, rear of terminal facing you).

• Press housing on the side facing you downward into the terminal cover as far as it will go.

• Hold terminal at the rear with both hands, press together and at the same time press downward into the terminal cover slowly and with even pressure. Continuously check the seal for correct seating. If necessary, the seal can also be pressed against the housing during the assembly using a suitable object (e.g. a ruler).
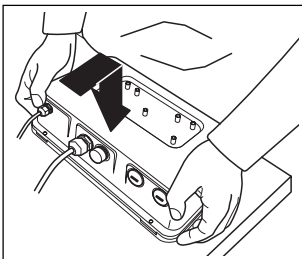
• Check the seal for correct seating: The seal must lie flat in the terminal cover and must not be pinched or buckled.

• Mount the 4 cap nuts. Do not overtighten the nuts. If the nuts are tightened too much, correct functioning of the seal is no longer assured. Check for correct seating of the seal once again. **Warning: If the seal is not mounted correctly, IP67 degree of protection is not assured!**

4. Configuring the terminal

Before you start configuring the terminal, it is essential to read through the information on determination of the configuration data in section 2.

4.1 Recall and operation of the service mode

The service mode is part of the software of the Spider and Spider S terminals and is used to match the terminal to the weighing platform.

Recalling the service mode

Requirements: The terminal is open and connected to the power supply, all ribbon cables of the keyboard are connected to the scale board or the daughter board and **no device is attached to the 1st serial interface**.
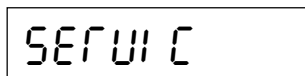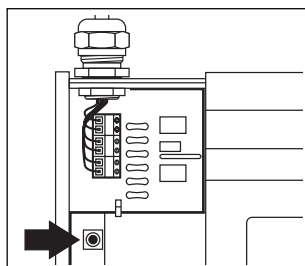
• Press the red button on the board. This button lies between the left cover and the display of the terminal. We advise you to use a pencil to press the button.

Note: The **Spider 3 terminal** has daughter boards which are connected to the mother board by connectors. Ensure that these connections are maintained (if need be, push the daughter boards towards the mother board), otherwise the service mode can not be called up.

$SEГUI\ C$

• Keep the red button pressed and switch the terminal on using the «**On/Off**» key. Keep the red button pressed until the display "SERVIC" appears.

Operation in the service mode

For operation in the service mode you need only two keys:

YES: ⮕

– The «⮕» key is used for the **acceptance** of a proffered option and has the same meaning as "**YES**".
Whenever you wish to **accept** a proffered **option**, press the «⮕» key briefly.

NO: →T←

– The «→T←» or «T» key is used for the **refusal** of a proffered option and has the same meaning as "**NO**".
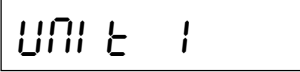Whenever you wish to **refuse** a proffered **option**, press the «→T←» or «T» key briefly.

If you press the «→T←» or «T» key ("NO") after recall of the service mode, the terminal returns to the weighing mode. Pressing «⮕» key ("YES") calls up the first block of the service mode ("Unit 1").

4.2 Layout of the service mode

The service mode comprises **10 main blocks**. **Note**: With digital Spider weighing platforms for ID terminals, the structure of the service mode is somewhat different (see section 8).

$$UNI \; t \quad 1$$

1. Basic unit ("UNIT 1")
In this block you specify the basic unit. All subsequent settings refer to the selected basic unit.
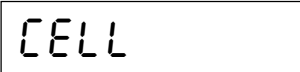
$$rAMP$$

2. Ramp ("RAMP")
You can use this block to request the values of the analog/digital converter (deflection of the A/D converter).

$$SNr.$$

3. Serial number ("SNR")
This block contains the serial number of the terminal. This number was entered in the factory and should not been changed.

$$CELL$$

4. Weighing cell ("CELL")
In this block you enter the parameters of the weighing cell (e.g. the total capacity of the weighing cell(s)).

$$rAnGE$$

5. Weighing range ("RANGE")
In this block you specify the available weighing range.

$$rESoLu$$

6. Resolution ("RESOLU")
You use this block to select the desired resolution.

$$CAL$$
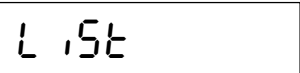
7. Calibration ("CAL")
In this block you set the geo adjustment value, specify the preload and perform the calibration.

$$L \; in$$

8. Linearity ("LIN")
In this block you can correct the linearity error of your weighing system.

$$L \; iSt$$

9. Printing configuration data ("LIST")
In this block you can print out the current configuration data assuming your terminal is connected to a printer.

$$rEturn$$

10. Exiting the service mode ("RETURN")
Here you decide whether you wish to exit the service mode or continue with your settings.

4.3   Selecting basic unit

Many of the setting options in the service mode refer to the selected basic unit.

$$\boxed{U\Pi I \; \boldsymbol{\mathrm{E}} \quad I}$$

$$\boxed{\qquad\qquad kg}$$

$$\boxed{\qquad\qquad t}$$

$$\boxed{\qquad\qquad g}$$

$$\boxed{\qquad\qquad lb}$$

- If you wish to change the basic unit, press the «⇒» key. Then press the «→T←» or «T» key repeatedly until the desired unit appears in the display. The following units are available:
  - − Kilogram ("kg"), factory setting
  - − Metric ton ("t")
  - − Gram ("g")
  - − Pound ("lb")
- Confirm the desired unit with the «⇒» key. The next block of the service mode ("RAMP") then appears directly.
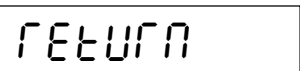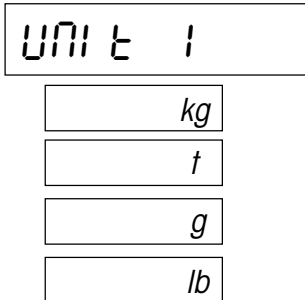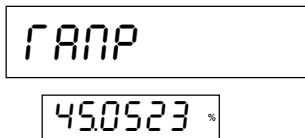
4.4   Requesting ramp

In this block you request the values of the internal analog/digital converter. This allows a check on the correct operation of the A/D converter and the weighing cell. The "RAMP" value is not influenced by any service mode setting. You will find additional information in sections 2 and 5.

$$\boxed{\Gamma \; \boldsymbol{R} \boldsymbol{\Pi} \boldsymbol{P}}$$

$$\boxed{45.0523} \; \text{\tiny \%}$$

$$\text{RAMP } [\%] = \frac{L + PL}{N} \bullet 50 + 25$$

- If you wish to request the values, press the «⇒» key. The result then appears in the display (deflection of the A/D converter in %). The displayed value is static and is not updated until the «→T←» or «T» key has been pressed.

  Scales with an identical and a correctly functioning weighing cell and the same weighing range have approximately the same ramp values.

  You can use the formula opposite to calculate whether the displayed ramp value is correct (L = load, PL = preload, N = capacity of the weighing cell).

- To end the inquiry, press the «⇒» key and the next block of the service mode ("SNR") then appears directly.

4.5   Requesting or changing the serial number

In this block you can request or modify the preset serial number of the terminal.

$$\boxed{5\Pi\Gamma.}$$
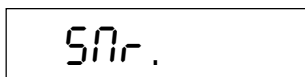
- Press the «⇒» key to display the serial number. As the number has more digits than the display can show, you can move the cursor to the right with the «⇒» key to display the remaining digits.

$-2 \, 11346$

Important! The individual digits can be changed with the «→T←» or «T» key (**Warning**: Change the number or enter a new one only if necessary, e.g. after installation of a new terminal board).

$5\Pi r \quad 0 \vdash$

• After the display of the last digit, you are asked if you wish to accept the serial number. Press «⇥» to accept the number and call up the next block of the service mode ("CELL"). If you wish to verify the number again, press the «→T←» key.

4.6 Entering parameters of the weighing cell

This block contains two sub-blocks for setting the scale type (certified or noncertified) and a sub-block to set the total capacity of the weighing cell(s).

$\mathcal{C}ELL$

• If you wish to enter the parameters of the weighing cell, press the «⇥» key.

The sub-block for **selection of the admissibility for certification** appears:

• Press the «→T←» or «T» key until the desired setting appears in the display. The following setting possibilities are available:

$RPPr\,0U$

– certified scale ("APPROU")

$\Pi0\_RPP$

– noncertified scale ("NO_APP")

$\mathcal{C}RP\mathcal{C}E\,y$

• As soon as you have set the appropriate option with the «⇥» key, the second sub-block for entry of the **total capacity of the weighing cell(s)** is called up (see also section 2).

$-0\,100_{kg}$
•
•
•
0250_{kg}

• Press the «⇥» key to enter the total capacity of the weighing cell(s) (range: 1 - 9999). The display shows the value of the capacity preset in the factory (100) in the basic unit selected in the first block.

• Use the «⇥» key to select the digits you wish to change (indicated by the small horizontal dash) and alter the digit using the «→T←» or «T» key.

$\mathcal{C}RP \quad 0\vdash$

• If you press the «⇥» key again after changing the last digit (unit), you are asked whether you wish to accept the value:

  • If you wish to correct the value, press the «→T←» or «T» key and the display returns to the start of this sub-block.

  • If you wish to accept the value, press the «⇥» key and the next block of the service mode ("Range") appears directly.

4.7 Selecting the weighing range

In this block you define the weighing range (see also section 2). If the specified range is exceeded during the weighing operation, an error message (overload) appears in the display.

┌─────────┐ │ ┌ 8n⌐6 │ └─────────┘	• If you wish to specify the weighing range, press the «⊡→» key.
┌─────────┐ │ -0060 kg │ └─────────┘ • • • • • ┌─────────┐ │ 0090 kg │ └─────────┘	• The display shows the weighing range preset in the factory (60% of the total capacity of the weighing cell(s)) in the selected basic unit. Press the «→T←» or «T» key to change the weighing range (selectable maximum value: 120% of the total capacity of the weighing cell(s) for noncertified scales or 100% for certified scales). • Use the «⊡→» key to select the digits you wish to change (indicated by the small horizontal dash) and alter the digit using the «→T←» or «T» key.
┌─────────┐ │ ┌8n 0├ │ └─────────┘	• If you press the «⊡→» key after changing the last digit (unit), you are asked if you wish to accept the value. If you wish to correct the value, press the «→T←» or «T» key and the display returns to the start of this sub-block. If you wish to accept the value, press the «⊡→» key and the next sub-block ("Resolution") appears directly.

4.8 Selecting resolution

In this block you select the desired resolution of your weighing system (see also section 2).

┌─────────┐ │ ┌ESoLu │ └─────────┘	• If you wish to select the resolution, press the «⊡→» key.
┌─────────┐ │ 0.020 kg │ └─────────┘ • • • • ┌─────────┐ │ 0.100 kg │ └─────────┘	• The display shows the first value of the resolution (dependent on the total capacity of the weighing cell(s)). Press the «→T←» or «T» key to change the value. Each time the key is pressed, the next value is shown. • Confirm the selected resolution with the «⊡→» key and the next block of the service mode ("CAL") appears directly.

4.9 Setting geo adjustment value, specify preload and performing calibration

In this block you can calibrate your weighing system. **A calibration is required if the total capacity of the weighing cell(s) has been changed**. During the calibration procedure, you can also specify a preload which is not taken into account in weighing (see also section 2).

CAL	• If you wish to set values in this block, press the «⮕» key.
$GEO\ 18$	• In the first sub-block you can change the geo adjustment value and hence match your weighing system to the local gravitational conditions (**please do not perform this step if you are not familiar with the geo adjustment values!**). Press the «→T←» or «**T**» key to change the geo adjustment value. Each time you press the key, the next value is displayed (setting range: 0 - 31). You will find the value you need in the Table in section 7. Confirm the selected geo adjustment value with the «⮕» key.
$CALEXE$	• In this sub-block you can specify a preload and perform the calibration with or without preload (roller track or other built-on accessories). Press the «⮕» key.
$SEt\ PL$	• The display shows the prompt to place the preload on the platform. If you wish to specify a preload, place this load on the scale. Irrespective of whether or not a preload is loaded, press the «⮕» key to start the calibration process.
$------^c$	During determination of the zero point, horizontal segments appear in the display.
60.000_{kg}^{c}	• The display then prompts you to calibrate your weighing system at the value you **have defined as the weighing range** ("Range", see section 4.7).
50.000_{kg}^{c} • • • 40.000_{kg}^{c}	• If you do **not** wish to calibrate with this value, press the «→T←» or «**T**» key repeatedly until the desired calibration weight appears in the display (each time you press the key, the calibration weight is lowered). **Note: Certifiable weighing systems must be calibrated with the value defined as the weighing range!**
	• Place the desired calibration weight on the scale and confirm with the «⮕» key.
	Note: If an error message appears during the calibration, please consult section 5.
$UnLoAd$	Remove the calibration weight and confirm this with the «⮕» key. The next block of the service mode ("Lin") then appears directly in the display.

4.10 Correcting linearity error

After a calibration you can be assured that the display exactly matches the load on the weighing pan with regard to the zero point and at the calibration point. Ideally, this should be the case over the entire weighing range. However, in the case of **systems with 4 weighing cells**, it is possible that the displayed value is not exactly identical to the load on the weighing pan in a particular range (linearity error). With complete weighing systems, the linearity error is usually already corrected by the manufacturer. **A new correction is necessary only with systems with 4 weighing cells and only if one or more of these measuring cells have been replaced or if the total capacity of the weighing cell(s) has been changed**.

```
L in
```

In this block you can compensate the linearity error of your weighing system by entry of a correction value. This involves the following 7 steps:

- Set any existing correction value to zero.
- Calibrate weighing system (see section 4.9).
- Place load on weighing pan which is **exactly 50%** of the weight used to calibrate the system.
- Calculate difference between the displayed weight value and the target value (actual value – target value).
- Determine correction value (see example below). The maximum admissible correction value for the linearity error is **±0.08% of the total capacity of the weighing cell(s)**, ("Capacity", see section 4.6).
- Enter correction value
- **Recalibrate weighing system**.

The following example illustrates the individual steps in detail:

Let us assume the weighing system has 4 weighing cells each with a capacity of 550 kg. The total capacity of all weighing cells is consequently 2200 kg. The calibration weight is 1000 kg. A correction value for the linearity error already exists.

The existing correction value must be set to **zero at the start**:

```
L in
```

```
1.65500 kg  ¹
  •
  •
  •
  •
0.00000 kg  ²
```

- Press the «⇥» key to activate the service mode block for correction of the linearity error.

- The display shows the current correction value. Press the «→T←» or «T» key to change the value. The small "1" in the top right corner of the display signals that you are working with the large increment i.e. the value changes in steps of 10. To set the value precisely in steps of 1 (symbolized by the small "2"), press the «⇥» key briefly. Press the «→T←» or «T» key repeatedly until the **correction value is zero**.

- To accept the value, press the «⇥» key.

Example illustrating **determination of the correction value**:

- Calibrate your weighing system (e.g. with 1000 kg).

$$500.25 \; kg$$

- On completion of the calibration, place a load on the weighing pan that is exactly **50%** of the weight you used to calibrate the system (= 500 kg).

- Calculate the difference between the loaded weight and the displayed value (500.25 kg – 500.00 kg = +0.25 kg).

- Calculate the **effective correction value** using the formula opposite:

$$V = D \bullet \frac{N^2}{C^2}$$

  V = effective correction value

  N = total capacity of all weighing cells (e.g. 2200 kg)

  C = calibration weight (e.g. 1000 kg)

  D = difference with 50% of the calibration load (e.g. +0.25 kg)

  This example results in an **effective correction value** of:

  +0.25 kg • (4 840 000 kg/1 000 000 kg) = **+1.21 kg**

  If the difference is negative (actual value < target value), the correction value is also negative.

Entry of the determined correction value:

- Call up the Master mode block again for entry of the correction value for the linearity error.

$$L \; in$$

$$0.00000 \; kg \; ^1$$
•
•
$$1.20000 \; kg \; ^1$$
•
•
$$1.21000 \; kg \; ^2$$

  The display shows the correction value zero. Press the «→T←» or «T» key to change the correction value. The small "1" in the top right corner of the display signals that you are working with the large increment, i.e. the value changes in steps of 10.

  To set the value precisely in steps of 1, press the «⇥» key briefly (this range is symbolized by the small "2" in the top right corner of the display). Press the «→T←» or «T» key repeatedly until the desired correction value is displayed.

- To accept the value, press the «⇥» key and the next block of the service mode ("List") then appears.

4.11 Printing the service mode data

If you have attached a printer to the first interface of your terminal, you can print out the current data of the service mode in this block. You will find directions on how to attach a printer in the interface description, which you can request from your METTLER-TOLEDO dealer.

```
L iSt
```

```
***********************
--  SPIDER Terminal  --
SW 1.27  5.23
Cell:
 approved      OFF
 capacity   50.000 kg
Range        30.000 kg
Resolution    0.010 kg
GEO value     18
Linearity    0.0000 kg
***********************
```

• If you wish to print out the data of the service mode, press the «⮕» key.

On completion of the printing operation, the display shows the next block of the service mode ("RETURN") directly.

The example opposite shows a specimen printout. The data are listed in the same order as they appear in the service mode.

4.12 Exiting the service mode

In the last block of the service mode, you can decide whether you wish to exit the service mode or continue with your settings.

```
rEtUrn
```

• If you wish to continue setting parameters in the service mode, press the «→T←» or «T» key to show the first block of the service mode ("UNIT 1") in the display again.

• If you do not wish to continue setting parameters and would like to exit the service mode, press the «⮕» key.

```
*         0.000 kg
```

The terminal is now in the so-called **control mode**. In the control mode, the asterisk symbol lights up in the display and the scale operates with **maximum resolution**. This mode is used to check the settings made in the service mode. To call up the service mode again from the control mode, press the «⮕» key.

```
          0.00  kg
```

• To exit the control mode and return to the **normal weighing mode**, switch the scale off and then on again with the «**On/Off**» key.
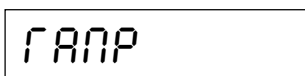
```
*         0.000 kg
                  c
```

Note: If the symbol "**C**" appears after quitting the service mode, the scale has not been calibrated. Call the service mode again and carry out the calibration (section 4.9).
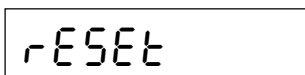
4.13 Deleting the data in the EAROM

If your terminal operates with **Version 5.31 (or later) service software**, you can delete the configuration data in the terminal EAROM when in service mode. This may be necessary if the system is malfunctioning or if the terminal displays "Error 9" **when first switched on**. After deleting the configuration data you must reload the terminal basic settings and carry out the calibration procedure. To delete the data in the EAROM and reload the configuration data (basic settings), proceed as follows:

Deleting the data

$$r\,A\,\Pi\,P$$

- In service mode select the "**RAMP**" block.

→T←

- **Hold down the red key on the PC board in the terminal** (see section 4.1) while you press the «→T←» or «**T**» key.

$$r\,E\,5\,E\,t$$
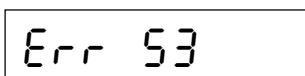
- You are now asked to confirm that you really do want to delete the data in the EAROM.

  If you do not want to delete the data, press the «→T←» or «**T**» key again to display the next service mode block ("SNR").
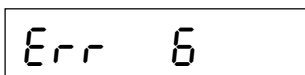
  But if you really do want to delete the data, press the «⇥» key.

⇥

$$E\,r\,r \quad 5\,3$$

After the data have been deleted, an error message "Error 53" (no data in memory) appears in the display. You must now reload the basic settings for the terminal.

Loading basic settings

→0←

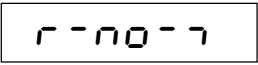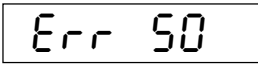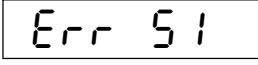- To reload the basic settings for the terminal, hold down the «→0←» key until the scale restarts.
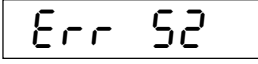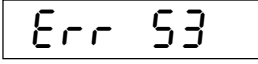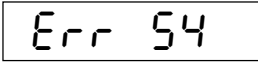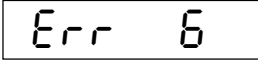
$$E\,r\,r \quad 6$$

After the new start the error message "Error 6" (no calibration) appears in the display.

- Carry out the calibration procedure (see section 4.9).

5. Troubleshooting and malfunction correction

If an error message appears in the **service mode**, press the «⥂» or «→T←» (or «T») key to clear the message. The next block of the service mode then appears in the display. All actions which were performed in the block in question before the appearance of the error message will be ignored. Several of the error messages may also appear in weighing operation (see operating instructions of the Spider and Spider S scales) as a result of incorrect operations. In contrast, the cause of service mode error messages is the result of faults or wrong entries in the service mode.

Error message/symptom	Cause	Rectification
On startup, the following message appears: `r ‾ ∩o ‾ ‾]` • The "Ramp" value alters when the weight changes • "Ramp" value > 99%, does not alter when weight changes • The "Ramp" value is approx. 25% with attached weighing cell and short-circuited signal inputs on the board (supply "Sense" inputs via supply outputs)	• Weighing cell faulty due to overload (pressure) • A/D converter faulty • Weighing cell attached wrongly, break, A/D converter OK	• Change weighing cell • Change terminal board • Ensure correct connection between weighing cell and terminal
On startup, the following message appears: `L _ ∩o _ ]` • The "Ramp" value alters when the weight changes • "Ramp" value < 1%, does not alter when the weight changes • "Ramp" value is approx. 25% with attached weighing cell and short-circuited signal inputs (supply "Sense" inputs via supply outputs)	• Weighing cell faulty due to underload (traction) • A/D converter faulty • Weighing cell attached wrongly, break, A/D converter OK	• Change weighing cell • Change terminal board • Ensure correct connection between weighing cell and terminal

Error message/symptom	Cause	Rectification
$Err\ 50$	• Attached weighing cell does not match the set data	• Check setting for total capacity of the weighing cell(s) ("CELL"). Weighing cells with 3 mV/V sensitivity: check max. differential signal.
$Err\ 51$	• Maximum capacity exceeded	• Total capacity of the weighing cell(s): max. 100 t ("CELL").
$Err\ 52$	• Upper limit of effective weighing range exceeded	• Note max. value for weighing range ("RANGE"): 120% of the total capacity of the weighing cell(s) for noncertifiable scales or 100% for certifiable scales.
$Err\ 53$	• Storage data in EAROM lost (software with loading possibility) • Storage data lost (older software versions without loading possibility) or changed due to faulty EAROM	• Reload basic settings (version V2.36, V4.50, V3.50 of the application software or higher): Press and hold the «→0←» key, the scale restarts and shows "Error 6". Calibrate scale. • Replace terminal board.
$Err\ 54$	• EPROM 2 is not compatible with scale PC board	• Install correct EPROM. For further information please refer to the Spider product group service manual, section 6.
$Err\ 6$	• No calibration exists	• Calibrate weighing system.

| Error message/symptom	Cause	Rectification
$$\boxed{E\,r\,r \qquad 9}$$ or weight display unstable • Weight value "0.00" in service mode stable at a "RAMP" value of approx. 25% with attached cell and short-circuited signal inputs (supply "Sense" inputs via supply outlets) • As above, but weight value not stable **Error message "Err 9" appears when terminal is switched on**	• Unstable weight value • Unstable surroundings • Weighing cell faulty, A/D converter OK • A/D converter faulty • EAROM contains incorrect data	 • Stable surroundings (calibrate) • Change weighing cell • Replace terminal board • Delete the data in the EAROM by the "Reset" operation in service mode (possible with Version 5.31 service software and later versions). Then reload the terminal basic settings. The entire procedure is described in section 4.13.
• After the calibration, "0.00" flashes and it is no longer possible to quit the service mode.	• The service software does not have the correct internal parameters. The parameters must be recalculated.	• Change total capacity of the weighing cell(s) in the service mode. Before quitting the service mode or before calibration, set the capacity to the correct value.

6. Technical data

The following specifications may be changed at any time without warning. You will find the dimensions of the terminal in the enclosed operating instructions of the Spider or Spider S scale, respectively.

6.1 Requirements regarding the weighing cell

Nominal load of cell:	10 g .... 100 t or 10 lb .... 200,000 lb	
Platform supply:	5 VDC	
Admissible platform impedance:	80 ohm .... 1000 ohm	A[1]
In-phase signal [(+OUT) + (–OUT)] / 2:	1 V .... 2.6 V	B[1]
Differential signal: (+OUT) – (–OUT)	–4 mV .... 14 mV	C[1]

[1] **Test points** at the connection terminal in the Spider terminal or on the lines of the weighing cell in accordance with the following diagram:
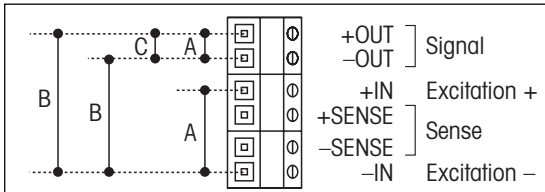
Note: Measure platform impedance when weighing cell is **not** attached.

Calculated example for the differential signal:

Data of the weighing cell: Sensitivity of 2 mV/V and nominal load of 100 kg

Calculation of **differential signal for full load** (100 kg):   2 mV/V • 5 V • 100 kg/100 kg = **10 mV**

Calculation of **differential signal for half load** (50 kg):   2 mV/V • 5 V • 50 kg/100 kg = **5 mV**

Note: If the sensitivity of the weighing cell is > 2 mV/V, ensure that the maximum differential signal is not exceeded!

6.2   Specifications of the terminal

Resolution:	35 000 points for noncertified applications
	3 500 points for certified applications
Filters:	Vibration adapter (matching to the ambient conditions)
	Spider 2/2S and 3/3S: process adapter (matching to type of weighing)
Max. weighing range:	120% of the total capacity of the weighing cell(s) for noncertified cells,
	100% of the total capacity of the weighing cell(s) for certified cells
Zero setting range:	2% of the weighing range of the weighing cell ("RANGE")
Autozero range:	0.16% of the total capacity of the weighing cell(s)
Startup zero setting range:	−2% …18% relative to the weighing range
	or −2% … +2% with certified scales with a weighing range ("RANGE")
	larger than 80% of the total capacity of the weighing cell(s)
Max. preload:	70% of the total capacity of the weighing cell(s)
Numeric increments:	1, 2, 5, 10, 20, 50, 100 or 200
Linearity:	0.002% of the total capacity of the weighing cell(s)
Units:	g, kg, t, lb
Interface:	RS232C bidirectional
Baud rate:	300 – 9600 bd
Parity:	8 bits no parity, 7 bits with even parity, 7 bits with odd parity
Handshake:	none, XON/XOFF, hardware handshake for optional 2nd interface
Max. data rate:	20 weight values per second
Operating mode:	Printout at a keystroke, printout on changing load, dialog (SICS)
Power supply:	Spider terminals: 6 VDC/500 mA, via national AC adapter
	Spider S terminals: Direct connection to power supply

6.3   Notes on certified scales

The following requirements must be met for certified scales:

− Certified weighing cell with SENSE lines (6 leads)

− Sensitivity of the cell 2 mV/V or 3 mV/V

− Differential signal maximum 14 mV

− The scale must be configured as certified in the service mode (see section 4.6)

− Marking by the system constructor in accordance with the instructions (if complete scale has not been supplied by METTLER TOLEDO).

7. Table of the geo adjustment values

Northern and southern latitude in degrees and minutes	Height above sea level in meters										
	0	325	650	975	1300	1625	1950	2275	2600	2925	3250
	325	650	975	1300	1625	1950	2275	2600	2925	3250	3575
	Height above sea level in feet										
0	1060	2130	3200	4260	5330	6400	7460	8530	9600	10660	
	1060	2130	3200	4260	5330	6400	7460	8530	9600	10660	11730
0° 0' - 5° 46'	5	4	4	3	3	2	2	1	1	0	0
5° 46' - 9° 52'	5	5	4	4	3	3	2	2	1	1	0
9° 52' - 12° 44'	6	5	5	4	4	3	3	2	2	1	1
12° 44' - 15° 6'	6	6	5	5	4	4	3	3	2	2	1
15° 6' - 17° 10'	7	6	6	5	5	4	4	3	3	2	2
17° 10' - 19° 2'	7	7	6	6	5	5	4	4	3	3	2
19° 2' - 20° 45'	8	7	7	6	6	5	5	4	4	3	3
20° 45' - 22° 22'	8	8	7	7	6	6	5	5	4	4	3
22° 22' - 23° 54'	9	8	8	7	7	6	6	5	5	4	4
23° 54' - 25° 21'	9	9	8	8	7	7	6	6	5	5	4
25° 21' - 26° 45'	10	9	9	8	8	7	7	6	6	5	5
26° 45' - 28° 6'	10	10	9	9	8	8	7	7	6	6	5
28° 6' - 29° 25'	11	10	10	9	9	8	8	7	7	6	6
29° 25' - 30° 41'	11	11	10	10	9	9	8	8	7	7	6
30° 41' - 31° 56'	12	11	11	10	10	9	9	8	8	7	7
31° 56' - 33° 9'	12	12	11	11	10	10	9	9	8	8	7
33° 9' - 34° 21'	13	12	12	11	11	10	10	9	9	8	8
34° 21' - 35° 31'	13	13	12	12	11	11	10	10	9	9	8
35° 31' - 36° 41'	14	13	13	12	12	11	11	10	10	9	9
36° 41' - 37° 50'	14	14	13	13	12	12	11	11	10	10	9
37° 50' - 38° 58'	15	14	14	13	13	12	12	11	11	10	10
38° 58' - 40° 5'	15	15	14	14	13	13	12	12	11	11	10
40° 5' - 41° 12'	16	15	15	14	14	13	13	12	12	11	11
41° 12' - 42° 19'	16	16	15	15	14	14	13	13	12	12	11
42° 19' - 43° 26'	17	16	16	15	15	14	14	13	13	12	12
43° 26' - 44° 32'	17	17	16	16	15	15	14	14	13	13	12
44° 32' - 45° 38'	18	17	17	16	16	15	15	14	14	13	13
45° 38' - 46° 45'	18	18	17	17	16	16	15	15	14	14	13
46° 45' - 47° 51'	19	18	18	17	17	16	16	15	15	14	14
47° 51' - 48° 58'	19	19	18	18	17	17	16	16	15	15	14
48° 58' - 50° 6'	20	19	19	18	18	17	17	16	16	15	15
50° 6' - 51° 13'	20	20	19	19	18	18	17	17	16	16	15
51° 13' - 52° 22'	21	20	20	19	19	18	18	17	17	16	16
52° 22' - 53° 31'	21	21	20	20	19	19	18	18	17	17	16
53° 31' - 54° 41'	22	21	21	20	20	19	19	18	18	17	17
54° 41' - 55° 52'	22	22	21	21	20	20	19	19	18	18	17
55° 52' - 57° 4'	23	22	22	21	21	20	20	19	19	18	18
57° 4' - 58° 17'	23	23	22	22	21	21	20	20	19	19	18
58° 17' - 59° 32'	24	23	23	22	22	21	21	20	20	19	19
59° 32' - 60° 49'	24	24	23	23	22	22	21	21	20	20	19
60° 49' - 62° 9'	25	24	24	23	23	22	22	21	21	20	20
62° 9' - 63° 30'	25	25	24	24	23	23	22	22	21	21	20
63° 30' - 64° 55'	26	25	25	24	24	23	23	22	22	21	21
64° 55' - 66° 24'	26	26	25	25	24	24	23	23	22	22	21
66° 24' - 67° 57'	27	26	26	25	25	24	24	23	23	22	22
67° 57' - 69° 35'	27	27	26	26	25	25	24	24	23	23	22
69° 35' - 71° 21'	28	27	27	26	26	25	25	24	24	23	23
71° 21' - 73° 16'	28	28	27	27	26	26	25	25	24	24	23
73° 16' - 75° 24'	29	28	28	27	27	26	26	25	25	24	24
75° 24' - 77° 52'	29	29	28	28	27	27	26	26	25	25	24
77° 52' - 80° 56'	30	29	29	28	28	27	27	26	26	25	25
80° 56' - 85° 45'	30	30	29	29	28	28	27	27	26	26	25
85° 45' - 90° 00'	31	30	30	29	29	28	28	27	27	26	26

8. Notes on digital Spider weighing platforms for ID terminals

The service mode of the digital Spider weighing platforms for ID terminals differs in a few points from the service mode of the Spider terminals (compare section 4.2). However, the order of the blocks is identical.

$5\Pi r$

– The blocks for the serial number ("SNR") and for printout of the configuration data ("LIST") are not available.

$L \cdot 5E$

$U\Pi l \ t \ 1$

kg

g

– In the block for the basic unit ("UNIT 1"), only the weighing units kilogram and gram are available.

$rE5Et$

– The first main block which appears after recall of the service mode is used to reset certain parameters. This block ("RESET") is available only for the digital Spider weighing platforms for ID terminals. Recall of this block with the «⇥» key activates the following sequence:

$\Pi O \ rE5$

– You are asked if you wish to abort the reset operation. If you press the «⇥» key (YES), reset will be aborted and the next block of the service mode ("UNIT 1") appears directly. If you press the «→T←» or «T» key (NO), the sequence is continued.

$rE5RLL$

– You are again asked whether you really wish to perform the reset operation. If you press the «→T←» or «T» key (NO), reset will be aborted and the next block of the service mode appears directly. If you press the «⇥» key (YES), reset will be performed.

$PO\Pi OFF$

– You are now prompted to switch off the weighing system (the reset parameters do not become active until the scale is switched on again).

In the reset operation, the ID select address is deleted and the weighing process adapter, the vibration adapter, the automatic stability detector and the automatic zero point correction are reset to the factory settings.

To protect your METTLER TOLEDO product's future:
METTLER TOLEDO service assures you of quality, measuring
accuracy and preservation of value of the METTLER TOLEDO
products for years to come.
Please send for full details of our attractive terms of service.
Thank you.