Spider™

SI Indicator
Service Manual

B14832900A
6/98.01

Mettler Toledo is recognized around the world for manufacturing and marketing high quality scales and weighing systems. With roots tracing back to 1901, the company takes pride in its long established record of employing innovation, technology, and a close working relationship with its customers to meet the diverse needs of the global marketplace. Mettler Toledo's worldwide headquarters are in Greifensee, Switzerland. Corporate offices for the North American Marketing Organization are in Worthington, Ohio.

FCC NOTICE

This equipment has been tested and found to comply with the limits of the United States of America FCC rules for a Class A digital device, pursuant to Part 15 of the FCC Rules and the Radio Interference Regulations of the Canadian Department of Communications. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

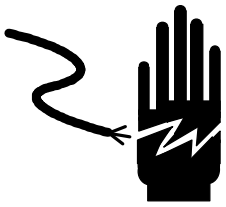
ORDERING INFORMATION

It is most important that the correct part number is used when ordering parts. Parts orders are machine processed, using only the part number and quantity as shown on the order. Orders are not edited to determine if the part number and description agree.

METTLER TOLEDO RESERVES THE RIGHT TO MAKE REFINEMENTS OR CHANGES WITHOUT NOTICE.

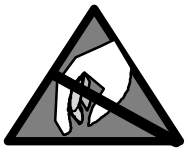
PRECAUTIONS

- Read this manual before operating or servicing this equipment.
- Always take proper precautions when handling static sensitive devices.
- Do not connect or disconnect load cells or a scale base to the equipment with power connected or damage may result.
- Always remove power and wait at least 30 seconds before disconnecting any cables. Failure to observe this precaution may result in damage to, or destruction of the equipment.
- Save this manual for future reference.
- Call METTLER TOLEDO for parts, information, and service.



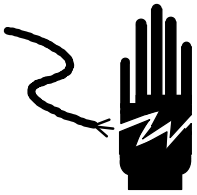
WARNING

ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM.



CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.



WARNING

Remove power from the Spider and wait a minimum of 30 seconds before connecting or disconnecting any cables from PCBs or load cells as damage may result.

TABLE OF CONTENTS

1 Introduction

Overview

The SPIDER indicator is a flexible, general purpose indicator that can be used for the following applications:

- Simple weighing
- Weigh-in operations
- Weigh-out operations
- Piece counting
- Formula weighing
- Dynamic weighing
- Accumulation

For added flexibility, the indicator can be mounted to the wall with an optional wall-mount kit. The SPIDER indicator's inherent simplicity makes it easy to perform various weighing and counting operations regardless of your familiarity with Mettler Toledo products or scales.

Standard Features

The SPIDER indicator comes with the following standard features:

- Compact and rugged extruded aluminum industrial enclosure
- Integrated functions for special applications such as formula and/or dynamic weighing
- Convenient 5-key keypad
- Large and easy-to-read LCD digital display
- RS232 Bidirectional serial data interface

Optional Features

Serial RS-232C (0917-0219)

A second RS-232 serial interface can be installed in the SPIDER indicator. The second interface is designed to operate hardware components using XON/XOFF handshaking. The second serial interface can be used to connect serial peripheral devices such as a printer, personal computer, or auxiliary display.

RS232C Interface Cable (0900-0313)

The Interface cable's 15 feet (4.6 meter) length allows attachment of computers, printers and other peripherals to the scale's serial interfaces.

Battery Kit Attachment (0917-0222)

The battery attachment allows you to operate the SPIDER indicator away from a conventional power supply. The battery kit uses four standard (or four rechargeable) C-size batteries. A symbol in the SPIDER indicator display indicates when battery power is too low for accurate operation.

Wall Mount Kit (0917-0220)

The optional wall mount kit lets you install the SPIDER indicator display terminal on nearly any vertical surface. The stainless steel constructed kit contains all mounting parts including screws and dowels.

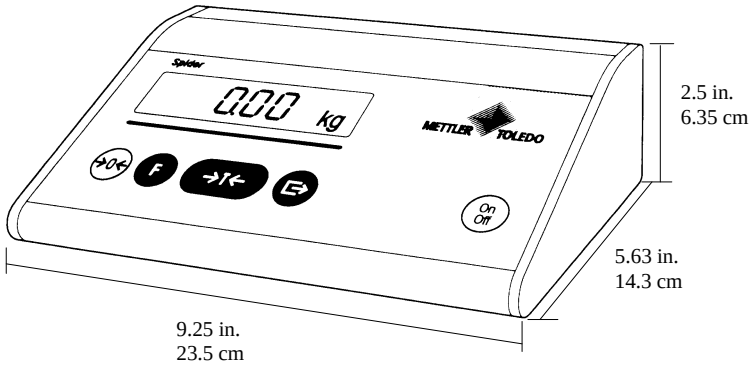
Secondary Display (0917-0221)

You can connect a secondary remote display to the SPIDER indicator via any of the serial interfaces. This remote provides display information only (no keyboard control.)

Specifications

Physical Dimensions

The SPIDER indicator measures 9.25 in. (23.5 cm) wide, 5.63 in. (14.3 cm) deep, and 2.5 in (6.35 cm) high.



Power Requirements

A 6 VDC (500 mA) AC adapter provides power to the SPIDER indicator. It can also be powered by an optional battery pack that uses rechargeable or conventional batteries. A symbol in the display indicates when battery power is too low for accurate operation. NOTE: A SPIDER indicator with four analog load cells has a maximum operating life of up to 25 hours with alkaline-manganese batteries and up to 11 hours with NiCd rechargeable batteries.

Indicator Specifications

Specifications of the SPIDER indicator	
Resolution	1K to 5K divisions for non-certified applications (non legal-for-trade) 1K to 3 K divisions for certified applications (legal-for-trade) Selection of resolutions exceeding 5 divisions is not recommended. The SPIDER indicator may permit higher resolution choices, but could result in poor weighing performance such as instability or non-repeatability.
Filters	Vibration adapter (matching the ambient conditions) Process adapter (matching the type of weighing)
Max. Display Range	5 increments over capacity
Zero Setting Range	1.2% of the total load cell capacity
Auto Zero Range	0.16% of the stated scale's weighing capacity
Start-up Zero Range	–1.4% to +12.6% of the total load cell capacity
Max. Preload	70% of the nominal load of the stated scale weighing capacity
Numeric Increments	1, 2, 5 multiples
Decimal Positions	From 0.0002 to 200
Linearity	0.033 percent of the total load cell capacity
Units	g, kg, t, lb
Interface Baud Rate Parity Handshake Max. Data Rate Operating Mode	RS-232C bi-directional 300 to 9600 baud 8 bits (no parity), 7 bits (even/odd parity) none, XON/XOFF, hardware 20 weight values per second Printout at keystroke, printout on changing load, dialog (SICS)

Standards Compliance

The SPIDER indictor meets or exceeds the following standards and certifications:

AC Power Line Voltage Variation

The SPIDER indicator meets NIST HB-44, Canadian Gazette Part 1, and OIML-SP7/SP2 line voltage variation specifications as listed in the following table:

AC Power Line Voltages						
Line Voltage Variation Specification	AC Line Voltage			Line Frequency in Hz		
	Minimum	Nominal	Maximum	Minimum	Nominal	Maximum
NIST HB-44	100	120	130	59.5	60	60.5
Canadian	108	120	132	58.8	60	61.2
OIML-SP7/SP2	102 187 204	120 220 240	132 242 264	58.8 49.0 49.0	60 50 50	61.2 51 51

RFI Susceptibility

The SPIDER indicator meets USA, Canadian, VDE 0871 Class B, UK requirements for RFI susceptibility as listed in the following table with a maximum of one display increment of change when calibrated for recommended builds.

Radio Interference Frequency	Field Strength
26-1000 MHz	3 volts/meter

UL Listing

The 120 VAC power adapter complies with UL requirements and carries the UL label.

CSA Certification

The 120 VAC power adapter complies with CSA requirements and carries the CSA label.

Weights and Measures Approval

The SPIDER indicator has been submitted to the NIST for approval under the National Type Evaluation Program (NTEP) for compliance with HB-44 for Class II, III, and IIIL devices (U.S. Approval # 96-021). It was also submitted for Canadian Weights and Measures Laboratories' approval. After evaluation, the instrument was found to have met or exceeded requirements for a Class III, 3000d rating and approval AM5129 issued by statutory authority of the Minister of Industry, Science, and Technology of Canada.

2 Installation

This chapter gives detailed instructions and important information you will need to install the SPIDER indicator successfully. Please read this chapter thoroughly before you begin installation.

Environment

If you have moved a certified unit, please contact Mettler Toledo to have the scale recalibrated and certified at its new location.

Before you install the indicator, identify an appropriate installation site. The proper environment will enhance the SPIDER indicator's operation and longevity. The following sources of scale error may help you as you locate the proper environment for the SPIDER indicator:

- Vibration—Vibration diminishes the scale's ability to measure accurately. Electrical machinery such as conveyors and drill presses can cause inaccurate and non-repeatable readings. The scale may also read inaccurately if it is not balanced properly.
- Air Currents—Moving air can cause the scale to read an additional force (additional weight) and have the same affect as vibration.
- Temperature Stability—Scales at temperatures lower than room temperature can read inaccurately as the scale measures the change in resistance of the strain gauges when weight is applied to the scale. To ensure accurate readings, let the scale warm-up approximately 30 minutes before using it.
- Electrical Influences—Fluctuations in the electrical power supply can affect performance and possibly damage the load cell. The scale should be set apart from equipment that generates static electricity. "Clean" power should be used at all times to avoid damage.
- Friction—A scale cannot measure accurately if an object is rubbing or pressing against the platter.
- Moisture/Humidity—Moisture and humidity can corrode electrical circuitry.
- Other
  - Operate the indicator at –10° C to +40° C (+14° F to 104° F).
  - Do not locate or operate the indicator in a hazardous area.
  - Do not locate or operate the indicator in a wet area.
  - Place the scale in a stable location with little or no vibration.
  - Do not place the indicator in a location subject to excessive drafts.

Package Contents

Check to make sure all components are included in the shipping carton containing the SPIDER indicator. The package contents includes:

- SPIDER indicator
- Technical manual
- AC adapter (configured to national codes)
- Scale capacity, increment, and units labels

Contact your Mettler Toledo representative immediately if any components are missing or damaged.

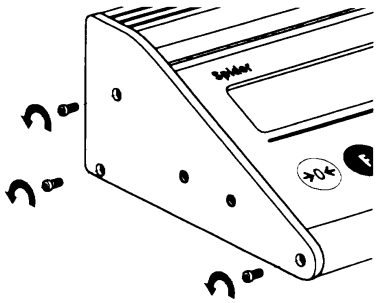
Electrical Connections

The SPIDER indicator must be attached to a scale base. It can be used with most industry-standard analog scale bases. Mettler Toledo manufactures a complete range of scale bases including bench, portable, floor, and drum scales. The company can also supply load cell kits that convert mechanical scales to electronic scales that can use a SPIDER indicator. You can attach up to four 350 ohm analog strain gauge load cells to a single SPIDER indicator.

Single Load Cell Connections

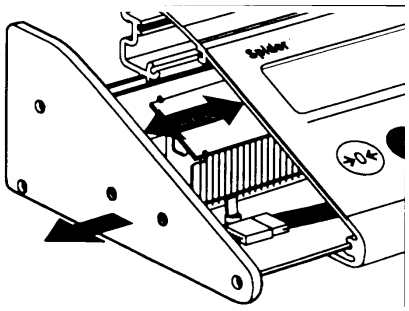
The circuit board is connected to the keypad by a ribbon cable. Pull the circuit board carefully away from the enclosure to avoid disconnecting the keypad.

The following instructions describe how to connect a SPIDER indicator to most industry-standard scale bases.

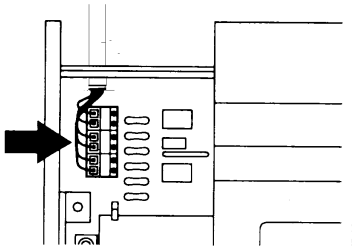


1. Using a Phillips head screwdriver, remove the three outermost retaining screws located on the left side of the indicator. Do not remove the two screws in the center.

2. Gently pull the circuit board away from the enclosure. (Approximately three inches is sufficient.)

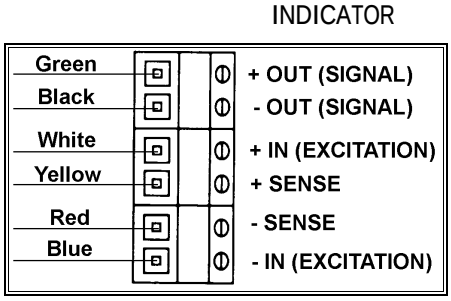


3. Insert the load cell cable through the plastic cord grip, then gently pull the cable through the large hole located on the back plate of the indicator.
4. Attach the individual wires of the load cell cable to the circuit board according to the following diagrams:

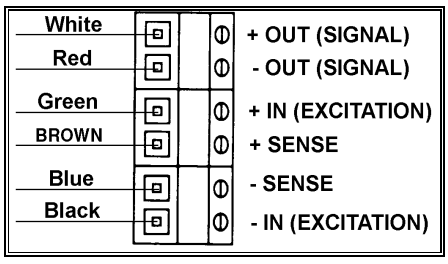


If the load cell cable is too large in diameter for the cord grip, contact Mettler-Toledo for an adapter cable (P/N 0900-0308).

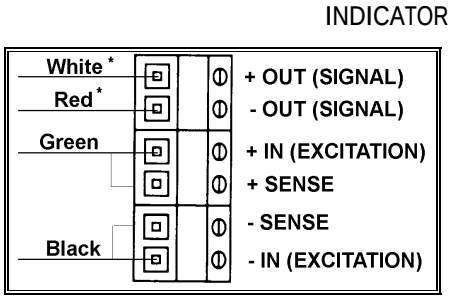
Standard 6-Wire Cable



Masstron 6-Wire Cable

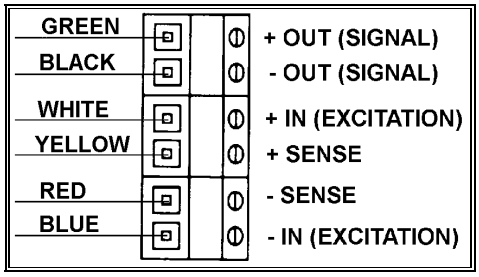


Standard 4-Wire Cable



* If an increase in load results in a decrease in weight display, reverse the signal wires (+OUT and –OUT).

Standard Wiring for GB Bases



NOTE: The maximum allowable distance from the load cell to the indicator is 10 meters (33 feet). The cable shield must be grounded to the indicator on one end and to the load cell on the other.

In some cases, it is necessary to locate the indicator further from the scale.

5. Secure the cord grip in the back plate and gently slide the circuit board back into the enclosure until the side is flush with the enclosure. Replace the retaining screws.

Multiple Load Cell Connections

The SPIDER indicator can be connected to as many as four 350 ohm load cells. A load cell junction box is required for multiple load cell scales. The sum of the rated capacities of the individual load cells corresponds to the total capacity of the weighing system. The total capacity must be entered in the Service mode as described in Chapter 3.

The connecting cable between the load cell and the junction box is called a “home run cable.” Please refer to the load cell wiring diagrams given in the previous section for termination of the home run cable. Mettler Toledo recommends use of a 6-wire home run cable with the sense leads terminated at the junction box.

Serial Port Connections

The SPIDER indicator is equipped with an RS-232C serial port that is accessible from the rear of the indicator. This serial port is a standard sub-miniature DB-9 female serial connection that can be used for compatible serial devices such as a printer or personal computer. The following diagram shows the pin assignments of the serial port connector:

Pin	Signal	
1	NC	No connection
2	TxD	Send line of SPIDER indicator
3	RxD	Receive line of SPIDER indicator
4	DSR	Receive handshake (I-face 2 only)
5	GND	Signal ground
6	DTR	Send handshake (I-face 2 only)
7	NC	No connection
8	NC	No connection
9	NC	No connection

The following Mettler Toledo devices use the RS-232 connection shown below:

SPIDER indicator	Device	Mettler Toledo Serial Printers
2	3	8622 8624 8806 8807
5	7	8842 8843 8844 8845
		8856 8861 8865 MP750

Using interface cable number 09000313, ensures both electrical and mechanical compatibility between the indicator and printers above.

SPIDER indicator	Device TB-2	Mettler Toledo Serial Accessories
2	2	8617 9323 9325
5	3	

Chapter 4, Master Mode Configuration, provides additional information describing how to configure data for printing through the serial port connection. The Appendix section entitled Operating Instructions Using a PC describes how to use the SPIDER indicator from a PC connected through the serial port.

Power Supply Connections

After the load cell(s) are connected, you are ready to connect the power supply. Inspect the SPIDER indicator terminal and scale base to ensure that all wiring is connected properly and secured before you apply power.

Apply power by inserting the molded end of the power cable to the rear of the indicator then plugging the modular power supply into a properly grounded AC power outlet.

Power-up Sequence

The SPIDER indicator goes through a series of self tests when it is turned on. These tests confirm normal operation. The power-up sequence is as follows:

1. All segments of the display window are lit. This verifies operation of all segments.
2. The display shows the indicator software version numbers.
3. The indicator advances to normal operating mode.

The total power-up sequence requires approximately 6 seconds.

If the display shows NO after the power-up sequence, the scale must capture zero before displaying weight.

Scale Build Determination

If you want a standard, recommended scale build using a standard Mettler Toledo analog scale base, proceed to Chapter 3, Configuring Service Mode.

For a nonstandard build or if the SPIDER indicator is used with a mechanical lever system conversion, you must determine the minimum increment size for the scale base before calibration. Never program the SPIDER indicator for less than 1.0 microvolt/increment. The following section describes the calculation for determining the minimum increment size for analog load cell scales.

Minimum Increment Size for Analog Scale Input

Determine the minimum increment size selection for an analog scale input by calculating the microvolts per increment for the desired build. To calculate the microvolts per increment:

Solve the following equation for µV per increment.

$$\mu V \text{ per Increment} = \frac{\text{Increment Size} \times \text{Cell Output} \times 5000}{\text{Load Cell Capacity} \times \text{Ratio}}$$

The increment size, scale capacity, and load cell capacity must all be measured in the same weight units, lb or kg. If the weight units for any of these variables are listed in kg units, multiply by 2.2046 to convert to lb units for the purposes of this calculation.

Load cell output is rated in mV/V (millivolts per volt of excitation), marked on load cell data tag. Mettler Toledo load cells are typically 2 mV/V. Other load cells can range from 1 mV/V to 4.5 mV/V.

The load cell capacity is the rated capacity marked on load cell data tag. The ratio is the total number of load cells in the system or the total lever ratio (if scale is a mechanical lever system conversion).

Sample Calculation

1. Refer to the following example of a microvolt per increment calculation for a Model 2158 floor scale installation.

Scale Capacity	5000 lb
Increment Size	1.0 lb
Load Cell Capacity	2500 lb
Number of Cells	4
Cell Output	2 mV/V
Excitation Voltage	5 VDC

2. Use the following formula to calculate the (µV per increment):

$$\mu V \text{ per Increment} = \frac{\text{Increment Size} \times \text{cell output} \times \text{excitation (mV)}}{\text{Load Cell Capacity} \times \text{Ratio}}$$

Substituting the Model 2158 parameters in the formula:

$$\mu V \text{ per Increment} = \frac{1.0 \text{ lb} \times 2 \text{ mV per V} \times 5000}{2500 \text{ lb} \times 4} = 1.0 \text{ mV per increment}$$

Since this is not less than the minimum acceptable microvolt build (1.0 microvolt per increment), the indicator should perform acceptably in non-legal for trade applications. At full scale, the maximum load cell output may not exceed 15 mV.

Model Numbers	Number of Load Cells	Load Cell Capacity	Total Capacity of Load Cell(s)	Range (Capacity of Base)	Minimum Display Div.	Display Division
GB6, SP6	1	48 lb/22 kg	48 lb/22 kg	15 lb/6 kg	0.005 lb/.002 kg	3000d
GB15, SP15	1	48 lb/22 kg	48 lb/22 kg	30 lb/15 kg	0.005 lb/0.002 kg	6000d
GB30, SP30	1	99.lb/45 kg	99.lb/45 kg	60 lb/30 kg	0.01 lb/0.005 kg	6000d
GB60, SP60	1	220 lb/100 kg	220 lb/100 kg	120 lb/60 kg	0.02 lb/0.01 kg	6000d
GB60L, SP60L	1	220 lb/100 kg	220 lb/100 kg	120 lb/60 kg	0.02 lb/ 0.01kg	6000d
GB150, SP150	1	440 lb/200 kg	440 lb/200 kg	300 lb/150 kg	0.05lb/0.02kg	6000d
1985						
(RAM 7)	1	50 lb/22.7 kg	50 lb/22.7 kg	25 lb/10 kg	0.005lb/0.002kg	5000d
(RAM 0105)	1	100 lb/45.4 kg	100 lb/45.4 kg	50 lb/20 kg	0.01 lb/ 0.005kg	5000d
(RAM 0106)	1	200 lb/90.7 kg	200 lb/90.7 kg	100 lb/20 kg	0.02 lb/0.01kg	5000d
2095						
(RAM 0104)	1	100 lb/45.4 kg	100 lb/45.4 kg	50 lb/20 kg	0.01 lb/0.005kg	5000d
(RAM 0105)	1	200 lb/90.7 kg	200 lb/90.7 kg	100 lb/50 kg	0.02lb/0.01 kg	5000d
(RAM 0106)	1	500 lb/226.8 kg	500 lb/226.8 kg	400 lb/200 kg	0.05 lb/0.02 kg	8000d
2185						
(RAM 1)	1	500 lb/226.8 kg	500 lb/226.8 kg	250 lb/100 kg	0.05 lb/0.02 kg	5000d
(RAM 2)	1	1000 lb/453.6 kg	1000 lb/453.6 kg	500 lb/200 kg	0.1 lb/0.05 kg	5000d
(RAM 3)	1	2000 lb/907.2 kg	2000 lb/907.2 kg	1600 lb/800 kg	0.2 lb/0.1 kg	8000d
2158(Vertex)						
2158	4	500 lb/227 kg	2000 lb/908 kg	1000 lb/500 kg	0.2 lb/0.1 kg	5000d
2158	4	1250 lb/568 kg	5000 lb/3272 kg	2500 lb/1250 kg	0.5 lb/0.5 kg	5000d
2158	4	2500 lb/1135 kg	10000 lb/4540 kg	5000 lb/2500 kg	1 lb/0.5 kg	5000d
2158	4	5000 lb/2270 kg	20000 lb/9080 kg	10000 lb/5000 kg	2 lb/1 kg	5000d
2158	4	10000 lb/4540 kg	40000 lb/18160 kg	20000 lb/10000 kg	5 lb/2 kg	5000d
2254 (Predator)	4	2500 lb/1135 kg	10000 lb/4540 kg	5000 lb/2500 kg	1lb/0.5 kg	5000d
2256	4	2500 lb/1135 kg	10000 lb/4540 kg	6000 lb/3000 kg	1 lb/0.5 kg	6000d
2888	4	500 lb/227 kg	2000 lb/908 kg	1000 lb/500 kg	0.2 lb/0.1 kg	5000d

Legal-For-Trade Preparations

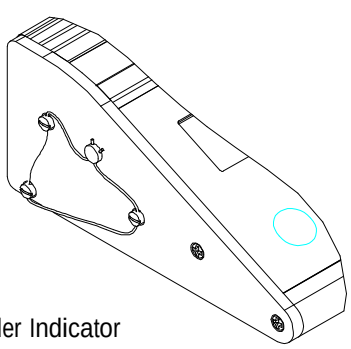
If you are using the SPIDER indicator with an approved scale in a legal-for-trade application, you must configure it as such when installing it.

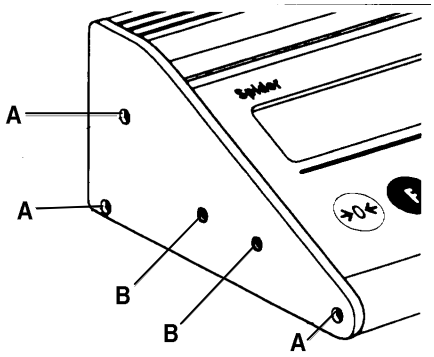
- Select the "Approv" option in the Weighing Cell program block, Approval sub-block (in Service mode). This restricts the options in other program blocks to those that provide approved operations.

You can physically seal the indicator to prevent tampering or alteration of its calibration.

- Place a paper seal over one of the left end cap screws (A) and one of the two center end cap screws (B).

You can also seal the indicator using the included cross drilled screws and sealing wiring along with a lead seal.



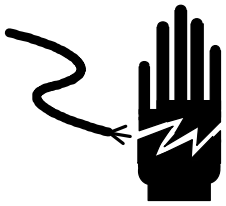


Spider Indicator
W & M Sealing

NOTES

3 Service Mode Configuration

Overview



⚠ WARNING

ONLY PERMIT QUALIFIED PERSONNEL TO PROGRAM METTLER TOLEDO EQUIPMENT. EXERCISE CARE WHEN CREATING PROGRAMS OR MAKING PROGRAM CHANGES WHEN OUTPUTS ARE CONNECTED TO EXTERNAL EQUIPMENT. FAILURE TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

Service mode lets you configure those parameters governing scale and system setup and calibration. Service mode's nine program blocks let you

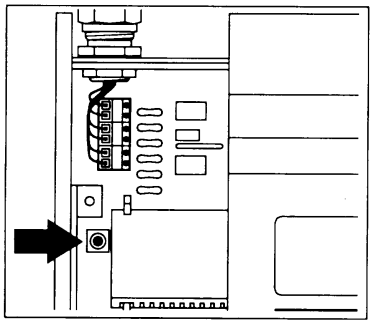
- Select the main weighing unit
- View the current value for the analog-to-digital converter
- Recall the SPIDER indicator serial number
- Enter parameters for the connected scale
- Set the weighing range
- Select a weight display resolution based on the load cell capacity
- Calibrate the scale base attached to the SPIDER indicator
- Print the current indicator configuration parameters
- Exit Service mode

As you configure the program blocks in Service mode, please keep in mind that the SPIDER indicator's display is designed for digital numeric characters. Some alphabetical characters cannot be created accurately, and it may take some time to become accustomed to the alpha characters.

Accessing Service Mode

If you cannot reach the button safely with your fingertip, use a non-conductive instrument to press the button. Do not use a metal tool because it may damage sensitive components.

1. Turn the indicator off by pressing the ON/OFF button on the keypad.
2. Open the indicator.
3. Slide the circuit board from the enclosure as you did when attaching the indicator to a scale base. (Refer to Chapter 2 of this manual.)
4. Press and hold the red Service mode access button located to the left of the display as you switch the power to the indicator back on. Hold the red button in until the display verification is complete. The display reads Service indicating that you are in Service mode.

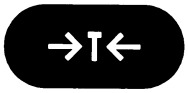


5. Slide the circuit board back into the case and close the unit.

Navigating in Service Mode

You will use only two keys on the SPIDER indicator keypad to configure the program blocks of Service mode.

ENTER—The ENTER key is used to accept the displayed parameter. ENTER corresponds to a “Yes” response. Pressing ENTER at the Service prompt immediately after accessing Service mode brings up the first program block in Service mode.



TARE—The TARE key is used to refuse the displayed parameter. Pressing TARE corresponds to a “No” response. Pressing TARE at the Service prompt immediately after accessing Service mode exits Service mode.

Unit Program Block

The Unit program block lets you select the basic weighing unit for the SPIDER indicator. To select a weighing unit:

1. At the Service prompt, press ENTER to access the Unit program block.
2. At the Unit 1 prompt, press TARE until the desired unit is displayed. Weight unit options include:
   - Kilogram (kg)
   - Metric ton (t)
   - Gram (g)
   - Pound (lb)
3. Press ENTER to confirm the displayed weighing unit. The SPIDER indicator automatically proceeds to the next Service mode program block.

Ramp Program Block

The Ramp program block lets you view the current values of the internal analog-to-digital converter. This is not a calibration critical step. Press TARE if you wish to bypass this program block. To recall the value:

1. Press ENTER at the Ramp prompt. The SPIDER indicator displays the current deflection of the A/D converter in percent.
2. Press TARE to update the value.
3. Press ENTER again to close the Ramp program block and continue to the Serial Number program block.

The following is offered as examples of how the Ramp readings relate to loads on the cell:
Ramp ---> 25% ---> No load on load cell (0 mV)
Ramp ---> 27% ---> Scale with weighing pan in place.
Ramp ---> 77% ---> Scale with 100% of scale capacity loaded.
Ramp ---> 87% ---> Scale with 120% of scale capacity loaded.

Weighing Cell Program Block

The Weighing Cell program block has two sub-blocks that let you select the scale type (certified or non-certified) and set the capacity of the load cell. These steps are necessary in order to calibrate the scale.

1. Approval Sub-block

The Approval sub-block lets you select a scale type for the scale currently attached to the SPIDER indicator.
To select the scale type:

1. Press ENTER at the Cell prompt to access the sub-block.
2. At the Approv prompt, press TARE to display the desired scale type. Options include:
   - Certified scale (Approv)
   - Non-certified scale (No_App)
3. Press ENTER to confirm the displayed scale type.

2. Capacity Sub-block
(Total Load Cell Capacity)

The Capacity sub-block lets you configure the TOTAL LOAD CELL CAPACITY for the load cell(s) currently attached to the SPIDER indicator. If multiple load cells are attached, the capacity is the sum of all individual load cells.
To configure the weighing cell capacity:

1. Press ENTER at the Capacity prompt to access the sub-block. The display shows the factory default value (100). The cursor position is indicated by a horizontal bar at the left of the active digit.
2. Press ENTER to select the digit you want to change. Each time you press ENTER, the cursor moves one position to the right.
3. Press TARE to change the numeric value of the active digit. Each time you press TARE, the digit is incremented by one.
4. Repeat steps 2 and 3 for each digit you wish to configure. When the right-most digit is configured, the SPIDER indicator displays the Cap OK prompt.
5. Press ENTER at the Cap OK prompt to confirm the weighing cell capacity and continue to the Range program block.

   Alternately, you can press TARE at the Cap OK prompt to return the cursor to the beginning of the Capacity sub-block.

Range Program Block
(Scale Weighing Capacity)

The Range program block lets you specify the upper limit value of the SCALE WEIGHING CAPACITY. If the upper weighing limit is exceeded by weight on the scale, an overload error message is displayed. The section entitled Troubleshooting in Chapter 6 lists error messages for the SPIDER indicator.
To configure the upper limit of the weighing range:

1. Press ENTER at the Range prompt. The SPIDER indicator displays the default upper weighing range limit (60% of the load cell(s) capacity). The cursor position is indicated by a horizontal bar at the left of the active digit.
2. Press ENTER to select the digit you want to change. Each time you press ENTER, the cursor moves one position to the right.
3. Press TARE to change the numeric value of the active digit. Each time you press TARE, the digit is incremented by one.
4. Repeat steps 2 and 3 for each digit you wish to configure. When the right-most digit is configured, the SPIDER indicator displays the Rn OK prompt.
5. Press ENTER at the Rn OK prompt to confirm the upper limit of the weighing range and continue to the Resolution program block.

   Alternately, you can press TARE at the Rn OK prompt to return the cursor to the beginning of the Range sub-block.

Resolution Program Block

The Resolution program block lets you select the desired weight display resolution for the weighing system. Resolution is selectable in display increments. The SPIDER indicator determines all possible display increments. The smallest

increment selection available results in 5,000 (3,500 for certified scales) or fewer display increments.

To configure the weighing system resolution:

1. Press ENTER at the Resolu prompt. The SPIDER indicator displays the first possible resolution value based on the nominal load of the load cell(s).
2. Press TARE to display the desired resolution value. Each time you press TARE, the next value is displayed.
3. Press ENTER to confirm the displayed resolution value and continue to the Calibration program block.

Calibration Program Block

You must calibrate the system if the load cell has been changed, or if another load cell has been added to the system.

The Calibration program block lets you calibrate the weighing system.

Cal Program Block

The Cal program block prompts you through the actual calibration of the weighing system. To calibrate the system:

1. Press ENTER at the Cal prompt to access the calibration sub-block.
2. The calibration sub-block allow settings of a Geo value for correcting the acceleration due to gravity or calibration of the scale with calibration weights.

   Enter the Geo value according to the list in the Appendix. When you press TARE, the indicator displays the values in succession. Press ENTER to confirm the Geo value and advance to the next step (CALEXE).

   Press ENTER to begin calibration and proceed to the Set_Pl (Set Preload) prompt.
3. At the Set PL prompt, place a preload on the weighing platform. For example, the preload may be a container that will be used for each weighing transaction. The preload is not included in the actual weight displayed for the load in the container. The sum of the preload and the selected weighing range must not exceed 70% of the nominal load of the weighing cell.

After the preload is set, the Spider prompts you through the remaining calibration steps.

4. Press ENTER to begin calibration. The SPIDER indicator displays horizontal segments as it captures zero.
5. At the full load prompt (ex. 60.00 kg), press TARE to select the full-load calibration weight value that you will use to calibrate the system. The full-load prompt varies depending on the capacity of the load cell currently connected to the indicator. You can select a value less than full value if desired.
6. Place the selected full-load calibration weight on the scale, then press ENTER to perform the calibration.

7. At the Unload prompt, remove the calibration weight from the scale. Press ENTER when the weight is removed. The SPIDER indicator automatically continues to the FacreS (Factory Reset) program block.

Factory Reset Program Block

The Factory Reset program block allows selected portions of the Service mode program blocks to be automatically reset to the factory default values.
To initiate a factory reset:

1. Press the ENTER key at the Facres prompt to enter the Factory Reset mode.
2. Press ENTER at the Std. On prompt.

To bypass Factory Reset:
Press TARE at the Facres prompt. The Menu advances to the List program block.

Service mode Default Settings

Units	lb
Serial number	Factory assigned
Approval	Non Approved
Capacity	100% of load cell rating
Range	60% of load cell capacity
Resolution	According to scale range selection

List Program Block

The List program block lets you print a copy of the current Service mode configuration if a compatible serial printing device is connected to the indicator.
To print the Service mode configuration:
Press ENTER at the List prompt. The SPIDER indicator automatically sends the current configuration to the printer and continues to the Return program block.
The example below shows a sample printout. In addition to the values configured for the Service mode program blocks, the printout includes the zero capture range and auto-zero range.

```
**********************
— — SPIDER Terminal — —
Cell:
  approved      OFF
  capacity  100.000  [kg]
Range        60.000  [kg]
Resolution    0.050  [kg]
**********************
```

Restricting Access to Master Mode

You can restrict access to Master mode by:

- Pressing ENTER at the rEStr (Restrict) prompt.
- Pressing TARE to select the display prompt ON or OFF.
- Pressing ENTER to confirm this selection.
- Pressing TARE at the End prompt to continue to the next program block.
- Alternately, press ENTER to quit the Master mode and return to normal operating mode.

Return Program Block

The Return program block lets you exit Service mode. You can select to save any changes you have made to the Service mode program block parameters, or you can return to any Service mode program block and make additional changes.

1. Press ENTER at the Return prompt to exit Service mode and save all changes. Alternately, you can press TARE to return to the first program block (Unit) and make additional changes.

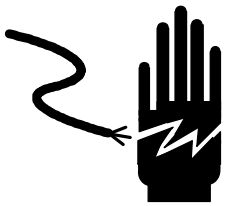
   When you press ENTER to exit, the SPIDER indicator is in “Control Mode” as indicated by an asterisk in the upper left-hand corner of the display. In control mode the weighing system operates with expanded resolution to check the Service mode parameter settings. This lets you verify the settings before you close the unit and begin weighing transactions in normal operating mode.

2. Switch the SPIDER indicator off, then on with the ON/OFF key to return to normal operating mode.

NOTES

4 Master Mode Configuration

Overview



⚠ WARNING

ONLY PERMIT QUALIFIED PERSONNEL TO PROGRAM METTLER TOLEDO EQUIPMENT. EXERCISE CARE WHEN CREATING PROGRAMS OR MAKING PROGRAM CHANGES WHEN OUTPUTS ARE CONNECTED TO EXTERNAL EQUIPMENT. FAILURE TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

Master mode lets you set those parameters governing scale operation and customize the SPIDER indicator to meet your particular needs.

With Master mode's 12 program blocks, you can:

- Assign a specific weighing application to the Function key
- Enable/disable auto zero correction
- Enable/disable the auto tare function
- Enable/disable the automatic shutdown feature
- Enable/disable the power-up zero function
- Set the vibration adapter
- Set the process adapter
- Configure both SPIDER indicator interfaces (1 and 2)
- Increase the display accuracy
- Print Master mode settings
- Restrict access to the Master mode
- Reset Master mode settings to factory default values

The SPIDER indicator display is designed for digital numeric characters. Some alphabetical characters cannot be created accurately, and it may take some time to become accustomed to the alpha characters.

Accessing Master Mode

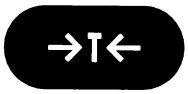
To access Master mode:

1. Press and hold the ENTER key for approximately 5 seconds until the display reads **Master**. Access to Master mode may be restricted by a restricted programming selection made in Master mode.

Navigating in Master Mode

You will use only two keys on the SPIDER indicator keypad to configure the program blocks of Master mode.

ENTER—The ENTER key is used to accept the displayed parameter. ENTER corresponds to a “Yes” response. Pressing ENTER at the Master prompt immediately after accessing Master mode brings up the first program block in Master mode.



TARE—The TARE key is used to refuse the displayed parameter. Pressing TARE corresponds to a “No” response. Pressing TARE at the Master prompt immediately after accessing Master mode exits Master mode and returns you to the normal weighing mode.

Function Program Block

Several scale functions are available through the SPIDER indicator. The Function program block lets you configure the scale function that will be active in normal operating mode when the FUNCTION key is pressed. Details on using each function in normal operating mode are given in Chapter 5 of this manual.

To configure the Function program block:

1. Press ENTER at the Master prompt to access the Function program block.
2. At the F-Key prompt, press ENTER to access the function key options, then press TARE to display the desired operating function. Options include:
   - Gross (Gross)—Displays the gross weight of the scale load when the FUNCTION key is pressed.
   - Count (Count)—Switches to piece counting mode.
   - Formula Weighing (Formula)—Lets you weigh in several components into a single container on the scale and determines the total weight and number of components in the total load.
   - Totalization (Total)—Lets you weigh several independent loads, one after another, and accumulate the total weight and number of weighments.
   - Dynamic Weighing (Dynam)—Determines an average weight over a predetermined sampling period. This is useful for loads that will not become stable such as livestock.
   - Second Units (Unit 2)—Lets you select an alternate unit of measure

- Control Mode (Ctrl)—When the FUNCTION key is pressed, the expanded resolution is displayed with an asterisk for approximately 5 seconds. The display automatically returns to the normal weighing mode.
- No Function (No F)—The FUNCTION key has no assignment at this time.

If You Select Dynamic:

At the Dynam prompt, press ENTER to access sampling interval options, then press TARE to display the desired preset sampling interval. Sampling interval options include:

- Short—approximately three seconds
- Med—approximately five seconds
- Long—approximately ten seconds

This block is not available for legal-for-trade (certified) applications.

If You Select Unit 2:

At the Unit 2 prompt, press ENTER to access the second unit options, then press TARE to display the desired second unit. Second unit options include:

- kg
- g
- lb

3. Press ENTER to select the displayed function choice.
4. At the End prompt, press TARE to continue to the next program block. Alternately, you can press ENTER twice to quit Master mode and return to normal operating mode.

Auto Zero Correction Program Block

The Auto Zero Correction program block lets you enable/disable this feature. If enabled, the SPIDER indicator automatically compensates for fluctuations in temperature or slight contamination on the scale platform when capturing zero.

To configure the Auto Zero Correction program block:

1. Press ENTER at the A-Zero prompt to access the program block, then press TARE to display the desired switch option (On or Off).
2. Press ENTER to confirm the selection.
3. At the End prompt, press TARE to continue to the next program block. Alternately, you can press ENTER twice to quit Master mode and return to normal operating mode.

Auto Tare Program Block

The Auto Tare program block lets you enable/disable the auto tare feature. If enabled, the Net annunciator blinks until a load is added to the scale and the scale stabilizes. The SPIDER indicator then automatically tares the load on the scale. You do not need to press the TARE key each time a new container is to be tared.

To configure the Auto Tare program block:

1. Press ENTER at the A-Tare prompt to access the program block, then press TARE to display the desired switch option (On or Off).
2. Press ENTER to confirm the selection.
3. At the End prompt, press TARE to continue to the next program block. Alternately, you can press ENTER twice to quit Master mode and return to normal operating mode.

Automatic Shutdown Program Block

The Automatic Shutdown program block lets you configure the SPIDER indicator to switch itself Off automatically if no operation has taken place in the preceding three minutes. This is useful if you are operating with an optional PowerPac battery to prolong the battery life.

To configure the program block:

1. Press ENTER at the Pwr OFF prompt to access the program block, then press TARE to display the desired switch option (On or Off).
2. Press ENTER to confirm the selection.
3. At the End prompt, press TARE to continue to the next program block. Alternately, you can press ENTER twice to quit Master mode and return to normal operating mode.

Power-Up (Save) Program Block

The Power-up (Save) program block lets you enable/disable the Save feature. If the Save feature is enabled, the SPIDER indicator stores the scale mode at

power-down and returns to that mode when powered-up next. If the Save feature is disabled, the scale must capture zero at power-up before the indicator can display weight.

To configure the program block:

1. Press ENTER at the Save prompt to access the program block, then press TARE to display the desired switch option (On or Off).
2. Press ENTER to confirm the selection.
3. At the End prompt, press TARE to continue to the next program block. Alternately, you can press ENTER twice to quit Master mode and return to normal operating mode.

Vibration Adapter Program Block

The Vibration Adapter program block lets you set the vibration filter to match the conditions at the scale. The vibration filter compensates for disturbances in the scale vicinity.

To configure the program block:

1. Press ENTER at the Vibrat prompt to access the program block, then press TARE to display the desired switch option. Options include:
   - Low—Select Low if the scale is in a virtually disturbance-free environment. With the Low filter selected, the scale is sensitive to external disturbances.
   - Med—Select Med if the scale is in a normal environment where extreme vibration conditions are not present.
   - High—Select High if the scale is in an unstable environment. The scale will be less sensitive to external disturbances.
2. Press ENTER to confirm the selection.
3. At the End prompt, press TARE to continue to the next program block. Alternately, you can press ENTER twice to quit Master mode and return to normal operating mode.

Process Adapter Program Block

The Process Adapter program block lets you select the type of operation that will be performed at the scale. This program block best matches the SPIDER indicator's capabilities with the weighing process.

To configure the program block:

1. Press ENTER at the **Process** prompt to access the program block, then press TARE to display the desired process option. Options include:
   - **Dosing**—Select Dosing if the weighing operation involves dispensing liquid or powdery weighing samples.
   - **Univer**—Select the Universal setting to accommodate most weighing applications.
   - **Abs**—Select Absolute Weighing for check-weightings or weighing samples for piece counting operations.
2. Press ENTER to confirm the selection.
3. At the **End** prompt, press TARE to continue to the next program block. Alternately, you can press ENTER twice to quit Master mode and return to normal operating mode.

Be careful when performing an interface reset. You will lose all previous settings for the interface!

Interface 1 Program Block

This program block lets you configure the parameters of the SPIDER indicator's built-in serial interface. The Interface program block contains several sub-blocks that let you

- Reset interface parameters to original factory default settings
- Configure communication parameters
- Set the operating mode for the interface
- Define data for transmission
- Define the format for printed data

As you configure the Interface 1 program block parameters, keep in mind that the configuration of the serial device connected to the port must match the configuration you set here.

1. Reset Interface to Factory

The Reset Interface to Factory is the first sub-block that appears under the Interface 1 program block. This sub-block resets the Interface 1 parameters only.

This reset does not affect parameters that you have configured in other program blocks in Master mode.

To reset Interface 1 parameters:

1. Press ENTER at the IFace 1 prompt, then press ENTER again at the Reset prompt to access the program block.
2. Press ENTER at the Std On prompt to reset the Interface 1 settings. This will not reset the parameters in the other Master mode program blocks.
3. At the End prompt, press TARE to continue to the next sub-block.

   Interface 1 default settings are reset as follows:

Master mode Program Block	Factory Default Setting
Data Transmission Protocol	NO
Parity	8 NO P
Data Transmission Rate	2400 baud
Operating Mode	Print
Data Definition	Gross weight (gross), tare weight (tare), net weight (net), no application specific values
Print Format	Multi (new line for every value)

2. Communication Parameters Sub-block

The Communication Parameters sub-block lets you select the data transmission parameters for the Interface 1 serial port.

1. Press ENTER at the Comuni prompt, then press ENTER at the Proto prompt to access the protocol options.
2. Press TARE to display the desired protocol option. Options include:
   - NO—The SPIDER indicator operates without a data flow protocol. This option is suitable for communication with a printer and a PC.
   - XON/XOFF—The SPIDER indicator stops data transmission upon receipt of the XOFF character and resumes transmission on receipt of the XON character. This data flow control helps to eliminate buffer overflow problems that can cause printing errors.
3. Press ENTER to confirm the protocol selection.
4. At the End prompt, press TARE to continue to the next parameter.
5. At the Parity prompt, press ENTER to access the parity and data bits parameter.

6. Press TARE to display the desired option. Parity and data bit options include:
   - 7 data bits/No parity (7 NO P)
   - 8 data bits/No parity (8 NO P)
   - 7 data bits/Even parity (EVEN)
   - 7 data bits/Odd parity (ODD)
7. At the End prompt, press TARE to continue to the next parameter.
8. At the Baud prompt, press ENTER to access the data transmission rate parameter.
9. Press TARE to display the desired baud rate. Options include:
   - 300
   - 600
   - 1200
   - 2400
   - 4800
   - 9600
10. At the End Com prompt, press ENTER to proceed or press TARE to return to the Proto prompt. If you press ENTER, at the End prompt, press TARE to continue to the sub-block.

3. Operating Mode Sub-block

The Operating Mode sub-block lets you select the operating mode of the Interface. This operating mode pertains to data transferred through the serial port only. It is not related to the Process Adapter program block that you configured earlier.

1. Press ENTER at the Mode prompt to access the sub-block.
2. At the Print prompt, press TARE to display the desired Interface operating mode. Options include:
   - Print—The interface will transfer data to the attached printer. Data transmission is in one direction from the scale to the printer.
   - Cycle—The interface will send data to the printer each time the deflection on the scale is greater than 30 divisions. Information is sent in one direction from the scale to the printer and is sent only when the load on the scale is stable. This is sometimes called “auto print.”
   - Dialog—The interface will send and receive data from a computer. Data transmission is bidirectional. Please refer to the section in the Appendix entitled Operating Instructions Using a PC for a description of this mode. Reference is also made to ME-21250163, Interface description of Mettler Toledo SPIDER indicator Scales for a description of the command set and the SICS response strings.
   - 2 Disp—This setting is used to connect an optional auxiliary display to the interface.

- Cont—The interface will send data continuously (with each A/D cycle) in the ID terminal format.
- DT—This is a bidirectional communications mode that responds to the number commands, 1,2,3,4,5 and 6 as well as the corresponding alpha command set of PM/SM scales and balances. Response strings are in the PM/SM format, not SICS.
- T–Cont— Toledo continuous mode. Transfer rate is 2 times per second. This mode is not suitable for process control applications.
- RS Key— The digital input of the first interface (pin 9) is assigned a key (ENTER, TARE, or FUNCTION). For assignment to one of these three keys, short circuit pin 9 to signal ground (pin 5) and at the same time press the desired key on the SPIDER indicator terminal. Once selected, key function is triggered by a contact closure across pins 5 and 9. A hand or foot switch or similar normally open, momentary contact closure can be used to activate the selected function.

3. Press ENTER to confirm the interface mode selection.
4. At the End prompt, press TARE to continue to the sub-block.

4. Data Definition

The application-specific values pertain only if the interface mode is selected as Print or Cycle.

The Data Definition sub-block lets you select the types of data that will be transmitted through the serial interface. The data definition applies only if the interface mode is selected as Print or Cycle.

You can include one, several, or all of the data types in the data definition string. They are not mutually exclusive.

1. Press ENTER at the DefStr prompt to access the sub-block.
2. At the Gross prompt, press ENTER to include gross weight in the data transmission, or press TARE to exclude gross weight from the data transmission.
3. At the Net prompt, press ENTER to include net weight in the data transmission, or press TARE to exclude net weight from the data transmission.
4. At the Tare prompt, press ENTER to include tare weight in the data transmission, or press TARE to exclude tare weight from the data transmission.
5. At the Appl prompt, press ENTER to access the application-specific values, then press ENTER or TARE at each data option to include or exclude the data in the transmission.

Display	Meaning	Application*			
		1	2	3	4
DISPL	Display value	X	X	X	X
PCS	Piece count	X			
APW	Average Piece Weight	X			
REF CT	Reference Count	X			
CMP WT	Component Weight		X	X	
CMP CT	Component Count		X	X	
NETTOT	Net Total		X	X	
TOTAL	Gross Total			X	
DYN WT	Dynamic Weight				X
2 LINF	Insert 2 blank lines	X	X	X	X

* Applications

1 Piece Counting
2 Formulization
3 Totalization
4 Dynamic Weighing

6. At the **EndStr** prompt, press ENTER. At the **End** prompt, press TARE to continue to the sub-block.

5. Define Print Format Sub-block

This program block is displayed only if a second (optional) serial interface is installed.

The Define Print Format sub-block lets you select a line format based on the type of printer you have connected. The print format selection applies only if the interface mode is selected as Print or Cycle.

1. Press ENTER at the **Ln For** prompt to access the sub-block.
2. At the **Single** prompt, press TARE to display the desired line format. Options include:
   - **Single**—This setting is used for printers with a wide print width. All values are printed on one line. A new line is used for each data record that is printed.
   - **Multi**—This setting is used for printers with a narrow print width. Each value is printed on a new line. You can select multi with a normal printer if you want each data value printed on a separate line.
3. Press ENTER to confirm the print format selection.
4. At the **End** prompt, press TARE to continue to the sub-block.

6. Define Line Terminator Sub-block

The Define Line terminator sub-block allows you to choose the combination of ASCII characters used to terminate a line of data. This step applies only when the interface mode is selected as Print or Cycle.

1. Press ENTER at the **LN End** (Line End) prompt to access the sub-block.

2. Press TARE to display the desired line terminator. Options include:
   - CrLF – Both a carriage return and a line feed character will be sent.
   - Cr – Only a carriage return will be sent.
1. Press ENTER to confirm the line termination selection.
2. At the **End** prompt, press TARE to continue to the next sub-block.

7. Exit Interface 1 Sub-block

This sub-block lets you exit the Interface 1 configuration routine, save the interface parameters you have configured, and return to the next program block in Master mode.

1. Press ENTER at the **End Int** prompt.
2. At the **End** prompt, press TARE to continue to the next program block. Alternately, you can press ENTER twice to quit Master mode and return to normal operating mode.

Interface 2 Program Block (Optional)

The Interface 2 program block lets you configure the parameters of a second serial interface if one is installed in the SPIDER indicator. This program block contains the same parameters as described above for Interface 1 and is configured exactly as Interface 1 is configured. Because Interface 2 is identical to Interface 1, separate instruction are not given here.

The Reset Interface to Factory is the first sub-block that appears under the Interface 2 program block. This sub-block resets the Interface 2 parameters only. This reset does not affect parameters that you have configured in other program blocks in Master mode.

Control Mode Program Block

The Control program block lets you view the current weight on the scale at a resolution ten times higher than normal resolution (i.e. one more decimal place). This feature is used for test purposes and is available only in Master mode.

To use the Accuracy Control feature:

1. Press ENTER at the **Ctrl** prompt to display the weight currently on the scale at ten times its normal resolution. When you press ENTER, the enhanced scale weight appears in the display with an asterisk.

2. Press ENTER or TARE to normal operating mode and normal weight resolution. When you press ENTER or TARE after viewing scale weight at high resolution using the Control program block, the SPIDER indicator returns to normal operating mode. You must re-enter Master mode if you wish to configure additional program blocks.
3. Re-enter Master mode as described above and press TARE several times to display the next program block (List).

List Program Block

The List program block lets you print your Master mode settings. You should keep a copy of the program block settings in a separate file or location where they can be retrieved should the SPIDER indicator need reconfigured.

To print Master mode settings:

1. Press ENTER at the List prompt to access the program block.
2. Press ENTER again at the Print prompt to print the Master mode settings.
3. At the End prompt, press TARE to continue to the next program block. Alternately, you can press ENTER twice to quit Master mode and return to normal operating mode.

Be careful when performing a Master mode reset. You will lose all previous settings for Master mode except the Interface1 and 2 settings.

Restricting Access to Master Mode

You can restrict access to Master mode by:

- Pressing ENTER at the rEStr (Restrict) prompt.
- Pressing TARE to select the display prompt ON or OFF.
- Pressing ENTER to confirm this selection.
- Pressing TARE at the End prompt to continue to the next program block.
- Alternately, press ENTER to quit the Master mode and return to normal operating mode.

Reset to Factory Program Block

The Reset to Factory program block lets you reset all Master mode parameters except Interface 1 and Interface 2 to their original factory settings. Interface 1 and Interface 2 program block parameters can be reset in the respective Interface program block.

To reset Master mode:

1. Press ENTER at the **Reset** prompt to access the program block.
2. Press ENTER again at the **Std On** prompt to reset the Master mode settings. This will not reset the Interface 1 or Interface 2 program blocks. Master mode program block default settings are reset as follows:

Master mode Program Block	Factory Default Setting
Function (F-Key)	Gross
Auto Zero (A-ZErO)	ON
Auto Tare (A-tArE)	OFF
Automatic Shutdown (PIIr OFF)	OFF
Save	OFF
Vibration Adapter (VibrAt)	Med
Process Adapter (ProcES)	Universal
Restricted Access (rEStr)	OFF

3. At the **End** prompt, press TARE to continue to the next program block. Alternately, you can press ENTER twice to quit Master mode and return to normal operating mode.

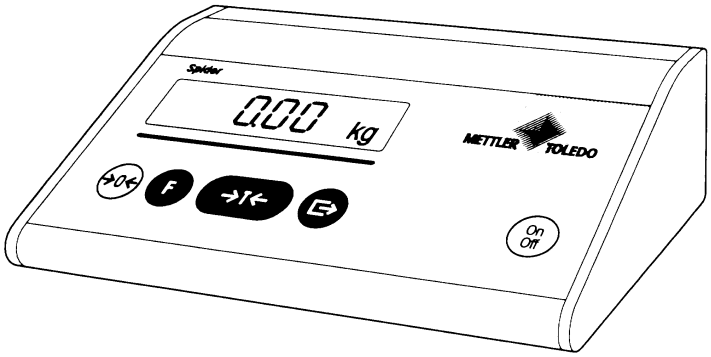
NOTES

5 Operating Instructions

This chapter gives basic information about the SPIDER indicator that an operator will need to become familiar with the product and perform its functions. Step-by-step instructions explain each SPIDER indicator function.

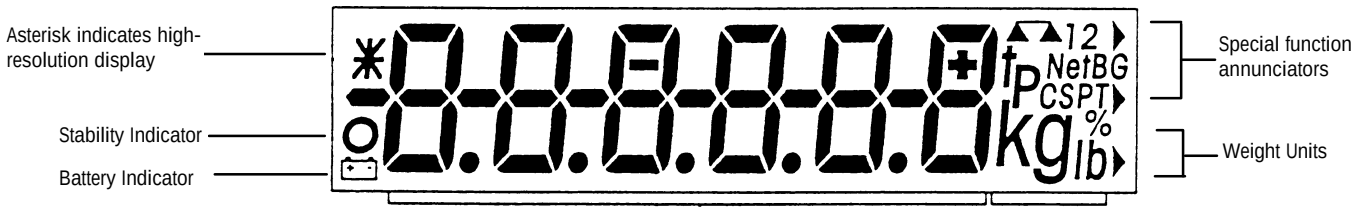
General Information

The following general information provides an overview of the SPIDER indicator's display and keypad.



SPIDER Indicator Display

The SPIDER indicator has a six-character LCD display where scale data and operational messages are displayed. Each character has a decimal point associated with it. The display also contains annunicators as shown below:

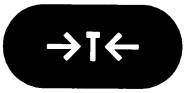


SPIDER Indicator Keypad

The SPIDER indicator has five keys that perform all of the unit's functions. These keys and their functions are described below:

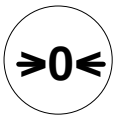
The ON/OFF key switches the SPIDER indicator On and Off.

In normal operating mode, the ENTER key is used to print scale data to a connected, compatible printing device. In Service mode and Master mode, ENTER accepts the displayed parameter in a program block. ENTER corresponds to a “Yes” response. Pressing ENTER at the Service or Master prompt immediately after accessing Service mode or Master mode brings up the first program block.



In normal operating mode, the TARE key is used to tare a container, or compensate for its weight, so the display indicates the net weight of the load on the scale. In Service mode and Master mode, the TARE key is used to refuse the displayed parameter. Pressing TARE corresponds to a “No” response. Pressing TARE at the Service or Master prompt immediately after accessing Service mode or Master mode exits back to normal operating mode.

The FUNCTION key is used to access the SPIDER indicator’s special weighing function capabilities. These are described in detail later in this chapter. Before you can use a special function, you must configure the Function program block in Master mode for that function. Please refer to Chapter 4 for details on configuring the Function program block. The FUNCTION key does not have any function in Service mode or Master mode.



The ZERO key is used to return the scale to its zero reference point. Zero can be captured if residual weight on the scale does not exceed ± 2% of the scale’s capacity. The ZERO key does not have any function in Service mode or Master mode.

Basic Operator Functions

This section describes how to perform the SPIDER indicator’s most basic operator functions. The SPIDER indicator’s basic functions are independent of the way you have configured the Function program block in Master mode. These functions can be performed as soon as the SPIDER indicator is removed from its box and attached to a compatible scale base.

Please read the following section entitled “Advanced Operator Functions” for information on the SPIDER indicator’s more advanced capabilities.

Turning the SPIDER Indicator On and Off

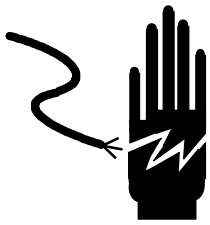
The ON/OFF key controls power to the SPIDER indicator. You should keep the SPIDER indicator turned Off when it is not in use. This will prolong the life of the display and of the battery pack if one is installed.

Once your SPIDER indicator is connected and ready for operation, Mettler-Toledo recommends that you keep the power cable connected at all times (except for lengthy periods when the scale is not in use). This will help maintain the SPIDER indicator's thermal equilibrium and keep it ready for use.

To turn the SPIDER indicator On and Off:

Turning the Spider On and Off does not affect the power supply to connected peripheral devices and/or the connected scale.

1. With the power turned Off, press the ON/OFF key once to apply power. The SPIDER indicator goes through its power-up sequence and performs a brief self-test before advancing to normal operating mode.
2. With the SPIDER indicator turned On, press the ON/OFF key once to switch the unit Off. The SPIDER indicator briefly displays the message OFF, then the display is blank.



⚠ WARNING

YOU MUST UNPLUG THE SPIDER INDICATOR POWER SUPPLY BEFORE SERVICING. THE ON/OFF KEY DOES NOT REMOVE POWER TO ALL COMPONENTS. FAILURE TO OBSERVE THIS PRECAUTION CAN RESULT IN BODILY HARM.

Zeroing the Scale

The ZERO key allows you to reset the SPIDER indicator's point of zero reference at the push of a button. This is useful when residual weight on the scale or environmental conditions prevent the indicator from reading exactly zero.

You can zero the indicator only if weight on the scale does not exceed ± 2% of the scale's total capacity.

To zero the scale:

1. Press ZERO. The display will show horizontal bars for a short time while the SPIDER indicator automatically captures zero. One of the following situations will follow:
   - If zero was captured successfully, the display reads 0.00 with the current weight unit annunciator lit.
   - If zero was not captured successfully, the SPIDER indicator displays an error message indicating zero is outside the zero capture range.

Taring the Scale

The tare function is often used to compensate for the weight of a container on the scale before adding the load to be weighed. The resulting weight represents the net contents of the container.

To tare the scale:

1. Place the container to be tared on the scale platform. The weight of the container is displayed.
2. Press TARE. The SPIDER indicator may display horizontal bar segments until the load on the scale becomes stable. When the load is tared, the display reads 0.00 with the unit and Net annunciators lit.

   The SPIDER indicator stores one tare value at a time. If the tared load is removed from the scale, the display shows the tare value with a negative sign (–).
3. Press TARE again (with the scale empty) to clear the tare value before taring the next load.

Simple Weighing

Simple weighing operations are performed as follows:

Weighing a Load (No Tare)

1. Press ZERO if the display does not read 0.00.
2. Place the load to be weighed on the scale platform. The SPIDER indicator displays the gross weight of the load with the current weighing unit annunciator lit. If the SPIDER indicator does not sense a stable condition on the scale, the small circle annunciator remains lit until the load becomes stable.
3. Read the gross weight of the load.

Weighing a Load (With Tare)

1. Place an empty container on the scale and press TARE. When the load is tared, the display reads 0.00 with the unit and Net annunciators lit.
2. Place the load to be weighed on the scale. The SPIDER indicator displays the net weight of the contents of the container with the unit and Net annunciators lit. If the SPIDER indicator does not sense a stable condition on the scale, the small circle annunciator remains lit until the load becomes stable.
3. Read the net weight of the load.

Weigh-in Operations

Weigh-in operations are similar to weighing a load with tare and are performed as follows:

1. Place an empty container on the scale and press TARE. When the load is tared, the display reads 0.00 with the unit and Net annunciators lit.
2. Begin adding sample to be weighed into the container. The SPIDER indicator displays the net weight of the contents of the container with the unit and Net annunciators lit.
3. Continue adding sample until the desired weight is reached.

Weigh-Out Operations

The SPIDER indicator's weigh-out function lets you place a full container on the scale and remove a predetermined amount of weight from the container. SPIDER indicator displays the weight of the quantity removed from rather than added to the scale.

To perform weigh-out operations:

1. Place a full container on the scale.
2. Press TARE to tare the load.
3. Begin removing the contents of the container on the scale. The net weight of the removed sample is displayed with a negative sign (–) and the Net annunciator lit.
4. Continue removing contents until you have removed the desired amount.
5. Repeat steps 2 through 4 if you need to remove another quantity from the remaining contents of the container.

Transferring Scale Data

If your SPIDER indicator is connected to a compatible printing device through the RS-232 serial interface, you can transmit the weighing results from the scale to the printer. You can also transmit scale data to a personal computer through the interface. This function is dependent upon the Interface configuration in Master mode.

To transfer scale data:

- With the weighing results displayed on the SPIDER indicator, press ENTER. to transmit the data through the serial port to the connected device. The SPIDER indicator transmits the data as soon as a stable condition is detected.

Weighing Operations With Auto Tare

The SPIDER indicator's automatic taring feature automatically tares the first load placed on the scale such as an empty container, and prepares to display the net weight of the next load placed on the scale. This saves the operator the step of manually taring a container before weighing in contents.

The SPIDER indicator's automatic tare feature requires that Auto Tare be enabled in Master mode. When Auto Tare is enabled the Net annunciator blinks in the display to indicate that the scale is waiting for a tare.

To use the auto tare feature:

1. Place a container (empty or full) on the scale to be tared. The SPIDER indicator automatically tares this first weight when the scale becomes stable, then displays 0.00 with the unit and the Net annunciators. While the SPIDER indicator is capturing the tare, the display blanks.
2. Begin adding or removing sample to be weighed. The SPIDER indicator displays the net weight of the contents of the container. A negative sign precedes the net weight if you are removing sample from a full container.
3. Continue adding/removing sample until the desired weight is reached.
4. Remove the load from the scale. The SPIDER indicator deletes the tare value and the Net annunciator blinks in the display to indicate that the scale is ready for the next tare and weigh transaction.

Auto Tare remains enabled until you disable the feature in Master mode.

Advanced Operator Functions

Advanced functions are those functions that rely on the configuration of the Master mode program blocks, particularly the Function program block. These functions are not difficult to perform, but they cannot be done without first configuring the appropriate setup program blocks in Master mode. Please refer to Chapter 4 Master mode Configuration for detailed information on configuring the program blocks that govern advanced operations.

Unit Switching

Unit switching enables you to display scale weight in the unit you have selected as the auxiliary weight unit. The auxiliary weight unit is configured in the Function Key program block in Master mode.

Unit switching requires that Second Units be selected as the active function of the FUNCTION key.

To switch units:

1. With the scale weight displayed, press FUNCTION. The weighing result is automatically converted to the auxiliary unit and displayed with the appropriate weight unit annunciator lit.
2. Press FUNCTION to display the result in the first weight unit again.

Displaying Gross Weight

The SPIDER indicator lets you switch back and forth between the net weight and gross weight of a load on the scale that has been placed into a tared container. Gross weight display switching requires that Gross be selected as the active function of the FUNCTION key.

To display gross weight:

1. Tare a container and add a load as described above in the section entitled Weighing a Load With Tare. The SPIDER indicator displays the net weight.
2. With net weight displayed, press FUNCTION. The SPIDER indicator displays the gross weight of the load (the weight of the container + the weight of the sample in the container).
3. Press FUNCTION to display the net weight again.

Piece Counting

The SPIDER indicator's piece counting feature automatically calculates the total number of pieces weighed into or out of a container using the weight of a representative sample as a reference. The SPIDER indicator uses the sample reference-piece number to calculate the average weight of individual pieces, then divides the total weight by the sample piece weigh for a total piece count.

The SPIDER indicator's piece counting feature requires that Count be selected as the active function of the FUNCTION key.

Count-In Operations

To count a specific number of pieces into a container or to obtain a total piece count of the number of pieces placed into a container:

1. Place an empty container on the scale.
2. Press TARE to tare the container.
3. Select a sample reference-piece number as follows:
   - Press and hold the FUNCTION key until the current reference-piece number is displayed.
   - Press TARE to display the desired reference-piece number. You can choose 1, 2, 5, 10, 20, 50, or 100.
4. Add to the empty container the exact number of pieces that you defined as the reference-piece number.

You can skip steps 3 through 5 if count-in operations after the first will use the same reference data.

Because the Spider counts pieces based on an average, a larger reference piece count results in greater accuracy.

Each time you press FUNCTION, the display switches between the main and auxiliary weight unit.

If the scale was not stable when the reference calculation was attempted or if the reference weight was too low, the Spider returns to normal operating mode.

You can skip steps 3 through 5 if count-out operations after the first will use the same reference data.

5. Press ENTER to store the weight of the reference quantity. The SPIDER indicator automatically calculates an average piece weight, then displays the total piece count of the reference quantity in the container.
6. Add more pieces to the sample quantity already in the container until the desired quantity is indicated, or until you have obtained a total piece count.
7. Press the FUNCTION key to switch between the piece count and the scale weight as desired.
8. Press ENTER to print the data according to the Interface program block configuration.
9. To exit the count mode, return to gross zero, ZERO the scale, and press the FUNCTION key to return to the weight mode if in the count mode.

Count-Out Operations

To remove a specific number of pieces from a full container or to count the total number of pieces in a full container:

1. Place a full container on the scale.
2. Press TARE to tare the container.

Because the Spider counts pieces based on an average, a larger reference piece count results in greater accuracy.

3. Select a sample reference-piece number as follows:
   - Press and hold the FUNCTION key until the current reference-piece number is displayed.
   - Press TARE to display the desired reference-piece number. You can choose 1, 2, 5, 10, 20, 50, or 100.
4. Remove from the container the exact number of pieces that you defined as the reference-piece number.
5. Press ENTER to store the weight of the reference quantity. The SPIDER indicator automatically calculates an average piece weight, then displays the total piece count of the reference quantity removed from the container.

If the scale was not stable when the reference calculation was attempted or if the reference weight was too low, the Spider returns to normal operating mode.

6. Remove more pieces from the container until you have removed the desired quantity, or until you have removed all pieces and obtained a total piece count.
7. Press the FUNCTION key to switch between the piece count and the scale weight as desired.
8. Press ENTER to print the data according to the Interface program block configuration.
9. To exit the count mode, return to gross zero, ZERO the scale, and press the FUNCTION key to return to the weight mode if in the count mode.

Formula Weighing

The SPIDER indicator's Formula weighing capability lets you weigh in succession several different components (such as ingredients of a formulation) into a single container. The SPIDER indicator keeps track of the total weight on the scale and the number of components you have weighed.

NOTE: The FORMULATION mode accumulates both the GROSS and NET weight. You can recall the NET accumulation, and you can print both the NET and GROSS TOTALS. If the current tare value is zero, the GROSS weight is treated as if it is a net weight. There is no requirement to return to zero before the next transaction is accumulated.

The SPIDER indicator's formula weighing feature requires that Formula be selected as the active function of the FUNCTION key.

To weigh components of a formula:

1. Place an empty container on the scale.
2. Press TARE to tare the container.
3. Add the desired amount of the first component. The SPIDER indicator displays the net weight of the first component.
4. Press FUNCTION to store the weight and reset the display to zero. The component weight data will be sent to the printer.
5. Repeat steps 3 and 4 for each component in the formulation.
6. When all components are in the container, press and hold the FUNCTION key to display the combined net weight.
7. Press and hold the FUNCTION key again to display the total number of components that were weighed into the container.
8. When finished, press the FUNCTION key again to return to net zero and add additional components.
9. To clear the stored values of the transaction (total weight, tare value, and number of components), unload the weighing platform and press the ENTER key. Alternately you can press the zero key at gross zero to reset the formula weighing.

Enabling auto tare in Master mode will automate the tare process (step 2).

Accumulation
(Totalization)

The SPIDER indicator's Accumulation feature lets you weigh in succession several individual loads while the indicator keeps track of the total weight and the number of individual loads you have weighed. You can include up to 9999 individual loads in an accumulation.

NOTE: The TOTALIZATION mode always uses the NET weight. If the current tare value is zero, the GROSS weight is treated as if it is a net weight. The scale must return to zero (though stability at zero is not required) before the next value is accumulated.

The SPIDER indicator's accumulation feature requires that Total be selected as the active mode of the FUNCTION key.

To accumulate weight and number of individual weighing transactions:

1. Place an empty container on the scale.
2. Press TARE to tare the container.
3. Place the first load of the accumulation on the scale. The SPIDER indicator displays the net weight of the first load.
4. Press FUNCTION to store the weight.
5. Unload the weighing platform and return to gross zero.
6. Repeat steps 1 through 5 for each load to be included in the accumulation.
7. When all loads have been weighed, press and hold the FUNCTION key to display the total net weight of the loads.
8. Press and hold the FUNCTION key again to display the total number of individual loads that were weighed.
9. Press and hold the FUNCTION key to return to again repeat steps 1 through 5 again for additional loads.
10. To clear the stored values of the transaction (total weight and number of loads), unload the weighing platform and press the ENTER key. Alternately you can press the zero key at gross zero to reset the formula weighing.

Enabling auto tare in Master mode will automate the tare process (step 2).

Dynamic Weighing

The SPIDER indicator's dynamicwWeighing feature lets you obtain an accurate weight of an unstable load such as when weighing livestock.

The SPIDER indicator's dynamic weighing feature requires that Dynam be selected as the active function of the FUNCTION key.

To weigh an unstable load:

1. If the unstable load is to be contained, place an empty holding container on the scale and press TARE. If the unstable load is to be placed directly on the scale, press ZERO to zero the scale.
2. Place the unstable load on the scale.
3. Press FUNCTION. After a brief delay, the SPIDER indicator displays an average weight of the load obtained over a sampling period that is defined in the Function Key program block in Master mode. An asterisk appears in the upper left corner of the display to indicate the weighing result is for a dynamic load.
4. Remove the load.
5. The resulting weight will remain stored on the display until the FUNCTION key is pressed again.

6 Service and Maintenance

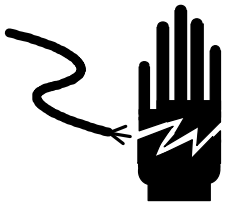
This chapter gives information on servicing, upgrading, and maintaining the SPIDER indicator including cleaning and regular maintenance, troubleshooting, and installing optional accessories.

Cleaning and Regular Maintenance

You may need to occasionally wipe the keypad and display with a clean, soft cloth that has been dampened with a mild cleaner. Do not use any type of industrial solvent such as toluene or isoproponol (IPA). These may damage the display finish. Do not spray cleaner directly on the indicator.

Troubleshooting

The SPIDER indicator is designed to be virtually error free and reliable. If problems do occur, do not attempt to repair the indicator before you have determined the source of the problem. Record as much information as possible about what has happened including any messages and physical responses. The following troubleshooting information may be helpful to determine the cause of the problem.



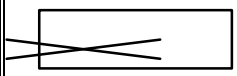
⚠ WARNING

ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM.

CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

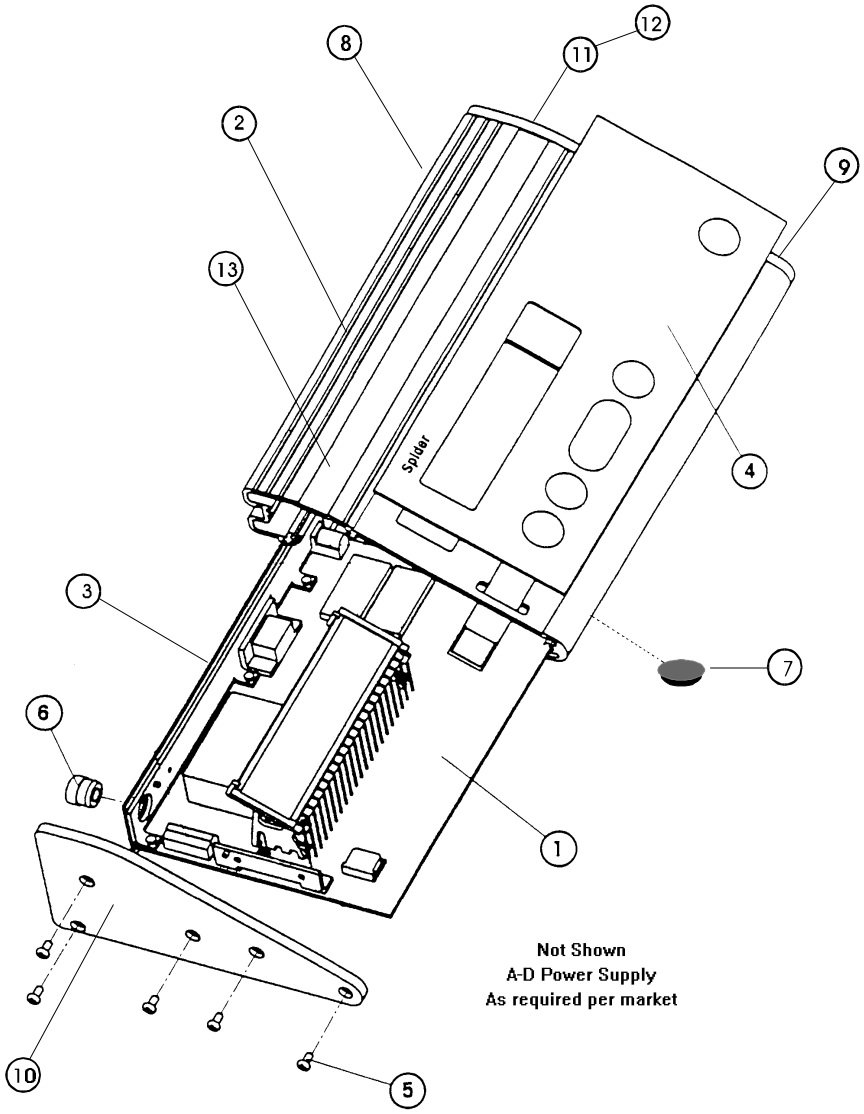
Error Codes and Descriptions

Error Message	Description	Remedy
	Wrong weighing result: Scale not zeroed correctly Weighing pan rubbing Scale not level	Unload scale, zero and repeat weighing Clear tare weight or tare with correct weight Ensure that pan is not touching surroundings Level scale
	Display remains dark: -No line voltage -Scale switched off -Power cable not plugged in -Batteries discharged	 Check power supply Switch on scale Plug in power cable Change or charge batteries
ERR 3	Invalid manual entry: -An invalid manual entry was entered in an application	Repeat entry which is valid for the selected application.
ERR 4	Reference weight too small:	Use a larger reference weight
ERR 6	No calibration: - The scale is not calibrated.	Contact your Mettler Toledo dealer.
ERR 9	Unstable weight value: -The weight value did not achieve stability	Repeat operation
ERR 50	Attached weighing cell: does not match set data	Check the nominal load setting for the weighing cell in the Capacity sub-block in Service mode. If the sensitivity of the weighing cell is greater than 2 mV/V, ensure that the maximum differential signal is not exceeded.
ERR 51	Maximum capacity exceeded:	Reduce the capacity value in the Cell sub-block in Service mode. The admissible value limit is 100 metric tons.
ERR 52	Upper limit value of the weighing range exceeded:	Reduce the upper limit value of the weighing cell range in the Range sub-block in Service mode. This value cannot exceed 120% of the cell capacity.
ERR 53	Printed circuit board damage:	Contact Mettler-Toledo. A new PCB may be required.
ERR 59	Admissible range exceeded:	Reduce the preload or the upper limit value of the weighing range in the Range sub-block in Service mode.

7 Parts and Accessories

Please refer to the following diagram and parts list when ordering parts and accessories for the SPIDER indicator.

SPIDER Indicator



Parts List—SPIDER indicator			
Ref. #	Part Number	Description	Qty
1	*14876100A	Circuit Board with EPROMS	1
2	* 14592800A	Housing, indicator	1
3	*14593300A	Plate, Rear Panel	1
4	* 145930 00A	Keypad Overlay with Switch	1
5	* R05207 00A	End Cap Fastening Screws	8
6	*13693200A *13693400A	Load Cell Cable Grip Nut, Load Cell Cable Grip	1 1
7	* 10839700A	Foot-Stick on	4
8	*14593500A	Plate, Blank, Rear	1
9	*14593600A	End Cap, Right	1
10	*14593700A	End Cap, Left	1
11	*14115500A	Label, Data	1
12	*14115600A	Shield, Data Label	1
13	*14600500A	Strip, Decorative	1
A	*145958 00A	Power Supply, 120 VAC, 6 VDC, USA	1
B	* 145946 00A	Power Supply, 240 VAC, 6 VDC, UK	1
C	* 145970 00A	Power Supply, 240 VAC, 6 VDC, Aust.	1
D	* 146012 00A	Power Supply, 220 VAC, 6 VDC, Cont. Europe	1

*Number may have an alpha prefix designating revision level.

Optional Accessories

Optional Accessories		
Description	Factory Number	Part Number
Second Serial Interface (RS-232C)	0917-0219-000	14601100A
RS232C Interface Cable	0900-0313-000	14861800A
Secondary Display	0917-0221-000	14903500A
PowerPac Battery Attachment	0917-0222-000	14840000A
Load Cell Adapter Cable—1 foot	0917-0308-000	14863300A
Wall Mount Kit--Painted Mild Steel	0917-0220-000	14594800A
Wall Mount Kit--Stainless Steak	0917-0220-000	14594800A
Column Mounting Kit	0917-0239-000	14900600A
Sealing Kit	0901-0408-000	14892900A

NOTES

Appendices

Appendix: 1
Geo Codes

Northern and southern latitude in degrees and miles	Height above sea-level in meters 0 325	325 650	650 975	975 1300	1300 1625	1625 1950	1950 2275	2275 2600	2600 2925	2925 3250	3250 3575
	Height above sea-level in feet 0 1060	1060 2130	2130 3200	3200 4260	4260 5330	5330 6400	6400 7460	7460 8530	8530 9600	9600 10660	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

Northern and southern latitude in degrees and miles	Height above sea-level in meters										
	0 325	325 650	650 975	975 1300	1300 1625	1625 1950	1950 2275	2275 2600	2600 2925	2925 3250	3250 3575
	Height above sea-level in feet										
	0 1060	1060 2130	2130 3200	3200 4260	4260 5330	5330 6400	6400 7460	7460 8530	8530 9600	9600 10660	10660 11730
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

Appendix 2: Operating a SPIDER Indicator with PC

The SPIDER indicator interface supports seven commands of the Mettler-Toledo Standard Interface Command Set (MT-SICS). These commands can be tested using a communications program such as Procomm or Windows Terminal on the PC, but the commands are really designed to be integrated into a program. Using these seven commands, you can:

- Zero the scale
- Tare the scale
- Send data record on stability
- Send data record immediately
- Send data records continuously
- Send serial number of scale
- Reset the interface

Before you begin operations with the PC, you should verify the items of the following checklist to ensure accurate communication:

- Be sure the computer is attached correctly to the serial port.
- Set the communication parameters (baud rate, parity, and data bits) of the computer and SPIDER indicator interface to match.
- Configure the operating mode of the interface to Dialog for bi-directional communication.

Zero the Scale

The following steps describe how to zero the scale using the MT-SICS through a PC keyboard:

- On the computer keyboard, press Z, then press CR/LF to send the zero command. As soon as the scale is stable, the weight display of the scale is reset to zero. The character string ZA appears on the computer monitor as confirmation that the command was received.

  If the scale cannot be reset to zero, one of the following messages appears on the computer monitor:

  - Z – means that the zero value on the scale is below the zero setting range.
  - Z + means that the zero value on the scale exceeds the zero setting range.
  - Z I means that the command was received and understood; however, it cannot be performed at present.

Tare the Scale

The following steps describe how to tare the scale using the MT-SICS through a PC keyboard:

- On the computer keyboard, press T, then press CR\LF to send the command. As soon as the scale is stable, the current weight on the scale is stored as the tare value, and the scale is reset to zero. The character string TS appears on the computer monitor followed by the tare value and the weighing unit.

  If the scale cannot be tared, one of the following messages appears on the computer monitor:

  - T – means that the weight on the scale to be tared is below the tare range.
  - T + means that the weight to be tared exceeds the tare range.
  - T I means that the command was received and understood; however, it cannot be performed at present.

Send Scale Data on Stability

The following steps describe how send scale data when the scale is stable using the MT-SICS through a PC keyboard:

- On the computer keyboard, press S, then press CR/LF to send the command. As soon as the scale is stable, the current net weight value on the scale is sent to the computer. The character string SS appears on the computer monitor followed by the net weight value and the weighing unit.

  If the data cannot be sent, one of the following messages appears on the computer monitor:

  - S – means that the weight on the scale is in the underload range.
  - S + means that the weight on the scale is in the overload range.
  - S I means that the command was received and understood; however, it cannot be performed at present.

Send Scale Data Immediately

The following steps describe how to send scale data immediately using the MT-SICS through a PC keyboard:

- On the computer keyboard, press SI, then press CR/LF to send the command. The current scale data is sent to the computer immediately regardless of the stability of the system. The character string SS appears on the computer monitor followed by the net weight value and the weighing unit if the system was stable at the time the command was received. The character string SD appears on the computer monitor followed by the net

weight value and the weighing unit if the system was not stable (i.e. Dynamic) at the time the command was received.

If the data cannot be sent immediately, one of the following messages appears on the computer monitor:

- S – means that the weight on the scale is in the underload range.
- S + means that the weight on the scale is in the overload range.
- S I means that the command was received and understood; however, it cannot be performed at present.

Send Scale Data Continuously

The following steps describe how to send scale data continuously using the MT-SICS through a PC keyboard:

- On the computer keyboard, press SIR, then press CR/LF to send the command. This command sends scale data continuously regardless of the stability of the system.

  The character string SS appears on the computer monitor followed by the net weight value and the weighing unit if the system was stable at the time the command was received. The character string SD appears on the monitor followed by the net weight value and the weighing unit if the system was not stable (i.e. Dynamic) at the time the command was received. These results continue to appear on the monitor one after another as long as the system is sending data continuously.

  If scale data cannot be sent, one of the following messages appears on the computer monitor:

  - S – means that the weight on the scale is in the underload range.
  - S + means that the weight on the scale is in the overload range.
  - S I means that the command was received and understood; however, it cannot be performed at present.

Send the SPIDER Indicator Serial Number

The following steps describe how to send the SPIDER indicator's serial number to the computer using the MT-SICS through a PC keyboard:

- On the computer keyboard, press I4, then press CR/LF to send the command. The character string I4 A appears on the computer monitor followed by the serial number in quotation marks. The quotation marks indicate a text string rather than scale data.

  If the serial number cannot be sent, the following message appears on the computer monitor:

  I4 I means that the command was received and understood; however, it cannot be performed at present.

Reset the Interface

The following steps describe how to reset the interface parameters using the MT-SICS through a PC keyboard:

- On the computer keyboard, press @, then press CR/LF to send the command. This command resets the balance to the values that are effective upon power-up, and displays the SPIDER indicator's serial number in quotation marks. The scale is not reset to zero with this command.

  The Reset command is carried out immediately, and any other commands that are still awaiting response are canceled. The Reset command can also be used to switch the SPIDER indicator On if it is connected to the computer and is not disconnected from its power supply.

MT-SICS Error Messages

The following error messages may be encountered as you operate the SPIDER indicator using the MT-SICS through a PC keyboard.

- ET (Transmission Error)—This error reports that the transmitted data are faulty. Attempt to send the command again. If the error message persists, check the communication parameters and/or the cable connection.
- ES (Syntax Error)—This error reports that a command cannot be processed because the command you attempted to enter does not exist (usually a typographic error). Enter the correct command.
- EL(Logic Error)—This error reports that a command cannot be carried out because the SPIDER indicator has been switched Off. Switch the SPIDER indicator On and retry the command.

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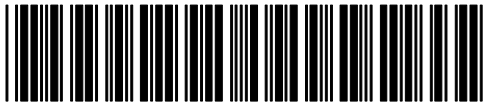

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