Operating Instructions

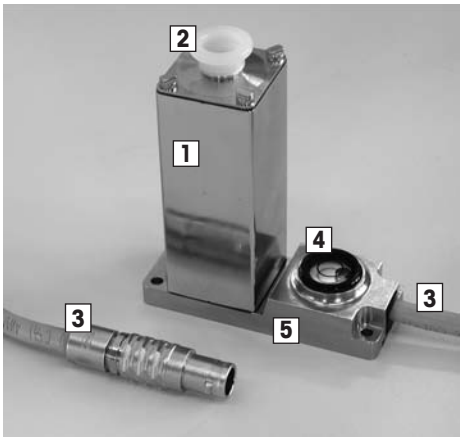
Weigh Modules

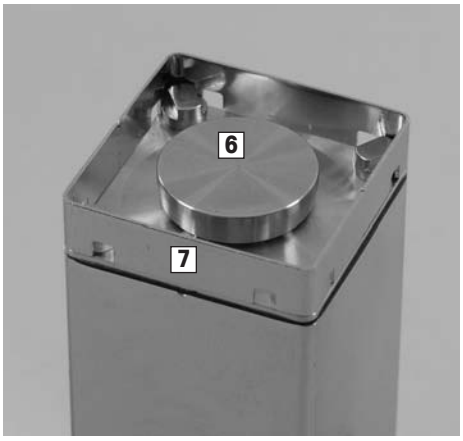
WMC

METTLER TOLEDO

The WMC Weigh Module at a Glance

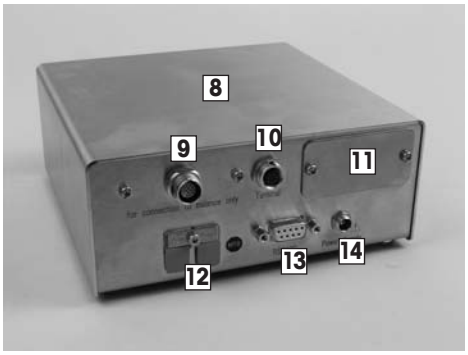
Weigh unit





1	Housing
2	Plastic cover
3	Connector for electronic unit (direct cable exit and plug)
4	Level bubble (leveling aid)
5	Base (mounting flange)
6	Weighing pan support with standard weighing pan
7	Draft shield

Electronic unit

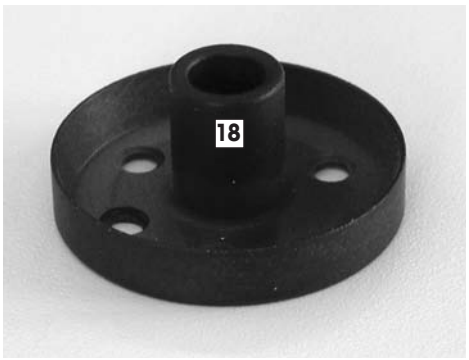


8	Housing
9	Weigh unit connector
10	Terminal connector
11	Optional interface plug-in
12	"Aux" connectors (for "ErgoSens," hand or foot-operated buttons)
13	RS232-C standard interface
14	Connector for AC adapter

Terminal SWT (accessory)

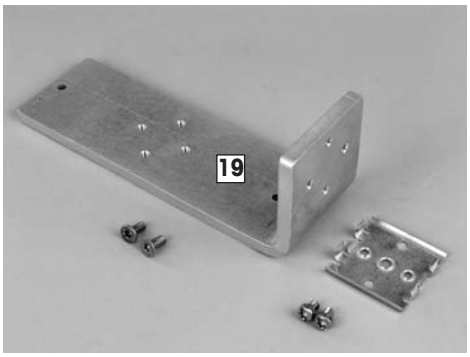
15	Display (monochrome)
16	Keyboard

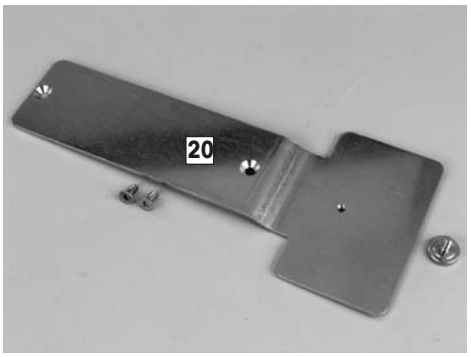
Weighing pans



17	Standard weighing pan
18	Weighing pan adapter

Mounting materials





19	Mounting bracket for electronic unit, including DIN clip and screws
20	Terminal holder for SWT terminal, including screws (accessory)

Connecting cable (accessory)

21	Terminal – electronic unit connector cable (0.575m/1.9ft or 2m/6.5ft long) Note: The maximum allowable cable length is 5m/16.4ft.

Power supply

22	AC adapter
23	Power cable (country-specific)

Contents

1 Introduction

Thank you for choosing a METTLER TOLEDO weigh module.

This section will provide you with basic information on the WMC weigh module. Even if you have previous experience with other scales or METTLER TOLEDO scales, please read this section carefully. It is VERY IMPORTANT that you obey all safety instructions!

1.1 Introduction to the WMC Weigh Module

These instructions apply to all WMC weigh modules.

Each weigh module consists of a weigh unit and an electronic unit. A terminal may be connected, if required. The optional SWT terminal has a monochrome display and built-in applications.

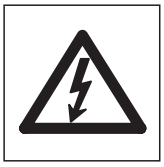
All WMC models have the following features:

- Integrated RS232C interface
- Optional interface plug-in
- Standard weighing pan and weighing pan adapter for weighing pan support or customized setups.
- Draft shield provided
- Mounting bracket and mounting accessories provided
- A CD-ROM with additional instructions and a PC program for setup and operation of the weigh module are also included

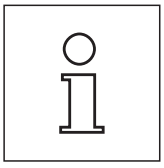
A brief word regarding standards, directives and procedures for quality assurance: The WMC weigh modules comply with all commonly accepted standards and guidelines. They support standard processes, requirements and work methodologies in accordance with **GLP** (**G**ood **L**aboratory **P**ractice) and **GMP** (**G**ood **M**anufacturing **P**ractice) and allow for the creation of **SOPs** (**S**tandard **O**perating **P**rocedures). The WMC weigh modules have been issued a CE-Declaration of Conformity. METTLER TOLEDO, the manufacturer, is both ISO 9001 and ISO 14001certified.

1.2 What you Should Know About this Manual

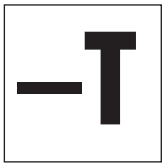
The following conventions apply to the entire manual:

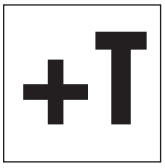


These symbols mark safety and hazard warnings. Failure to comply with these warnings may result in personal risk to the user, damage to the weigh module or other property, or unit malfunction.



This symbol marks additional information and notes. Following these instructions will make it easier for you to work with the weigh module and ensure proper and efficient use of the unit.



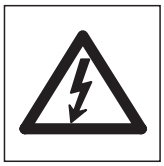


These symbols mark specific information on setting up, configuring, or operating weigh modules **without a terminal ("–T")** or **with a terminal ("+T")**.

1.3 Safety First!

Please follow the tips and instructions given below on the safe operation of your WMC weigh module. Always operate and use your weigh module solely in accordance with the instructions given in this manual. Failure to do so may limit the protection the unit can offer you. Be sure to follow the instructions on the initial startup of your new weigh module.

WMC weigh modules may be used only in closed indoor spaces. Never operate these units in areas where there is any explosion hazard.



METTLER TOLEDO recommends that you use the AC adapter provided with your unit to operate it. Make sure that the voltage printed on the adapter matches your local power supply. Plug the adapter into a grounded outlet only.

Your WMC weigh module is built to be tough, but it is still a precision instrument. Handle it carefully.

Do not open the weigh module. There are no user-servicable parts inside. If you should ever have a problem with your weigh module, please contact the METTLER TOLEDO office nearest you.

Use only METTLER TOLEDO accessories and peripheral devices with your weigh module; these items are designed to work optimally with your WMC weigh module.

Disposal

In compliance with the requirements of the EU Waste Electrical and Electronic Equipment Directive 2002/96/EU (WEEE), this unit may not be disposed of with household waste.

The spirit of this Directive also applies to countries outside the EU in accordance with currently valid national regulations.

Please dispose of this product in compliance with local regulations in a separate collection for electrical and electronic equipment.

If you have any questions, please contact the responsible authority or the dealer from whom you purchased your unit.

If you sell or give your unit to someone else (e.g., for private or commercial/industrial use), this stipulation must be made known to the new owner as appropriate.

Thank you for helping protect the environment.

1.4 Available Documentation

The table below lists all documentation available for the WMC weigh modules, along with the document numbers for each document.

	German	English	French	Spanish	Italian
Operating Instructions for WMC weigh modules (this document)	11781253	11781254	11781255	–	–
MT-SICS reference manual	–	11781363	–	–	–
Instructions for SWT terminal Operating Instructions XS Balances, Part 2 Operating Instructions XS Balances, Part 3	 11781117 30003897	 11781118 30003899	 11781119 30003910	 11781120 30003911	 11781121 30003912

The **CD-ROM** (11781257) provided with your unit includes all of the documents listed above. Also, printed copies of all instructions are provided in the language of the country to which the unit is delivered. Printed instructions for the SWT terminal are included with the terminal.

2 Initial Startup of the Weigh Modules

This section tells you how to unpack your new weigh module, set it up, and prepare it for operation.

2.1 Unpacking the Weigh Module

The weigh unit and the electronic unit are each packed in separate cardboard boxes along with the associated hardware and appropriate mounting materials. The boxes are labeled with their contents as follows: "Weighing module," and "Electronic Unit". Both cardboard boxes are placed inside a large transport box. The terminal must be ordered separately, and consequently it is supplied separately.

Unpacking the electronic unit and terminal:

Remove the top foam cushion, then remove the unit and the hardware.

Unpacking the weigh unit:

Remove the grey foam cushion. Carefully remove the weigh unit from the cushion and place it smoothly on a level surface.

Keep all packaging in case you need to ship the module in the future; the weigh module should only be transported in its original packaging.

2.2 Scope of Delivery

Please check the scope of delivery using the following table. If any parts are missing or defective, please report this to your METTLER TOLEDO representative or the shipper immediately.

		WMC24-SH	WMC15-SH	WMC25-SH
"Weighing Module" Box	WMC weigh unit	✔	✔	✔
	Standard weighing pan	✔	✔	✔
	Weighing pan adapter	✔	✔	✔
	Draft shield	✔	✔	✔
	WMC weigh module instructions (this document)	✔	✔	✔
	Production certificate and CE Declaration of Conformity	✔	✔	✔
	CD-ROM with instructions and PC software	✔	✔	✔
"Electronic Unit" Box	Electronic unit	✔	✔	✔
	Mounting bracket for electronic unit, including clip and screws for attaching to DIN standardized rail	✔	✔	✔
	AC adapter	✔	✔	✔
	Power cable (country-specific)	✔	✔	✔

Terminal option

"Terminal" Box	SWT terminal (monochrome display), including protective cover
	2 terminal-electronic unit connector cables (0.575m/1.9ft and 2m/6.5ft long)
	Terminal instruction manual (XS instructions, part 2 and part 3)

2.3 Assembling the WMC Weigh Modules

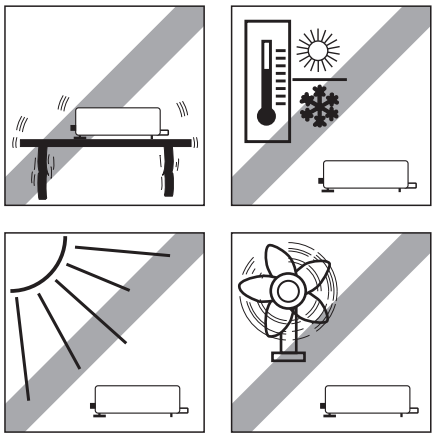
The WMC weigh modules can be integrated into higher-level systems (machines, systems, etc.). Be sure to follow the tips in the following sections to select the optimal installation method

2.3.1 Weigh unit installation

The weigh modules were designed to record weights very quickly and accurately under normal conditions and communicate the result using the integrated interface and/or display the result on a terminal. In practice, ambient conditions (vibration, oscillations, shocks, air movements and temperature changes) affect weighing time and achievable accuracy as well as the repeatability.

You can adjust various parameters on your weigh module (Section 3). We recommend that you adjust the settings to the levels needed for your application; higher accuracy requirements increase the weighing time (period between the placement of the weight and the availability of a stable result).

Filter settings must be stricter to compensate for unfavorable ambient conditions (Section 3); this also has a negative impact on weighing time. Therefore, be sure to note the following:

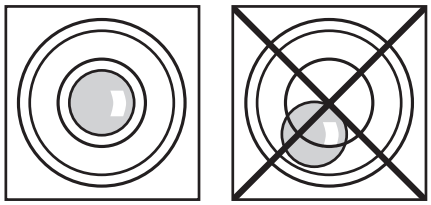


- Mount the weigh unit on a base that is mechanically decoupled from the system and therefore free of shocks and vibration.
- The location of the weigh unit should not be in areas that are exposed to drafts, direct sunlight, or severe temperature fluctuations.
- Make sure that any vibrations in the building are not transferred through the floor and to the weigh unit
- Make sure that the weigh unit is as perfectly horizontal as possible. Use the built-in precision level to achieve exact leveling. It is acceptable to have a unit that is not perfectly horizontal if its position is not altered after it has been adjusted (Section 3.4.1) (e.g., if it is mounted in a fixed position in the system).
- Attach the weigh unit to the base across as wide an area as possible. Use the appropriate holes in the base plate of the cell (4x M3 screws, tightening torque 1.3 – 2 Nm). The base must be perfectly flat to avoid putting tension on the weigh unit base plate.
- Make sure that vibrations cannot be transferred across the connector cable between the weigh unit and the electronic unit.
- Make sure that the weigh unit housing is connected in an electrically conductive manner with the system.

If your requirements are extremely demanding (short weighing time, high accuracy), we recommend that you try a test setup first and test the entire system under real-world conditions using various settings (Section 3). This will allow you to tweak the system and optimize it bit by bit.

2.3.2 Levelling the weigh unit

The weigh unit must be horizontally aligned (leveled) at the desired location.

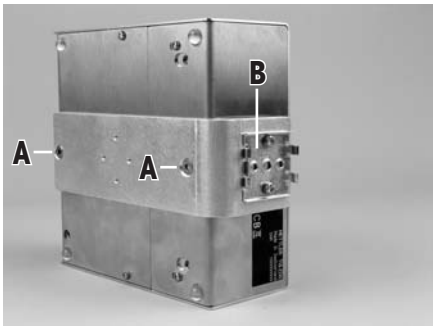


The weigh unit is equipped with a level control (level bubble). The weigh unit is completely horizontal when the bubble is precisely in the middle of the level window (left image = properly level, right image = not properly level).

Note: You must always level and adjust the weigh unit after moving it to a new location.

2.3.3 Electronic unit assembly and mounting

The electronic unit can be mounted in any position you wish. A mounting bracket and clip for attaching the unit to a DIN standardized rail are provided. Proceed as follows for mounting:



Remove the two existing screws from the bottom side of the electronic unit (Torx T-20) and use the provided Torx T-20 countersunk head screws (A) to secure the mounting bracket.

Secure the clip (B) to the front face or underside of the mounting bracket. Use the two provided M4 pan head screws (Torx T-20) to do so.

Note: The electronic unit can also be attached directly to a support (without the clip) via the M4 threads of the mounting bracket .

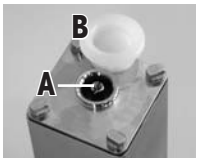
Important: The electronic unit meets the requirements for protection class IP40. If required, appropriate protective measures must be taken to protect the unit from dirt.

Additional assembly items:

- Place weighing pan (Section 2.4)
- Connect weigh unit and electronic unit (Section 2.5)
- Connect the optional terminal and adjust settings (Section 2.6)
- Connect the unit to the power supply (Section 2.7)

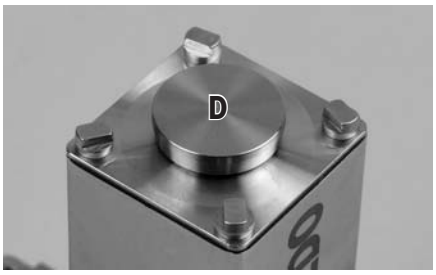
2.4 Install the Weighing Pan and the Draft Shield

The WMC weigh modules come with a weighing pan adapter and a standard weighing pan. The weighing pan adapter can either be fitted with the standard weighing pan or a customized setup.



Remove the **white plastic cover** (B) from the weighing cell. This cover protects the **weighing pan support** (A) from damage during transport and keeps liquid from penetrating into the weighing cell during cleaning. Therefore keep the cover in a safe place!

Locate the bushing of the **Weighing pan adapter** (C) on the pin of the weighing pan support (A).



Put the **standard weighing pan** (D) onto the weighing pan adapter.

If you wish to use your own setup, place it directly on the weighing pan adapter; the standard weighing pan is not needed in this case.

Dimensional drawings of both weighing pans are found in Section 6.4.

To ensure proper startup of the weigh module, the preload must not exceed 80 % of the weighing range. The weighing range will hence be reduced by the amount of the preload weight.
If the entire weighing range is required, the preload may not exceed 4 g (starting from standard weighing pan)

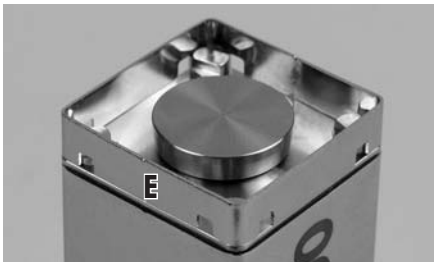
Weight of weighing pan adapter:	approx. 0.2 g
Weight of standard weighing pan:	approx. 1.1 g

Note: With high preload, the adjusting weight must be chosen accordingly.
For adjusting purposes, it is preferable to convert the weighing cell back to its original state.

Note on overload protection

The weigh units of the WMC weigh modules have overload protection. The following limit values must not be exceeded:

Vertical load:	1 kg (static load)
Lateral load:	200 g (static load)
Torsion:	0.3 Nm



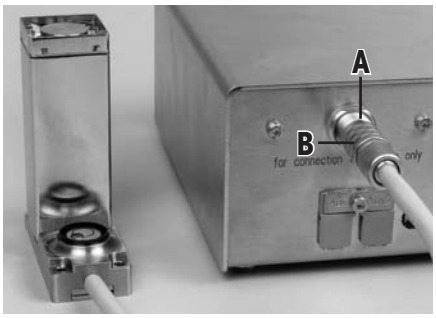
Slide the **draft shield** (E) onto the weigh unit by evenly pressing down on two opposite corners until it engages with an audible 'click'.

Instructions and precautions for custom weighing pan:
The weighing pan support (A) comes with a concentric M2 thread to attach a custom weighing pan. Note the following conditions so as to not damage the weigh unit:

– The tightening torque of the screw must not exceed 30 Ncm / 2.65 in lbs. Use Indicating Type Torque Screwdriver. (do NOT use click type). Observe also the tensile strength of the screw used. This is valid only for metallic counterparts.
– The screw must penetrate approx. 3 mm.
– Use only non-magnetic material for your weighing pan (eg nickel-chromium steel, titanium, brass, aliminum etc.).
– Switch off the weigh module before installing the weighing pan.

See section 6.4 for dimensions of your weighing pan.

2.5 Connect Weigh Unit and Electronic Unit



The weigh unit housing has no plug or socket but a direct cable exit. Typically, the cable length is 3m.

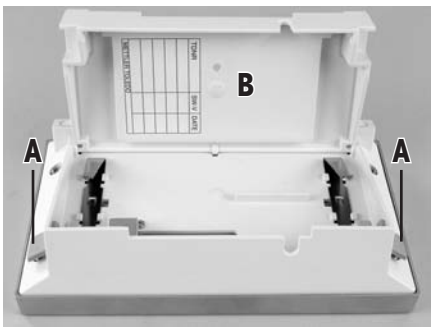
Connect the plug to the appropriate socket of the electronic unit: Align the red dot of the plug with the red dot on the socket (A), then push the plug into the socket. A clicking sound confirms that the plug is locked in place.

To unlock the plug, pull the sleeve (B) back, then pull the plug out of the socket.

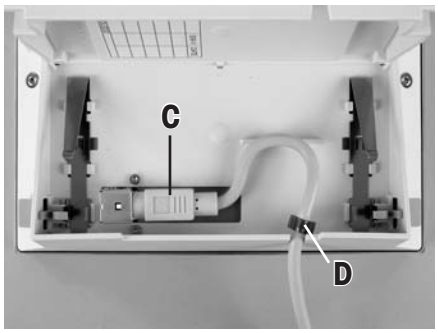
Lay the cable so that no one will trip over it and so that no vibrations can travel up the cable and be transferred to the weigh unit.

2.6 Connect Terminal and Adjust Settings

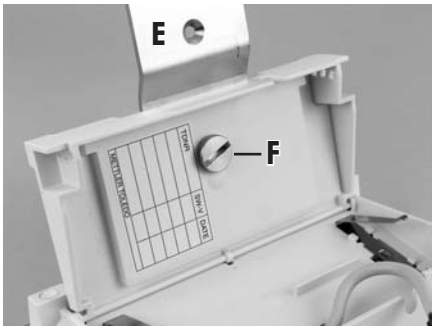
You'll need this section only if your weigh module was delivered with the optional terminal.



Place the terminal on a flat surface with the display face down.
Press the two tabs (A) on the back of the terminal to open it, and open the bottom of the terminal (B).



Feed the terminal cable through the cutout in the back of the terminal and plug in the jack (C). Make sure that the strain relief (D) **is inside the terminal**.

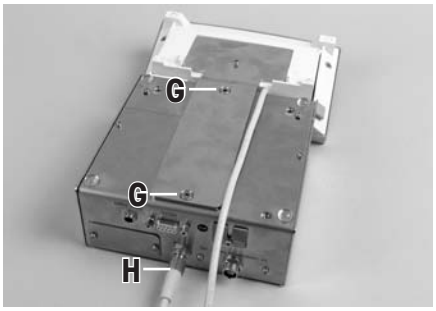


If you want to permanently affix the terminal to the electronic unit, you can also attach the terminal holder now (accessory, item no. 11121255):

Place the terminal holder (E) into the corresponding cutout on the bottom of the terminal and use the knurled screw (F) provided to secure it from the inside of the terminal.

Close the bottom of the terminal. Then push in the two side tabs to completely close the terminal.

Note: You can also use the two tabs on the back side to adjust the **viewing angle of the terminal** while it is in operation: Press both buttons simultaneously and pull the top of the terminal gently upwards, or press it down until it clicks into the desired position. You can choose from three different positions.



Remove the two screws (Torx T-20) in the bottom of the electronic unit and store them in a safe place. Align the terminal holder exactly with the two holes and secure it with the Torx T-20 countersunk head screws (G).

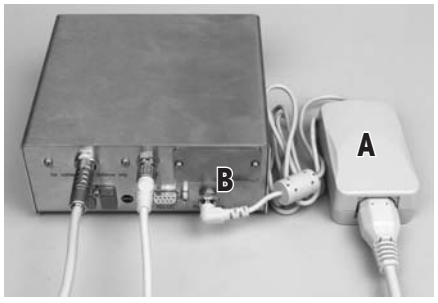
Plug the terminal cable plug (H) into the appropriate jack on the back of the electronic unit and screw in to tighten. Try to run the terminal cable as close as parallel as possible to the terminal holder.

2.7 Connect the Unit to the Power Supply

The electronic unit for your weigh module is delivered with an AC adapter and a power cord for your country. The AC adapter is suitable for use with the following voltage range:

100 – 240 VAC, 50/60Hz (see Section 6 for exact specifications).

Check whether your local power supply falls within this range. **If it does not, DO NOT connect the electronic unit or the AC adapter to your power supply** and contact your local METTLER TOLEDO office.



Connect the AC adapter (A) to the connector (B) on the back of the electronic unit and to your power supply. Tighten the connector to ensure a good connection to the electronic unit.

Important: Be sure to lay the cables so that they cannot be damaged or get in your way while you're working! Remember that the AC adapter may NOT come into contact with any liquids!

Once the weigh module has been connected to the power supply, the weigh module will perform a self-test, and then it will be ready to operate.

3 Configuring the Weigh Module

Once the weigh modules have been installed, they must be configured, i.e., prepared for operation. For weigh modules with a terminal connected, nearly all configuration work can be performed via the terminal; weigh modules without a terminal are configured using MT-SICS commands issued from a host computer. An expansion of the MT-SICS command set is available for product-specific configuration work.

All weigh modules come from the factory with a built-in RS232C interface. In addition, the modules can be equipped with a second optional interface (Section 6) that is inserted into the electronic unit. The optional interfaces are delivered with their own instructions describing installation and all configuration work needed.

The procedure for configuring the weigh modules and interface functionality depends on how the individual weigh module is equipped. There are four possible configurations:

1 Weigh module without terminal, with built-in RS232C standard interface
2 Weigh module without terminal, with built-in RS232C standard interface and additional optional interface
3 Weigh module with terminal and built-in RS232C standard interface
4 Weigh module with terminal, built-in RS232C standard interface, and additional optional interface.

The following page provides an overview of the various configurations and the available settings.

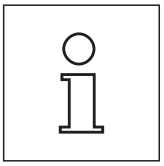
Configuration / Interface/ commands	1	2	3	4
				
	Electronic unit Weigh unit	Electronic unit Weigh unit Optional interface	Electronic unit Weigh unit Terminal	Electronic unit Weigh unit Optional interface Terminal
HOST interface	Built-in RS232C	Optional interface (the built-in RS232C can be used during operation to connect a printer, for example).	Built-in RS232C (can be configured via the terminal for "host", see Terminal instructions)	Choice of built-in RS232C or optional interface (the terminal can be used to configure one of the interfaces for the "host," see terminal instructions).
Setting interface parameters	via MT-SICS "COM" command	**Host interface**: Configured using SICS command "COPT" via the built-in RS232C (if present—otherwise, a terminal can be hooked up and used to configure the interface). **Built-in RS232C**: Not configurable; will always work with the factory settings..	Via terminal (as per terminal instructions)	Via terminal (as per terminal instructions)
Extended SICS Level 3 instruction set for the HOST interface	Commands as in Section 3.1. Note: All SICS commands in the list * are also supported.	Commands as in Section 3.1. Note: All SICS commands in the list * are also supported.	Not available	Not available
Expanded SICS Level 3 commands for second interface	—	Commands as in Section 3.1. Note: All SICS commands in the list * are also supported (including the "COPT" command to configure the "Host" interface) EXCEPT "SIR," "SR," and "SNR"..	—	Not available
"FastHost" commands (as per MT-SICS reference manual)	Available on host interface	Available on host interface	Available on built-in RS232C, assuming it is configured as host interface	Available on built-in RS232C, assuming it is configured as host interface
Notes			When the terminal is removed, the system behaves like a weigh module without a terminal, with a RS232C standard interface (Configuration 1)	When the terminal is removed, the system behaves like a weigh module without a terminal, with a RS232C standard interface and additional optional interface (Configuration 2)

* in the MT-SICS reference manual.

3.1 Extended SICS Command set for WMC Weigh Modules without Terminal

The following commands were added to the MT-SICS Level 3 command set specifically for the configuration of WMC weigh modules:

Command	Meaning
FCUT	Set filter characteristics (limit frequency)
RDB	Set readability
USTB	Set stability criteria
FSET	Restore factory settings
LST	List user settings



These commands can only be used if NO terminal is connected.

3.2 Standard SICS Command set for WMC Weigh Modules without Terminal

The following list provides an overview of the commands from the standard SICS command set that WMC weigh modules without terminals support. For more detailed information on the individual commands and their parameters, refer to the MT-SICS manual provided on the included CD-ROM.

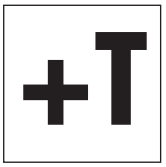
Command	Meaning
SICS Level 0	
I0	Lists all commands supported by SICS levels 0-3
I1	Lists supported MT-SICS level and MT-SICS versions
I2	Inquiry of weigh module data
I3	Inquiry ofSW version and type definition number
I4	Inquiry ofserial number
I5	Inquiry of software verification number
S	Send stable net weight
SI	Send current net weight without regard for stability
SIR	Send continuous current net weight without regard for stability. Note: This command is not available in the built-in RS232C standard interface on weigh modules without a terminal and with the optional interface.
Z	Zero
ZI	Zero without waiting for stability
@	Cancel current commands and send serial number to host
SICS Level 1	
SR	Send stable weight when weight changes (repeatedly). Note: This command is not available in the built-in RS232C standard interface on weigh modules without a terminal and with the optional interface.
T	Trigger taring
TA	Inquire and set tare memory
TAC	Clear tare memory
TI	Trigger taring without waiting for stability

Command	Meaning
SICS Level 2	
C2	Adjust using external weight. Note: Only possible when external adjustment is permitted.
COM	Configuration command for built-in RS232C standard interface. Note: This command is only available for weigh modules without a terminal and without the optional interface.
COPT	Configuration command for optional interface. Note: This command is only available for weigh modules without a terminal and with the optional interface. The command is only available via the built-in RS232C standard interface.
DAT	Inquiry/setting of date
I10	Inquiry/setting of weigh module ID
I11	Inquiry/setting of module type
I14	Inquiry of information on the weigh module
I15	Inquire duration of operation of the weigh module in minutes since startup
I16	Inquiry of next service date
I21	Inquiry of assortment tolerance dataset version
I22)	Inquiry of linearity tolerance
I23	Inquiry of repeatability tolerance
I24	Inquiry of sensitivity tolerance
I25	Inquiry of shift tolerance
I26	Inquiry of operating mode
M01	Inquiry/setting of weighing mode (filter characteristics)
M02	Inquiry/setting of ambient parameters (filter damping)
M03	Inquiry and activation/deactivitation of AutoZero (automatic zeroing)
M19	Inquiry/setting of external adjustment weight. Note: Only possible when external adjustment is permitted
M20	Inquiry/setting of external test weight.
M21	Inquiry/setting of weighing units
M27	Inquiry of user adjustment history
M28	Inquiry of temperature values
M29	Inquiry/setting of reading release
M31	Operating mode of the weigh module following restart. Note: Only parameters of 0 (standard) or 3 (diagnostic mode) are allowed
M32	ProFact: Inquiry/setting of time criteria
M33	ProFact: Inquiry/setting of weekday
M35	Define zero at power-up (0 = normal, 1 = start in the future with a momentary zero).
SIS	Send net weight with weighing unit and additional information
SNR	Send continuous stable weight following a defined change in weight. Note: This command is not available in the integrated RS232C standard interface on weigh modules without a terminal and with the optional interface.
TIM	Inquiry/setting of time
TST2	Start test sequence with external weight
UPD	Inquiry of host interface update rate

Command	Meaning
FAST Host	
B00	Lists all available FastHost commands (“Bxx”)
B01	Inquiry of individual reading
B02	Start/stop continuous data transmission
B03	Inquiry of reading counter time base (SV counter)
B04	Inquiry/setting of FastHost format specification
B05	Inquiry/setting of FastHost stability criteria
B06	Inquiry/setting of FastHost output reduction (output cycle)
B07	Inquiry/setting of automatic sending following restart
B08	Zeroing using FastHost stability criterion (“B05”)

Note: The availability of single commands depends on the product configuration. Find a respective listing in the MT-SICS reference manual.

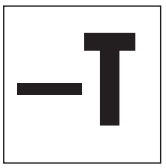
3.3 Preparatory Steps for Configuration



For **weigh modules with a terminal connected**, the configuration tasks described in the following sections are performed using the terminal. Therefore, no preparatory work is required; however, it is assumed that you have the terminal instructions handy and are already familiar with how to operate the terminal and use the menu structure.

The menu options for configuring the weigh module are found in the system settings of the terminal.

The configuration tasks described in the following section are for weigh modules without a terminal. At the end of each section, you will see a note for users of weigh modules with terminals telling you where the equivalent settings can be found on the terminal.



Weigh modules without a terminal are confugred via the interface with MT-SICS commands. You'll need a host computer (PC) and a terminal program to do this. ″

Connect the host computer with the built-in RS232C standard interface to the weigh module. Set the communications parameters of the terminal program as follows:

Baud rate:	9600
Data bits:	8
Stop bits:	1
Parity:	None
End of line:	<CR><LF>
Handshake:	Xon/Xoff

These are the factory settings for the built-in RS232C standard interface on the weigh module.

For weigh modules that have only a RS232C standard interface, you can change the RS232C standard interface communications parameters using the "COM" command (SICS level 2). Once you have made your changes, you must adjust the terminal program's communications parameters accordingly so that you can continue to communicate with the weigh module.

For weigh modules that have an additional optional interface, you can configure them using the "COPT" command (SICS level 2). Only the RS232C standard interface supports the "COPT" command; therefore, for this configuration, the weigh module must first be connected with the host computer via the standard interface. Once you have configured your system, you can connect the host computer with the optional interface. The RS232C standard interface itself cannot be configured; it always uses the factory settings (see above). If an optional interface is available, the RS232C standard interface is used as a service interface.
Note: If you have a terminal, you can connect it temporarily and configure the optional interface using the terminal. This is easier and faster than configuring it with the "COPT" command. Once you've configured the optional interface, you can disconnect and remove the terminal.

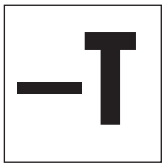
The next section describes the most important configuration task (user settings) with special consideration given to the expanded MT-SICS command set for WMC weigh modules without a terminal (Section 3.1). The standard SICS commands are available for additional configuration work (Section 3.2).

3.4 Configuring the Weigh Module

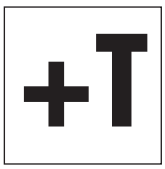
It is recommended that the weigh modules are configured before they are used in order to achieve best weighing performance. The following sections provide information on the most important configuration tasks.

3.4.1 Adjusting the weigh module

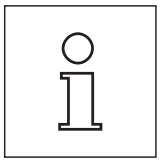
Following initial startup, the weigh module must be adjusted using an external weight. Various parameters can be set for the adjustment.



For **weigh modules without a terminal**, the command "C2," (SICS level 2) is used for the adjustment and the corresponding settings. Use the "M19" command to set up the weight of the external adjustment weight you intend to use.



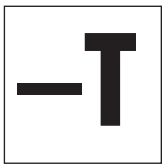
Weigh module with a terminal connected: The settings for adjustment using an external weight are part of the system settings. See the description of the "Weighing" application for how to perform the adjustment. You can find more information in the terminal instructions.



Note: The adjustment of the weigh module should be carried out if the system has not been used for a longer period. Allow time for the weigh module to warm-up (chapter 6.1). We recommend adjustment at intervals of max. 24 hours.

3.4.2 Set readability

Readability refers to the smallest difference in weight that the weigh module can still measure and transmit via the interface and/or show on the display (see also the technical data in Section 6). The factory-set readability (= maximum possible number of places after the decimal point) can be reduced if necessary to shorten weighing time.

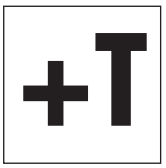


For **weigh modules with no terminal connected**, use the "**RDB**" command to set readability:

Command:	**RDB**	Inquire current readability
Answer:	**RDB A dp**	Readability expressed as the number of places after the decimal point (dp) when weighing in grams (g).
Command:	**RDB dp**	Set readability (dp = number of places after the decimal point)
Responses:	**RDB A**	Command executed, readability set
	I4 A "..."	Restart performed (the system always restarts after readability has been set)
Responses (errors):	**RDB L**	Incorrect "dp" parameter
	RDB I	Command cannot be executed right now
	ES	Terminal connected
For example:	**RDB 2**	Set readability to 2 places after the decimal point (0.01 g)
Responses:	**RDB A**	Command executed
	I4 A "..."	Restart performed

Notes:

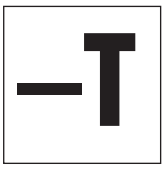
- The definition of readability always uses grams (g) as the unit, regardless of what the current unit of display is.
- The "RDB" command will let you reduce readability by a maximum of 3 places after the decimal point below the maximum resolution of the weigh module.
- Once an "RDB" command has been executed, the weigh module automatically restarts, a new zero point is set, and the tare memory is cleared.
- The selected readability affects various other settings and functions such as stability criteria for weighing, taring, and zeroing as well as adjustment.



For **weigh modules with a terminal connected**, use the "**1/10d**" function key to set readability. **Note**: Depending on your particular weigh module, you may have several of these function keys available, such as "**1/100d**" and "**1/1000d**". For more information on these function keys, see the description for the "Weighing" application (terminal instructions).

3.4.3 Set stability criteria

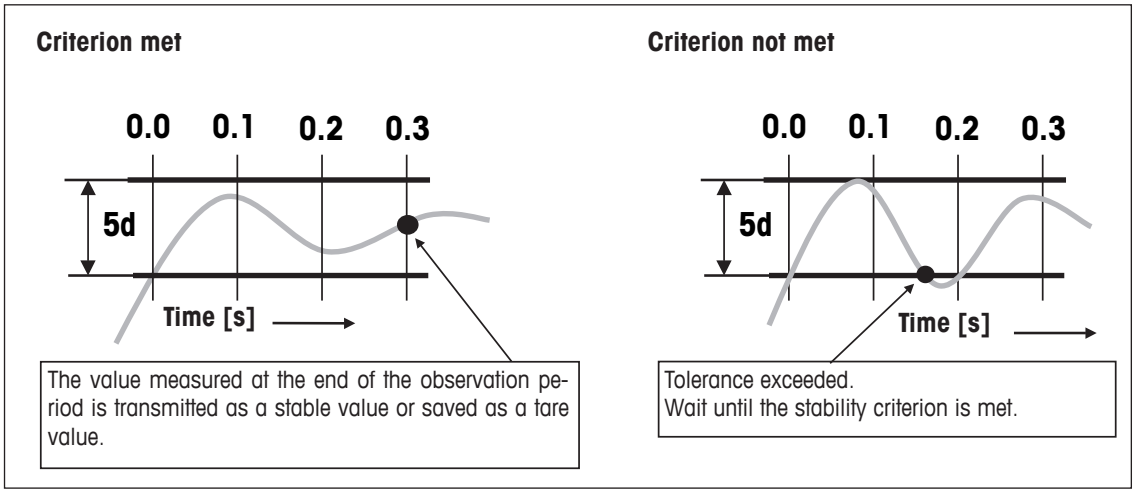
The stability criterion specifies when a weighing result is considered stable. A stability criterion must also be fulfilled to perform the zeroing and taring functions. A separate stability criterion can be defined for every mode (weighing, zeroing, and taring). A value is considered to be stable when it moves within a defined bandwidth during a specified observation period. These two parameters (length of observation and bandwidth) define the stability criterion.



For **weigh modules without a terminal**, use the "**M29**" command (refer to the MT-SICS reference manual) or the "**USTB**" command (explained below) to set stability criteria.

Command:	**USTB**	Inquire all stability criteria
Response:	**USTB B 0 0.000 0.000** **USTB B 1 0.000 0.000** **USTB A 2 0.000 0.000**	Current stability criteria for weighing, taring, and zeroing
Command:	**USTB x**	Inquire stability criterion for specific weighing process: x = 0: Weighing x = 1: Taring x = 2: Zeroing
Response:	**USTB A 1 0.000 0.000**	Current stability criterion (Example "Taring")
Command:	**USTB x y z**	Set stability criterion: x: Modes (0, 1 or 2, see above) y: Bandwidth (in digits of current readability – min 0.25 d) z: Observation period (in seconds)
Response:	**USTB A**	Command executed, stability criterion set
Responses (errors):	**USTB L**	Incorrect parameter (e.g. bandwidth > 1000d, observation period > 4 s)
	ES	Terminal connected
For example:	**USTB 0 5.0 0.3**	Set stability criterion for weighing with a bandwidth of 5 digits and an observation period of 0.3 seconds
Response:	**USTB A**	Command executed

The figure below illustrates how the stability criterion works.



Notes:

- At the factory, all "USTB" stability criteria are set to 0.0000 (in this case, the settings defined with the "M29" command are being used).
- A bandwidth of <0.001d and an observation period of <0.001 s are interpreted as 0.0.
- If any of the parameters of the "USTB" command is not equal to zero, the respective settings of the "M29" command are not being considered for the respective mode (weighing, taring or zeroing).
- The observation period is event-oriented; it restarts each time the reading falls outside the defined bandwidth
- The stability criteria apply to the entire weighing range; it is not possible to adjust them dependant on weighing range (gross/fine range for dual-range weigh modules) changes.
- The user-specific stability criteria take effect only when the system is operated without a terminal. If a terminal is later connected, the settings stored in the terminal become effective.
- For adjustment, factory-set stability criteria are always used, with consideration given to the reading release setting ("M29" command).

+T

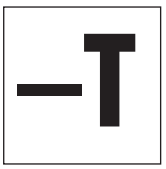
For **weigh modules with a terminal**, stability criteria settings (reading release) are part of the weighing parameters. On the SWT terminal, you'll find these settings in the system settings.

3.4.4 Activating and defining the fixed filter

Use the "M01" command to set the weighing type and the "M02" command to set the ambient conditions (Section 3.4.5). These two settings determine the type and strength of signal filtering that will occur. With the "M01" command you can choose between two weighing types, "Sensor Mode" (command "M01 2") or "Universal" (command "M01 0").

For the "Sensor mode" weighing type (command "M01 2"), the "**FCUT**" command offers an additional option for defining filter behavior. Filtering in "Sensor mode" is chronologically linear (fixed, non-adaptive filter) and is appropriate if the weight readings need to be further processed.

Important: The "FCUT" command is only available for the "sensor mode" weighing type. The fixed filter is deactivated at the factory.



Command:	**FCUT**	Inquire cut-off frequency of the fixed filter
Response:	**FCUT A frq**	frq = currently set cut-off frequency (in the 0.001Hz – 20.0Hz range)
Command:	**FCUT frq**	Set cut-off frequency for the fixed filter (frq = 0.001Hz ... 20.0Hz)
Response:	**FCUT A**	Command executed, cut-off frequency set
Responses (errors):	**FCUT L**	Incorrect parameter (outside the allowed range)
	FCUT I	Command cannot be executed right now
	ES	Terminal connected
Example 1:	**FCUT 0**	Set cut-off frequency to 0 (= fixed filter deactivated = factory setting)
Response:	**FCUT A**	Command executed, cut-off frequency set to 0
Example 2:	**FCUT 3.4**	Set cut-off frequency to 3.4 Hz
Response:	**FCUT A**	Command executed, cut-off frequency set to 3.4Hz

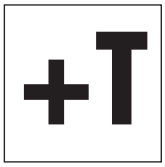
Notes:

– The fixed filter is deactivated at the factory, and the filtering is defined by setting the ambient conditions ("M02" command, see Section 3.4.5). The following cut-off frequencies are associated with the "M02" command parameters:

M02 0	5 Hz
M02 1	0.65 Hz
M02 2	0.28 Hz
M02 3	0.15 Hz
M02 4	0.056 Hz

– If the fixed filter is activated (frq ≠ 0), it will override any settings for ambient conditions ("M02" command) in sensor mode.

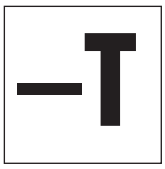
– Values for frq < 0.001 will be interpreted as zero (in this case, the filter frequency will be used in accordance with the "M02" command). **Admissible values**: 0.001 to 20 (Hz). Small values set up a slow filter, while high values define a fast filter. The slower the filter, the heavier the suppression of environmental effects. Note that a high cut-off frequency may possibly lead to unstable measured values.



For **weigh modules with a terminal connected**, selecting the weighing type is part of the weighing parameters. On the SWT terminal, you'll find these settings in the system settings. The ambient conditions (Section 3.4.5) determine filter damping of the weighing signal. These two settings determine the filtering of the weighing signal. When you activate the sensor mode, the weigh module automatically works with a factory-defined fixed filter with 5 selectable levels.

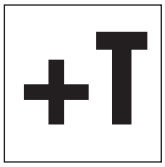
3.4.5 Adjustments to ambient conditions (filter damping)

Adjusting filter damping allows for the weigh module to be optimally adapted to ambient conditions. This setting determines how quickly the weigh module will react to a change in weight, but also how sensitive the module will be to outside disturbances. Strong filter damping will cause the module to react more slowly to small changes in weight, but it will also make it less sensitive to ambient conditions such as air movements and vibrations. In general, this also increases the measurement accuracy (repeatability). You can also control the measurement accuracy and the weighing time by changing the settings for stability criteria (Section 3.4.3).



For **weigh modules with no terminal connected**, use the "M02" command to adjust your system to ambient conditions (filter damping). This command from the standard SICS command set (level 2) is described in the MT-SICS reference manual.

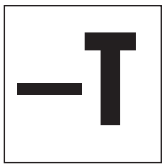
Note: If the "sensor mode" weighing type is active, and the "FCUT" command has been used to define a frequency limit (Section 3.4.4), the ambient condition settings for the "sensor mode" will not take effect. In this case, the weigh signal is processed by the fixed filter.



For **weigh modules with a terminal connected**, adjusting the system to ambient conditions is part of the weighing parameters. On the SWT terminal, you'll find these settings in the system settings.

3.4.6 Setting the update rate for continuous weight transmission

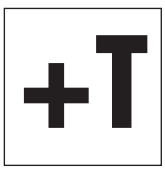
For weighing applications such as dosing to a specified target weight, the weigh module must constantly record weight changes and forward the readings regardless of their stability to the dosing system so that it can control the dosing process. In such cases, you should activate the "send continuous" mode to ensure a continuous flow of weight readings and set the number of weight readings to be transmitted each second via the interface (update rate).



For **weigh modules with no terminal connected**, use the "**SIR**" command (standard SICS level 0) to activate the "send continuous mode" mode. Use the "**UPD**" command (standard SICS level 2) to set the number of weight readings to be transmitted per second.

Notes:

- For weigh modules with an optional interface, the "SIR" command is available on the optional interface (host interface), but not on the RS232C standard interface.
- Update rates of up to 92 readings per second are possible.

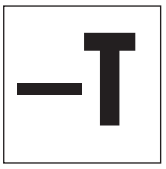


For **weigh modules with a terminal connected,** you can activate the "send continuous" mode and set the update rate as part of the interface definition in the system settings.

Update rates of up to 23 readings per second are possible if a terminal is connected.

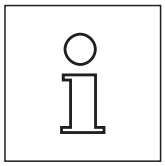
3.4.7 Recording user settings

The current user settings can be sent to the interface using the "LST" command.

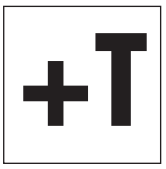


For **weigh modules with no terminal connected,** use the "**LST**" command (expanded SICS command set for WMC weigh modules) to output a list of all user-specific settings. The following example shows part of such a list:

LST B C0 0 0 ""
LST B FCUT 2.800000
LST B M01 0
LST B M02 2
LST B M03 0
LST B M07 0
LST B M17 00 00 00 0
LST B M18 1
.
LST A USTB 2 0.0000000 0.000000



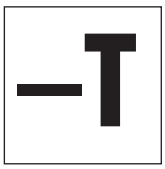
For reading and restoring the settings, use the METTLER TOLEDO "eloader".



For **weigh modules with a terminal connected,** both the system settings and the user-specific settings can be recorded. While viewing the system settings or user-specific settings, simply press the Print key on the terminal (key with the printer symbol). The current settings will be output via the interface.

3.4.8 Resetting user-specific settings to factory default

The current user-specific settings can be reset to the factory default using the "FSET" command.

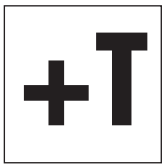


For **weigh modules with no terminal connected**, use the "**FSET**" command to reset:

Command:	**FSET x**	Settings to be reset: x = 0: All settings **except** communication parameters of the interface(s) x = 1: All settings **including** user adjustments and communication parameters of the interface(s) x = 2: All settings **except** communication parameters of the interface(s) and user adjustments
Responses:	**FSET A**	Command executed, selected settings reset
	I4 A "..."	Restart performed (the system always restarts after settings have been reset)
Responses (errors):	**FSET L**	Incorrect parameter for "x" (see above)
	FSET I	Command cannot be executed right now
	ES	Terminal connected
For example:	**FSET 1**	Reset all settings back to factory defaults
Response:	**FSET A**	Command executed
	I4 A "..."	Restart performed

Notes:

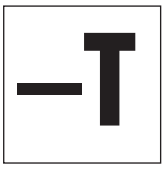
- The date ("DAT") and the time ("TIM") are not reset with the "FSET" command.
- If the communications parameters are reset ("FSET 1"), the reset will not occur until there is confirmation that the command has been executed (response).
- The "FSET" command cannot be cancelled (with the @ command).



Weigh modules with a terminal connected:
On the SWT terminal, all settings can be reset in the system settings. Please read the notes and warnings on this subject in the terminal instructions.

3.4.9 Information on the memory location for user-specific settings

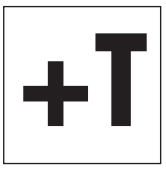
The memory location for user settings depends on whether or not a terminal is connected to the weigh module.



For **weigh modules with no terminal connected,** some user settings are **permanently stored in the electronic unit**. These are:

Command	Setting
FCUT	Fixed filter for sensor mode
I10	ID of the weigh module
M01	Weighing mode (filter properties)
M02	Ambient parameters (filter damping)
M03	AutoZero (automatic zeroing)
M19	External adjustment weight
M20	External test weight
M21	Weighing unit
M29	Reading release
M31	Operating mode of the weigh module following restart
M35	Zeroing upon startup
USTB	Stability criteria
UPD	Update rate for the interface

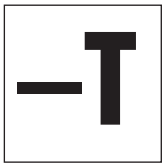
Note: The parameters for the "CO" (adjustment status) and "TSTO" (test configuration) commands are not permanently stored in the electronic unit.



For **weigh modules with a terminal connected,** all user settings are permanently stored in the terminal.

Exceptions: The settings for zeroing upon startup ("M35") and for the update rate for the interface ("UPD") are stored in the electronic unit.

4 Weighing Operation



This section contains helpful tips for weighing operation and information on possible error messages. Weigh modules with a terminal connected are operated using the terminal, and all error messages are displayed in plain English on the terminal; consult the terminal instructions for more information.

Information in this section applies to users with **weigh modules without a terminal**. The MT-SICS commands listed here are only some of the available commands you can use in weighing operations. See the MT-SICS reference manual for more information and detailed command descriptions.

4.1 Transmission of Weight Values

The readings transmitted via the interface refer either to zero or to the reading created as a result of the tare command, depending on whether zeroing or taring was the last function performed. Note that the system zeroes automatically each time it is powered up (zeroing upon startup). Commands that cannot be executed successfully until a stability criterion is met will cancel if stability is not attained within 40 seconds (timeout).

Weight query and transmission of a single stable weight reading

Command:	**S**	Transmits the current stable weight reading. If the weigh module is in the stabilization phase, the weight reading will not be sent until the stability criterion for weighing has been met.
Response:	**S S [current weight reading] g**	Stable weight value (the second "S" stands for "stable")
Response (errors):	**S I**	Command cannot be executed, e.g., because the stability criterion for weighing was not met (timeout).

Weight query and immediate transmission of a single weight reading

Command:	**SI**	Immediate transmission of the current weight reading, regardless of its stability.
Responses:	**S S [current weight reading] g**	Stable weight value
	S D [current weight reading] g	Non-stable weight reading (the "D" stands for "dynamic = not stable")

Automatic transmission of each stable weight reading after a change in weight

Command:	**SNR**	Transmits the current stable weight reading, and automatically sends all subsequent weight readings that fulfill the stability criterion after any change in weight. You can input the weight change that is necessary to trigger transmission as needed. If you do not want any more readings, cancel automatic transmission with commands such as "S," SI," or "@" (reset).
Response:	**S S [current weight reading] g**	Stable weight value. After a change in weight and subsequent stabilization, the module will automatically transmit the next stable weight reading.

Continuous transmission of all weight readings ("continuous mode")

Command:	**SIR**	Continuously transmits all weight readings, regardless of stability. This continuous transmission mode is particularly helpful for dosing to a specified target weight because it allows monitoring of the continuous changes in weight. The effective number of transmitted readings per second may not deviate more than 1 reading per second from the set transmission rate.
Responses:	**S S [current weight reading] g**	Stable weight value
	S D [current weight reading] g	Dynamic, non-stable weight reading

4.2 Taring Function

Taring after fulfillment of the stability criterion

Command:	**T**	This command sets the current stable weight reading (that references the current zero) as tare weight, transfers it to the tare memory, and transmits it across the interface. The current weight reading will then be set to zero. If the weigh module is in the stabilization phase, the command will not be executed until the stability criterion for taring has been met, or it will cancel in the event of a timeout.
Response:	**T S [current tare reading] g**	The current stable weight reading (net weight) has now been set to zero..
Response (error):	**T I**	Tare function cannot be carried out. This could occur if the current weight reading (referencing the current zero) is negative, or if the stability criterion for taring has not been met (timeout).

Immediate taring regardless of the stability criterion

Command:	**TI**	The current weight reading referencing the current zero is immediately considered to be the tare weight. It is transferred to the tare memory and transmitted across the interface, regardless of the stability criterion for the taring function being met. The current weight reading (net weight) will then be set to zero.
Responses:	**TI S [current weight reading] g**	The current stable weight reading (net weight) has now been set to zero.
	TI D [current weight reading] g	The current dynamic weight reading (net weight) is set to zero (the "D" stands for "dynamic" = not stable). In this case, the zero is also considered unstable.
Response (error):	**TI I**	Command cannot be executed – this may happen if the current weight reading referencing the current zero is negative.

4.3 Zeroing Functions

Zeroing creates a new zero (reference point), sets the current weight reading to zero, and clears the tare memory.The weigh module automatically zeroes itself each time it is powered up.
If the weigh module cannot zero upon power-up due to filter settings and prevailing ambient conditions, it will time out, and the system zero will be used. This means that all weight values will reference this zero. You will not be able to perform a test or an adjustment until a zero command is successfully executed.

Zeroing with fulfillment of the stability criterion

Command:	**Z**	Creates a new zero. If the weigh module is in the stabilization phase, the command will not be executed until the stability criterion for zeroing has been met.
Response:	**Z A**	The current stable weight reading is set to zero and the tare memory is cleared.
Response (error):	**Z I**	Command cannot be executed, e.g., because the stability criterion for zeroing was not met (timeout).

Immediate zeroing regardless of the stability citerion

Command:	**ZI**	A new zero is immediately set, regardless of the stability criterion for zeroing being met. The tare memory is then cleared.
Responses:	**ZI S**	Zeroed on the basis of a stable weight reading.
	ZI D	Zeroed on the basis of a dynamic weight reading (the "D" stands for "dynamic" = not stable).

4.4 Troubleshooting Weigh Module Errors and Malfunctions

Go through each of the steps offered here and try to remedy the problem yourself – it may be due to system settings. Never open the weigh module housing.

4.4.1. If your weigh module doesn't perform correctly until it has been powered up for quite a while

If the weigh module responds to transmission, taring, or zeroing commands with "S I", "T I" or "Z I" for a long time after being powered up:

- Check ambient conditions.
- Check your zero after power-up by executing an "SI" command. If the weight reading deviates more than a few increments from zero, the unit was unable to get a stable reading upon being powered up, and was then unable to zero.
- Temporarily change your filter settings and/or your stability criterion for zeroing so that you can successfully zero the system with a "Z" command (response: "Z A").
- If necessary, restore the filter settings (Section 3.4).

4.4.2 If the weigh module does not transmit the expected weight readings

- Check the weigh module settings by using the "LST" command (inquire user settings).
- Run the test function with the "TST2" command (see the MT-SICS reference manual). The difference sent is the adjustment error, also called sensitivity deviation, that has developed as a result of drift since the last adjustment. The result should give you an idea of whether adjustment is needed. **Note**: If the difference is in the hundreds of increments (digits), you should assume that the weigh module was never adjusted before, handled improperly, dropped, or suffered some other shock or blow. You should have a technician check the unit before you use it again.
- Switch the power off and back on and check the message that the interface sends after the weigh module's startup phase. If you see an error message instead of the serial number, contact your METTLER TOLEDO office.

4.4.3 If the weigh module doesn't react to your commands at all

- Check to see that power is being supplied to your unit.
- Check your interfaces and interface parameter settings.

If you, or the person at your company responsible for maintaining the weigh module, cannot remedy the problem, please contact your supplier or your METTLER TOLEDO contact. Be sure to have the following information ready when contacting us:

– Your weigh module's current settings ("LST" command).

– Size of preload, if you're working with the weighing pan adapter and a custom setup for accepting objects to be weighed.

– Brief description of weighing application and the error or malfunction you are experiencing.

5 Maintenance and Service

To ensure that your weigh module remains reliable, accurate, and functional for many years to come, the individual components must be cleaned and maintained periodically as appropriate for the intensity of use and the risk of contamination with debris.

5.1 Cleaning the Weigh Module

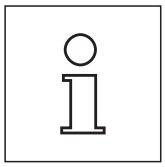
Clean the weighing pan and the weigh unit housing regularly with a damp cloth. The electronic unit and terminal can also be cleaned in this fashion as needed. For tougher dirt, a mild household cleaner may be used. Make sure that no liquid penetrates inside the components (protect with plastic cover)!

Never use cleansers containing solvents or gritty scrubbing particles. They could damage or scratch certain surfaces (particularly the terminal screen).

5.2 Maintenance

Your weigh module is a precision instrument, and periodic maintenance is one of the basic requirements to ensure it will perform well for you for many years to come.

Maintenance intervals will depend on the duration of use and the application and ambient conditions. Maintenance must be performed by a technician trained by METTLER TOLEDO.



Ask your METTLER TOLEDO office about **service packages** – regular maintenance by an authorized service technician will ensure your weigh module remains accurate and lengthen its service life.

6 Technical Data, Accessories, and Replacement Parts

This section includes the most important technical data for your weigh module. Accessories from METTLER TOLEDO will expand the functionality of your weigh module and open up additional applications. This section lists the currently available options and replacement parts.

6.1 General Data

Power supply

- External power supply: Primary: 100-240VAC, -15%/+10%, 50/60Hz, 0.5A
  Secondary: 12VDC +/-3%, 2A (provides electronic overvoltage protection)
  Please note the detailed information about the power supply on the next page.
- Cable for power supply: Three-prong with country-specific plug
- Power feed-in at electronic unit: 12 VDC +/-3%, 5W, maximum ripple: 80mVpp
  ⚠ Operate only with a certified power supply with a limited SELV circuit output.
  Pay special attention to polarity. ⊖—●—⊕

Protection and standards

- Overvoltage category: Class II
- Pollution level: 2
  (non-conductive soiling only; every once in a while temporary conductivity may occur due to condensation)
- Protection: In operation, the weigh unit is rated IP30.
  The electronic unit meets IP40.
  The SWT terminal is rated IP54.
- Safety and EMV standards: See Declaration of Conformity (provided separately)
- Application range: Use only in closed indoor spaces; DO NOT OPERATE in hazardous areas

Ambient conditions

- Height above sea level: to 4000m
- Ambient temperature: 5-40 °C
- Relative humidity: Max. 80% at 31°C, decreasing lineraly to 50% at 40 °C, non-condensing
- Warm-up time: At least 180 minutes after the weigh module has been connected to the power supply; the weigh module can be used immediately if it is turned on from standby mode (when operated with a terminal connected).

Materials

- Weigh unit housing: Polished chromium steel, X2CrNiMo17-12 (1.4404 resp. 316L)
- Electronic unit housing: Polished chromium steel, X2CrNiMo17-12 (1.4404 resp. 316L)
- Terminal housing: Painted die-cast zinc and plastic
- Weighing pans: Standard weighing pan: chromium steel, X2CrNiMo17-12 (1.4404 resp. 316L)
  Weighing pan adapter: plastic (PEEK CF30)

Standard Equipment See scope of delivery in Section 2.2

Detailed information on your METTLER TOLEDO power supply unit

METTLER TOLEDO weigh modules are shipped with an external power supply. In accordance with Class II protection, it is double-insulated and certified. It is equipped with functional grounding to ensure electromagnetic compatibility (EMC). The ground connection has NO safety-related function. For more information on our products' conformity, refer to the Declaration of Conformity shipped with each product or download details from www.mt.com.

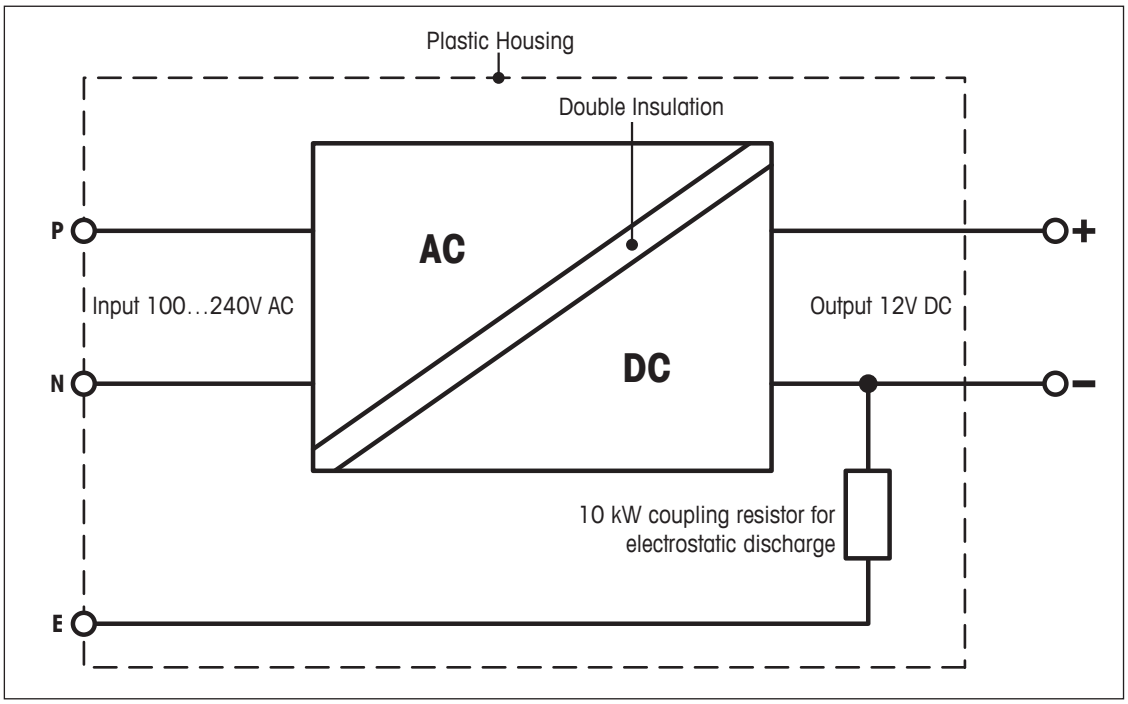
For testing in accordance with Directive 2001/95/EC, the power supply and weigh module should be treated as double-insulated Class II devices.

Therefore, grounding tests are not required. It is also unnecessary to conduct a grounding test between the protective ground of the power supply and a metallic surface on the weigh module housing.

Because precision weigh modules are sensitive to electrostatic discharge, a coupling resistor (typically 10kΩ is installed between the grounding conductor (at the power supply input) and the power supply output. See the equivalent circuit diagram for placement.

This resistor is not part of the electrical safety plan; therefore, it does not need to be tested at regular intervals.

Equivalent circuit diagram:



6.2 Model-Specific Data

Parameter			WMC25-SH	WMC24-SH	WMC15-SH
Limit values					
	Maximum capacity		21 g	21 g	11 g
	Readability		0.01 mg	0.1 mg	0.01 mg
	Repeatability (at nominal load)	sd	0.02 mg (20 g)	0.1 mg (20 g)	0.02 mg (10 g)
	Repeatability (at low load)	sd	0.012 mg (5 g)	0.08 mg (5 g)	0.012 mg (5 g)
	Linearity deviation		0.05 mg	0.2 mg	0.05 mg
	Eccentric load deviation (test load)		0.12 mg (10 g)	0.4 mg (10 g)	0.12 mg (5 g)
	Sensitivity offset [1]		$4x10^{-6} \cdot R_{nt}$	$1x10^{-5} \cdot R_{nt}$	$4x10^{-6} \cdot R_{nt}$
	Sensitivity temperature drift [2]		0.0002 %/°C	0.0002 %/°C	0.0002 %/°C
	Sensitivity stability		0.0001 %/a	0.0001 %/a	0.0001 %/a
Typical values					
	Repeatability		0.01 mg	0.06 mg	0.01 mg
	Linearity deviation		0.03 mg	0.13 mg	0.032 mg
	Eccentric load deviation (test load)		0.08 mg (10 g)	0.24 mg (10 g)	0.08 mg (5 g)
	Minimum weight (according to USP)		30 mg	180 mg	30 mg
	Minimum weight (@ U=1%, 2 sd))		2 mg	2 mg	2 mg
	Settling time [3]		3 s	2.5 s	2.5 s
Typical uncertainties & more					
	Repeatability	sd	$0.01mg+0.000025\% \cdot R_{gr}$	$0.06mg+0.0001\% \cdot R_{gr}$	$0.01mg+0.00005\% \cdot R_{gr}$
	Differential linearity deviation	sd	$\sqrt{(1.2x10^{-8}mg \cdot R_{nt})}$	$\sqrt{(2x10^{-7}mg \cdot R_{nt})}$	$\sqrt{(2.5x10^{-8}mg \cdot R_{nt})}$
	Differential eccentric load deviation	sd	$0.0004\% \cdot R_{nt}$	$0.0012\% \cdot R_{nt}$	$0.0008\% \cdot R_{nt}$
	Minimum weight (according to USP)		$30mg+0.075\% \cdot R_{gr}$	$180mg+0.3\% \cdot R_{gr}$	$30mg+0.15\% \cdot R_{gr}$
	Minimum weight (@ U=1%, 2 sd))		$2mg+0.005\% \cdot R_{gr}$	$2mg+0.005\% \cdot R_{gr}$	$2mg+0.01\% \cdot R_{gr}$
	Interface update rate		92 /s	92 /s	92 /s
	Weight of balance		0.415 kg	0.415 kg	0.415 kg
Dimensions of weigh unit					
	High (with standard weighing pan)	nom.	73.35 mm	73.35 mm	73.35 mm
	Width	nom.	25 mm	25 mm	25 mm
	Depth	nom.	65 mm	65 mm	65 mm
	Diameter of standard weighing pan	nom.	15 mm	15 mm	15 mm
	Diameter of weighing pan adapter	nom.	14 mm	14 mm	14 mm

Legend:

[1] Applies only after adjustment at nominal capacity with an OIML E2 weight (see accessories).

[2] Temperature range 10 ... 30 °C.

[3] The settling time is the time between when the object to be weighed is placed on the scale and a stable signal is transmitted – this assumes optimal ambient conditions and optimal parameter settings.

sd = Standard deviation

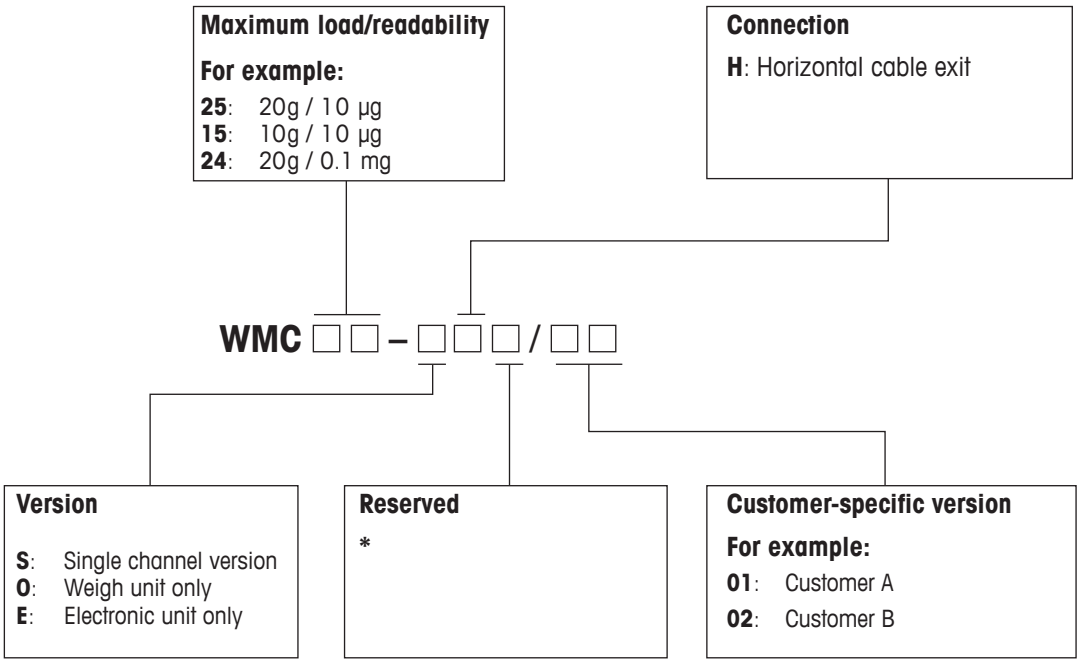
R_{gr} = Gross weight

R_{nt} = net weight (of sample)

a = Year (annum)

6.3 Key to Types and List of Available Models

The type designation allows you to clearly identify your weigh module. The type designation can be found on the name plate for the weigh unit and the electronic unit.



*: blank (blank spaces that are not used are left out of the type designation, i.e., the type designation has no spaces and no set length).

The type designation always refers to the configuration as originally shipped. For example, if a weigh module has a terminal added to it later, the type designation printed on the name plate will no longer be correct. In this case, the terminal will check all weigh module components and use this information to generate a new type designation. This designation can be queried directly at the terminal or by using a software command.

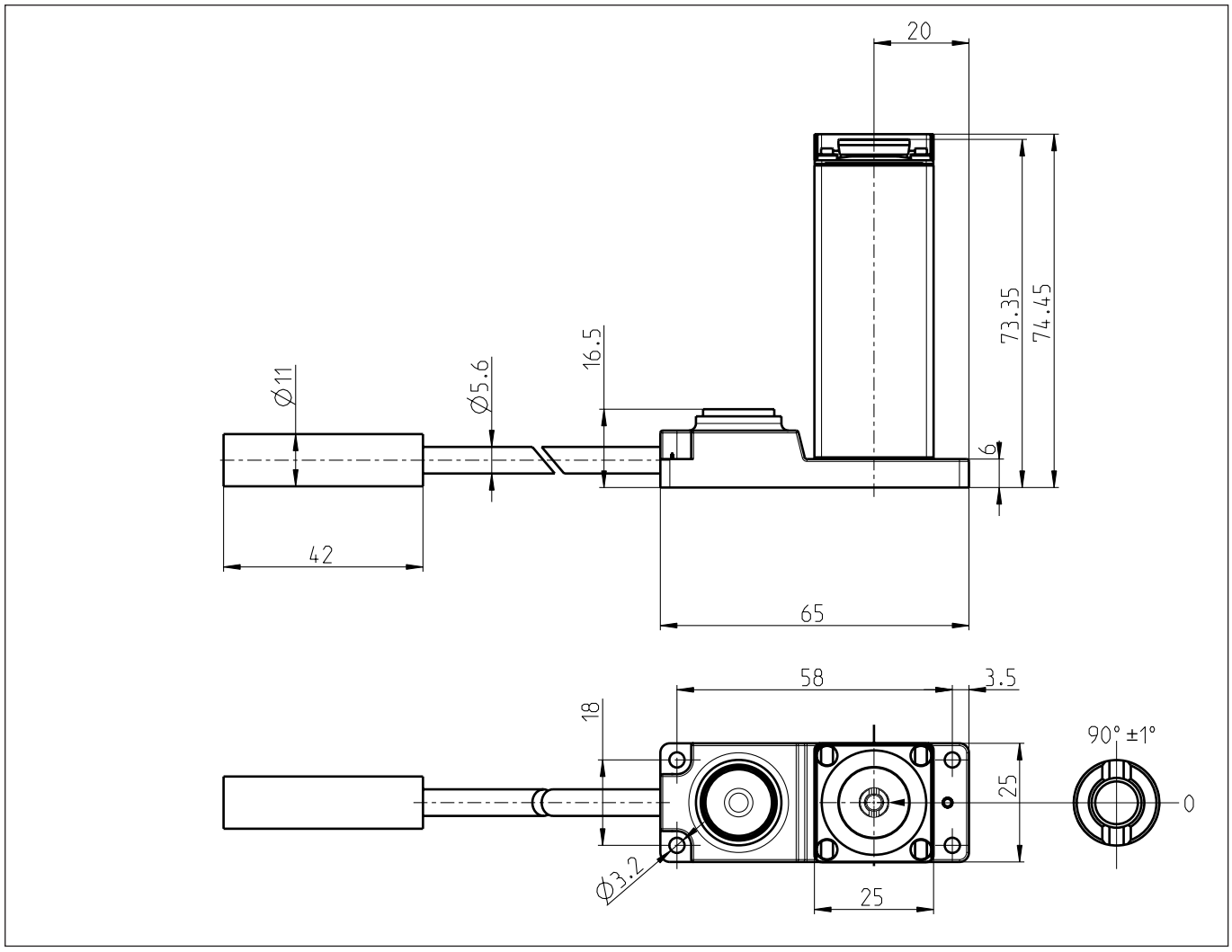
List of available models

Model	Part #
WMC25-SH	11149000
WMC15-SH	11149009
WMC24-SH	11149002

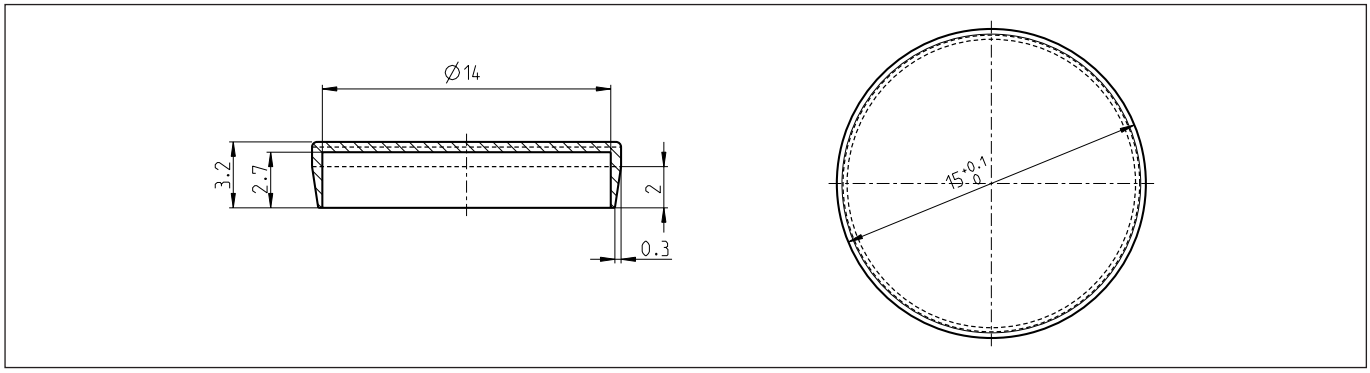
6.4 Dimensions

Dimensions in all of the following dimensional drawings are given in millimeters (mm).

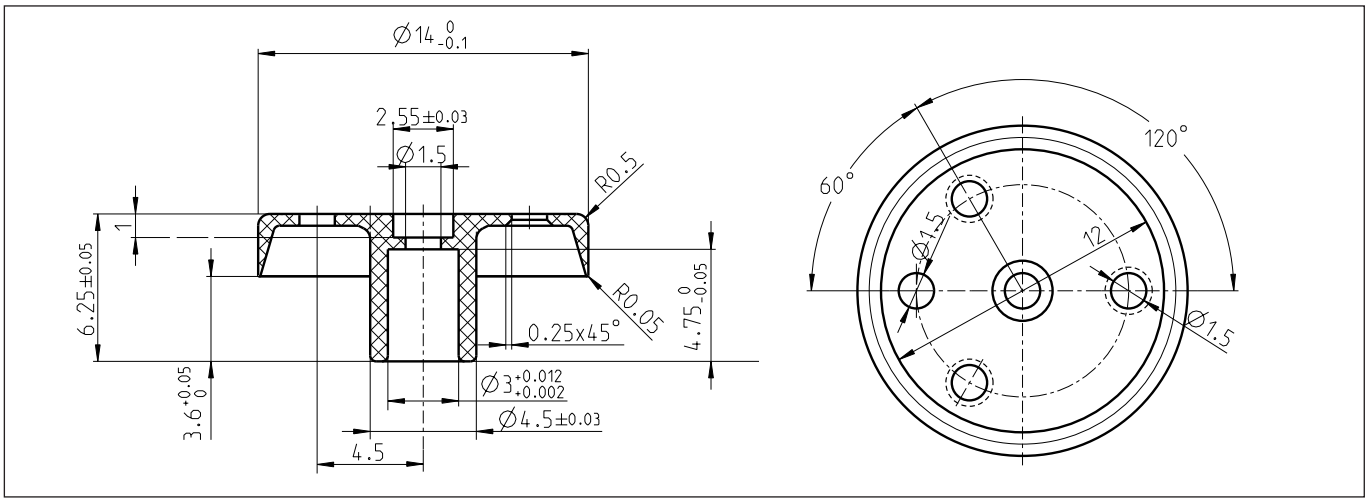
6.4.1 WMC weigh unit dimensional drawing (with draft shield)



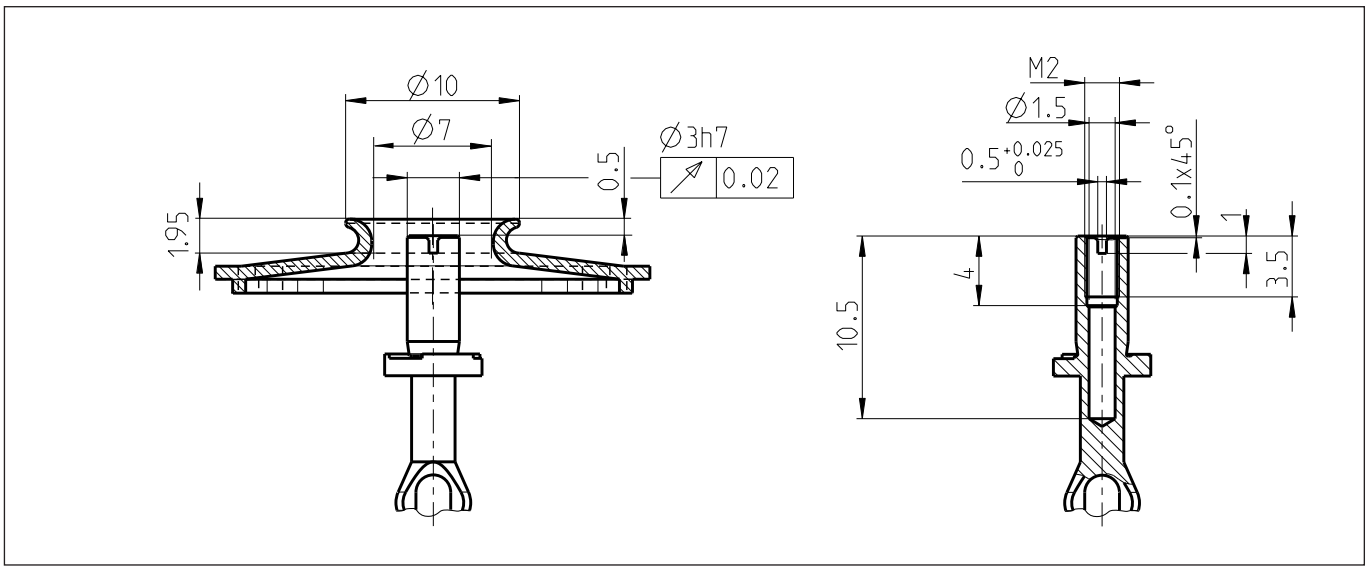
6.4.2 Standard weighing pan dimensional drawing



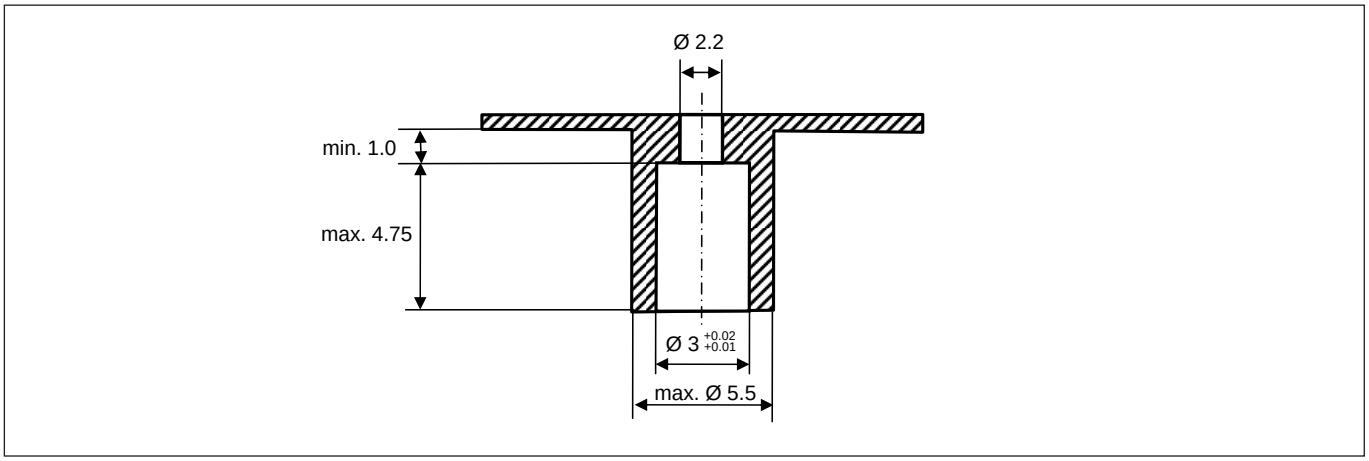
6.4.3 Weighing Pan Adapter Dimensional Drawing



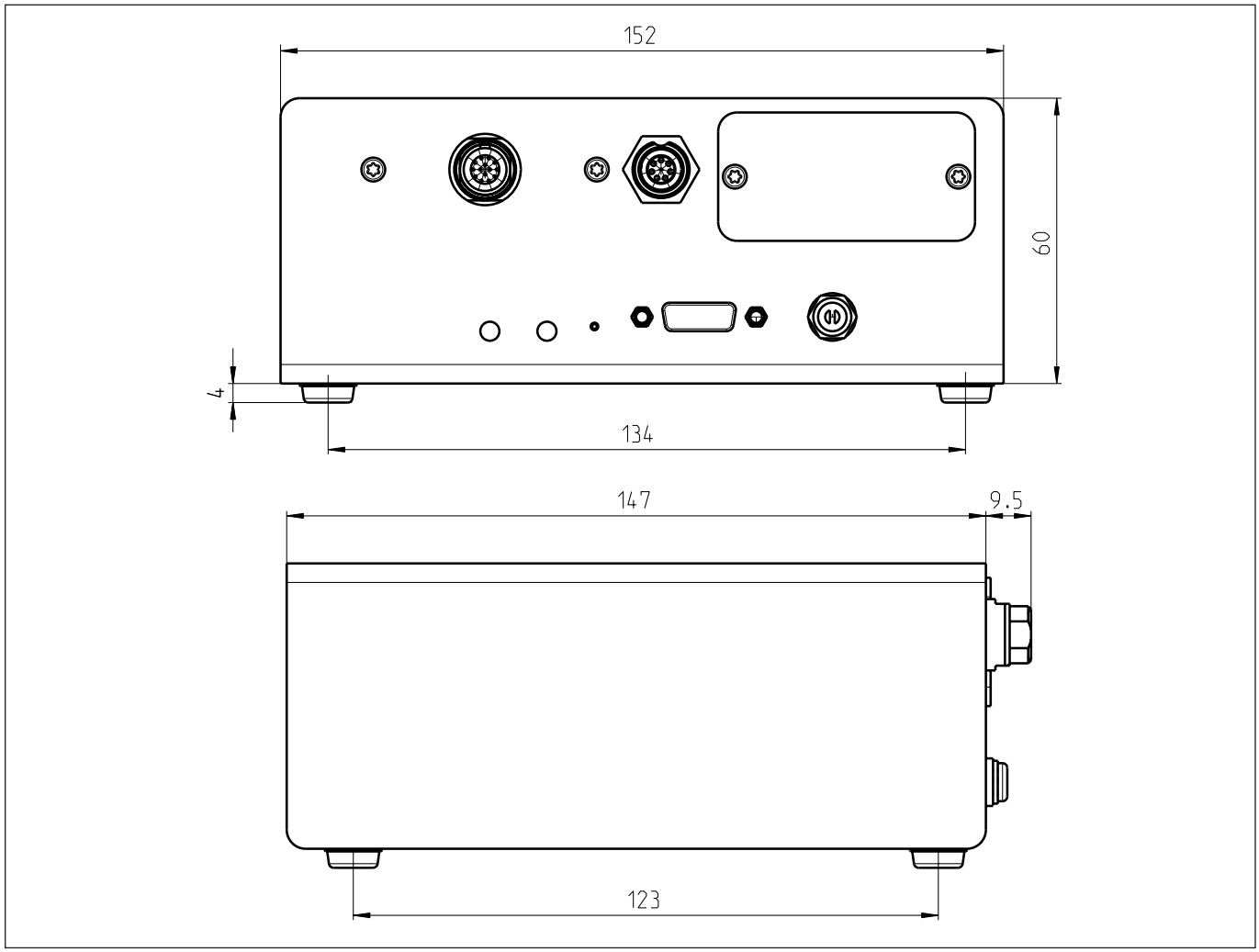
6.4.4 Weighing pan Support Dimensional Drawing



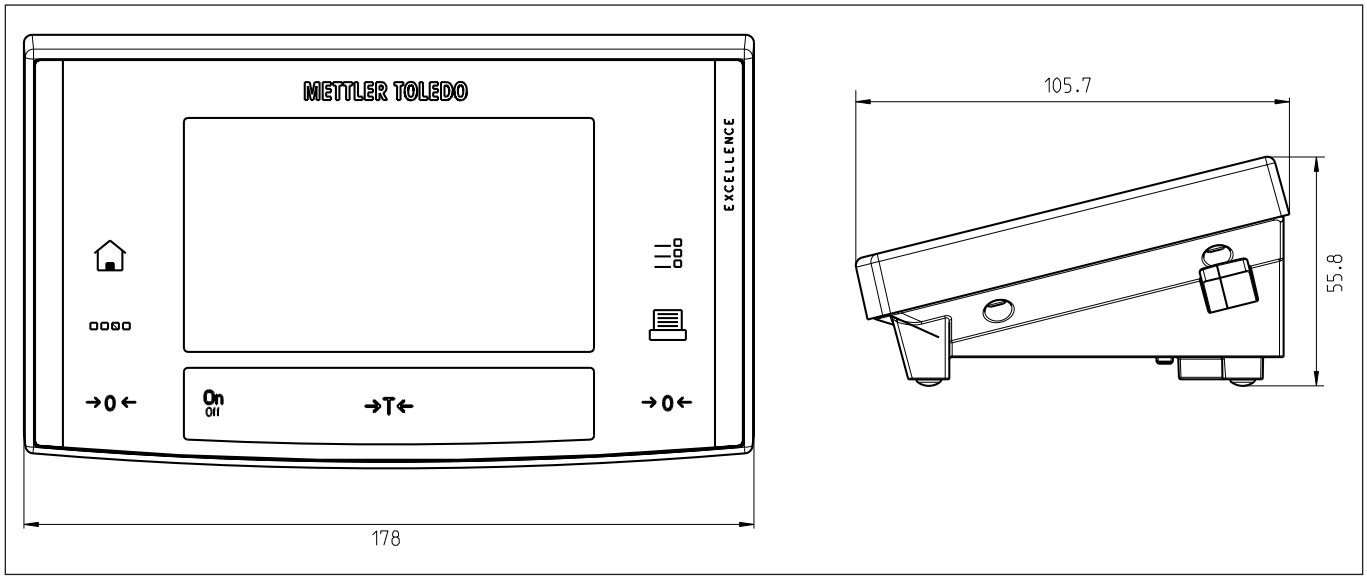
6.4.5 Custom Weighing pan Drawing (Limitations)



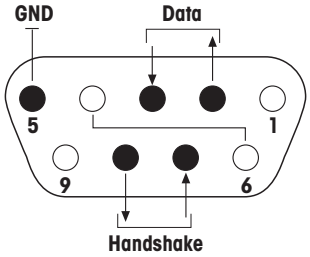
6.4.6 Electronic Unit Dimensional Drawing (including Mounting Bracket)



6.4.7 SWT Terminal Dimensional Drawing



6.5 RS232C Interface (Standard Interface) Specifications

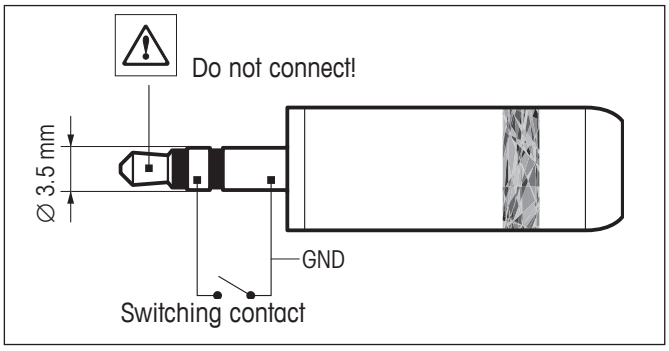
Interface type:	Voltage interface as per EIA RS-232C/DIN 66020 (CCITT V24/V.28)
Max. cable length:	15m
Signal level:	Outputs: +5V ... +15V (RL = 3 – 7kΩ) –5V ... –15V (RL = 3 – 7kΩ) Inputs: +3V ... 25V –3V ... 25V
Connection:	D-Sub 9-pin female
Operating mode:	Full-duplex
Transmission mode:	asynchronous serial bit
Transmission code:	ASCII
Baud rates:	600, 1200, 2400, 4800, **9600**, 19200, 38400[1)] (can be selected using interface commands)
Bits/parity:	7 Bit/Even, 7 Bit/Odd, 7 Bit/None, **8 Bit/None** (can be selected using interface commands)
Stop bits:	1 stop bit
Handshake:	None, **XON/XOFF**, RTS/CTS (can be selected using interface commands)
End of line:	**<CR><LF>**, <CR>, <LF> (can be selected using interface commands)
	Pin 2: Transmission line for scale (TxD) Pin 3: Receiving line for scale (RxD) Pin 5: Signal ground (GND) Pin 7: Ready to send (hardware handshake) (RTS) Pin 8: Ready to receive (hardware handshake) (RTS)

1) 38400 baud only possible with:

- Weigh module without terminal, or
- Weigh module with terminal, only via the optional RS232C interface.

6.6 Specification for Aux Connections

You can plug the "**ErgoSens**" from METTLER TOLEDO or an external optical sensing device into the Aux 1 and Aux 2 jacks. This allows you to perform functions such as taring, zeroing, printing, etc.



External wiring:

Connection:	3.5 mm stereo jack	
Electrical data:	Max. voltage	12 V
	Max. power	150 mA

6.7 Accessories and Spare Parts

6.7.1 Accessories

Terminals		
SWT Terminal (touchscreen, monochrome display), including 2 terminal cables (0.575 m and 2m long), including protective covering and documentation		11121057
Interface options (plug-in module) and accessories		
RS232C (second RS232C-interface)		11132500
LocalCAN: Connect up to 5 devices with LocalCAN connection		11132505
MiniMettler (backwards compatible with older METTLER TOLEDO devices) [1)]		11132510
PS/2: Connect commercial keyboards and barcode readers [1)]		11132520
BT (Bluetooth): For wireless control of up to 7 peripheral devices [1)]		11132530
BT (Bluetooth): Wireless connection to a BT-P42 printer, a second BT-BLD display or PC [1)]		11132535
Ethernet: For connecting to an Ethernet network		11132515
USB RS232C converter		11103691
Connecting cables		
Terminal-electronic unit connector cable, 6-pin	0.575m/1.9ft 0.945m/3.1ft 2m/6.5ft	11132124 11132129 11132133
Miscellaneous		
Terminal holder for SWT terminal, including mounting screws.		11121255
Mounting bracket for electronic unit, including DIN clip and mounting screws		11121254
CarePac® 20g F1 / 1g E2		11123006
OIML weight 20g E2, plastic box, incl. certificate		00158437
OIML weight 10g E2, plastic box, incl. certificate		00158427
Tweezers, bent tips, length 130 mm		11116540
Tweezers, straight tips, length 220 mm		11116544

[1)] Only with terminal

6.7.2 Spare Parts

Weigh units		
Weigh unit with mounted plastic cover (incll. 3 m cable with connector)	WMC25-OH WMC15-OH WMC24-OH	11149001 11149011 11149003
Electronic units		
Electronic unit (without power supply, power cord and mounting bracket)	WMC25-E WMC15-E WMC24-E	11149027 11149026 11149028
Weighing pans		
Standard weighing pan ø 15 mm (requires weighing pan adapter)		30005370
Weighing pan adapter ø 14 mm (plastic)		30005372
Miscellaneous		
12V Power supply (without country-specific power cable)		11107909
Protective covering for the SWT terminal		11106870
Plastic cover (cover for weighing pan support)		30005374
Standard draft shield		30005371

7 Appendix

7.1 Conversion Table for Weight Units

Kilogram	1 kg	=	1000.0	g	1 g	=	0.001 kg
Milligram	1 mg	=	0.001	g	1 g	=	1000.0 mg
Microgram	1 µg	=	0.000001	g	1 g	=	1000000.0 µg
Carat	1 ct	=	0.2	g	1 g	=	5.0 ct
Pound	0.45 kg	=	453.59237	g	1 g	≈	0.00220462262184878 lb
Ounce (avdp)	28.35 g	=	28.349523125	g	1 g	≈	1.000000 g
Ounce (troy)	1 ozt	=	31.1034768	g	1 g	≈	0.0321507465686280 ozt
Grain	1 GN	=	0.06479891	g	1 g	≈	15.432358 GN
Pennyweight	1 dwt	=	1.55517384	g	1 g	≈	0.643014931372560 dwt
Momme	1 mom	=	3.75	g	1 g	≈	0.266666666666667 mom
Mesghal	1 msg	≈	4.6083 g		1 g	≈	0.217 msg
Hongkong Tael	1 tlh	=	37.429	g	1 g	≈	0.0267172513291833 tlh
Singapore Tael (Malaysia)	1 tls	≈	37.799364 g		1 g	≈	0.0264554714621853 tls
Taiwanese Tael	1 tlt	=	37.5	g	1 g	≈	0.0266666666666667 tlt
Tola	1 tola	=	11.6638038	g	1 g	≈	0.0857353241830079 tola
Baht	1 baht	=	15.16	g	1 g	≈	0.0659630606860158 baht

7.2 Volume/Mass Conversion Table

Density: 1000 g/l (= water)

Volume	**Mass**
1 l	1000 g
1 ml	1 g
1 µl	1 mg
1 nanoliter	1 µg

7.3 SOP - Standard Operating Procedure

SOPs are a relatively small, but very important, part of a GLP review.

Real-world experience confirms that SOPs drafted inside the company are much more likely to be complied with than SOPs drafted by an anonymous external source.

This section contains a brief overview of the various responsibilities connected with SOPs and a checklist for drafting your own SOP.

Responsibilities related to SOPs

Testing Unit Manager	orders SOPs to be drafted approves SOPs with a date and signature
Testing Manager	ensures that SOPs are submitted approves SOPs on behalf of management
Personnel	follows SOPs and other guidelines
GLP quality assurance	reviews whether valid SOPs exist checks whether those SOPs are being followed checks whether changes are documented, and how they are documented

Checklist for SOP creation

Administrative requirements	**Yes**	**No**
1. Use of SOP forms		
2. Name of testing institution		
3. Date (SOP creation date)		
4. Filing ID (key plan) for SOPs		
5. Page numbering (1 of n)		
6. Title		
7. Effective date		
8. Change notice		
9. Naming of positions responsible for implementation		
10. Dates and signatures: a) Author b) Reviewer c) People authorized to release		
11. Distribution list		

Content of SOP	Yes	No
1. Introduction and objective		
2. Required material		
3. Description of work steps		
4. Description of documentation		
5. Data processing and analysis		
6. Documentation and samples to be archived, etc.		
7. Archiving note		

7.4 Updating Firmware

In the interest of its customers, METTLER TOLEDO continuously updates its internal software (firmware) for the WMC weigh modules. Inquire at your local METTLER TOLEDO office about upgrade and update options.

7.5 Glossary

Adaptive filter	A filter where damping depends on the development of the weight signal over time (cf. linear filter).
Adjustment	Sensitivity adjustment with the goal of getting as close to the ideal value as possible. On WMC weigh modules, the correction is made at two weight points – at the current zero and the value of the adjustment weight.
Available maximum capacity	Maximum load that the weigh module can manage to measure when the preload is included. Available maximum load = nominal maximum load minus preload.
Base load	The load that is necessary to use the full weighing range of the weigh module once it is switched on. Another name for dead load.
Calibration	An old term (no longer considered correct) for adjustment. The technically correct term for the determination of the deviation between the actual and measured value (see calibration factor)..
Calibration factor	A term frequently used for the adjustment factor (initial adjustment) The technically correct term for the factor by which a measured value must be multiplied to obtain the correct (actual) value.
Dead load	At METTLER TOLEDO, this term is usually used to denote the base load. In general usage, dead load may also be used to mean "preload" (including base load).
Display accuracy	Another term for resolution or readability.
Dynamic weight	A weight reading that has not met the stability criterion. A value like this is transmitted with a status of "**D**" (dynamic), as in "S **D** 12.01234 g" (cf. stable weight value).
Gross weight	Weight of an object including its tank, container, or packaging.
Handshake	Denotes the manner in which the recipient directs data transmission via an RS232 interface to avoid data overruns..
Hardware handshake	Data flow control with the aid of separate control lines whose status is controlled by the recipient. On WMC weigh modules, these are the "CTS" (clear to send) and "RTS" (request to send) lines.
Increment	Another name for readability.

Initial adjustment	During production of the weigh module, the built-in weight is compared to a traceable adjustment weight whose weight is known exactly using a software routine. The resulting adjustment factor is stored in the system's permanent memory. The adjustment factor is responsible for the accuracy of the adjustment using the built-in weight. Following an adjustment by the user, this new factor replaces the factory-defined adjsutment factor and will remain in use unless the weigh module settings are reset.
Initial calibration	The term used at METTLER TOLEDO for initial adjustment.
Linearity	Deviation of a given measured value (weight value) from the ideal straight-line function between zero load and maximum load.
Linear filter	A filter with a fixed, defined damping independent of how the weight is measured over time.
Long-term stability	Specifies sensitivity deviation after a defined period of time, such as after one year
Maximum load	Maximum weight that the weigh module can still barely measure (cf. overload).
Net weight	Weight of an object excluding its tank, container, or packaging. Net weight = gross weight minus tare weight (see gross weight, tare weight).
Overload	Load that exceeds the available maximum load for the corresponding weigh module. In the event of overload, the weigh module responds with a status of"+", as in "S +".
Preload	Load above and beyond the base load that is on the scale when the weigh module is switched on or zeroed (see also available maximum load).
Readability	Another term for resolution or display accuracy.
Repeatability (s)	A critical factor for the accuracy of weight measurement. The repeatability value corresponds to the statistical standard deviation "s." At METTLER TOLEDO, the standard deviation is calculated from ten consecutive measurements of the same weight under the same ambient conditions..
Reproducibility	Old term for repeatability. Technically correct term for the "accuracy" with which a measurement can be repeated after time has passed under similar ambient conditions..
Resolution	Another term for readability or display accuracy. At METTLER TOLEDO, resolution denotes the number of weight increments (points) that a weighing sensor (scale, weigh module) can differentiate. This figure is calculated by taking the maximum load and dividing it by readability. For example: WMC25: A maximum load of 20g and readability of 0.00001g yield 2'000'000 points of resolution.
Sensitivity	At METTLER TOLEDO, this denotes the relationship between the actual and measured (transmitted) weight value. Ideally, the sensitivity of a weighing sensor (scale, weigh module) is equal to one.
Sensitivity deviation	Deviation of sensitivity from the ideal value (=1) (see adjustment).
Sensitivity drift	Deviation of sensitivity due to changes in temperature and/or the passage of time (see long-term stability).
Software handshake	Data flow control achieved by transmitting a "stop" or "start" control signal from the recipient to the sender. As a rule, the signals are "Xoff" and "Xon."
Stabilization phase	Phase after placement or removal of a load during which the weight reading has not yet achieved stability.
Stabilization time	Time from the placement or removal of a load until the first stable weight value is reached.
Stable weight	A weight reading that has met the corresponding stability criterion. Such a value is transmitted with a status "S" (stable) (cf. dynamic weight value).
Startup zero	The zero point set when the weigh module is turned on; weighing values will reference this value until the "Zero" function is used to set a new zero point, or until the scale is tared..

System zero point	Zero point set during production at the factory for the weigh module. If the unit settings and current ambient conditions prevent the weigh module from meeting the stability criterion for zeroing when it is turned on, the system zero will become the current zero once a stability time-out has occurred. Because the system zero is usually somewhat higher than the base load, the current weight value in this case will actually be a negative number rather than zero. You must zero with stability before you can get correct weighing results or use the adjustment and test functions.
Tare memory	Weight value memory that is overwritten each time the tare function is activated and cleared at each zeroing.
Tare weight	Weight of the tank, container, or packaging. The weight on the weigh module relative to the current zero will be considered the tare weight and stored in the tare memory.
Timeout	The period of time during which the weighing value must meet the corresponding stability criterion. If current settings and ambient conditions make this impossible, the command is cancelled and the weigh module responds with the status "I" (**I**mpossible = the command cannot be executed right now), e.g., "S I." ".
Underload	Load the is less than the base load. If the load falls below this limit, such as when the weighing platter is missing, the weigh module will respond with a status of "–", as in "Z –".
Weighing period, weighing time	The time that elapses between the placement or removal of a weight (weight change) until a result is recorded, usually a stable weight value.
Weighing range	Range where the weight to be measured must fall so that the weigh module can record it. Range between zero and maximum load.
Zero drift	Deviation of the zero point from a true zero value (0.000 g) due to temperature changes or the passage of time.

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GWP® – Good Weighing Practice™

The global weighing guideline GWP® reduces risks associated with your weighing processes and helps to

- choose the appropriate balance
- reduce costs by optimizing testing procedures
- comply with the most common reulatory requirements

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