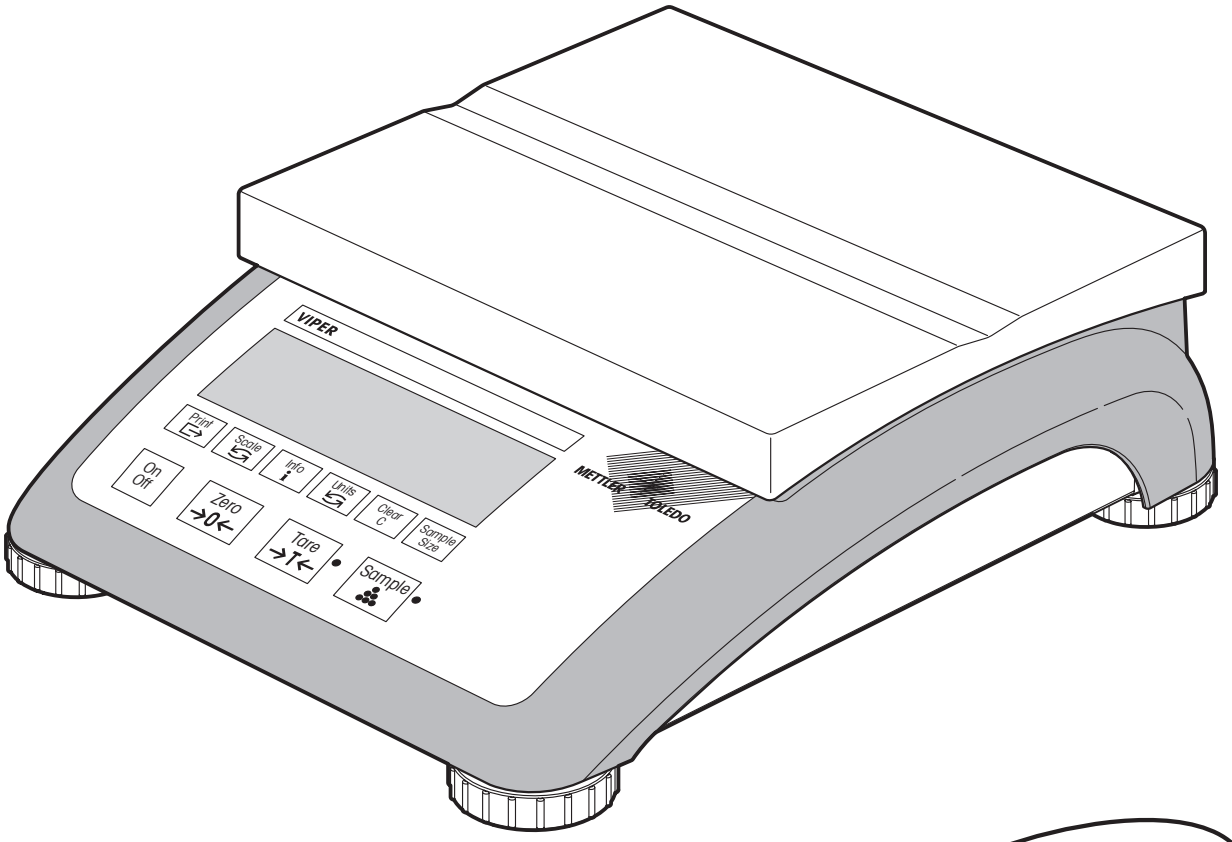
METTLER TOLEDO

Service Manual

METTLER TOLEDO
Viper M, L and D Scales



VIPER
The culture of precision

Section 1

General

Contents **Page**

1 How to use this service manual

1.1 General

This service manual contains instructions for the repair and maintenance work to be performed by service engineers.

It is assumed that the reader is familiar with the operation of the scale and can refer to the relevant operating instructions when necessary.

1.2 Layout of the service manual for Viper M, L and D scales

This manual comprises seven main sections:

- **General**: Section 1gives instructions on using the service manual, and also provides an overview of the Viper scales covered by it.
- **Viper with small platform**: Section 2 contains the exploded view drawings and spare parts lists for Viper scales with the small platform.
- **Viper with large platform**: Section 3 contains the exploded view drawings and spare parts lists for Viper scales with the large platform.
- **Replacing components**: Section 4 describes all repair work and the replacement of components for Viper scales with large and small platforms.
- **Technician setup**: Section 5 describes how to enter scale data, calibrate the scale and use the diagnostic functions.
- **Miscellaneous information**: Section 6 contains technical information on the Viper product group, plus an overview of all weighing cells and preloads and a table of geographical adjustment values.
- **Software**: Section 7 contains information on the various software versions. It also describes typical error messages that can appear following service work and provides troubleshooting instructions.

1.3 Working with the service manual

The section number and title are printed in the header of every page in the service manual. Each footer shows the order number for the manual, the date issued and the page number.

The pages are numbered in the footer. First comes the section number, then a hyphen followed by the page number, starting with 1 in every section.

The exploded view drawings are provided as a guide for disassembly and assembly work and for identifying the order numbers for spare parts.

When ordering spare parts, please use the information given in the spare parts lists. The item numbers in the first column correspond to those on the exploded view drawing opposite.

2 Service concept

The scales have been designed so that defective components can be replaced with just a few simple tools. The LC-PT45 printer for service is not required, as almost all parameters can be configured with the keyboard of the scale (in special cases temperature compensation data of the MonoBloc weighing cell may need to be entered using a computer).
As you can see, we have kept it simple for efficient servicing.

3 Introducing the Viper product group

The Viper product group comprises the following models, which are all covered by this manual:

Viper M scales

Viper M scales possess basic weighing functions for simple weighing duties.

Viper L scales

In addition to basic weighing functions, Viper L counting scales also have built-in functions for piece counting. An extended keypad and a display with a visual weighing-in aid are available in order to use these additional functions.

Viper D scales

Viper D scales are counting scales providing an additional numeric keypad and ID functions.

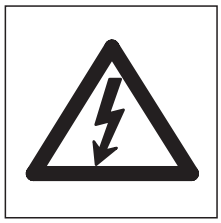
Common features

Apart from the differences with regard to functions and operating and display elements, all models in the Viper product group have the following common features:

- Depending on the weighing range, some models are only available with the small platform, some only with the large platform and some with both. The essential difference between the two platform sizes is in their external dimensions and the type of weighing cell used.
- All models are designed either for direct connection to the AC power line or contain a built-in rechargeable battery. Rechargeable battery scales are connected to the AC power line via an AC adapter.
- All models are certifiable.
- The weighing cells are either of the strain gauge or MonoBloc type.

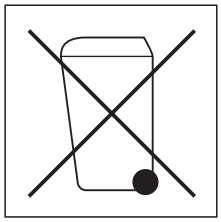
4 Safety and environmental protection

When carrying out service or repair work, always observe the following:



- Before opening the scale, isolate it from the AC power line (pull out the plug).

- The scales contain precision electronic components that are sensitive to **electrostatic discharge**. We recommend that you wear a grounding wrist strap when doing any work in the interior of the scale, in order to prevent any electrostatic charge building up. Grounding wrist straps are commercially available from electronic component suppliers.



- Some models in the Viper product group have a built-in rechargeable battery. This contains heavy metals which could be hazardous to the environment. The battery is therefore classified as a hazardous waste, which must not be disposed of as normal domestic refuse. Please ensure that used batteries are disposed of correctly in accordance with the relevant local regulations.

Section 2

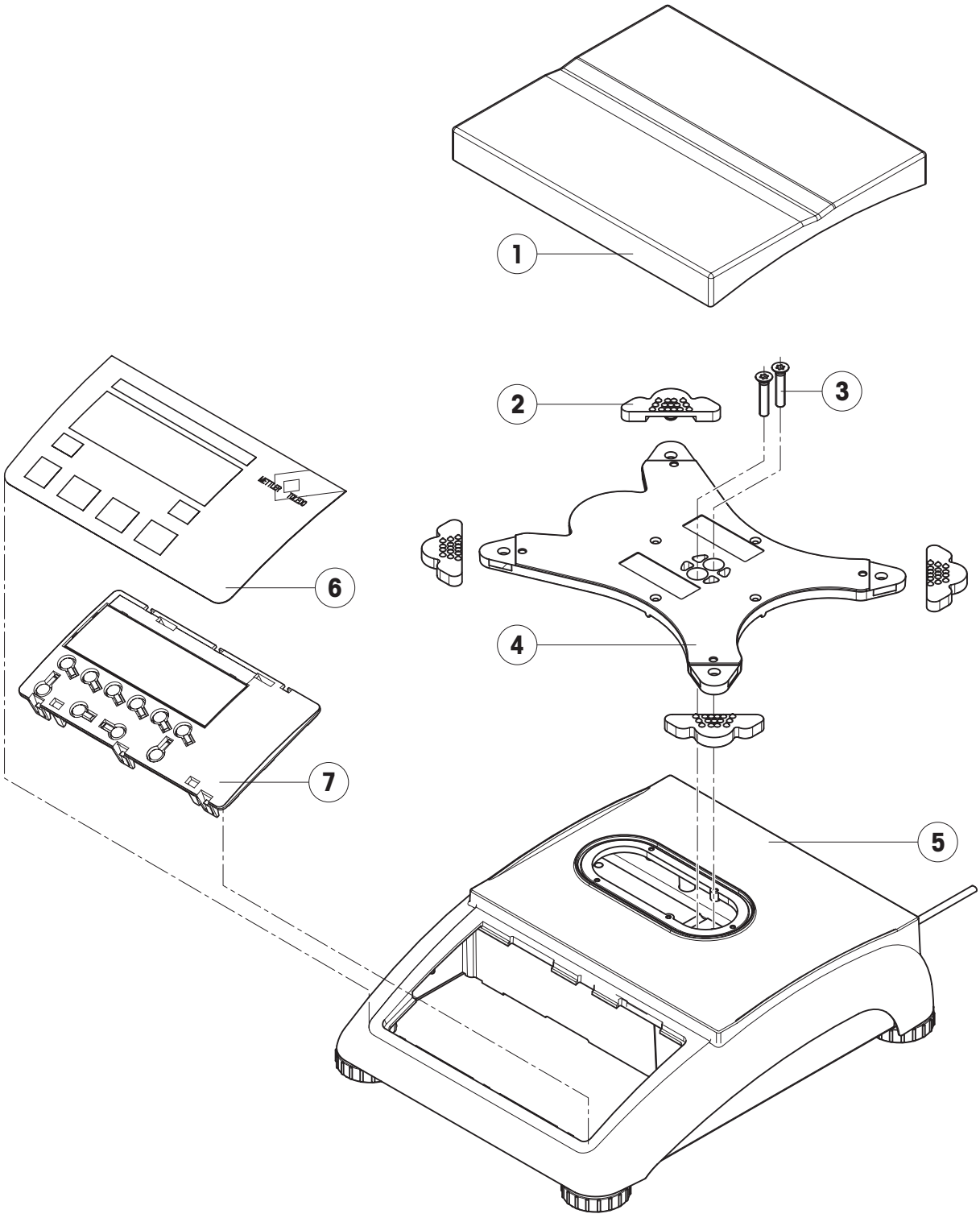
Viper with small platform

Contents **Page**

Replacing components: see Section 4

1 Scales

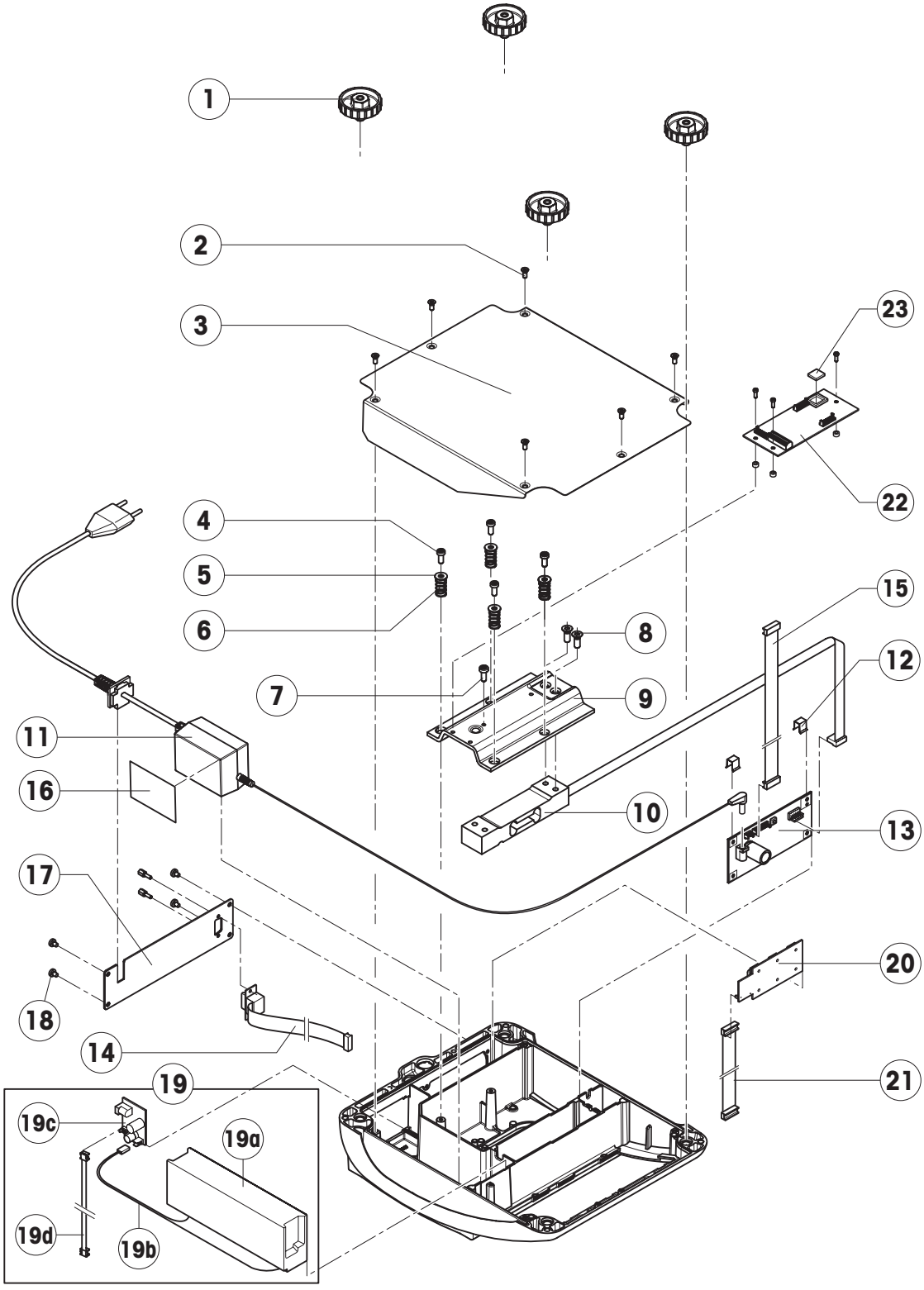
1.1 Scales with strain gauge weighing cells



Item	Quantity	Description	Order No.
1	1	weighing pan 7.9" x 9.5" (200 x 240 mm)	21203071
2	4	rubber cushions	21203073
3	2	countersunk Torx screw M6 x 30	*
4	1	pan support plate 7.9" x 9.5" (200 x 240 mm)	–
5	1	housing, VIPER with small platform	–
6	1	keypad overlay	Chapter 2
7	1	mounting plate and display unit (digital PCB with LCD and back-light unit)	Chapter 2

* included in the fasteners set (chapter 3)

Scales with strain gauge weighing cells (continued)

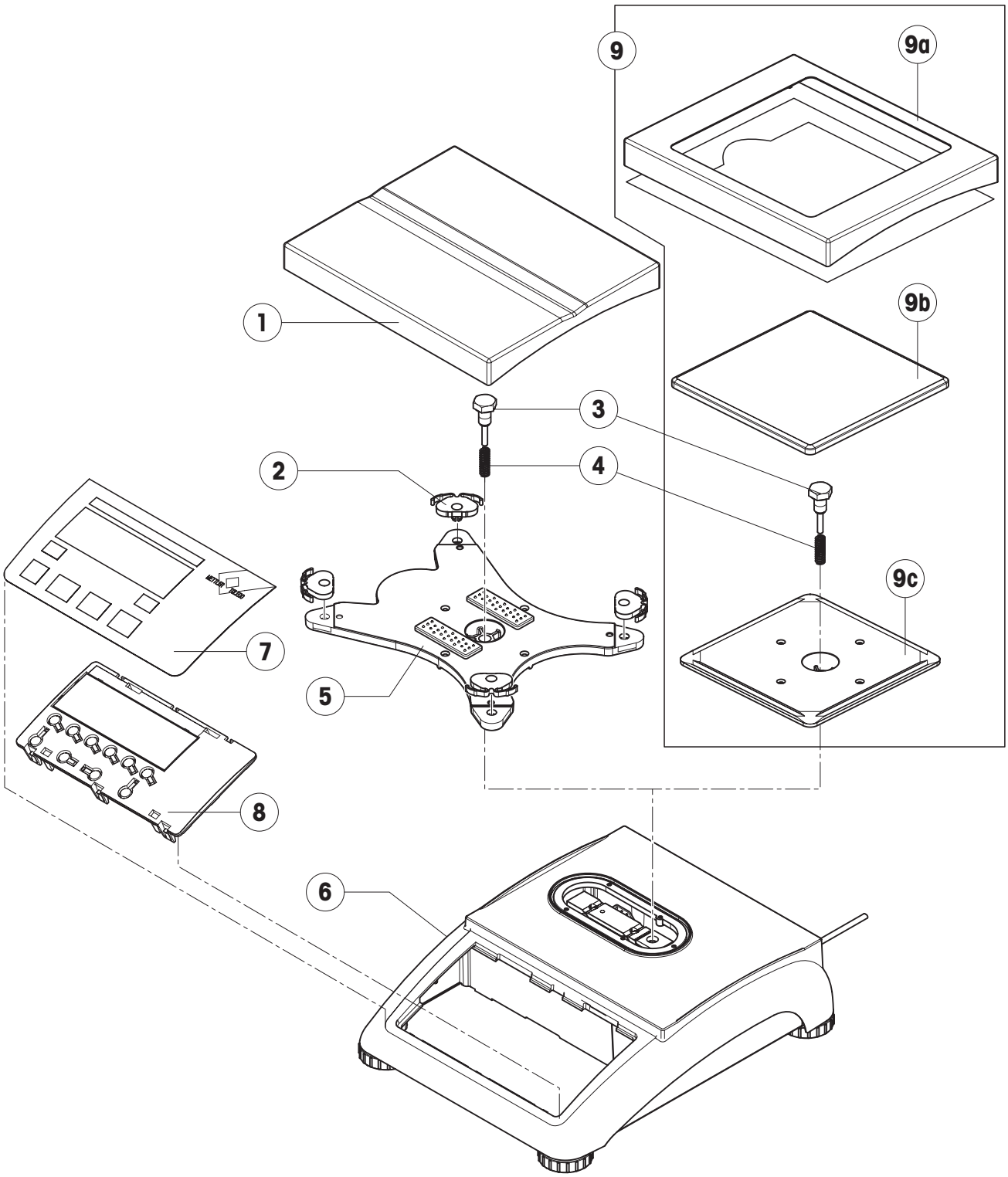


Item	Quantity	Description	Order No.
1	4	adjustable foot ∅ 1.7" (44 mm)/ M10 x 0.75 mm	21203109
2	6	countersunk Torx screw M4 x 10	*
3	1	bottom plate for small platform model	–
4	4	button head Torx screw M4 x 12	*
5	4	wide flange washer 4.3 x 20	*
6	4	overload spring	**
7	1	overload stop adjustment screw (with certain production series only)	**
8	2	countersunk Torx screw M6 x 16	*
9	1	overload plate for small platform model	–
10	1	**weighing cell with cable** (certifiable):	
		C5MRS, weighing range 7.5 lb (3 kg)	21203143
		C10MRS, weighing range 12 lb (6 kg)	21203144
		C20MRS, weighing range 24 lb (12 kg)	21203145
11	1	bench AC adapter US version (always order together with item 16):	21203122
12	2	spring clip	*
13	1	VIPER AN DMS 7k analog PCB	21203092
14	1	RS cable 18.1" (460 mm)	21203168
15	1	A/D cable 4.3" (110 mm) for small platform model	21203164
16	1	adhesive patch for AC adapter or battery	21203184
17	1	RS blanking plate (various types, depending on the equipment of the scale)	–
18	4	button head Torx screw M4 x 6	*
19		**For scales with AccuPac only**:	
19a	1	accu 12V/2,2Ah (always order together with item 16)	21203232
19b	1	battery connection cable	21203233
19c	1	charging circuit print (with fuse T2A/250V, order No. 0089385)	21203105
19d	1	battery cable (charging PCB – analog PCB)	21203231
20	1	PCB RS option (2 x RS232C)	21203476
21	1	connection cable RS option	21203490
22	1	PCB optional analog interface	21203383
23	1	EPROM with interface software (for optional analog interface)	21203715

* included in the fasteners set (chapter 3)

** see section 4 "Replacing the weighing cell"

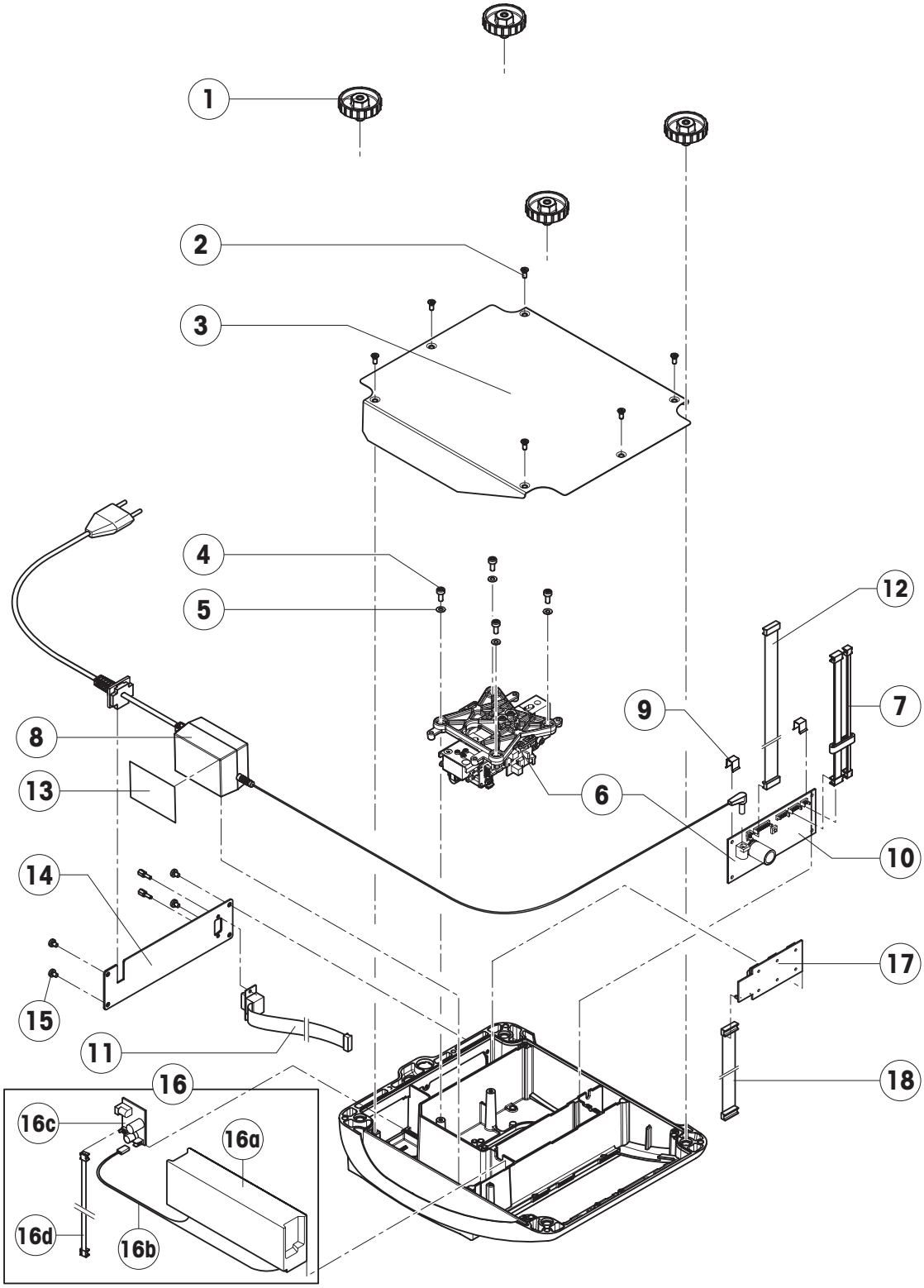
1.2 Scales with MonoBloc weighing cells



Item	Quantity	Description	Order No.
1	1	weighing pan 7.9" x 9.5" (200 x 240 mm) for 12 lb scale (6 kg)	21203071
2	4	pan mount (rubber cushion)	21203238
3	1	hexagon screw for load plate support	–
4	1	fastener spring	–
5	1	load plate support 7.9" x 9.5" (200 x 240 mm)	–
6	1	housing VIPER with small platform	–
7	1	keypad overlay	Chapter 2
8	1	mounting plate and display unit (digital PCB and display compl.)	Chapter 2
9		**For 7.5 lb (3 kg) model only**:	
9a	1	draft shield and screen	21203849
9b	1	weighing pan 6.5" x 6.5" (165 x 165 mm)	225158
9c	1	load plate support 16.5" x 6.5" (165 x 165 mm)	–

* included in the fasteners set (chapter 3)

Scales with MonoBloc weighing cells (continued)

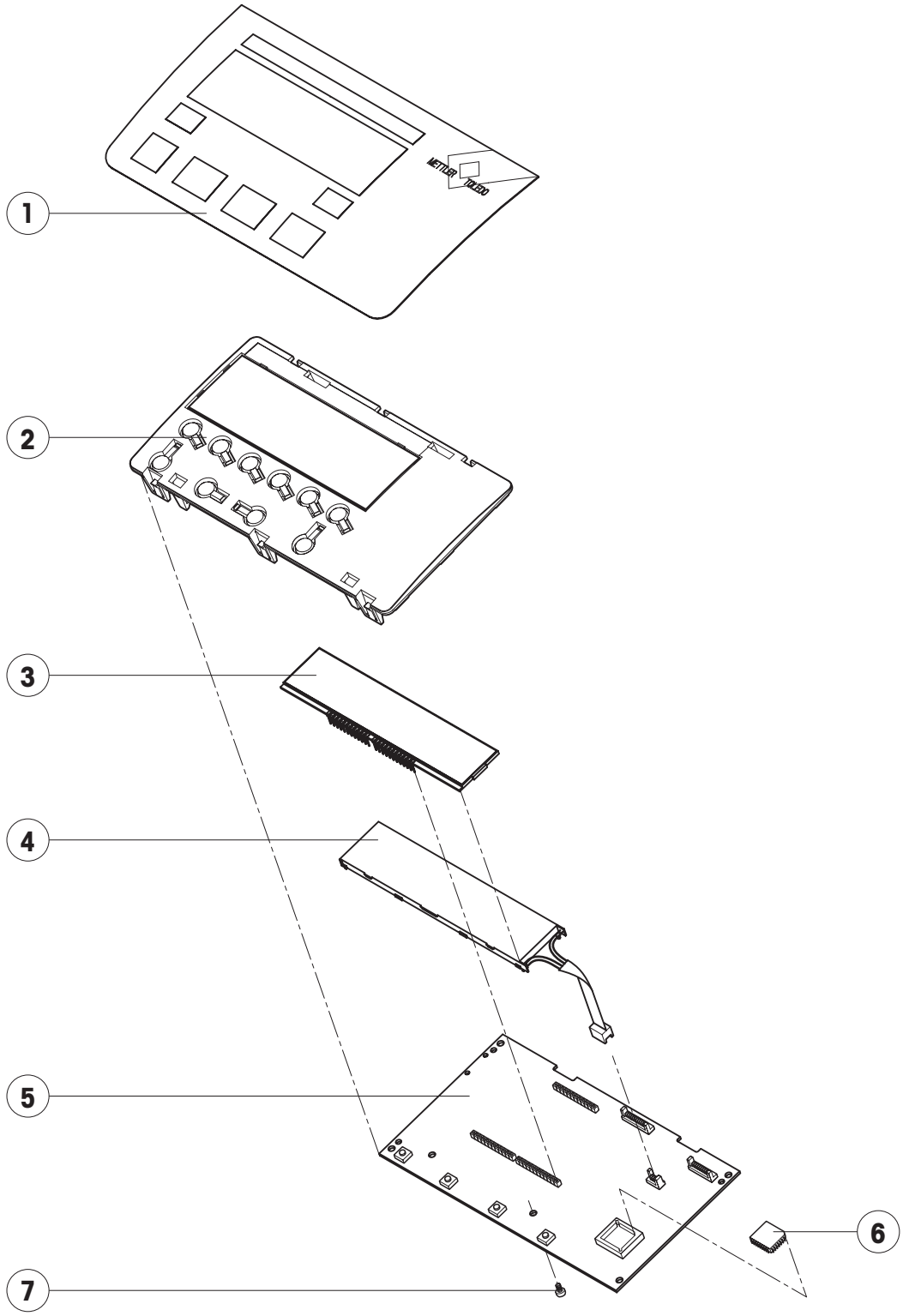


Item	Quantity	Description	Order No.
1	4	adjustable foot ∅ 1.7" (44 mm)/ M10 x 0.75 mm	21203109
2	6	countersunk Torx screw M4 x 10	*
3	1	bottom plate for small platform model	–
4	4	cylinder head Torx screw M4 x 12	*
5	4	flange washer 4.3 x 9	–
6	1	**weighing modules** (load cell and analog PCB):	
		weighing module 3002 for 7.5 lb scale (3 kg)	11102685
		weighing module 6001 for 12 lb scale (6 kg)	11102686
7	1	cell cable MB SM with ferrite ring	21203289
8	1	bench AC adapter US version (always order together with item 13)	21203122
9	2	spring clip	*
10	1	VIPER AN MonoBloc analog PCB	21203100
11	1	RS cable 18.1" (460 mm)	21203168
12	1	A/D cable 4.3" (110 mm), for small platform model	21203164
13	1	adhesive strip for AC adapter or battery	21203184
14	1	RS connector plate (various types, depending on equipment of scale)	–
15	4	cylinder head Torx screw M4 x 6	*
16		**For scales with AccuPac only**:	
16a	1	accu 12V/2,2Ah (always order together with item 13)	21203232
16b	1	battery connection cable	21203233
16c	1	print charging circuit (with fuse T2A/250V, order No. 0089385)	21203105
16d	1	battery cable (charging PCB – analog PCB)	21203231
17	1	PCB RS option (2 x RS232C)	21203476
18	1	connection cable RS option	21203490

* included in the fasteners set (chapter 3)

2 Display units

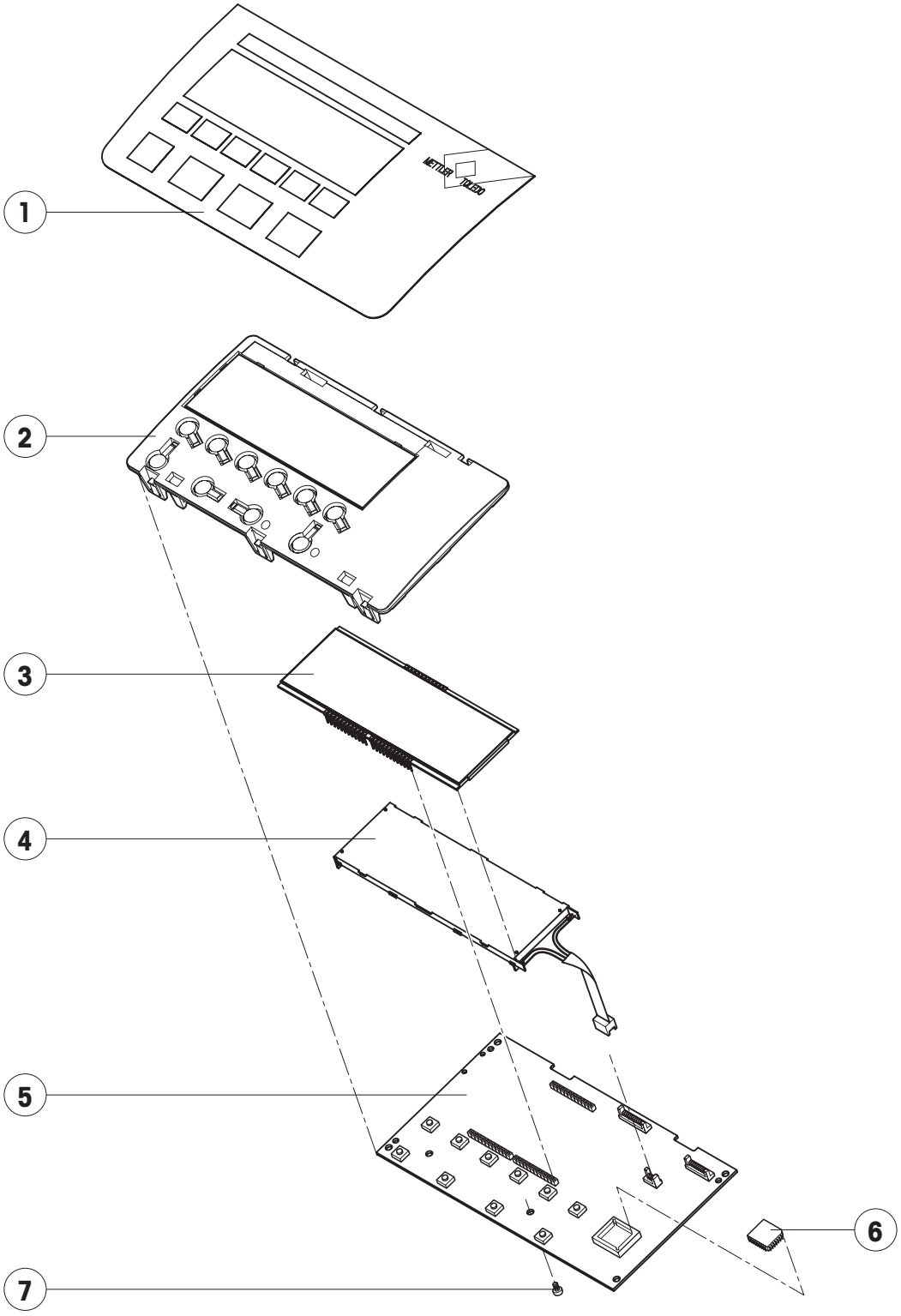
2.1 Viper M display unit



Item	Quantity	Description	Order No.
1	1	keypad overlay for Viper M small platform model	21203440
2	1	display mounting plate for Viper M (always order together with item 1)	21203120
3	1	LCD for Viper M	21203134
4	1	back-light unit for Viper M	21203136
5	1	VIPER DIG M digital PCB	21203098
6	1	**EPROM with scale program**:	
		EPROM for Viper M scales with strain gauge weighing cell	21203583
		EPROM for Viper M scales with MonoBloc weighing cell	21203584
7	1	retaining screw	*

* included in the fasteners set (chapter 3)

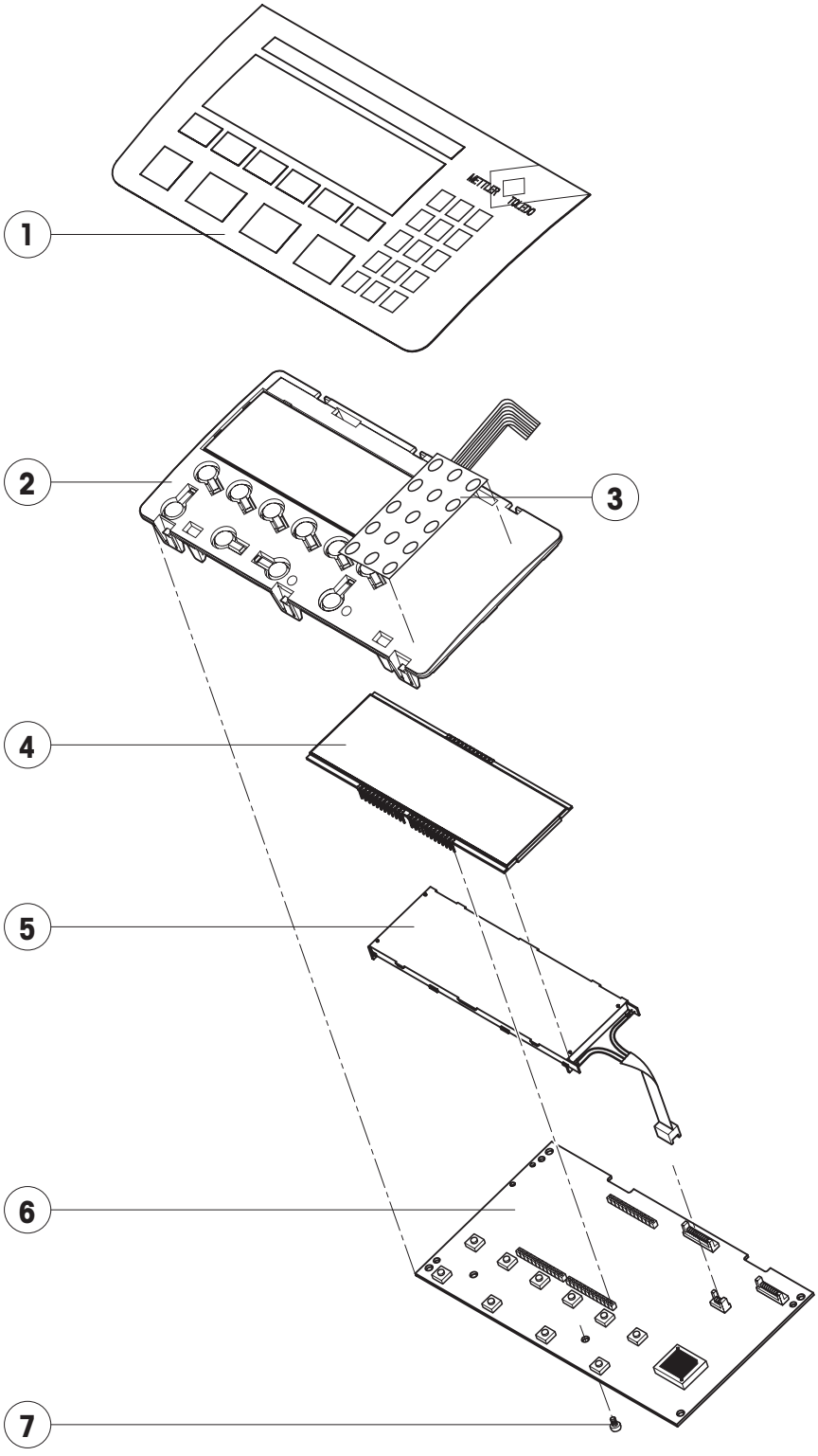
2.2 Viper L display unit



Item	Quantity	Description	Order No.
1	1	keypad overlay for Viper L small platform model	21203441
2	1	display mounting plate for Viper L (always order together with item 1)	21203491
3	1	LCD for Viper L	21203135
4	1	back-light unit for Viper L/D	21203137
5	1	VIPER DIG L digital PCB	21203097
6	1	**EPROM with scale program**:	
		EPROM for Viper L scales with strain gauge weighing cell	21203588
		EPROM for Viper L scales with MonoBloc weighing cell	21203587
7	1	retaining screw	*

* included in the fasteners set (chapter 3)

2.3 Viper D display unit



Item	Quantity	Description	Order No.
1	1	keypad overlay for Viper D small platform model	21203442
2	1	display mounting plate for Viper D (always order together with items 1 and 3)	21203448
3	1	pressure sensitive membrane for numeric keypad (15 keys) [1)]	21203439
4	1	LCD for Viper D	21203687
5	1	back-light unit for Viper L/D	21203137
6	1	VIPER DIG D digital PCB with FLASH Memory chip (soldered)	
7	1	retaining screw	*

* included in the fasteners set (chapter 3)

[1)] always order together with item 1.

3 Fasteners set

The fasteners set comprises all the standard components (screws and washers) required for service work on Viper scales with large and small platforms, plus the spring clips that hold the analog PCB in place.

Quantity	Description	Order No.
1	**fasteners set**:	21203404
20	countersunk Torx screw M3 x 8	–
20	countersunk Torx screw M3 x 10	–
20	countersunk Torx screw M6 x 30	–
50	countersunk Torx screw M4 x 10	–
20	button head Torx screw M3 x 6	–
30	button head Torx screw M4 x 12	–
30	button head Torx screw M5 x 12	–
20	wide flange washer 4.3 x 20	–
20	wide flange washer 5.3 x 20	–
20	countersunk Torx screw M6 x 16	–
20	spring clip	–
50	pan head Torx screw M4 x 6	–

Section 3

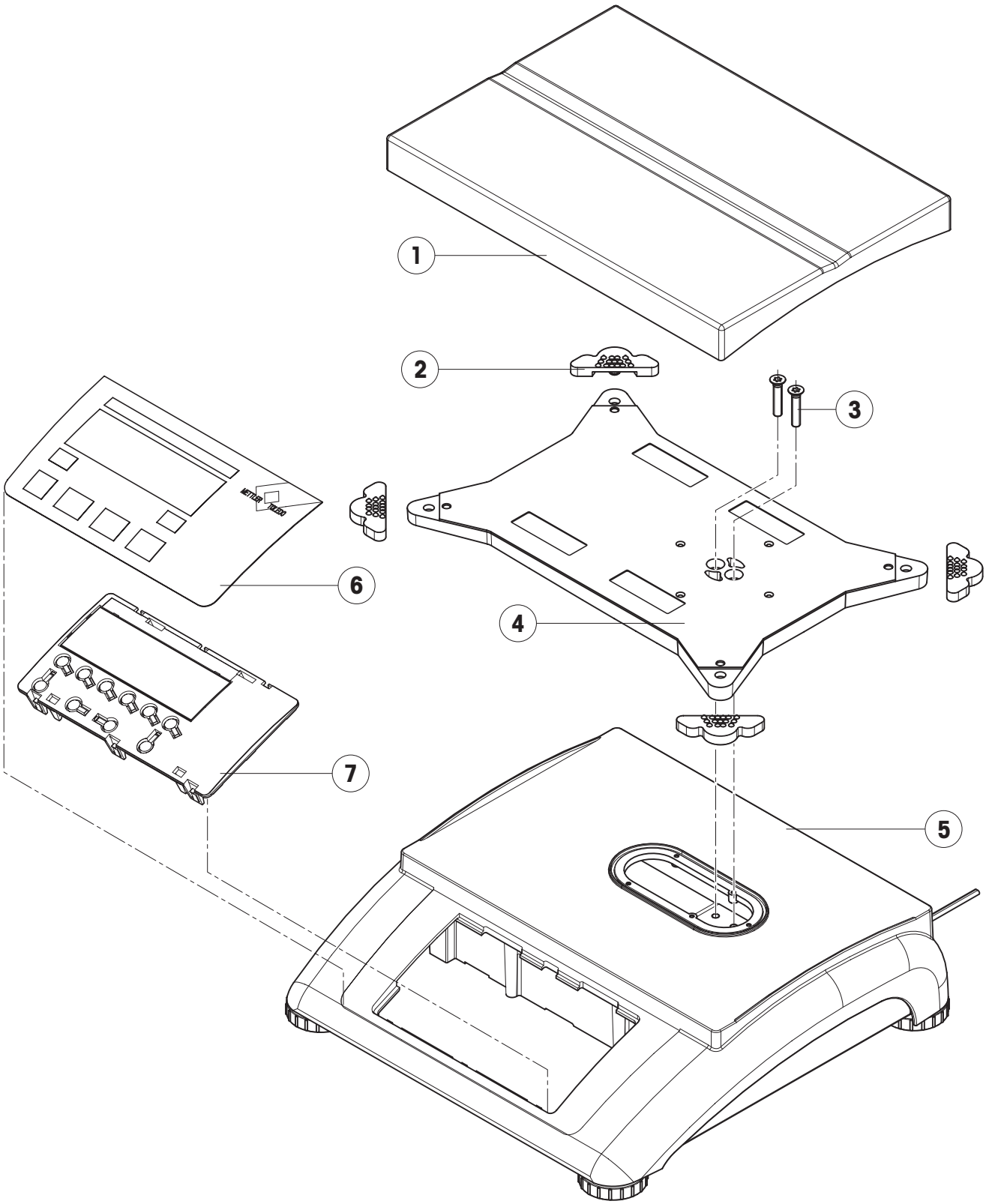
Viper with large platform

Contents **Page**

Replacing components: see Section 4

1 Scales

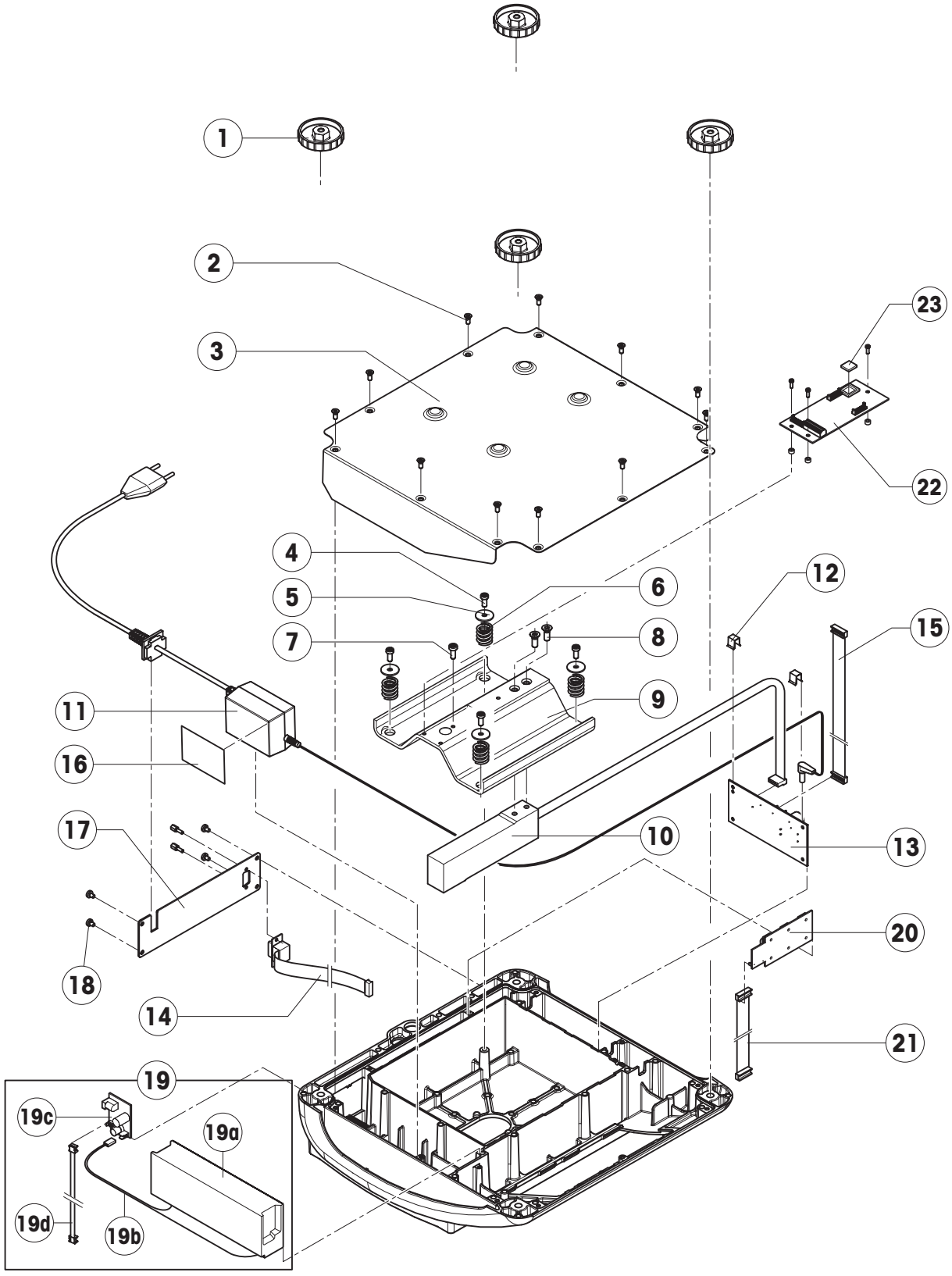
1.1 Scales with strain gauge weighing cells



Item	Quantity	Description	Order No.
1	1	weighing pan 9.5" x 13.8" (240 x 350 mm)	21203072
2	4	rubber cushions	21203073
3	2	countersunk Torx screw M6 x 30	*
4	1	pan support plate 9.5" x 13.8" (240 x 350 mm)	–
5	1	housing, VIPER with large platform	–
6	1	keypad overlay	Subsection 2
7	1	mounting plate and display unit (digital PCB with LCD and back-light unit)	Subsection 2

* included in the fasteners set (chapter 3)

Scales with strain gauge weighing cells (continued)

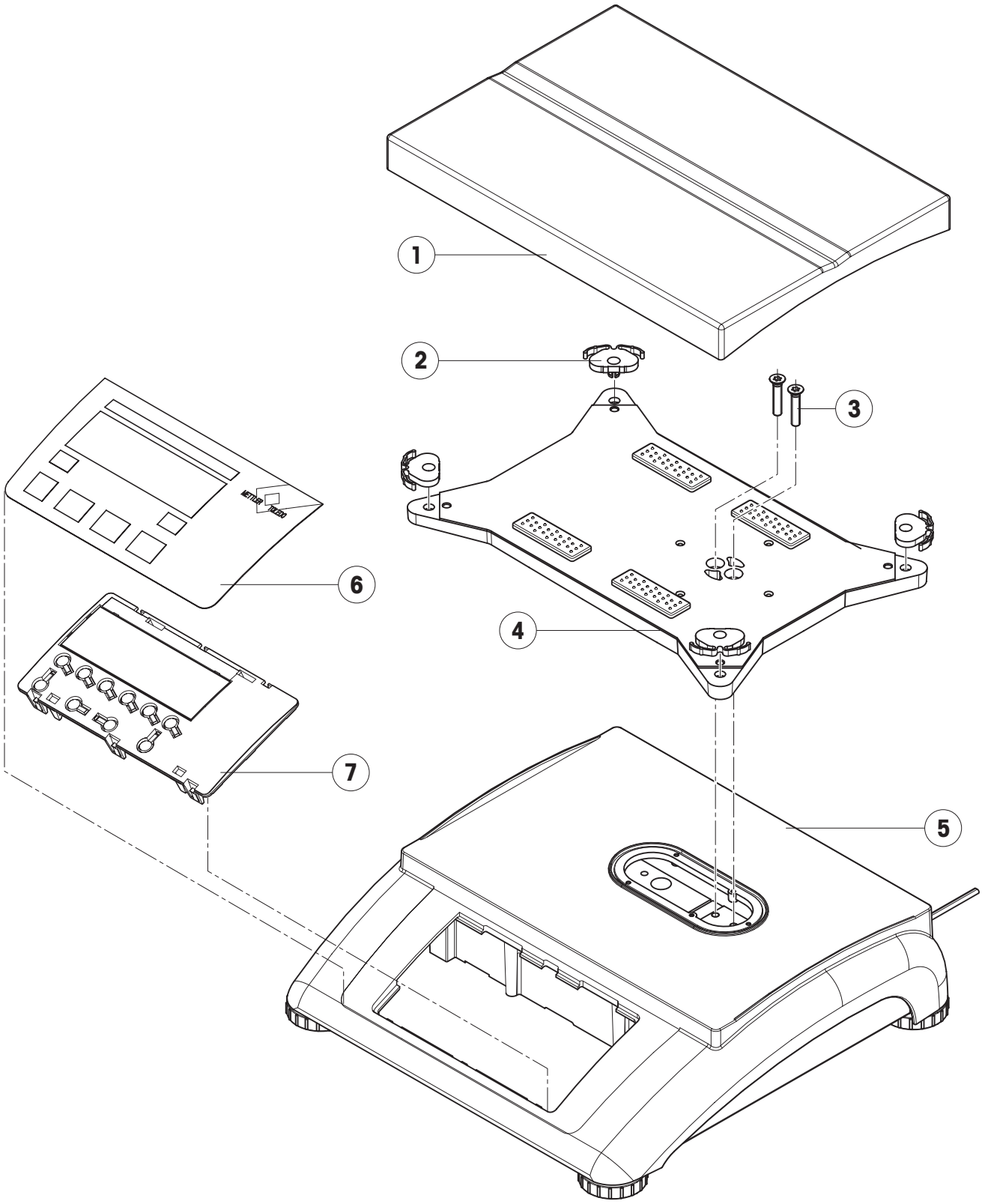


Item	Quantity	Description	Order No.
1	4	adjustable foot ∅ 2.2" (55 mm)/M10 x 0.75 mm	21203110
2	11	countersunk Torx screw M4 x 10	*
3	1	bottom plate for large platform model	–
4	4	button head Torx screw M5 x 12	*
5	4	wide flange washer 5.3 x 20	*
6	4	overload spring	**
7	1	overload stop adjustment screw (with specific production series only)	**
8	2	countersunk Torx screw M6 x 16	*
9	1	overload plate for large platform model	–
10	1	**weighing cell with cable** (certifiable):	
		C20MRL, weighing range 24 lb (12 kg)	21203151
		C50MRL, weighing range 75 lb (30 kg)	21203152
		C100MRL, weighing range 120 lb (60 kg)	21203153
11	1	bench AC adapter USA version (always order together with item 16)	21203122
12	2	spring clip	*
13	1	VIPER AN DMS 7k analog PCB	21203092
14	1	RS cable 18.1" (460 mm)	21203168
15	1	A/D cable 11.8" (300 mm) for large platform model	21203167
16	1	adhesive patch for AC adapter or battery	21203184
17	1	RS blanking plate (various types, depending on equipment of scale)	–
18	4	button head Torx screw M4 x 6	*
19		**For scales with with AccuPac only**:	
19a	1	accu 12V/2,2Ah (always order together with item 16)	21203232
19b	1	battery connection cable	21203233
19c	1	charging circuit print (with fuse T2A/250V, order No. 0089385)	21203105
19d	1	battery cable (charging PCB – analog PCB)	21203231
20	1	PCB RS option (2 x RS232C)	21203476
21	1	connection cable RS option	21203490
22	1	PCB optional analog interface	21203383
23	1	EPROM with interface software (for optional analog interface)	21203715

* included in the fasteners set (chapter 3)

** see section 4 "Replacing the weighing cell"

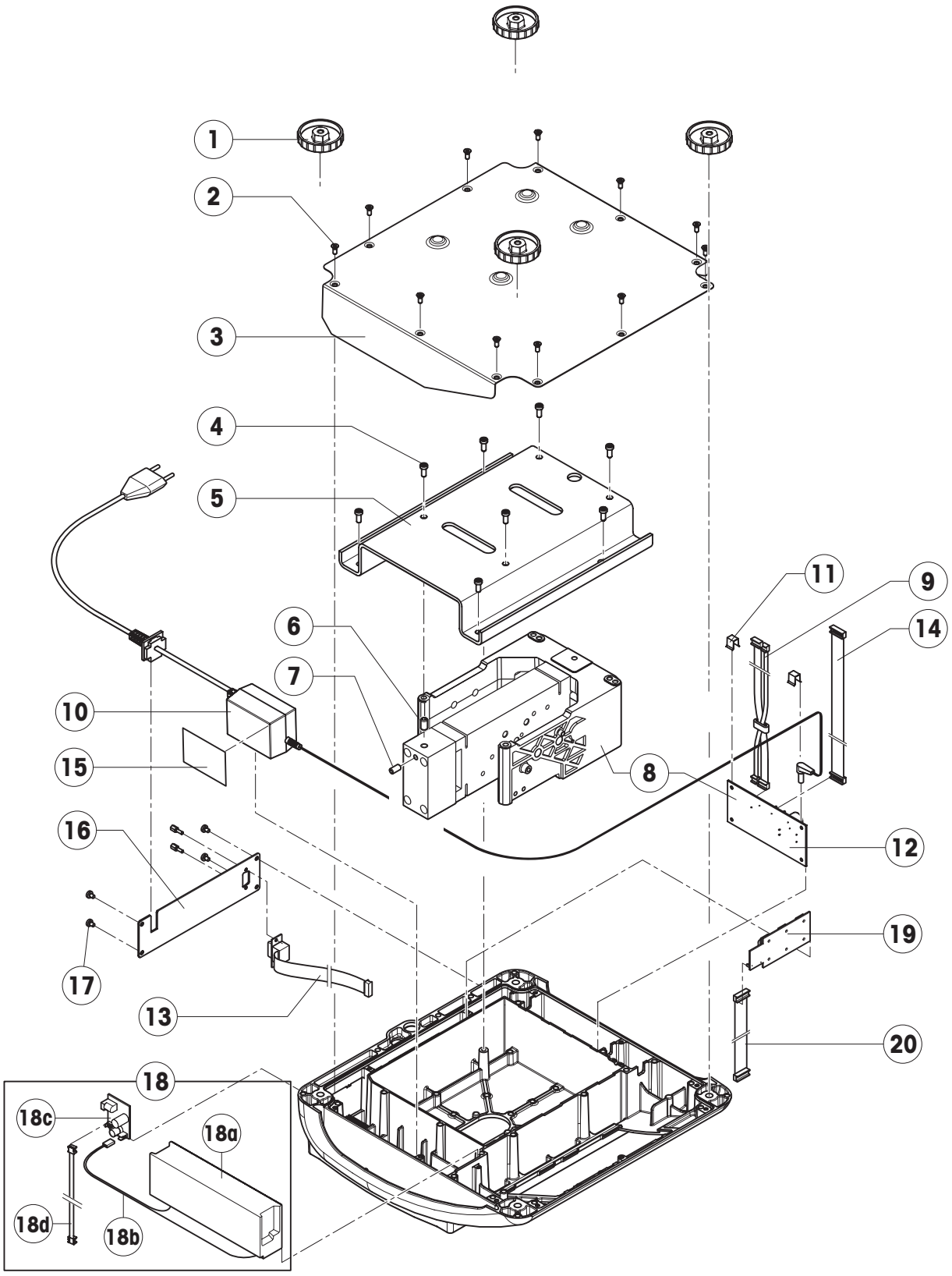
1.2 Scales with MonoBloc weighing cells



Item	Quantity	Description	Order No.
1	1	weighing pan 9.5" x 13.8" (240 x 350 mm)	21203072
2	4	pan mount (rubber cushion)	21203238
3	2	countersunk screw M6 x 30	*
4	1	load plate support 9.5" x 13.8" (240 x 350 mm)	–
5	1	housing VIPER with large platform	–
6	1	keypad overlay	Chapter 2
7	1	mounting plate and display unit (digital PCB and display compl.)	Chapter 2

* included in the fasteners set (chapter 3)

Scales with MonoBloc weighing cells (continued)

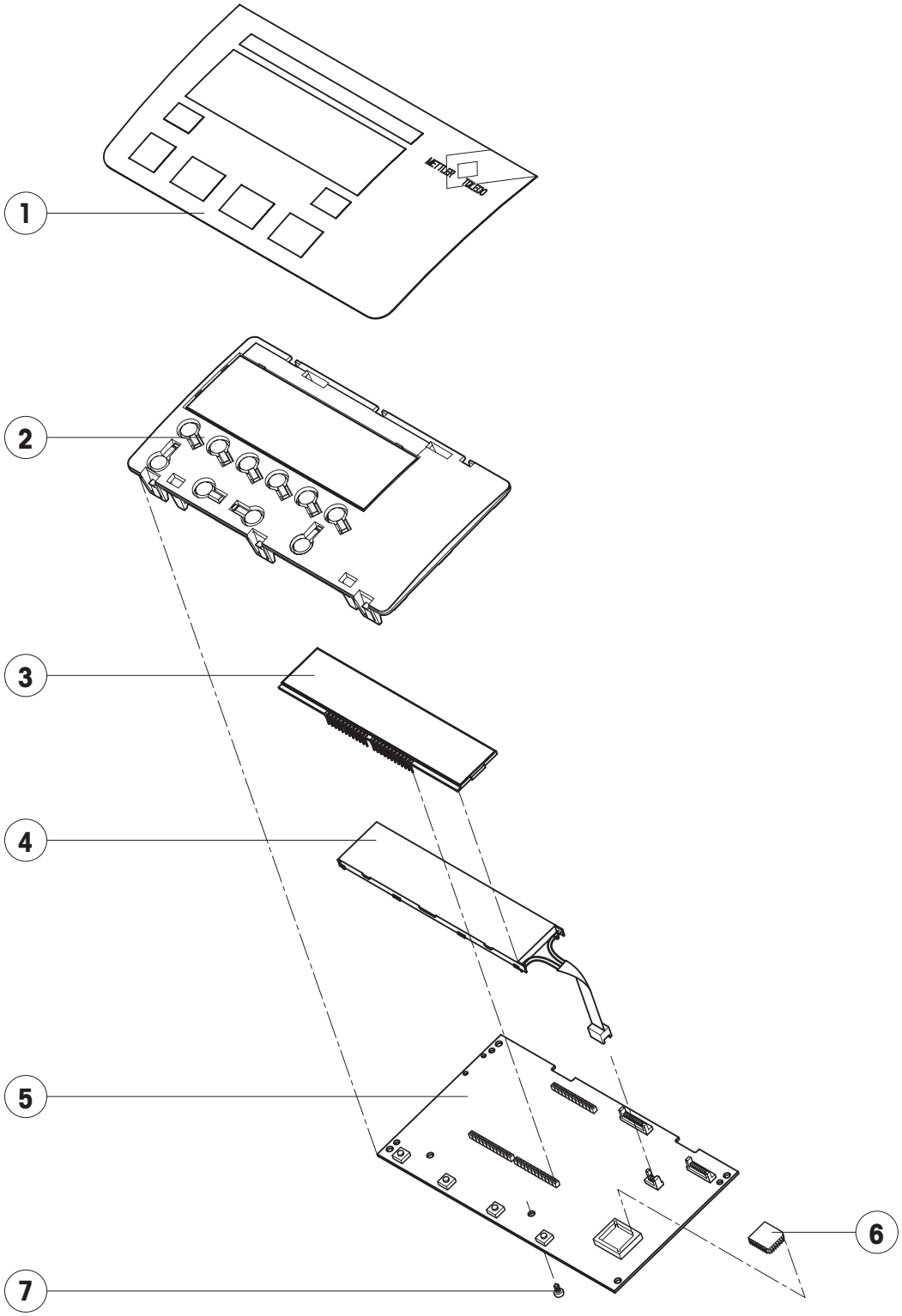


Item	Quantity	Description	Order No.
1	4	adjustable foot ∅ 2.2" (55 mm)/M10 x 0.75 mm	21203110
2	11	countersunk Torx screw M4 x 10	*
3	1	bottom plate for large platform model	–
4	8	cylinder head Torx screw M5 x 12	*
5	1	overload plate	–
6	1	overload stop: adjustment screw	–
7	1	overload stop: arrestment screw	–
8	1	**weighing modules** (load cell and analog PCB):	
		weighing module 32001 for 24 lb and 75 lb scales (12 kg and 30 kg)	11102687
9	1	cell cable MB-LA with ferrite ring	21203290
10	1	bench AC adapter US version (always order together with item 15)	21203122
11	2	spring clip	*
12	1	VIPER AN MonoBloc analog PCB	21203100
13	1	RS cable 18.1" (460 mm)	21203168
14	1	A/D cable 11.8" (300 mm), for large platform model	21203167
15	1	adhesive patch for AC adapter or battery	21203184
16	1	RS connector plate (various types, depending on equipment of scales)	–
17	4	cylinder head Torx screw M4 x 6	*
18		**For scales with AccuPac only**:	
18a	1	accu 12V/2,2Ah (always order together with item. 15)	21203232
18b	1	battery connection cable	21203233
18c	1	charging circuit print (with fuse T2A/250V, order No. 0089385)	21203105
18d	1	battery cable (store PCB – analog PCB)	21203231
19	1	PCB RS option (2 x RS232C)	21203476
20	1	connection cable RS option	21203490

* included in the fasteners set (chapter 3)

2 Display units

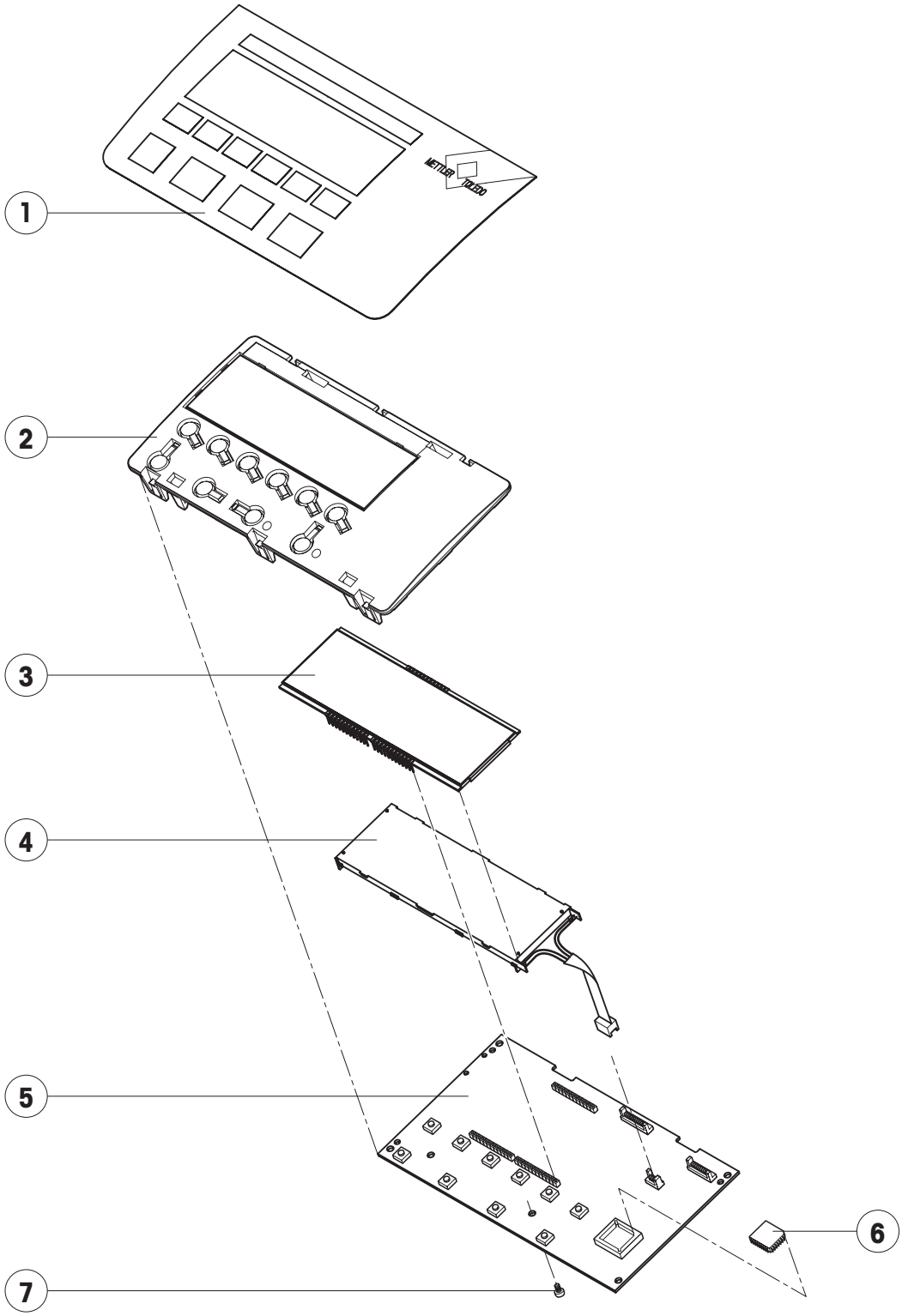
2.1 Viper M display unit



Item	Quantity	Description	Order No.
1	1	keypad overlay for Viper M large platform model	21203443
2	1	display mounting plate for Viper M (always order together with item 1)	21203120
3	1	LCD for Viper M	21203134
4	1	back-light unit for Viper M	21203136
5	1	VIPER DIG M digital PCB	21203098
6	1	**EPROM with scale program**:	
		EPROM for Viper M scales with strain gauge weighing cell	21203583
		EPROM for Viper M scales with MonoBloc weighing cell	21203584
7	1	retaining screw	*

* included in the fasteners set (chapter 3)

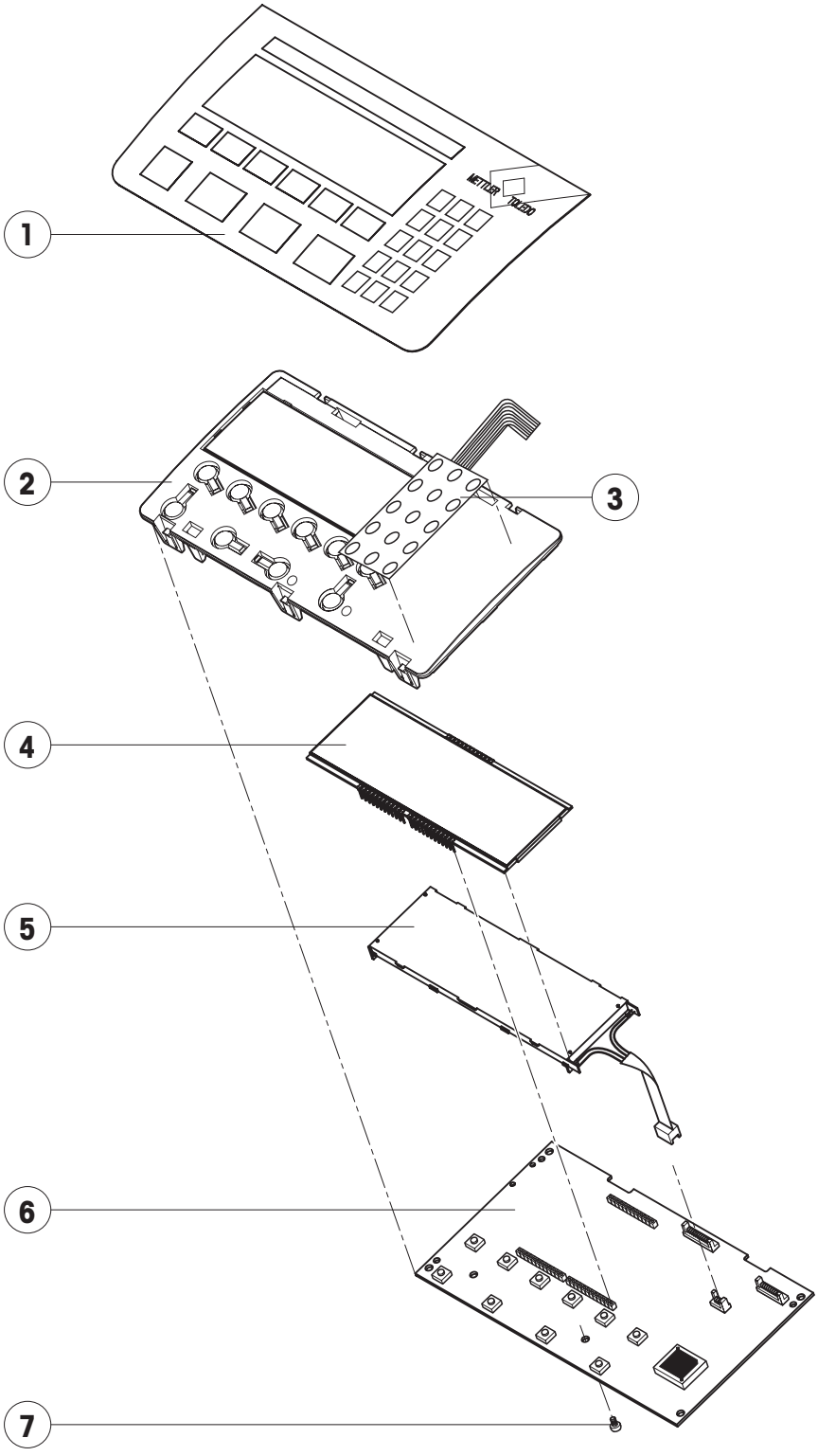
2.2 Viper L display unit



Item	Quantity	Description	Order No.
1	1	keypad overlay for Viper L large platform model	21203444
2	1	display mounting plate for Viper L (always order together with item 1)	21203491
3	1	LCD for Viper L	21203135
4	1	back-light unit for Viper L/D	21203137
5	1	VIPER DIG L digital PCB	21203097
6	1	**EPROM with scale program**:	
		PROM for Viper L scales with strain gauge weighing cell	21203588
		EPROM for Viper L scales with MonoBloc weighing cell	21203587
7	1	retaining screw	*

* included in the fasteners set (chapter 3)

2.3 Viper D display unit



Item	Quantity	Description	Order No.
1	1	keypad overlay for Viper D large platform model	21203445
2	1	display mounting plate for Viper D (always order together with items 1 and 3)	21203448
3	1	pressure sensitive membrane for numeric keypad (15 keys) [1)]	21203439
4	1	LCD for Viper D	21203687
5	1	back-light unit for Viper L/D	21203137
6	1	VIPER DIG D digital PCB with FLASH Memory chip (soldered)	21203524
7	1	retaining screw	*

* included in the fasteners set (chapter 3)

[1)] always order together with item 1.

3 Fasteners set

The fasteners set comprises all the standard components (screws and washers) required for service work on Viper scales with large and small platforms, plus the spring clips that hold the analog PCB in place.

Quantity	Description	Order No.
1	**fasteners set**:	21203404
20	countersunk Torx screw M3 x 8	–
20	countersunk Torx screw M3 x 10	–
20	countersunk Torx screw M6 x 30	–
50	countersunk Torx screw M4 x 10	–
20	button head Torx screw M3 x 6	–
30	button head Torx screw M4 x 12	–
30	button head Torx screw M5 x 12	–
20	wide flange washer 4.3 x 20	–
20	wide flange washer 5.3 x 20	–
20	countersunk Torx screw M6 x 16	–
20	spring clip	–
50	pan head Torx screw M4 x 6	–

Section 4

Replacing components

Contents **Page**

1 Introduction

This section describes how to change individual components of the Viper scales. When doing this, please refer to the exploded view drawings and spare parts lists in sections 2 and 3.

Important: After replacing components, a **functional check** of the scale must always be carried out.

2 Replacing the keypad overlay

- Lift up the defective keypad overlay (if necessary carefully prying it up with a knife) and gently peel it off the scale. **Note**: take care that the specification label is not damaged when the membrane is removed!
- Carefully clean the display mounting plate and window (removing all traces of adhesive).
- Make sure that the specification label is in its correct position (must be visible through the window in the keypad overlay), then peel off the protective film from the new membrane and carefully affix the latter to the display mounting plate.
- Press the keypad overlay down uniformly.

3 Replacing the AC adapter

Note: The AC adapter has a fuse as overcurrent protection. For safety reasons this fuse cannot be replaced, and the AC adapter must therefore be replaced completely if the fuse blows. This applies only to scales that are connected directly to the AC power line (without rechargeable battery and external AC adapter).

- Unscrew the adjustable feet and remove them.
- Undo the bottom plate retaining screws, removing them and the plate itself.
- Disconnect the AC adapter cable from the analog PCB.
- Remove the AC adapter (held on by an adhesive patch) from the wall of the housing . If necessary, carefully insert a flat blade (knife or screwdriver) between adapter and housing and pry them apart. Remove all traces of adhesive from the housing.
- Undo the 4 screws holding the blanking plate in place (rear panel of scale) and remove the plate.
- Slide the AC adapter power cord grommet out of the blanking plate. Remove the AC adapter from the scale.
- Place the new AC adapter in the scale and fix it in place with the adhesive patch.
- Slide the power cord grommet into the blanking plate slot and screw the plate in place.
- Plug the AC adapter output cable onto the analog PCB.
- Replace the bottom plate and the adjustable feet.

4 Replacing the battery

Note: This procedure is only required for scales that have a built-in battery and an external AC adapter.

- Unscrew the adjustable feed screws and remove them.
- Undo the bottom plate retaining screws, removing them and the plate itself.
- Undo the connection cable between the analog PCB and the charging PCB. **Note**: The 4-pin plugs are only attached to the PCB by 4 soldered joints, the cable must therefore be handled with care!
- Remove the battery from the wall of the housing (held in place by the adhesive strip). If necessary, carefully insert a flat blade (knife or screwdriver) between the battery and housing and pry them apart. Remove all traces of adhesive from the housing.
- Remove the battery from the scale and disconnect the cable to the charging PCB.
- Plug the cable to the charging PCB into the new battery (+ = red cable, – = blue cable).

- Attach the adhesive patch to the wall of the housing, remove its protective foil, place the battery in the scale and press it against the wall of the housing.
- Connect the cable between the analog PCB and the charging PCB. .
- Check the connections of all cables: The cables must lie in the correct slots of the housing, to ensure they are not pinched by the bottom plate.
- Replace the bottom plate and the adjustable feet.

5 Replacing the charging PCB/replacing the fuse

Note: This procedure is only required for scales with a built-in battery.

- Undo the screws holding the rear panel of the scale and remove the panel.
- Slide the PCB out from the guide and remove both plugs on the PCB (connection cable to battery and analog PCB).
- Only if the fuse has blown: Remove the defective fuse from its holder and replace it with a new fuse (T2A/250V, order No. 0089385).
- Attach both plugs with connectors to the (new) charging PCB and slide it into the guide.
- Replace the rear panel and secure with the 4 screws.

6 Replacing the analog PCB

Note: For **scales with MonoBloc weighing cells** the entire weighing module is usually replaced as its components (load cell and analog PCB) are a matching set: The analog PCB contains all temperature compensation data of the weighing cell (TK data). If only the analog PCB is to be replaced, then please note the following: A printout with the TK data of the weighing cell should be included in every scale. If this is not the case then this data must be printed out before the analog PCB is replaced. Otherwise the TK data cannot be loaded into the new analog PCB (see section 7)!

- Unscrew the adjustable feet and remove them.
- Undo the bottom plate retaining screws, removing them and the plate itself.
- Disconnect weighing cell cable, connecting cable to the digital PCB and the AC adapter output cable from the analog PCB.
- Pull off the two spring clips from the analog PCB and remove it.
- Fit the new analog PCB and fix it in place with the spring clips.
- Connect the weighing cell cable, the A/D cable from the digital PCB and the AC adapter output cable to the analog PCB.
- Replace the bottom plate and the adjustable feet.

Note: After replacing the analog PCB all scale data plus all user settings must be re-entered (see section 5)! The scale must first be calibrated and a linearization and recalibration carried out as required. For scales with MonoBloc weighing cells the temperature compensation data of the weighing cell must first be loaded into the new analog PCB via computer (see section 7).

7 Replacing the display mounting plate, display unit and digital PCB

The display mounting plate is located underneath the keypad overlay and is located in the scale housing by 6 snaps. The display unit comprises the digital PCB, the liquid crystal display (LCD) and the back-light unit. It is held in place on the mounting plate by snaps and one screw. The digital PCB is connected to the analog PCB and the RS232C interface by two ribbon cables (on Viper D scales there is an additional cable for the numeric keypad).

7.1 Preliminary work

- Unscrew the adjustable feet and remove them.
- Undo the bottom plate retaining screws, removing them and the plate itself.
- Undo the retaining screw which fastens the display unit to the mounting plate.
- Pull back the two front cantilever snaps holding the display unit to release it, raise the front edge of the display unit and withdraw it from the rear snaps.
- Disconnect the RS232 cable and the connecting cable to the analog PCB from the digital PCB (on Viper D scales also remove the cable of the numeric keypad membrane). Remove the display unit.

7.2 Replacing the display mounting plate

Note: In order to replace the display mounting plate, the keypad overlay must be removed. This cannot be reused and must also be replaced. On Viper D scales the pressure sensitive membrane for the numeric keypad must be replaced at the same time as it cannot be removed from the display mounting plate without damage.

- Remove keypad overlay (chapter 2).
- Push the 3 cantilever snaps at the front edge of the display mounting plate inwards to release the plate and remove it to the front.
- Insert the new display mounting plate into the aperture so that it clicks into place.
- **Viper D scales only**: peel off the protective film from the new membrane for the numeric keypad and carefully affix the latter to the display mounting plate.
- Apply the new self-adhesive keypad overlay (chapter 2).

7.3 Replacing the liquid crystal display (LCD) or the back-light unit

- Place the display unit with the digital PCB downwards on a conductive CMOS film.
- Disconnect the backlighting ribbon cable from the digital PCB.
- Carefully insert a flat blade screwdriver (size 4) between the digital PCB and the back-light unit immediately adjacent to the connectors.
- With the screwdriver pry the liquid crystal display and the back-light unit out of the socket strips. When doing this, lever the shaft of the screwdriver against the edge of the digital PCB. Never lever the tip of the screwdriver against the surface of the PCB, as this could damage the latter!
- Remove the upper protective cover of the back-light unit.
- Place the new back-light unit onto the digital PCB (it snaps into place on the board).
- Remove the upper and lower protective cover of the LCD.
- Carefully place the LCD onto the back-light unit and ensure that the connector pins are correctly aligned with the socket strips. When correctly positioned, the ends of the LCD and back-light unit are flush. Use a flat object such as a ruler to exert a uniform pressure on the LCD and gently push it home.
- Push the back-light unit ribbon cable connector onto the digital PCB pins.

7.4 Replacing the digital PCB

- Remove the LCD and back-light unit as described in the previous chapter.
- Remove the EPROM from its socket (Viper M and L scales only). With Viper D scales the entire digital PCB inlcuding the soldered Flash Memory chip must be replaced if downloading the scale software via a computer fails for any reason (see section 7).
- Fit LCD and back-light unit onto the new digital PCB (chapter 7.3). Fit the EPROM (Viper M and L scales only); see the notes in chapter 8.

7.5 Final reassembly

- Connect the RS232 cable and the cable from the analog PCB to the digital PCB (on Viper D scales also connect the cable of the numeric keypad membrane).
- Engage the display unit under the rear snaps of the display mounting plate and then lower its front edge until it snaps into place. Fit the retaining screw.
- Replace the bottom plate and adjustable feet.

8 **Replacing the software** (Viper M and L scales only)

The following description covers the **Viper M and L scales**. These scales have a plug-in EPROM on the digital PCB that may be replaced in order to update the software. **Viper D scales** are equipped with a Flash Memory chip allowing new scale software to be loaded from a computer (see section 7).

- Unscrew the adjustable feet and remove them.
- Undo the bottom plate retaining screws, removing them and the plate itself.
- Undo the retaining screw which fastens the display unit to the mounting plate.
- Pull back the two front cantilever snaps holding the display unit to release it, raise the front edge of the display unit and withdraw it from the rear snaps.
- Disconnect the RS232 cable and the connecting cable to the analog PCB from the digital PCB. Remove the display unit.
- Remove the EPROM from its socket using a special tool.
- Fit the new EPROM. **Note**: the chamfered corner of the EPROM must be oriented towards the chamfered corner of the socket (marked with an arrowhead).
- Connect the RS232 cable and the cable from the analog PCB to the digital PCB.
- Engage the display unit under the rear snaps of the display mounting plate and then lower its front edge until it snaps into place. Fit the retaining screw.
- Mount the bottom plate and adjustable feet.

9 Replacing the weighing cell

9.1 Replacing a strain gauge weighing cell

- Remove the weighing pan.
- Undo the pan support plate retaining screws and remove the pan support plate.
- Turn the scale upside down, unscrew the adjustable feet and remove them.
- Undo the bottom plate retaining screws, removing them and the plate itself.
- Remove the weighing cell cable connector from the analog PCB.
- Undo the 4 retaining screws for the overload plate. Remove the screws, washers and springs.
- Remove the overload plate with the weighing cell screwed to it.
- Remove the weighing cell retaining screws.
- Screw the new weighing cell to the overload plate. **Important**: Before tightening the screws, verify that the weighing cell is aligned exactly parallel with the edges of the overload plate! Screw torque: **10 Nm**
- Place the overload plate with the weighing cell screwed to it in the scale. Fit the springs and washers, then tighten the screws. **Important**: Pay attention to the color coding of the overload springs according to the table below!

Scale	Color of overload spring
Viper 7.5 lb (3 kg) small platform	blue
Viper 12 lb (6 kg) small platform	red
Viper 24 lb (12 kg) small platform	yellow
Viper 24 lb (12 kg) large platform	white
Viper 75 lb (30 kg) large platform	brown
Viper 120 lb (60 kg) large platform	black

- Fit the weighing cell cable connector onto the analog PCB pins.
- Replace the bottom plate and the adjustable feet.
- Turn the scale the right way up, replace the pan support plate and secure it with the screws. Before finally tightening the screws, make sure that the pan support plate is aligned squarely with the scale housing. **Important**: screw torque **10 Nm**!
- Replace the weighing pan.
- Calibrate and linearize the scale. If a weighing cell with another capacity has been installed, the new capacity must also be entered in the setup. Section 5 explains how to carry out these steps.

Note: Viper scales with strain gauge weighing cells have fixed cornerload stops that cannot be adjusted.

9.2 Replacing the MonoBloc weighing cell

Note: If a MonoBloc weighing cell is to be replaced, then the analog PCB must also be replaced at the same time as these components are a matching set (the analog PCB contains all TK data of the weighing cell). Both components are supplied together (temperature compensation data). After installing the new weighing cell, this printout must be stored in the scale (it is required if only the analog PCB is to be replaced, see chapter 6)!

9.2.1 Replacing the MonoBloc weighing cell of scales with small platforms

- Remove the weighing pan (if present, also remove the draft shield).
- Carefully undo the retaining screw of the load plate support. **Note**: When loosening the screw, the load plate support must be held firmly as no force must be applied to it when turning!
- Remove the load plate support and the screw. Seal the threaded hole on the weighing cell with an adhesive strip so that the spring cannot fall out.
- Turn the scale upside down, unscrew the adjustable feet and remove.
- Undo the retaining screws of the bottom plate and remove this.
- Remove the load cell cable coming from the analog PCB. **Note: The plugs are only attached to the analog PCB by soldered joints, the cable must therefore be handled with care**!
- Undo the 4 retaining screws for the overload cell. Remove the screws and washers.
- Carefully lift out the cell from the scale. **Note**: The cell may only be held by the baseplate or by the back part of the block!
- Carefully disconnect the cable at the cell that connects the weighing cell with the analog PCB. **Note**: Care should be taken as there is a small connection PCB with fine wires on the weighing cell that must not be jolted! The PCBs are also sensitive to mechanical tension and pressure!
- Connect the cable to the new weighing cell.
- Carefully insert the new weighing cell in the scale and secure with the 4 screws (with washers).
  Note: torque: **2.8 Nm**.
- Connect both plugs of the load cell cable to the analog PCB. Slide the ferrite core on the load cell cable as near as possible to the separating wall of the housing.
- Replace the bottom plate and adjustable feet.
- Turn the scale the right way up, remove the adhesive patch from the threaded hole on the load cell and check to ensure that the spring is in the hole. Replace the load plate support and secure it with the hexagon screw. Before finally tightening the screw, make sure that the load plate support is aligned squarely with the scale housing. **Note**: Under no circumstances is the load plate support to be under any tension when turning the screw! Screw torque: **5 Nm**.
- Replace the weighing pan (also mount the draft shield, if applicable).
- Calibrate and linearize the scale, then calibrate again. If a weighing cell with another capacity has been installed, the new capacity must also be entered in the setup. Section 5 explains how to carry out these steps.

Note: For Viper scales with small platforms and MonoBloc weighing cells, the cornerload and overload stops are permanently set and cannot be adjusted.

9.2.2 Replacing the MonoBloc weighing cell of scales with large platforms

- Remove the weighing pan.
- Carefully undo the retaining screws of the load plate support. **Note**: When loosening the screw, the load plate support must be held firmly as no force must be applied to it when turning! Remove the load plate support and screws.
- Turn the scale upside down, unscrew the adjustable feet and remove them.
- Undo the retaining screws of the bottom plate and remove.
- Remove the plugs of the load cell cable coming from the analog PCB. **Note: The plugs are only attached to the analog PCB by soldered joints, the cable must therefore be handled with care**!
- Undo the retaining screws of the overload plate and remove them.
- Carefully lift out the overload plate together with the attached cell from the scale.
- Undo the 4 retaining screws of the weighing cell and carefully remove the overload plate.
- Carefully disconnect the cable at the cell that connects the load cell with the analog PCB. **Note**: Care should be taken as there is a small connection PCB with fine wires on the weighing cell that must not be jolted! The PCBs are also sensitive to mechanical tension and pressure!
- Connect the cable to the new weighing cell.
- Screw the new weighing cell to the overload plate. **Important**: Before tighening the screws, verify that the load cell is aligned exactly parallel with the edges of the overload plate. Screw torque: **4 Nm**!
- **Undo the locking screw of the overload protection and set the adjustment screw to a gap of 0.3 mm (use feeler gauge)**. **Retighten the locking screw**.
- Carefully attach the connection cable of the analog PCB to the cell.
- Carefully insert the overload plate with the attached load cell into the scale and secure with the 4 screws.
  Note: torque: **4 Nm**.
- Connect both plugs of the load cell cable to the analog PCB. Slide the ferrite core on the load cell cable as near as possible to the separating wall of the housing.
- Replace the bottom plate and the adjustable feet.
- Turn the scale the right way up, replace the load plate support and secure it with the screws. Before finally tightening the screw, make sure that the load plate support is aligned squarely with the scale housing. **Note**: Under no circumstance is the load plate support to be under any tension when turning the screw! Screw torque: **10 Nm**!
- Replace the weighing pan.
- Calibrate and linearize the scale, then calibrate again. If a weighing cell with another capacity has been installed, the new capacity must also be entered in the setup. Section 5 explains how to carry out these steps.

Note: For Viper scales with large platforms and MonoBloc weighing cells, the cornerload stops are permanently set and cannot be adjusted.

Section 5

Technician setup

Contents **Page**

1 Introduction

The setup of the Viper scales includes a special section dedicated to the technician. The technician setup offers settings and procedures for scale maintenance and diagnostics. Accessing this part of the setup requires a special password while navigation within the technician setup is the same as with the user and supervsior setup (see Operator Manual). With certified scales, direct access to the technician setup is blocked. **Caution**: Settings may only be made by qualified personnel. The wrong settings could result in the scale not functioning correctly!

2 Accessing and using the technician setup

2.1 Accessing the technician setup of scales that are not certified

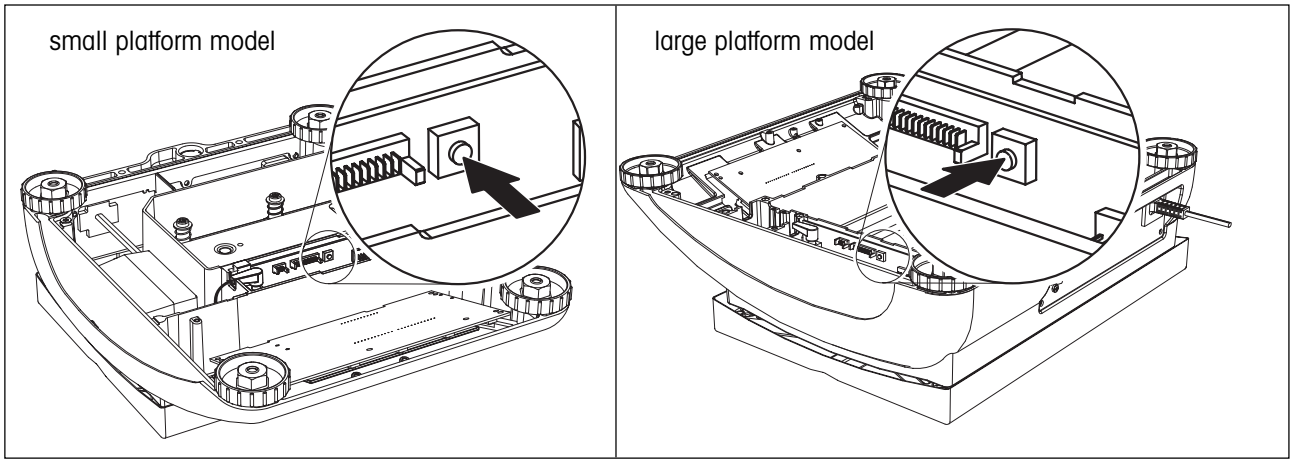
- Press the «**Print**» key and hold it down until the prompt to enter the password appears ("Code").
- Enter the Technician password and confirm with «**Print**». At the factory, the password for the technician has been set to «**Zero**» «**Tare**» «**Zero**» «**Tare**». We recommend you to replace this password with one of your own as soon as possible (in the "Terminal" section of the setup, see chapter 4).

Once you have confirmed the password, the first setup block appears ("SCALE"). Basically, the technician setup is the same as the one for the supervisor (see Operator Manual) except that there are some additional blocks for scale setup and diagnostics.

2.2 Accessing the technician setup of certified scales

With certified scales or certifiable scales, direct access to the technician setup is blocked. This is for technical reasons, and also to comply with regulations. To access the technician setup, proceed as follows:

- Switch off the scale.
- Remove the scale bottom plate by undoing the Torx TX20 retaining screws (see sections 2, 3 and 4 for a detailed description). **Important**: In order to remove the bottom plate it is necessary to break the **certification seal** affixed to it! **Once this seal has been destroyed, the scale must be recertified by an accredited organization, and a new certification seal must be affixed before the instrument may be used as a certified scale again!**
- Hold down the service switch (pushbutton) on the analog PCB (indicated by an arrow in the drawings below), while at the same time switching on the scale. Keep the service switch pressed in until "SCALE" appears in the display.



2.3 Overview of technician setup

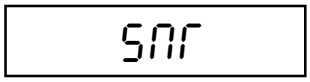
The overview below shows the setup blocks holding additional settings dedicated to the technician ("SCALE", "TERMINAL" and "DIAGNOSTICS"). The settings available to the technician only are printed in **boldface**. The further setup blocks ("APPLICATION" and "COMMUNICATION") are similar to the ones in the supervisor setup (see Operator Manual) and are not shown below. The factory settings are marked with an asterisk (*).

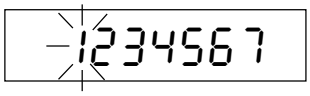
Level	*Level 2*	*Level 3*	*Level 4*	*Level 5*
SCALE	Scale 1	**SNR**		
		Metrology	**NTEP**	
			None	
		Build	**Unit**	**lb*, g, kg, oz**
			Capacity	**0 ... 9999**
			Resolution	**0.00001 ... 0.002**
		Linearization		
		GEO value	**0 ... 16* ... 31**	
		Calibration		
		Units	Displayed	lb*, g, kg, oz
			2nd	lb, g, kg*, oz
		Tare	Pushbutton	On*, Off
			Chain Tare	On*, Off
			Auto Tare	On, Off*
			Auto Clear Tare	On, Off*
		Zero	Auto Zero Mode (AZM)	Off, Gross*, Gross/Net
			Auto Capture	±2%, ±10%*, Off
			Pushbutton Zero	±2%, ±10%*, +20/–2%, Off
		Filtering	Low, Medium*, High	
		SCALE Reset	Sure?	
	Scale 2	Scale Type	Analog [1], SICS, None*	
		Mode	Reference, Bulk*	
TERMINAL	Device	Sleep	On, Off*	
		Backlight	On*, Off	
	Bargraph	On*, Off		*(Note: Not available with Viper M scales!)*
	Access	User	On*, Off	
		Codes	Supervisor Code	Enter code
				Retype code
			Technician Code	**Enter code**
				Retype code
DIAGNOSTICS	**Keyboard**	**Test**		
	Scale	**X10**		
	List			
	General reset	**Sure?**		

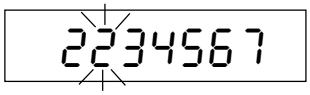
1) After this option has been activated, the same settings are available as for "Scale 1".

3 Scale settings and calibration ("SCALE")

3.1 Viewing or changing the serial number





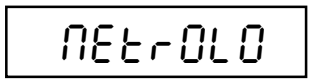


In this block you can view or change the scale serial number.

- Press the «**Print**» key to display the serial number. It is only necessary to change this number after replacing the analog PCB or rectifying "Error 53". The serial number is given on the scale model label.
- To enter a new number, press the «**Tare**» key. The cursor appears as a small line at the left where the first digit is. This digit (if there) starts to flash. Now press the «**Tare**» key repeatedly until the desired digit is displayed. If you want to leave this position empty, make sure that only the cursor is displayed. Confirm the digit by pressing the «**Print**» key. The cursor then moves to the second position, which you can change in the same way. This also applies for all the following positions (maximum of 7 digits).

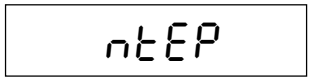
  Note: With Viper D scales the serial number can be entered directly via the numeric keypad.
- To quit this block, press the «**Print**» key again after entering the last digit.

3.2 Certification status

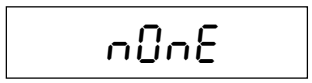


In this block you specify whether the scale is certifiable or not. **Caution**: If you declare a scale to be certifiable various scale settings are no longer available and direct access to the technician setup is blocked (see chapter 2)!

- Press the «**Print**» key to display the current certification approval status:



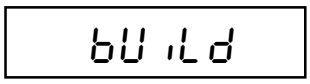
  – certifiable scale ("NTEP")



  – scale not certifiable ("none")

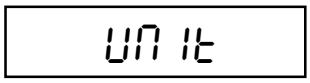
- Select the desired setting with the «**Tare**» key and confirm it with the «**Print**» key.

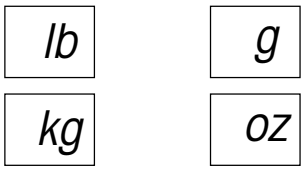
3.3 Entering scale data



This block contains 3 subblocks ("Unit", "Capacity" und "Resolution) used to set up the base unit, the weighing range and the resolution of the scale.

3.3.1 Selecting the base unit

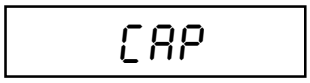




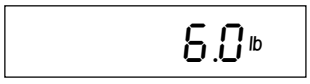
Use the «**Tare**» key to select the desired base unit, then confirm by pressing the «**Print**» key. The base unit is used for specifying the weighing range and resolution of the scale and has nothing to do with the weighing unit used in daily operation (which may be selected separately, see Operator Manual). The base units available are shown opposite.

Note: With certifiable scales only "lb" and "kg" are available.

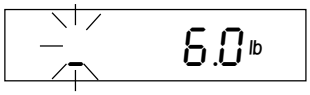
3.3.2 Specifying weighing range



If the analog PCB is replaced, it is necessary to specify the weighing range, because the EAROM on the PCB is set to a default value at the factory. The weighing range is shown on the plate above the display and must be set to this value. It is also necessary to set the weighing range if a weighing cell of a different capacity is installed. In this case the weighing range must be set in accordance with the weighing cell used (see specifications in section 6).



- If you want to specify the weighing range, press the «**Print**» key to display the range currently selected (or the factory-set default weighing range if the analog PCB or EPROM has been replaced). The value uses the selected base unit.

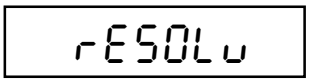


- To enter a new weighing range, press the «**Tare**» key. The cursor appears as a small line at the left where the first digit is. This digit (if there) starts to flash. Now press the «**Tare**» key repeatedly until the desired digit is displayed. If you want to leave this position empty, make sure that only the cursor is displayed. Confirm the digit by pressing the «**Print**» key. The cursor then moves to the second position, which you can change in the same way. This also applies for all the following positions (maximum of 7 digits).

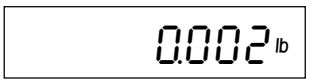
  Note: With Viper D scales the weighing range can be entered directly via the numeric keypad.

- To quit this block, press the «**Print**» key again after entering the last digit.

3.3.3 Setting the resolution

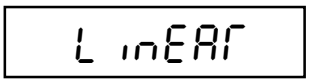


If the analog PCB is replaced, it is necessary to specify the resolution, because the EAROM on the PCB is set to a default value at the factory. The resolution is shown on the plate above the display and must be set to this value. It is also necessary to set the resolution if a weighing cell of a different capacity or type (e.g. MonoBloc instead of strain gauge cell) is installed. In this case the resolution must be set in accordance with the weighing cell used (see specifications in section 6).



Use the «**Tare**» key to select the desired resolution, then confirm by pressing the «**Print**» key. **Notes**: The settings available depend on the weighing range and are displayed in the selected base unit. With Viper D scales the resolution can be entered directly via the numeric keypad.

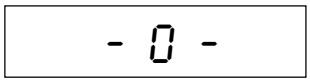
3.4 Correcting linearity errors



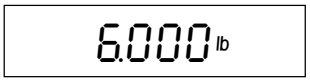
Correct calibration ensures that the displays at the zero point and the calibration point correspond exactly to the loads placed on the scale. Ideally, this should be the case over the entire weighing range. Any linearity error is corrected in the factory. Normally, repeat linearization is only necessary after replacing the weighing cell or changing the weighing range. A 3-point linearization procedure is available in the scale, the set calibration points being at 0%, 50% and 100% of the weighing range. These can be changed, however, if the required weights are not available.

Notes:

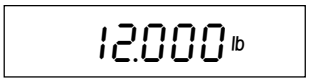
- The weights used for linearization are displayed in the standard weighing unit used in daily operation ("SCALE" –> "Units" –> "Display").
- If no valid calibration values are available ("Error 6"), linearization is not possible. In this case the scale must be calibrated first.
- It is strongly recommended that the scale is again calibrated after linearization!
- Linearization can be aborted at any time by pressing the «**On/Off**» key.



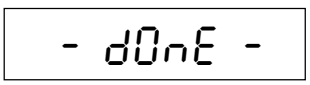
- Press the «**Print**» key if you want to linearize the scale. The flashing "- 0 -" display prompts you to remove the load from the weighing pan. Once this is done, zero point adjustment is carried out automatically.



- The second setting point (e.g. 6 lb for a 12 lb scale) now appears in the display. If you have this weight available, place it on the scale. If not, you can use the «**Tare**» key to change the linearization point and then place the corresponding weight on the scale. Adjustment is then carried out after the «**Print**» key is pressed.

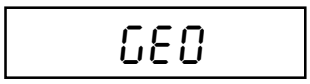


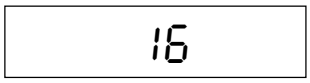
- The third setting point (e.g. 12 lb for a 12 lb scale) then appears in the display. This value can also be changed with the «**Tare**» key, if necessary. Place the appropriate weight on the scale. Adjustment is again carried out after the «**Print**» key is pressed.



The message "done" appears in the display, indicating that the linearization procedure has been successfully concluded.

3.5 Setting geographical adjustment value



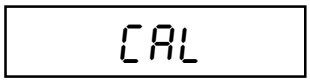


In this block you can set the geographical adjustment value and thus adapt the scale to local gravitational conditions. Please only change this setting if you are certain of the correct geographical adjustment value!

- Press the «**Print**» key to display the current geographical adjustment value (default setting is 16). Then press the «**Tare**» key to change it. Each time the key is pressed, the next value is displayed (range of settings: 0 - 31). Please refer to the table in section 6 to find the appropriate geographical adjustment value. Confirm the selected value by pressing the «**Print**» key.

Caution: The geographical adjustment value must not be readjusted after calibration as this will turn the calibration values invalid!

3.6 Calibration

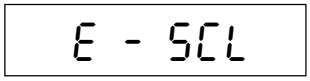


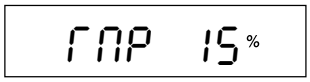
Notes:

– The weights used for calibration are displayed in the standard weighing unit used in daily operation ("SCALE" –> "Units" –> "Display").

– The geographical adjustment value should be checked before calibration and correctly set if necessary (chapter 3.5). Do not change the geographical adjustment value after calibration!

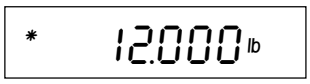
– Calibration can be aborted at any time by pressing the «**On/Off**» key.





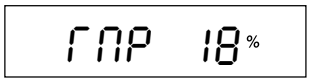
- Press the «**Print**» key if you want to calibrate the scale. You are now prompted to remove any weight from the weighing pan ("Empty Scale"). Once the weighing pan is empty press the «**Print**» key to continue the calibration procedure.

  While the zero point is being determined, the output signal of the analog/digital converter appears in the display.

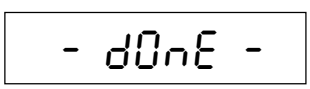


- You are now prompted by the display to calibrate your weighing system at that value which you have specified as weighing range (see chapter 3.3.2, "Capacity").

  If you do **not** want to calibrate with this value (e.g. because you do not have sufficient weights available), press the «**Tare**» key repeatedly until the desired calibration weight appears in the display (the calibration weight is reduced every time the key is pressed). **Note**: it is generally recommended to calibrate the scale **at full load.** This applies especially to **certifiable scales**.



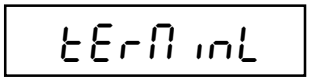
- Place the selected calibration weight on the scale and confirm it with the «**Print**» key. Again, the output signal of the analog/digital converter appears shortly in the display.



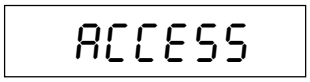
The message "done" appears in the display to confirm that calibration has been successfully concluded.

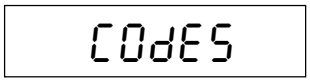
4 Changing the technician password

At the factory, the password for the technician has been set to «**Zero**» «**Tare**» «**Zero**» «**Tare**». We recommend you to replace this password with one of your own as soon as possible following the procedure explained below.

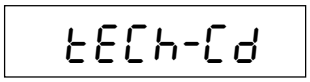


- Launch the "Access" section of the "TERMINAL" main block.

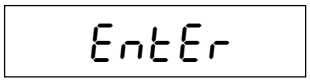




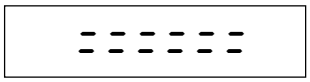
In the "Codes" subblock you can specify your own technician password. Proceed as follows:



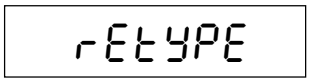
Call up the subblock "Tech-Cd" ("Technician Code") and …



… you will be prompted to enter your new password. Enter the sequence of keystrokes you wish to use as your password. You can use up to 6 keys. **Important**: The «**Print**» key cannot be used in the password! Do not press this key, as it is used to terminate input and confirm the new password!



Each keystroke is symbolized in the display by two double horizontal dashes. Confirm the new password by pressing the «**Print**» key.

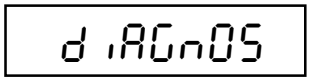


You will now be prompted to enter the password again. Retype the new password and confirm it again with the «**Print**» key.

Definition of the password is now complete, and the next time you attempt to enter the setup mode you will be asked for it.

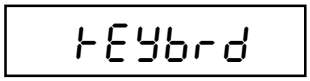
Important: Make a note of your new password! If you forget it, you will need to use the backdoor password to get access to the technician setup. The backdoor password can be found on the very last page of section 6 of the current manual. Remove this page from the Service Manual and keep it in a safe place.

5 Diagnostic functions ("DIAGNOSTICS")

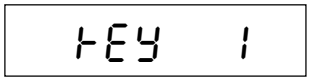


The main setup block "DIAGNOSTICS" provides 3 additional blocks for verifying and resetting the scale.

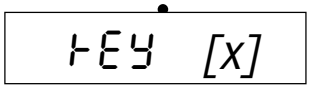
5.1 Diagnostic functions for keypad and display ("Keyboard")



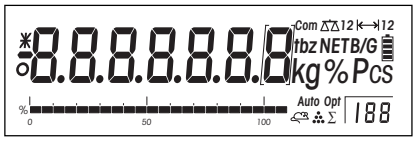
Within this setup block you may check proper **functioning of all keys and the display**.



You are prompted to press all keys, one after the other (6 keys for Viper M, 10 for Viper L and 25 keys for Viper D scales).

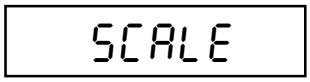


Press the required keys in sequence. If a key is working properly the scale jumps to the next key.

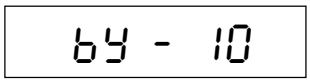


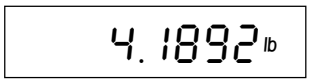
After the last key has been checked the scale lights up all segments of the display. Make sure all segments are visible.
Pressing any key aborts the display test.

5.2 Increasing the resolution ("Scale" --> "by 10")



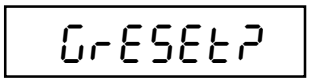
Within this setup block you may temporarily **increase the resolution of the scale** by a factor of 10.





Press the «**Print**» key and the weighing result will be displayed with an additional digit. This mode is used only for verifying the current weight at high resolution, all keys are inactive. Pressing any key aborts the high resolution display and returns you to the setup.

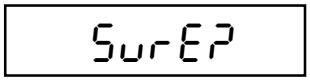
5.3 Resetting all settings to the factory default ("General Reset")



In this setup block you can reset **all scale settings** to their factory settings.

Caution: Use this option with care and only if you are absolutely sure that you want to reset all settings. You will loose all individual settings established by the user and the supervisor with the exception of passwords and access privileges ("TERMINAL" –> "Access"). However, the settings available to the technician only will not be reset (scale data, calibration values, etc.).

Press the «**Print**» key to reset the settings. If you do not want to reset the settings press «**Tare**» instead.



You are asked again whether you really want to reset the settings.

If you want to reset, press the «**Print**» key again. Otherwise, press the «**Tare**» key, because this is your last chance to cancel the reset. When you press the «**Print**» key as confirmation, all settings are reset and the scale immediately operates with the factory settings.

6 Operating the setup via the interface

The setup of the Viper scales can be operated using the built-in RS232C interface. However, a computer with a simple terminal emulation software is required. **Note**: For certified scales, access to the setup via the interface is locked!

Requirements

The following conditions must be fulfilled for communication between scale and computer:

- The scale must be connected to the RS232C interface of a computer via an appropriate interface cable.
- The interface of the scale must be set to the "SICS" operating mode.
- A communications program must be installed on the computer (e.g. "Hyper Terminal").
- The communications parameters (protocol, bits, pararity, transmission rate) for the scale and communications program must be the same.

Accessing the setup

- Enter the command "KAS" (capitals) in the communications program and confirm with <**CRLF**> («Enter», «Return» or «↵ key, depending on the keyboard). The first block of the setup ("SCALE") is shown on the screen.

Operating the setup

- The setup can be operated using either the computer keyboard or the keys on the scale.
- The operating procedure using the keyboard is identical to that of the keys on the scale (YES/NO prompts):
  - Confirm with "**y**" (lower case), corresponding to the «**Print**» key of the scale ("YES")
  - The "**n**" (lower case) corresponds to the «**Tare**» key of the scale ("NO").
- The <**ESC**> key quits the setup and saves the settings. The <**ESC**> key may also be used to abort running procedures such as calibration and linearization.
- Numerical input via the computer keyboard is possible only in the setup mode blocks for the serial number ("SNR") and for the weighing range ("CAPACITY"). All other numerical values must be entered in the same way as they would be when using the keys of the scale.
- Setup blocks as well as settings are shown at the same time on the scale and the computer screen.
- For certified scales, only those blocks in setup are accessible that can also be accessed with the keys of the scale. The technician setup is locked for certified scales.
- After entries in setup have been completed, the scale interface should be reset to the settings required for normal weighing operation.

SICS command set

As well as using the interface to operate in the service and master modes, the Viper scales also support the command set **MT-SICS** (**M**ettler-**T**oledo **S**tandard **I**nterface **C**ommand **S**et). SICS commands are implemented according to "Level 0" and "Level 1". Detailed information on interface commands are found in the "MT SICS Reference Manual" (No. 705184).

Standard commands are available as well as scale-specific SICS commands which support product-specific characteristics. One of these is the "ITK" command for loading temperature-compensation data of a MonoBloc weighing cell into the EAROM of the analog PCB. This is necessary with MonoBloc scales if the weighing cell and the analog PCB are not a matching pair because they have been replaced individually (see section 7 for further details).

Section 6

Miscellaneous information

Contents **Page**

1 Technical data

1.1 Certified Viper scales with strain gauge weighing cells

The following data apply to all certified Viper scales with strain gauge weighing cells, regardless of platform size.

Scale capacity	**3 kg 6 lb**	**6 kg 12 lb**	**12 kg 30 lb**	**30 kg 60 lb**	**60 kg 120 lb**
Weighing range	3.0045 kg 6.009 lb	6.009 kg 12.018 lb	12.018 kg 30.045 lb	30.045 kg 60.09 lb	60.09 kg 120.18 lb
Resolution	6000e	6000e	6000e	6000e	6000e
Certification class	III	III	III	III	III
Readability	0.0005 kg 0.001 lb	0.001 kg 0.002 lb	0.002 kg 0.005 lb	0.005 kg 0.01 lb	0.01 kg 0.02 lb
Repeatability	0.0005 kg 0.001 lb	0.001 kg 0.002 lb	0.002 kg 0.005 lb	0.005 kg 0.01 lb	0.01 kg 0.02 lb
Calibration weight, minimum [1)]	1 kg 2 lb	2 kg 4 lb	5 kg 10 lb	10 kg 20 lb	15 kg 30 lb
Overload stop	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable
Cornerload stop	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable

[1)] Note on calibration

Certified scales should be calibrated at full load.

1.2 Noncertifiable Viper scales with strain gauge weighing cells

The following data apply to all noncertifiable Viper scales with strain gauge weighing cells, regardless of platform size.

Scale capacity	**3 kg 7.5 lb**	**6 kg 12 lb**	**12 kg 24 lb**	**30 kg 75 lb**	**60 kg 120 lb**
Weighing range	3.0045 kg 7.509 lb	6.009 kg 12.018 lb	12.018 kg 24.045 lb	30.045 kg 75.09 lb	60.09 kg 120.18 lb
Resolution	15000d	12000d	12000d	15000d	12000d
Certification class	---	---	---	---	---
Readability	0.0002 kg 0.0005 lb	0.0005 kg 0.001 lb	0.001 kg 0.002 lb	0.002 kg 0.005 lb	0.005 kg 0.01 lb
Repeatability	0.0002 kg 0.0005 lb	0.0005 kg 0.001 lb	0.001 kg 0.002 lb	0.002 kg 0.005 lb	0.005 kg 0.01 lb
Calibration weight, minimum [1)]	1 kg 2 lb	2 kg 4 lb	5 kg 10 lb	10 kg 20 lb	15 kg 30 lb
Overload stop	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable
Cornerload stop	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable

[1)] Note on calibration

It is recommended that noncertifiable scales are also calibrated at full load. If required, however, these can also be calibrated at less than full load (minimum approx. 25% of full load).

1.3 Certified Viper scales with MonoBloc weighing cells

The following data apply to all certified Viper scales with MonoBloc weighing cells, regardless of platform size.

Scale capacity	**3 kg 6 lb**	**6 kg 12 lb**	**12 kg 24 lb**	**30 kg 60 lb**
Weighing range	3.1 kg 6.2 lb	6.1 kg 12.2 lb	12.1 kg 24.2 lb	30.1 kg 60.2 lb
Resolution	30000e	6000e	12000e	30000e
Certification class	II	II	II	II
Readability (d)	0.00001 kg 0.00002 lb	0.0001 kg 0.0002 lb	0.0001 kg 0.0002 lb	0.0001 kg 0.0002 lb
Repeatability	0.0000075 kg 0.0000 15lb	0.00005 kg 0.0001 lb	0.00005 kg 0.0001 lb	0.000075 kg 0.00015 lb
Calibration weight, minimum [1)]	1 kg 2 lb	2 kg 4 lb	5 kg 10 lb	10 kg 20 lb
Overload stop				
small platform	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable
large platform	——	0.3 mm	0.3 mm	0.3 mm
Corner load stop	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable

[1)] Note on calibration

Certified scales should be calibrated at full load.

1.4 Noncertifiable Viper scales with MonoBloc weighing cells

The following data apply to all noncertifiable Viper scales with MonoBloc weighing cells, regardless of platform size.

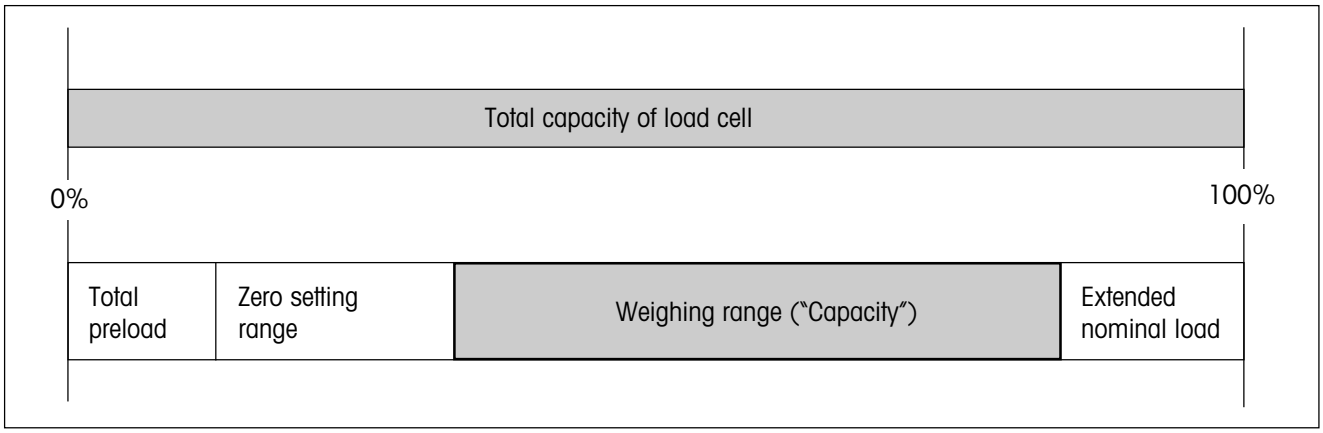
Scale capacity	**3 kg 6 lb**	**6 kg 12 lb**	**12 kg 24 lb**	**30 kg 60 lb**
Weighing range	3.1 kg 6.2 lb	6.1 kg 12.2 lb	12.1 kg 24.2 lb	30.1 kg 60.2 lb
Resolution	300000d	60000d	120000d	300000d
Certification class	---	---	---	---
Readability	0.00001 kg 0.00002 lb	0.0001 kg 0.0002 lb	0.0001 kg 0.0002 lb	0.0001 kg 0.0002 lb
Repeatability	0.0000075 kg 0.000015 lb	0.00005 kg 0.0001 lb	0.00005 kg 0.0001 lb	0.000075 kg 0.00015 lb
Calibration weight, minimum [1)]	1 kg 2 lb	2 kg 4 lb	5 kg 10 lb	10 kg 20 lb
Overload stop				
small platform	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable
large platform	——	0.3 mm	0.3 mm	0.3 mm
Corner load stop	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable

[1)] Note on calibration

It is recommended that noncertifiable scales are also calibrated at full load. These can also be calibrated at less than full load (minimum approx. 25% of full load), as required.

2 Notes on weighing cell capacities

The following diagram is a schematic summary of the distribution of the total capacity of a weighing cell.



Total capacity of load cell

The total capacity of the load cell is the combined sum of the weighing range, the total preload, the zero setting range and any extended nominal load (if any).

Total preload

The sum of all fittings and equipment that are acting on the weighing cell upon calibration (load plate support, load plate, roller track, etc.).

Zero setting range on power-up

+18/-2% for certified and noncertifiable scales starting from the calibrated zero point of the weighing range.

Weighing range

The weighing range ("Capacity") is specified in the setup (section 5).

Note: If the resolution for certified scales is set to "e = 10d" in the technician setup, then the last decimal place of the weighing result is shown in brackets ("parentheses"). These indicate that the last decimal position is not considered for the calibration tolerance. If the resolution is set to "e = d", then the weighing result is shown without parentheses.

3 Overview of weighing cells and preloads

3.1 Strain gauge weighing cells

Viper model	Weighing pan [in.]	Weighing range [kg]	Replacement cell no.	Preload load plate support	Preload weighing pan	Total of load plate support and weighing pan	Mechanical preload reserve	Preload reserve switch-on zero (18% of weighing range)	Cell capacity [kg]
Px (small)	7.9" x 9.5"	3 kg	21203143	0.340 kg	0.500 kg	0.840 kg	0.62 kg	0.54 kg	5 kg
Px (small)	7.9" x 9.5"	6 kg	21203144	0.340 kg	0.500 kg	0.840 kg	2.08 kg	1.08 kg	10 kg
Px (small)	7.9" x 9.5"	12 kg	21203145	0.340 kg	0.500 kg	0.840 kg	1.46 kg	2.70 kg	20 kg
Sx (large)	9.5" x 13.8"	12 kg	21203151	0.820 kg	0.850 kg	1.670 kg	0.63 kg	2.70 kg	20 kg
Sx (large)	9.5" x 13.8"	30 kg	21203152	0.820 kg	0.850 kg	1.670 kg	7.03 kg	6.30 kg	50 kg
Sx (large)	9.5" x 13.8"	60 kg	21203153	0.820 kg	0.850 kg	1.670 kg	27.53 kg	10.80 kg	100 kg

x = scale series (M, L or D)

3.2 MonoBloc weighing cells

Viper model	Weighing pan [in.]	Weighing range [kg]	Replacement cell no.	Preload load plate support	Preload weighing pan	Total of load plate support and weighing pan	Mechanical preload reserve	Preload reserve switch-on zero (18% of weighing range)	Cell capacity [kg]
Px MB (small)	6.5" x 6.5"	3 kg	11102685	0.340 kg	0.225 kg	0.560 kg	0.00 kg	0.54 kg	3.54 kg
Px MB (small)	7.9" x 9.5"	6 kg	11102686	0.360 kg	0.500 kg	0.860 kg	0.92 kg	1.08 kg	8.00 kg
Sx MB (large)	9.5" x 13.8"	15 kg	11102687	0.820 kg	0.850 kg	1.670 kg	20.00 kg	2.70 kg	41.30 kg
Sx MB (large)	9.5" x 13.8"	35 kg	11102687	0.820 kg	0.850 kg	1.670 kg	0.00 kg	6.30 kg	41.30 kg

x = scale series (M, L or D)

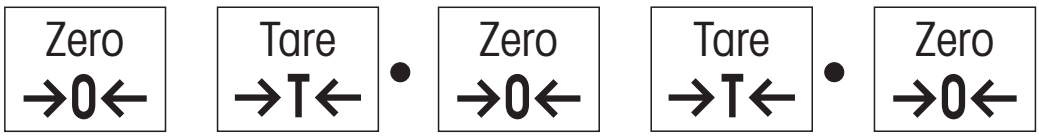
4 Table of geographical adjustment values

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

Backdoor password for the technician

Please cut and keep in a safe place!

Use this backdoor password in case you have set up your own technician pasword and lost it.



Section 7

Software

Contents **Page**

1 Software identification

The software for **Viper M and L scales** is held in an **EPROM on the digital PCB** and can therefore be replaced. **Viper D scales** are equipped with a Flash Memory chip allowing new scale software to be loaded from a computer (see chapter 4).

The type of software depends on the type of scale (Viper M, L or D) and on the type of weighing cell (strain gauge or MonoBloc). The various software versions are not compatible with one another. An illegible display can indicate that an incorrect EPROM is installed. The various models of a particular series with an identical type of weighing cell have identical software (e.g. Viper L 12lb/6kg MonoBloc and Viper L 24lb/12kg MonoBloc).

On powering up, the scale carries out a display test in which the software version is also briefly displayed (e.g. "L-1.01" or "Mb-1.00").

The leading characters designate the scale type and weighing cell used while the following digits specify the actual software version (e.g. "1.07"):

M: Viper M with strain gauge weighing cell (example as shown in the display: M-1.00)

L: Viper L with strain gauge weighing cell (example as shown in the display: L-1.00)

D: Viper D with strain gauge weighing cell (example as shown in the display: d-1.00)

MB: Viper M with MonoBloc weighing cell (example as shown in the display: Mb-1.00)

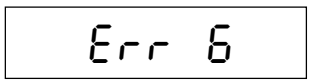
LB: Viper L with MonoBloc weighing cell (example as shown in the display: Lb-1.00)

DB: Viper D with MonoBloc weighing cell (example as shown in the display: db-1.00)

The **type data** for a scale are stored in the **EAROM on the analog PCB** (serial number, weighing range, calibration data, etc. and also temperature compensation data for MonoBloc weighing cells). If the analog PCB is replaced, these data no longer match the scale and must be re-entered (section 5). **Temperature compensation data (TK data)** are also stored on the analog PCB of MonoBloc weighing cells and must be re-entered after replacing the analog PCB (chapter 3). **Note**: After replacing the analog PCB of any scale, all settings established by the user and the supervisor must be re-entered as these are also stored in the EAROM.

2 Error messages after service work

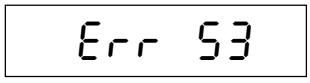
In addition to the errors described in the operating instructions, the following error messages may also appear after carrying out service work:



No calibration

This error only occurs after reinitializing the EAROM, i.e. after rectifying Error 53.

Remedy: recalibrate the scale (see section 5).



Invalid data in EAROM (checksum error)

This error message indicates defective scale definition data in the EAROM.

Remedy: Completely reset the scale by erasing the data stored in the EAROM (see chapter 4).

3 Printing out and reloading TK data (MonoBloc version only)

For scales with **MonoBloc weighing cells**, the weighing cell and analog PCB are usually replaced at the same time as their components are a matching set: the analog PCB contains all the temperature compensation data of the weighing cell (TK data). If only the analog PCB is to be replaced, then please note the following: a printout with the TK data of the weighing cell should be included in every scale. If this is not the case, then these data must be printed out **before the analog PCB is replaced**. Otherwise, the TK data cannot be loaded into the EAROM of the new analog PCB. If, however, only the load cell is to be replaced, then its TK data must be known and loaded into the EAROM of the existing analog PCB.

Printing out the temperature compensation of the measuring cell

If no printout of the weighing cell's TK data is available, then they can be printed out as follows:

```
ITK 1   12222.08
ITK 2   12165.29
ITK 3   12106.70
ITK 4   31842.41
ITK 5   31854.69
ITK 6   31867.59
ITK 7   51455.60
ITK 8   51536.88
ITK 9   51621.13
ITK 19   0.000000
ITK 11   1.500000
ITK 12   3.00000
ITK 13   33610.08
ITK 14   30896.57
ITK 15   27987.87
ITK 16   1

Chksum   :    379172.375
```

- Connect the scale to the RS323C interface of a computer using an appropriate interface cable.
- Set the interface of the scale and computer to the same parameters (protocol, parity, baud rate). Set the operating mode of the scale interface to "SICS".
- Start the communications program (e.g. "HyperTerminal") on the computer.
- Enter the SICS command "**ITK**" and terminate with <CRLF> (Return). The TK data of the weighing cell are read from the EAROM of the analog PCB and transmitted to the computer.
- Print out the TK data from the communications program. The printout will look similar to the example on the left. Keep this printout in the scale!

Note: If the TK data of a weighing cell are not available or cannot be printed out, then these can be supplied by Mettler-Toledo. The serial number of the weighing cell must then also be stated (sticker on the cell).

Reloading the temperature compensation data

After replacing the analog PCB, the TK data of the weighing cell present must be loaded into the EAROM of the new analog PCB:

- Connect the scale to the RS323C interface of a computer using a null modem cable.
- Set the interface of the scale and computer to the same parameters (protocol, parity, baud rate). Set the operating mode of the scale interface to "Dialog".
- Start the communications program (e.g. "HyperTerminal") on the computer.
- Enter all the TK data in order, according to the printout, and terminate every line with <CRLF> ("Return"). Example:

  ITK 1 12222.08 <CRLF>

  ITK 2 12165.29 <CRLF> etc.

  The line "Chksum" must not be entered.
- Enter the command "ITK" for control purposes. The TK data that were entered are then displayed. **Important**: The checksum ("Chksum") must agree with that in the printout. If this is not the case, then one or more TK values were entered incorrectly. The incorrect lines should now be entered correctly (e.g. "ITK9...") and the checksum verified again.

4 Erasing the scale data stored in EAROM

In an emergency (e.g. "Error 53") the scale definition data stored in the EAROM on the analog PCB may be erased as follows:

- Connect the scale to the RS323C interface of a computer using an appropriate interface cable.
- Set the interface of the scale and computer to the same parameters (protocol, parity, baud rate). Set the operating mode of the scale interface to "SICS".
- Start the communications program (e.g. "HyperTerminal") on the computer.
- Enter the command "**FLU_DEL_E2**" and proceed with <CRLF> (Return) (_ = space). The display briefly shows "Flush" to confirm the deletion of scale data, then the scale restarts.
- After restart the display shows "Error 6" (calibration data missing). All scale definition data must be re-entered and then the scale must be calibrated (see section 5). Flushing the EAROM also deletes all individual settings established by the user and the supervisor and these data must be re-entered as well. The temperature compensation data (TK data) of scales with MonoBloc weighing cells are also stored in the EAROM of the analog PCB. These data will not be erased, however, they should be verified after erasing the scale data (chapter 3).

5 Downloading new software to the Flash Memory (Viper D scales only)

Viper D scales have a **Flash Memory chip** instead of an EPROM. In case of software malfunction or if a new software release becomes available, the present software can be replaced. Software updates can be downloaded from the METTLER TOLEDO network (Extranet) to a computer and from there on to the scale. In case this action fails for any reason you will have to replace the digital PCB with the soldered Flash Memory chip (see section 4).

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