TECHNICAL DOCUMENTATION

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METTLER TOLEDO

Service manual

Electronic Precision Balances and Scales METTLER AM/PM/CM/J Series

Current status of the service manual, see section E.

PM100 / PM200 / PM300 / PM400 / PM600 / PM1200
PM2000 / PM4000 / PM6100 / PM5003 → Service Bulletins (section E)
PM460 DeltaRange / PM4600 DeltaRange / PM480 DeltaRange / PM4800 DeltaRange
PM2500 DeltaRange
PM3000 / PM6000 / PM6
AM50 / AM100
CM200 / CM1200 / PM400C / PM2000C / PM2000MC

PJ200 / PJ300 / PJ400 / PJ600
PJ2000 / PJ3000
PJ360 DeltaRange / PJ3600 DeltaRange
PJ4000 / PJ6000 / PJ6
AJ100
AJ50L / AJ100L / AJ150L
CJ150 / CJ500

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Edition: June 1993

Organization of the service manual

The service manual contains instructions for the service engineer.

To facilitate your search for a particular topic, the binder is divided into different parts (sections).

The first page of each part comprises a table of contents.

The top of each page carries the designation of the appropriate section.

The page numbering of each section always starts with 1.

Update 1990

In addition to changes in the design and improvements in the software, the following new products have been introduced:

- **GM303 Control Unit**
  Three-key option (direct function, switch and print key) for installation at the front of the AM/PM balances. This allows AM/PM balances to be operated in exactly the same manner as SM scales and the new high-capacity PM scales.
- **Simple applications**
  - Net total balance with GM303 and **NetEasy-M** program cassette.
  - Statistics balance with GM303 and **StatEasy-M** program cassette.
  - Counting balance with GM303 and **CountEasy-M** program cassette.

How to use this documentation efficiently

Exploded view diagrams

The exploded view diagrams serve as an assembly and orientation aid as well as to determine the spare part numbers.

Spare parts lists

Spare parts must be ordered using the information given in the spare parts list. The spare parts list specifies the order numbers of the parts itemized in the exploded view diagram.

Spare parts

Exploded view diagrams
Spare parts lists
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Troubleshooting

Troubleshooting
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Special types and certified balances/scales
Component diagrams and schemes

Contents

1. Exploded view diagrams

1.1 Overview of the AM/PM/CM/J series

The balances and scales of the PM/AM/CM/J series are summarized in the overview table and in the exploded view diagrams according to the criteria measuring cell and construction as follows:

- Balances/scales with M-technology
- Balances/scales with J-technology
- Balances with the high precision measuring cell
- Balances/scales with the precision measuring cell

	PM100 PM200 PM300 PM400 PM460 PM480 PM600 PM2000 PM4000 PM4600 PM4800 PM6100 PM400C	PJ200 PJ300 PJ360 PJ400 PJ600 PJ2000 PJ3000 PJ3600	PM3000 PM6000 PM6	PJ4000 PJ6000 PJ6	AM50 AM100 CM200 CM1200	AJ100 CJ150 CJ500	PM1200 PM2000C PM2500 PM2000MC	 AJ50L [1] AJ100 [1] AJ150L [1]
Measuring cell	precision measuring cell				high-resolution precision measuring cell			
DeltaTrac	yes	no	yes	no	yes	no	yes	no
Weighing pan/platform	dia. 150-180 mm		rectangular		dia. 60/80 mm		dia. 130/80 mm	
Display	fluorescent		fluorescent		fluorescent		LCD	
Reference resistor Temp. coefficient	circular 5 ppm/°C		circular 5 ppm/°C		circular [2] 5 ppm/°C		rectangular 1 ppm/°C	
Adjustment resistor	yes (ex. PM6100)		yes		no		no	
Magnetic field strength Temp. coefficient	powerful 400 ppm/°C		powerful 400 ppm/°C		weak 50 ppm/°C		moderate 50 ppm/°C	weak
Coil	normal		normal		encapsulated		encapsulated	
Coil leads	enamelled wires		enamelled wires		gold wires		gold wires	
Hole in detector vane (beam)	circular or 1 mm slit		circular or 1 mm slit		circular or 1 mm slit [2]		0.65 mm slit	
Stop	plastic		plastic		plastic [2]		metal	
Overload protection	in pan support		in pan support (spider)		spring in the hanger		spring in the hanger	
Level adjustment at beam	no		no		yes		yes	
Cornerload fixing plates	yes		yes		no		yes	no
Measuring cell fastening (number of screws)	3		3		2		2	
Collar around measuring cell	no		no		yes		yes	
Detector board: bright LED	no [3]		no [3]		no [2]		yes	
Dead load weight	model specific							

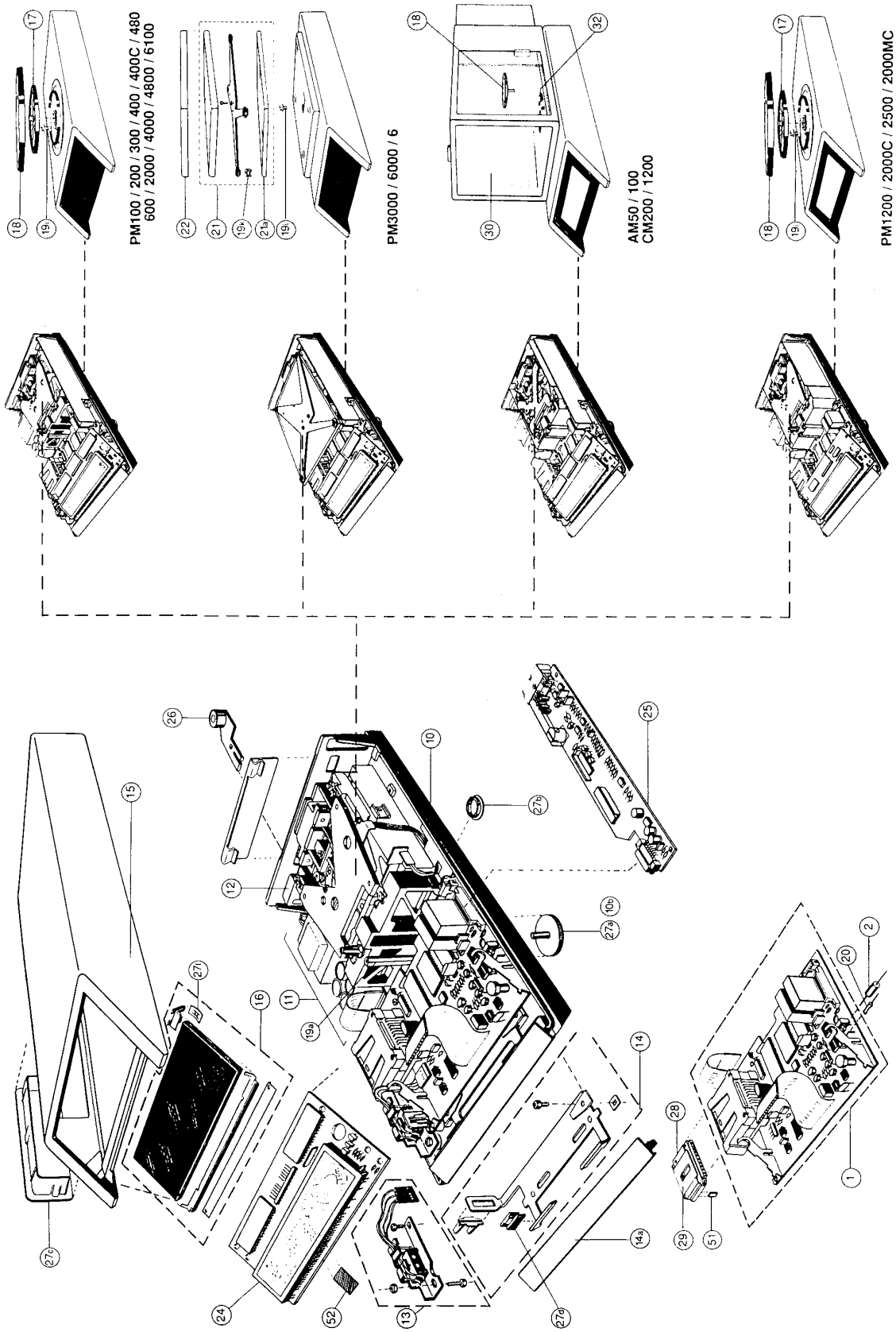
[1] AJ...L balances must be adjusted with the type and adjustment cassettes of the M series

[2] after 1989 model: see AJ...L

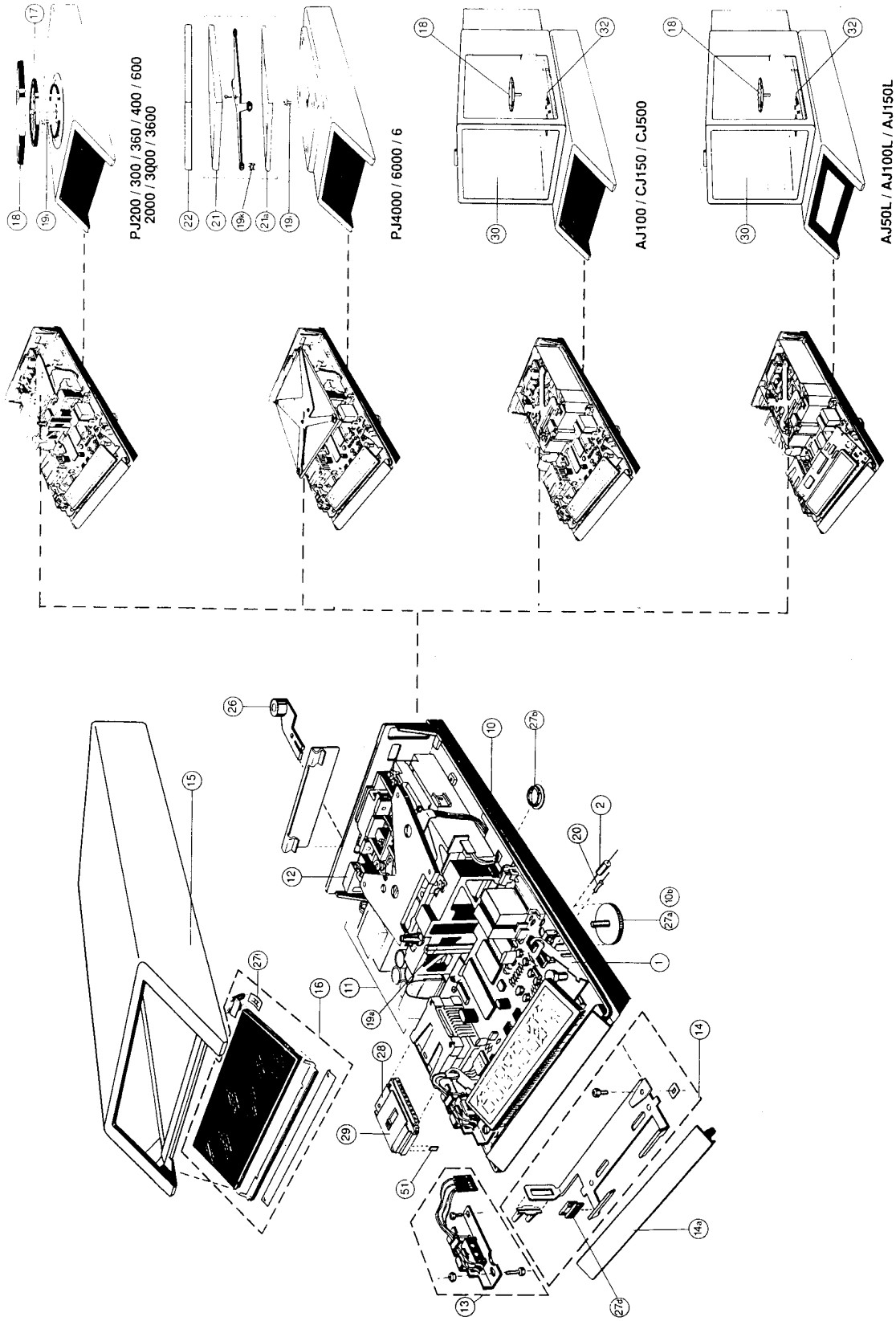
[3] after middle 1990, bright LED, detectors of analytical and precision balances are different

1.2 Exploded view diagrams of the balances/scales

1.2.1 Waagen mit M-Technologie / Balances/scales with M technology / Balances de technologie M

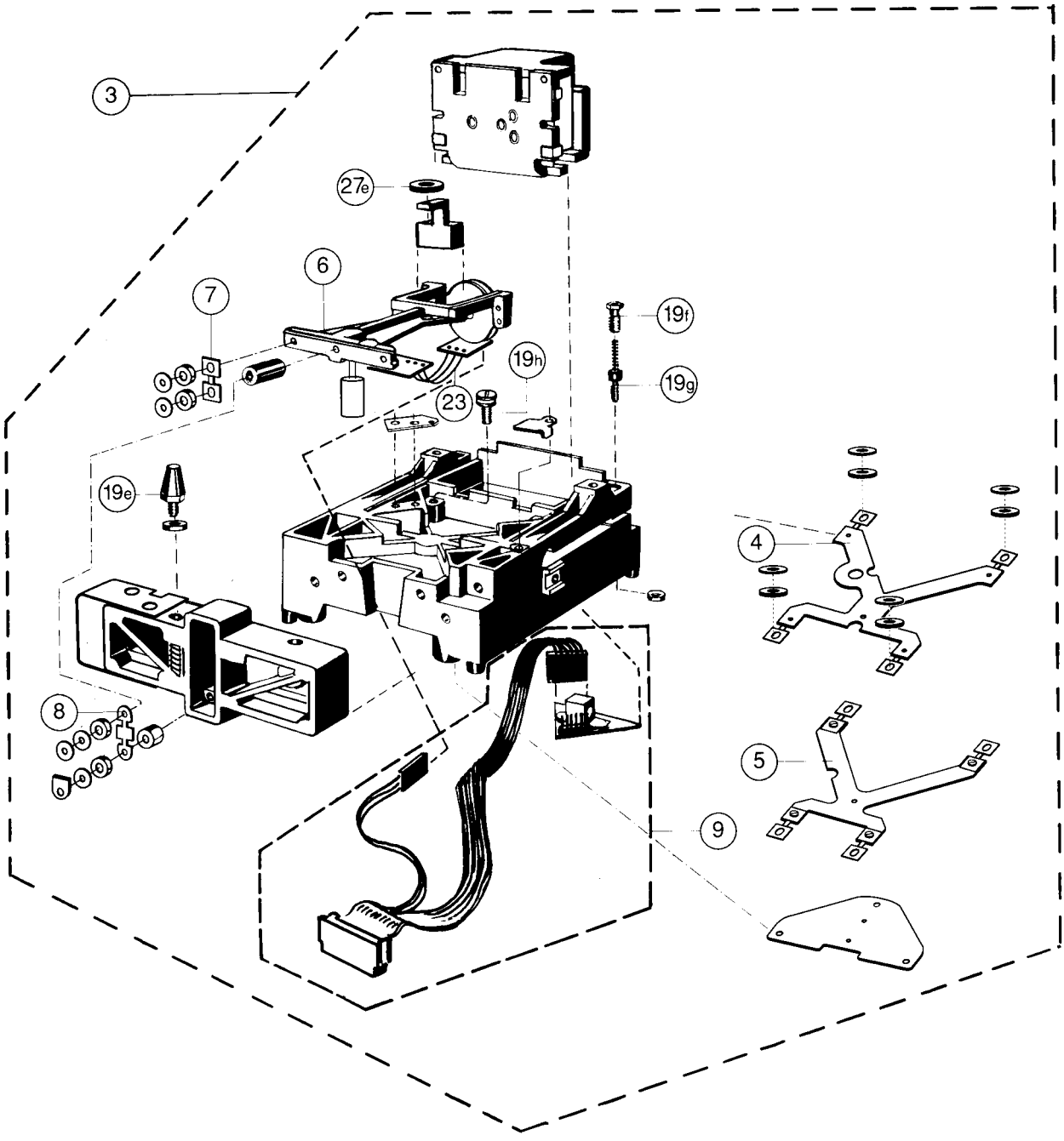


1.2.2 Waagen mit J-Technologie / Balances/scales with J technology / Balances de technologie J

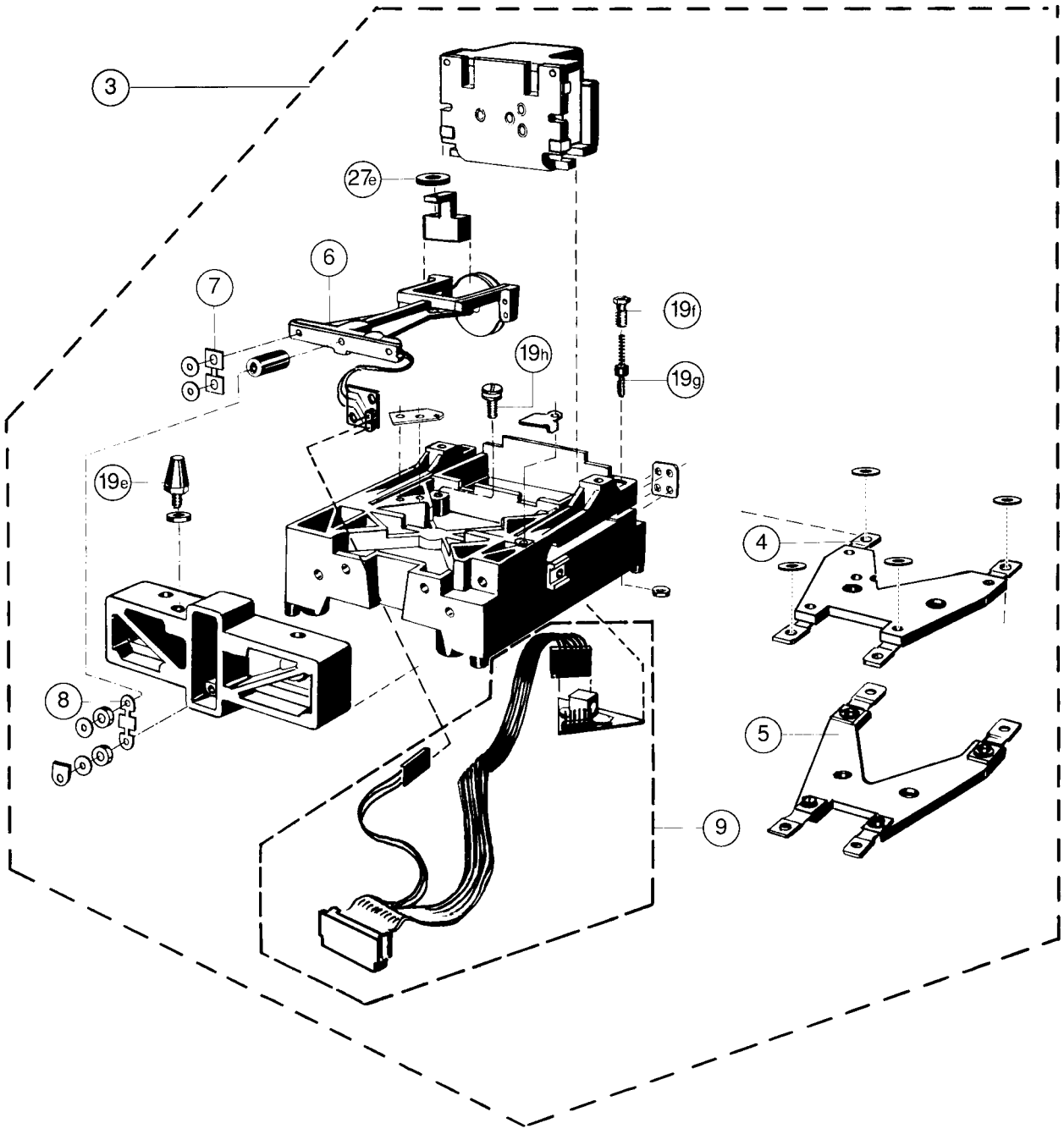


1.3 Explosionszeichnungen der Meßzellen / Exploded view diagrams of the measuring cells / Vues éclatées des cellules de mesure

1.3.1 Hochauflösende Präzisionsmeßzelle / High resolution precision measuring cell / Cellule de mesure de précision à haute résolution



1.3.2 Präzisionsmeßzelle / Precision measuring cell / Cellule de mesure de précision



2. Spare parts lists

2.1 Spare parts list PM100, PM200, PM300, PM400

Item	Designation	PM100 ME No.	PM200 ME No.	PM300 ME No.	PM400 ME No.
1	Balance board (with µprocessor, EAROM, 2 display holders, without items 2 and 20) Display holder	600264 34134	600264 34134	600264 34134	600264 34134
2	Reference resistor set	600259	600259	600259	600259
3	Measuring cell packed (adjusted, incl. TC)	600275	600275	600276	600276
4	Upper guide (with flexible bearing)	47051	47051	47051	47051
5	Lower guide (with flexible bearing)	47054	47054	47054	47054
6	Beam, complete	47661	47661	47661	47661
7	Flexible bearings for beam (set of 6 in each case, identical)	600307	600307	600307	600307
8	Link (set of 6 in each case, identical)	47060	47060	47060	47060
9	Detector with cable	600312	600312	600312	600312
10	Lower housing, without level, grey	216320	216320	216320	216320
10b	Leveling foot, black	216321	216321	216321	216321
11	Power supply unit, mounted	34160	34160	34160	34160
12	Power connector with wiring	600273	600273	600273	600273
13	Switch unit, mounted b) lock nut; 2 screws	47066	47066	47066	47066
14	Control bar (installation kit), without key b) 1 stirrup c) 1 fork d) 2 leaf springs e) 2 support plates f) 2 screws g) 2 rubber gaskets	600266	600266	600266	600266
14a	1 Key	216300	216301	216302	216303
15	Upper housing	600267	600267	600267	600267
16	Front glass set a) 1 front glass b) 1 clamping strip c) 4 seating locks d) 2 clips e) 1 cover strip	600021	600021	600021	600021

Item	Designation	PM100 ME No.	PM200 ME No.	PM300 ME No.	PM400 ME No.
17	Pan support, complete	47081	47081	47081	47081
18	Weighing pan	47085 Ø 130 mm	47085 Ø 130 mm	47085 Ø 130 mm	47085 Ø 130 mm
19	Small parts set (PE/PM) a) 2 spacer sleeves b) 10 rubber feet c) 2 covers (GD), PE/PM d) 5 covers (cal. screw PE) e) 1 cone f) 2 cornerload adjustment screws g) 2 setscrews h) 1 stop screw i) 2 housing screws k) 4 grommets	47089	47089	47089	47089
20	Resistor set (calibration range) Set of 73, 50 ppm, 560 Ω...1 MΩ Set of 15, 15 ppm, 3.6 kΩ...13 kΩ	 41299 47042	 41299 47042	 41299 47042	 41299 47042
24	Display board	600357	600357	600357	600357
25	Interface (data interface)	600355	600355	600355	600355
26	Level	34320	34320	34320	34320
27	Small parts set (PM) a) 6 leveling feet, brown b) 6 covers (GD), PM c) 3 cassette covers d) 6 rubber gaskets for control bar e) 8 taring washers for beam f) 6 seating locks for front glass	600256	600256	600256	600256
28	Memory cassette standard	600274	600274	600274	600274
29	Memory cassette bracket	34169	34169	34169	34169
51	Shorting plug, 2-pin for certified balances	89404	89404	89404	89404
52	Hatched stickers for certified balances (49)	31350	31350	31350	31350

2.2 Spare parts list PM460, PM480, PM600, PM1200

Item	Designation	PM460 ME No.	PM480 ME No.	PM600 ME No.	PM1200 ME No.
1	Balance board (with µprocessor, EAROM, 2 display holders, without items 2 and 20) Display holder	600264 34134	600264 34134	600264 34134	33577 34134
2	Reference resistor set	600259	600259	600258	600260
3	Measuring cell (adjusted, incl. TC)	600276	600276	600277	600230
4	Upper guide (with flexible bearing)	47051	47051	47052	600253
5	Lower guide (with flexible bearing)	47054	47054	47055	600019
6	Beam, complete	47661	47661	47661	600231
7	Flexible bearings for beam (set of 6 in each case, identical)	600307	600307	47058	600221
8	Link (set of 6 in each case, identical)	47060	47060	600024	600024
9	Detector with cable	600312	600312	600312	600252
10	Lower housing, without level, grey	216320	216320	216320	216322
10b	Leveling foot, black	216321	216321	216321	216321
11	Power supply unit, mounted	34160	34160	34160	34160
12	Power connector with wiring	600273	600273	600273	600273
13	Switch unit, mounted b)lock nut; 2 screws	47066	47066	47066	47066
14	Control bar (installation kit), without key b) 1 stirrup c) 1 fork d) 2 leaf springs e) 2 support plates f) 2 screws g) 2 rubber gaskets	600266	600266	600266	600266
14a	1 Key	34137	216304	216305	216356
15	Upper housing	600267	600267	600267	600225
16	Front glass set a) 1 front glass b) 1 clamping strip c) 4 seating locks d) 2 clips e) 1 cover strip	600021	600021	600021	600022

Item	Designation	PM460 ME No.	PM480 ME No.	PM600 ME No.	PM1200 ME No.
17	Pan support, complete	47081	47081	47082	47082
18	Weighing pan	47085 Ø 130 mm	47085 Ø 130 mm	47086 Ø 150 mm	47085 Ø 130 mm
19 a)	Small parts set (PE/PM) 2spacer sleeves b)10 rubber feet c) 2 covers (GD), PE/PM d) 5 covers (cal. screw PE) e) 1 cone f) 2 cornerload adjustment screws g) 2 setscrews h) 1 stop screw i) 2 housing screws k) 4 grommets	47089	47089	47089	47089
20	Resistor set (calibration range) Set of 73, 50 ppm, 560 Ω...1 MΩ Set of 15, 15 ppm, 3.6 kΩ...13 kΩ	 41299 47042	 41299 47042	 41299 47042	 – –
23	Contact strips (10)	–	–	–	43540
24	Display board	600357	600357	600357	34130
25	Interface (data interface)	600355	600355	600355	600355
26	Level	34320	34320	34320	34320
27	Small parts set (PM) a) 6 leveling feet, brown b) 6 covers (GD), PM c) 3 cassette covers d) 6 rubber gaskets for control bar e) 8 taring washers for beam f) 6 seating locks for front glass	600256	600256	600256	600256
28	Memory cassette standard	600274	600274	600274	600274
29	Memory cassette bracket	34169	34169	34169	34169
51	Shorting plug, 2-pin for certified balances	89404	89404	89404	89404
52	Hatched stickers for certified balances (49)	31350	31350	31350	–

2.3 Spare parts list PM2000, PM2500, PM3000, PM4000

Item	Designation	PM2000 ME No.	PM2500 ME No.	PM3000 ME No.	PM4000 ME No.
1	Balance board (with µprocessor, EAROM, 2 display holders, without items 2 and 20) Display holder	600264 34134	33577 34134	600264 34134	600264 34134
2	Reference resistor set	600258	600260	600258	600258
3	Measuring cell (adjusted, incl. TC)	600277	***600227***	600278*	600278
4	Upper guide (with flexible bearing)	47052	600253	47052	47052
5	Lower guide (with flexible bearing)	47055	600019	47055	47055
6	Beam, complete	47661	600231	47661	47661
7	Flexible bearings for beam (set of 6 in each case, identical)	47058	600023	47058	47058
8	Link (set of 6 in each case, identical)	600024	600024	47060	47060
9	Detector with cable	600312	600252	600312	600312
10	Lower housing, without level, grey	216320	216322	216320	216320
10b	Leveling foot, black	216321	216321	216321	216321
11	Power supply unit, mounted	34160	34160	34160	34160
12	Power connector with wiring	600273	600273	600273	600273
13	Switch unit, mounted b)lock nut; 2 screws	47066	47066	47066	47066
14	Control bar (installation kit), without key b) 1 stirrup c) 1 fork d) 2 leaf springs e) 2 support plates f) 2 screws g) 2 rubber gaskets	600266	600266	600266	600266
14a	1 Key	216306	216318	216307	216308
15	Upper housing	600267	600225	600272	600267
16	Front glass set a) 1 front glass b) 1 clamping strip c) 4 seating locks d) 2 clips e) 1 cover strip	600021	600022	600021	600021

* Remove cone (19e)!

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Item	Designation	PM2000 ME No.	PM2500 ME No.	PM3000 ME No.	PM4000 ME No.
17	Pan support, complete	47082	47082	–	47083
18	Weighing pan	47086 Ø 150 mm	47085 Ø 130 mm	–	47087 Ø 170 mm
19	Small parts set (PE/PM) a) 2 spacer sleeves b)10 rubber feet c) 2 covers (GD), PE/PM d) 5 covers (cal. screw PE) e) 1 cone f) 2 cornerload adjustment screws g) 2 setscrews h) 1 stop screw i) 2 housing screws k) 4 grommets	47089	47089	47089	47089
20	Resistor set (calibration range) Set of 73, 50 ppm, 560 Ω...1 MΩ Set of 15, 15 ppm, 3.6 kΩ...13 kΩ	 41299 47042	 – –	 41299 47042	 41299 47042
21	Platform support, complete	–	–	47084	–
21a	Drip pan (retrofittable)	–	–	33715	–
21b	***Pan support***	**–**	**–**	***47896***	**–**
22	Weighing platform 228 x 182 mm	–	–	47088	–
23	Contact strips (10)	–	43540	–	–
24	Display board	600357	34130	600357	600357
25	Interface (data interface)	600355	600355	600355	600355
26	Level	34320	34320	34320	34320
27	Small parts set (PM) a) 6 leveling feet, brown b) 6 covers (GD), PM c) 3 cassette covers d) 6 rubber gaskets for control bar e) 8 taring washers for beam f) 6 seating locks for front glass	600256	600256	600256	600256
28	Memory cassette standard	600274	600274	600274	600274
29	Memory cassette bracket	34169	34169	34169	34169
51	Shorting plug, 2-pin for certified balances	89404	89404	89404	89404
52	Hatched stickers for certified balances (49)	31350	31350	31350	31350

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2.4 Spare parts list PM4600, PM4800, PM6000, PM6100

Item	Designation	PM4600 ME No.	PM4800 ME No.	PM6000 ME No.	PM6100 ME No.
1	Balance/scale board (with µprocessor, EAROM, 2 display holders, without items 2 and 20) Display holder	600264 34134	600264 34134	600264 34134	33577 34134
2	Reference resistor set	600258	600258	600258	600260
3	Measuring cell (adjusted, incl. TC)	600278	600278	600279	600232
4	Upper guide (with flexible bearing)	47052	47052	47053	47052
5	Lower guide (with flexible bearing)	47055	47055	47056	47055
6	Beam, complete	47661	47661	600311	600311
7	Flexible bearings for beam (set of 6 in each case, identical)	47058	47058	47059	47058
8	Link (set of 6 in each case, identical)	47060	47060	47061	600261
9	Detector with cable	600312	600312	600312	600312
10	Lower housing, without level, grey	216320	216320	216320	216322
10b	Leveling foot, black	216321	216321	216321	216321
11	Power supply unit, mounted	34160	34160	34160	34160
12	Power connector with wiring	600273	600273	600273	600273
13	Switch unit, mounted b)lock nut; 2 screws	47066	47066	47066	47066
14	Control bar (installation kit), without key b) 1 stirrup c) 1 fork d) 2 leaf springs e) 2 support plates f) 2 screws g) 2 rubber gaskets	600266	600266	600266	600266
14a	1 Key	34137	216309	216311	216312
15	Upper housing	600267	600267	600272	600267
16	Front glass set a) 1 front glass b) 1 clamping strip c) 4 seating locks d) 2 clips e) 1 cover strip	600021	600021	600021	600021

Item	Designation	PM4600 ME No.	PM4800 ME No.	PM6000 ME No.	PM6100 ME No.
17	Pan support, complete	47083	47083	–	47083
18	Weighing pan	47087 Ø 170 mm	47087 Ø 170 mm	–	47086 Ø 150 mm
19	Small parts set (PE/PM) a) 2 spacer sleeves b)10 rubber feet c) 2 covers (GD), PE/PM d) 5 covers (cal. screw PE) e) 1 cone f) 2 cornerload adjustment screws g) 2 setscrews h) 1 stop screw i) 2 housing screws k) 4 grommets	47089	47089	47089	47089
20	Resistor set (calibration range) Set of 73, 50 ppm, 560 Ω...1 MΩ Set of 15, 15 ppm, 3.6 kΩ...13 kΩ	 41299 47042	 41299 47042	 41299 47042	 – –
21	Platform support, complete	–	–	47084	–
21a	Drip pan	–	–	33715	–
21b	***Pan support***	**–**	**–**	***47896***	**–**
22	Weighing platform 228 x 182 mm	–	–	47088	–
24	Display board	600357	600357	600357	600357
25	Interface (data interface)	600355	600355	600355	600355
26	Level	34320	34320	34320	34320
27	Small parts set (PM) a) 6 leveling feet, brown b) 6 covers (GD), PM c) 3 cassette covers d) 6 rubber gaskets for control bar e) 8 taring washers for beam f) 6 seating locks for front glass	600256	600256	600256	600256
28	Memory cassette standard	600274	600274	600274	600274
29	Memory cassette bracket	34169	34169	34169	34169
51	Shorting plug, 2-pin for certified balances/scales	89404	89404	89404	89404
52	Hatched stickers for certified balances/scales (49)	31350	31350	31350	31350

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2.5 Spare parts list PM6, PM400C, PM2000C, PM2000MC

Item	Designation	PM6 ME No.	PM400C ME No.	PM2000C ME No.	PM2000MC ME No.
1	Balance/scale board (with µprocessor, EAROM, 2 display holders, without items 2 and 20) Display holder	600264 34134	600264 34134	33577 34134	33577 34134
2	Reference resistor set	600258	600259	600260	600260
3	Measuring cell (adjusted, incl. TC)	600279	600276	600227	600227
4	Upper guide (with flexible bearing)	47053	47051	600253	600253
5	Lower guide (with flexible bearing)	47056	47054	600019	600019
6	Beam, complete	600311	47661	600231	600231
7	Flexible bearings for beam (set of 6 in each case, identical)	47059	600307	600023	600023
8	Link (set of 6 in each case, identical)	47061	47060	600024	600024
9	Detector with cable	600312	600312	600252	600252
10	Lower housing, without level, grey	216320	216320	216322	216322
10b	Leveling foot, black	216321	216321	216321	216321
11	Power supply unit, mounted	34160	34160	34160	34160
12	Power connector with wiring	600273	600273	600273	600273
13	Switch unit, mounted b)lock nut; 2 screws	47066	47066	47066	47066
14	Control bar (installation kit), without key b) 1 stirrup c) 1 fork d) 2 leaf springs e) 2 support plates f) 2 screws g) 2 rubber gaskets	600266	600266	600266	600266
14a	1 Key	216310	216313	216359	216357
15	Upper housing	600272	600267	600225	600225
16	Front glass set a) 1 front glass b) 1 clamping strip c) 4 seating locks d) 2 clips e) 1 cover strip	600021	600021	600022	600022

Item	Designation	PM6 ME No.	PM400C ME No.	PM2000C ME No.	PM2000MC ME No.
17	Pan support, complete	–	47081	47082	47082
18	Weighing pan	– –	47085 Ø 130 mm	47085 Ø130 mm	47085 Ø130 mm
19	Small parts set (PE/PM) a) 2 spacer sleeves b)10 rubber feet c) 2 covers (GD), PE/PM d) 5 covers (cal. screw PE) e) 1 cone f) 2 cornerload adjustment screws g) 2 setscrews h) 1 stop screw i) 2 housing screws k) 4 grommets	47089	47089	47089	47089
20	Resistor set (calibration range) Set of 73, 50 ppm, 560 Ω...1 MΩ Set of 15, 15 ppm, 3.6 kΩ...13 kΩ	 41299 47042	 41299 47042	 – –	 – –
21	Platform support, complete	47084	–	–	–
21a	Drip pan	33715	–	–	–
21b	***Pan support***	***47896***	**–**	**–**	**–**
22	Weighing platform 228 x 182 mm	47088	–	–	–
23	Contact strips (10)	–	–	43540	43540
24	Display board	600357	600357	34130	34130
25	Interface (bidirectional)	600355	600355	600355	600355
26	Level	34320	34320	34320	34320
27	Small parts set (PM) a) 6 leveling feet, brown b) 6 covers (GD), PM c) 3 cassette covers d) 6 rubber gaskets for control bar e) 8 taring washers for beam f) 6 seating locks for front glass	600256	600256	600256	600256
28	Memory cassette standard	600274	600274	600274	600274
29	Memory cassette bracket	34169	34169	34169	34169
30	Glass draft shield Height	– –	34300 150 mm	– –	– –
31	Repair kit for glass draft shield	–	600358	–	–
32	Draft ring (around weighing pan)	–	33548	–	–
34	Carat pan Ø 90 mm Ø 60 mm	– –	38730 43851	38730 43851	38730 43851
51	Shorting plug, 2-pin for certified balances/scales	89404	89404	89404	89404
52	Hatched stickers for certified balances/scales (49)	31350	31350	–	–

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2.6 Spare parts list AM50, AM100, CM200, CM1200

Item	Designation		AM50 ME No.	AM100 ME No.	CM200 ME No.	CM1200 ME No.
1	Balance board (with µprocessor, EAROM, 2 display holders, without items 2 and 20) Display holder		33577 34134	33577 34134	33577 34134	33577 34134
2	Reference resistor set (1 ppm)		600028	600028	600028	600260
3	Measuring cell (adjusted, incl. TC)		600218	600218	600218	600224
4	Upper guide (with flexible bearing)		600308	600308	600308	600308
5	Lower guide (with flexible bearing)		600309	600309	600309	600309
6	Beam, complete	* new * old	600231 600219	600231 600219	600231 600219	600231 600219
7	Flexible bearings for beam (set of 6 in each case, identical)		600221	600221	600221	600221
8	Link (set of 6 in each case, identical)		600226	600226	600226	600226
9	Detector with cable	* new * old	600252 600312	600252 600312	600252 600312	600252 600312
10	Lower housing, without level, grey		216322	216322	216322	216322
10b	2 leveling feet, black (also 27a)		216321	216321	216321	216321
11	Power supply unit, mounted		34160	34160	34160	34160
12	Power connector with wiring		600273	600273	600273	600273
13	Switch unit, mounted b) lock nut; 2 screws		47066	47066	47066	47066
14	Control bar (installation kit), without key b) 1 stirrup c) 1 fork d) 2 leaf springs e) 2 support plates f) 2 screws g) 2 rubber gaskets		600266	600266	600266	600266
14a	1 Key		216314	216315	216316	216351
15	Upper housing		600225	600225	600267	600225
16	Front glass set a) 1 front glass b) 1 clamping strip c) 4 seating locks d) 2 clips e) 1 cover strip		600021	600021	600021	600021

* New ME numbers (new parts). If an old 600219 beam is replaced by a 600231 beam, the old 600312 detector must be changed to 600252.

Item	Designation	AM50 ME No.	AM100 ME No.	CM200 ME No.	CM1200 ME No.
18	Weighing pan	33600 Ø 80 mm	33600 Ø 80 mm	33600 Ø 80 mm	33600 Ø 80 mm
19	Small parts set (PE/PM) a) 2 spacer sleeves b)10 rubber feet c) 2 covers (GD), PE/PM d) 5 covers (cal. screw PE) e) 1 cone f) 2 cornerload adjustment screws g) 2 setscrews h) 1 stop screw i) 2 housing screws k) 4 grommets	47089	47089	47089	47089
20	Resistor set (calibration range) Set of 73, 50 ppm, 560 Ω...1 MΩ Set of 15, 15 ppm, 3.6 kΩ...13 kΩ	 – –	 – –	 41299 47042	 41299 47042
23	Contact strips (10)	43540	43540	43540	43540
24	Display board	600357	600357	600357	600357
25	Interface (bidirectional)	600355	600355	600355	600355
26	Level	34320	34320	34320	34320
27	Small parts set (PM) a) 6 leveling feet, brown b) 6 covers (GD), PM c) 3 cassette covers d) 6 rubber gaskets for control bar e) 8 taring washers for beam f) 6 seating locks for front glass	600256	600256	600256	600256
28	Memory cassette standard	600274	600274	600274	600274
29	Memory cassette bracket	34169	34169	34169	34169
30	Glass draft shield Height	34300 150 mm	33515 235 mm	34300 150 mm	34300 150 mm
31	Repair kit for glass draft shield	600358	600222	600358	600358
32	Draft ring (around weighing pan)	33548	33548	33548	33548
33	Calibration weight Weight	216502 50 g	216504 100 g	216500 20 g	216504 100 g
34	Carat pan Ø 90 mm Ø 60 mm	– –	– –	38730 43851	38730 43851
51	Shorting plug, 2-pin for certified balances	89404	89404	89404	89404
52	Hatched stickers for certified balances (49)	31350	31350	31350	31350

2.7 Spare parts list PJ200, PJ300, PJ360, PJ400

Item	Designation	PJ200 ME No.	PJ300 ME No.	PJ360 ME No.	PJ400 ME No.
1	Balance board (with µprocessor, EAROM, 2 display holders, without items 2 and 20) Display holder	600356 34134	600356 34134	600356 34134	600356 34134
2	Reference resistor set	600259	600259	600259	600259
3	Measuring cell (adjusted, incl. TC)	600275	600276	600276	600276
4	Upper guide (with flexible bearing)	47051	47051	47051	47051
5	Lower guide (with flexible bearing)	47054	47054	47054	47054
6	Beam, complete	47661	47661	47661	47661
7	Flexible bearings for beam (set of 6 in each case, identical)	600307	600307	600307	600307
8	Link (set of 6 in each case, identical)	47060	47060	47060	47060
9	Detector with cable	600312	600312	600312	600312
10	Lower housing, without level, grey	216320	216320	216320	216320
10b	2 leveling feet, black (also 27a)	216321	216321	216321	216321
11	Power supply unit, mounted	34160	34160	34160	34160
12	Power connection with wiring	600273	600273	600273	600273
13	Switch unit, mounted b) lock nut; 2 screws	47066	47066	47066	47066
14	Control bar (installation kit), without key b) 1 stirrup c) 1 fork d) 2 leaf springs e) 2 support plates f) 2 screws g) 2 rubber gaskets	600266	600266	600266	600266
14a	1 Key	34137	34137	34137	34137
15	Upper housing	600243	600243	600243	600243
16	Front glass set a) 1 front glass b) 1 clamping strip c) 4 seating locks d) 2 clips e) 1 cover strip	600248	600233	600234	600235

Item	Designation	PJ200 ME No.	PJ300 ME No.	PJ360 ME No.	PJ400 ME No.
17	Pan support, complete	47081	47081	47081	47081
18	Weighing pan	47085 Ø 130 mm	47085 Ø 130 mm	47085 Ø 130 mm	47085 Ø 130 mm
19	Small parts set (PE/PM) a) 2 spacer sleeves b)10 rubber feet c) 2 covers (GD), PE/PM d) 5 covers (cal. screw PE) e) 1 cone f) 2 cornerload adjustment screws g) 2 setscrews h) 1 stop screw i) 2 housing screws k) 4 grommets	47089	47089	47089	47089
20	Resistor set (calibration range) Set of 73, 50 ppm, 560 Ω...1 MΩ Set of 15, 15 ppm, 3.6 kΩ...13 kΩ	 41299 47042	 41299 47042	 41299 47042	 41299 47042
25	Interface (bidirectional)	600355	600355	600355	600355
26	Level	34320	34320	34320	34320
27	Small parts set (PM) a) 6 leveling feet, brown b) 6 covers (GD), PM c) 3 cassette covers d) 6 rubber gaskets for control bar e) 8 taring washers for beam f) 6 seating locks for front glass	600256	600256	600256	600256
28	Memory cassette standard	600240	600240	600240	600240
29	Memory cassette bracket	34169	34169	34169	34169
51	Shorting plug, 2-pin for certified balances	89404	89404	89404	89404
52	Hatched stickers for certified balances (49)	31350	31350	31350	31350

2.8 Spare parts list PJ600, PJ2000, PJ3000, PJ3600

Item	Designation	PJ600 ME No.	PJ2000 ME No.	PJ3000 ME No.	PJ3600 ME No.
1	Balance board (with µprocessor, EAROM, 2 display holders, without items 2 and 20) Display holder	600356 34134	600356 34134	600356 34134	600356 34134
2	Reference resistor set	600258	600258	600258	600258
3	Measuring cell (adjusted, incl. TC)	600277	600277	600278	600278
4	Upper guide (with flexible bearing)	47052	47052	47052	47052
5	Lower guide (with flexible bearing)	47055	47055	47055	47055
6	Beam, complete	47661	47661	47661	47661
7	Flexible bearings for beam (set of 6 in each case, identical)	47058	47058	47058	47058
8	Link (set of 6 in each case, identical)	600024	600024	47060	47060
9	Detector with cable	600312	600312	600312	600312
10	Lower housing, without level, grey	216320	216320	216320	216320
10b	2 leveling feet, black (also 27a)	216321	216321	216321	216321
11	Power supply unit, mounted	34160	34160	34160	34160
12	Power connection with wiring	600273	600273	600273	600273
13	Switch unit, mounted b) lock nut; 2 screws	47066	47066	47066	47066
14	Control bar (installation kit), without key b) 1 stirrup c) 1 fork d) 2 leaf springs e) 2 support plates f) 2 screws g) 2 rubber gaskets	600266	600266	600266	600266
14a	1 Key	34137	34137	34137	34137
15	Upper housing	600243	600243	600243	600243
16	Front glass set a) 1 front glass b) 1 clamping strip c) 4 seating locks d) 2 clips e) 1 cover strip	600247	600249	600236	600237

Item	Designation	PJ600 ME No.	PJ2000 ME No.	PJ3000 ME No.	PJ3600 ME No.
17	Pan support, complete	47082	47082	47083	47083
18	Weighing pan	47086 Ø 150 mm	47086 Ø 150 mm	47087 Ø 170 mm	47087 Ø 170 mm
19	Small parts set (PE/PM) a) 2 spacer sleeves b)10 rubber feet c) 2 covers (GD), PE/PM d) 5 covers (cal. screw PE) e) 1 cone f) 2 cornerload adjustment screws g) 2 setscrews h) 1 stop screw i) 2 housing screws k) 4 grommets	47089	47089	47089	47089
20	Resistor set (calibration range) Set of 73, 50 ppm, 560 Ω...1 MΩ Set of 15, 15 ppm, 3.6 kΩ...13 kΩ	 41299 47042	 41299 47042	 41299 47042	 41299 47042
25	Interface (bidirectional)	600355	600355	600355	600355
26	Level	34320	34320	34320	34320
27	Small parts set (PM) a) 6 leveling feet, brown b) 6 covers (GD), PM c) 3 cassette covers d) 6 rubber gaskets for control bar e) 8 taring washers for beam f) 6 seating locks for front glass	600256	600256	600256	600256
28	Memory cassette standard	600240	600240	600240	600240
29	Memory cassette bracket	34169	34169	34169	34169
51	Shorting plug, 2-pin for certified balances	89404	89404	89404	89404
52	Hatched stickers for certified balances (49)	31350	31350	31350	31350

2.9 Spare parts list PJ4000, PJ6000, PJ6

Item	Designation	PJ4000 ME No.	PJ6000 ME No.	PJ6 ME No.
1	Scale board (with µprocessor, EAROM, 2 display holders, without items 2 and 20) Display holder	600356 34134	600356 34134	600356 34134
2	Reference resistor set	600258	600258	600258
3	Measuring cell (adjusted, incl. TC)	600279	600279	600279
4	Upper guide (with flexible bearing)	47053	47053	47053
5	Lower guide (with flexible bearing)	47056	47056	47056
6	Beam, complete	600311	600311	600311
7	Flexible bearings for beam (set of 6 in each case, identical)	47059	47059	47059
8	Link (set of 6 in each case, identical)	47061	47061	47061
9	Detector with cable	600312	600312	600312
10	Lower housing, without level, grey	216320	216320	216320
10b	2 leveling feet, black (also 27a)	216321	216321	216321
11	Power supply unit, mounted	34160	34160	34160
12	Power connector with wiring	600273	600273	600273
13	Switch unit, mounted b) 1 lock nut; 2 screws	47066	47066	47066
14	Control bar (installation kit), without key b) 1 stirrup c) 1 fork d) 2 leaf springs e) 2 support plates f) 2 screws g) 2 rubber gaskets	600266	600266	600266
14a	1 Key	34137	34137	34137
15	Upper housing	626076	626076	626076
16	Front glass set a) 1 front glass b) 1 clamping strip c) 4 seating locks d) 2 clips e) 1 cover strip	600238	600239	600246

Item	Designation	PJ4000 ME No.	PJ6000 ME No.	PJ6 ME No.
19	Small parts set (PE/PM) a) 2 spacer sleeves b)10 rubber feet c) 2 covers (GD), PE/PM d) 5 covers (cal. screw PE) e) 1 cone f) 2 cornerload adjustment screws g) 2 setscrews h) 1 stop screw i) 2 housing screws k) 4 grommets	47089	47089	47089
20	Resistor set (calibration range) Set of 73, 50 ppm, 560 Ω...1 MΩ Set of 15, 15 ppm, 3.6 kΩ...13 kΩ	 41299 47042	 41299 47042	 41299 47042
21	Platform support, complete	47084	47084	47084
21a	Drip pan (retrofittable)	–	33715	33715
22	Weighing platform 228 x 182 mm	47088	47088	47088
25	Interface (bidirectional)	600355	600355	600355
26	Level	34320	34320	34320
27	Small parts set (PM) a) 6 leveling feet, brown b) 6 covers (GD), PM c) 3 cassette covers d) 6 rubber gaskets for control bar e) 8 taring washers for beam f) 6 seating locks for front glass	600256	600256	600256
28	Memory cassette standard	600240	600240	600240
29	Memory cassette bracket	34169	34169	34169
51	Shorting plug, 2-pin for certified scales	89404	89404	89404
52	Hatched stickers for certified scales (49)	31350	31350	31350

2.10 Spare parts list AJ100, AJ50L, AJ100L, AJ150L

Item	Designation	AJ100 ME No.	AJ50L ME No.	AJ100L ME No.	AJ150L ME No.
1	Balance board (with µprocessor, EAROM, 2 display holders, without items 2 and 20) Display holder	33693 34134	33577 34134	33577 34134	33577 34134
2	Reference resistor set	600028	600028	600028	600029
3	Measuring cell (adjusted, incl. TC)	600218	600218	600218	600020
4	Upper guide (with flexible bearing)	600308	600308	600308	600308
5	Lower guide (with flexible bearing)	600309	600309	600309	600309
6	Beam, complete	600231	600231	600231	600231
7	Flexible bearings for beam (set of 6 in each case, identical)	600221	600221	600221	600221
8	Link (set of 6 in each case, identical)	600226	600226	600226	600226
9	Detector with cable	600252	600252	600252	600252
10	Lower housing, without level, grey	216322	216322	216322	216322
10b	2 leveling feet, black (also 27a)	216321	216321	216321	216321
11	Power supply unit, mounted	34160	34160	34160	34160
12	Power connector with wiring	600273	600273	600273	600273
13	Switch unit, mounted b) lock nut; 2 screws	47066	47066	47066	47066
14	Control bar (installation kit), without key b) 1 stirrup c) 1 fork d) 2 leaf springs e) 2 support plates f) 2 screws g) 2 rubber gaskets	600266	600266	600266	600266
14a	1 Key	34137	34137	34137	34137
15	Upper housing	600245	600245	600245	600245
16	Front glass set a) 1 front glass b) 1 clamping strip c) 4 seating locks d) 2 clips e) 1 cover strip	600244	33480	33482	33475

Item	Designation	AJ100 ME No.	AJ50L ME No.	AJ100L ME No.	AJ150L ME No.
18	Weighing pan	33600	33600	33600	33600
19	Small parts set (PE/PM) a) 2 spacer sleeves b)10 rubber feet c) 2 covers (GD), PE/PM d) 5 covers (cal. screw PE) e) 1 cone f) 2 cornerload adjustment screws g) 2 setscrews h) 1 stop screw i) 2 housing screws k) 4 grommets	47089	47089	47089	47089
23	Contact strips (10)	43540	43540	43540	43540
24	Display board	–	34130	34130	34130
25	Interface (bidirectional)	600355	600355	600355	600355
26	Level	34320	34320	34320	34320
27	Small parts set (PM) a) 6 leveling feet, brown b) 6 covers (GD), PM c) 3 cassette covers d) 6 rubber gaskets for control bar e) 8 taring washers for beam f) 6 seating locks for front glass	600256	600256	600256	600256
28	Memory cassette standard	600240	***600141***	***600141***	***600141***
29	Memory cassette bracket	34169	34169	34169	34169
30	Glass draft shield Height	34300 150 mm	34300 150 mm	34300 150 mm	33515 235 mm
31	Repair kit for glass draft shield	600358	600358	600358	600222
32	Draft ring (around weighing pan)	33548	33548	33548	33548
33	Calibration weight Weight	216557 100 g	216558 50 g	216557 100 g	216557 100 g
51	Shorting plug, 2-pin for certified balances	89404	89404	89404	89404
52	Hatched stickers for certified balances (49)	31350	31350	31350	31350

Changed numbers or text are in bold italic print (Oct. 2001)

2.11 Spare parts list CJ150, CJ500

Item	Designation	CJ150 ME No.	CJ500 ME No.
1	Balance board (with µprocessor, EAROM, 2 display holders, without items 2 and 20) Display holder	33693 34134	33693 34134
2	Reference resistor set	600028	600028
3	Measuring cell (adjusted, incl. TC)	600218	600218
4	Upper guide (with flexible bearing)	600308	600308
5	Lower guide (with flexible bearing)	600309	600309
6	Beam, complete	600231	600231
7	Flexible bearings for beam (set of 6 in each case, identical)	600221	600221
8	Link (set of 6 in each case, identical)	600226	600226
9	Detector with cable	600252	600252
10	Lower housing, without level, grey	216322	216322
10b	2 leveling feet, black (also 27a)	216321	216321
11	Power supply unit, mounted	34160	34160
12	Power connector with wiring	600273	600273
13	Switch unit, mounted b) lock nut; 2 screws	47066	47066
14	Control bar (installation kit), without key b) 1 stirrup c) 1 fork d) 2 leaf springs e) 2 support plates f) 2 screws g) 2 rubber gaskets	600266	600266
14a	1 Key	34137	34137
15	Upper housing	600245	600245
16	Front glass set a) 1 front glass b) 1 clamping strip c) 4 seating locks d) 2 clips e) 1 cover strip	600250	 33605 (glass only)

Item	Designation	CJ150 ME No.	CJ500 ME No.
18	Weighing pan	43851	33600
19	Small parts set (PE/PM) a) 2 spacer sleeves b)10 rubber feet c) 2 covers (GD), PE/PM d) 5 covers (cal. screw PE) e) 1 cone f) 2 cornerload adjustment screws g) 2 setscrews h) 1 stop screw i) 2 housing screws k) 4 grommets	47089	47089
23	Contact strips (10)	43540	43540
25	Interface (bidirectional)	600355	600355
26	Level	34320	34320
27	Small parts set (PM) a) 6 leveling feet, brown b) 6 covers (GD), PM c) 3 cassette covers d) 6 rubber gaskets for control bar e) 8 taring washers for beam f) 6 seating locks for front glass	600256	600256
28	Memory cassette standard	600240	33607
29	Memory cassette bracket	34169	34169
30	Glass draft shield Height spherical	33520 150 mm	34300
31	Repair kit for glass draft shield	–	600358
32	Draft ring (around weighing pan)	–	33548
33	Calibration weight Weight	216559 20 g	216557 100 g
34	Beaker Pan	– –	15020 38730
51	Shorting plug, 2-pin for certified balances	89404	–
52	Hatched stickers for certified balances (49)	31350	–

3. Packings

	Balances with round weighing pan without draft shield ME No.	Scales with rectangular weighing platform or draft shield ME No.
Demo packing		
Upper and lower packing parts (set)	34415	34419
Partition carton	47655	47655
Demo wrapping	34416	34416
Hand grip (to demo wrapping)	41294	41294
Stopper (for cone)	47834	47834
Plastic bag (balance/scale)	***299020***	***299020***
Export packing (around demo packing)		
Export foam cushioning (2 needed)	47657	47657
Export box	34423	34423
Accessories packing (2 needed)	47931	47931

Changed numbers or text are in bold italic print (Oct. 2001)

4. Tools and working aids

In addition to the usual tools found in a mechanic's tool kit (screwdriver, engineer's wrench, etc.), the following tools and working aids are required:

Pcs.	Designation	ME No.
1	ServicePac-M 1 adjustment cassette 1 type cassette 1 service keypad	73611
1	ServicePac-J (for balances of the J series)* 1 adjustment cassette 1 type cassette 1 interface	73615
1	Multimeter with direct voltage, alternating voltage and ohm range (FLUKE No. 8022A)	73568
1	Soldering iron 25...30 watt	73561
	Soldering wire dia. 0.7 mm	73564
	Desoldering braid	73565
1	Vacuum desoldering tool	73005
1	Vernier calipers (sliding calipers)	73567
2	Special shims of 1.5 mm thickness for hanger immobilization	73571
1	Phillips screwdriver No. 1	73071
1	Phillips screwdriver No. 2	73072
 1 1	Resistor set (calibration range) Set of 73, 50 ppm, 560 Ω...1 MΩ Set of 15, 15 ppm, 3.6 kΩ...13 kΩ	 41299 47042
1	Operating instructions "Bidirectional data interface of the PM balances/scales"	702178
1	Operating instructions "Bidirectional data interface of the J balances/scales, Option 018"	702742
1	Service weight set (class F1) for precision balances 1 x 5 g, 1 x 20 g, 2 x 50 g, 2 x 100 g, 1 x 500 g, 2 x 1 kg, 2 x 2 kg	73603
1	Standard weight set (class E2) with certificate for analytical balances 2 x 100 mg, 2 x 200 mg, 2 x 500 mg, 2 x 1 g, 2 x 2 g, 2 x 5 g, 2 x 10 g, 2 x 20 g, 2 x 50 g, 1 x 100 g	73227

* The keypad of the ServicePac-M is needed for ServicePac-J.

Contents

1. Checklists

1.1 Checklist maintenance

Warning!

Standby circuit. The balance/scale is live when connected to the power line. It is also live when the display is switched off.

Visual check

- Completeness check in accordance with standard equipment.
- Check condition of the following parts:
  - Housing
  - Front glass
  - Weighing pan/platform
  - Pan/platform support
  - Control bar
  - Leveling screws
  - Level
  - Protective cover
  - Draft shield
  - Power cable
  - Fuse
  - Data transmission cable
  - Hand/foot switch

Function check

- Leveling
- Check control bar
- Check reproducibility
- Hysteresis check with full load and with minimum load
- Check cornerload and linearity
  Test weights and tolerances, see section F.
- Check plug-in connections
  - Check power socket, GM connection and DATA I/O connection
  - Check data transmission cable and peripherals
  - Check Pac application

Cleaning

- Disconnect power cable.
- For cleaning in the region of the front glass, it may be necessary to remove the control bar, see section D.
  Warning:
  Never use nitro solvents!

1.2 Checklist repairs and adjustment

Troubleshooting

Repairs

- Disconnect power cable.
- Replacement of damaged and/or defective parts, see section D.

Adjustment

- Print out customer's configuration or record in the list in section F.
- Disconnect any peripherals attached to the balance or scale.
- With the power cable disconnected, withdraw the customer's cassette and insert the adjustment cassette (service module).
- Readjust stop.
- Level.
- Adjust cornerload.
- With AM/CM/AJ/CJ balances and scales, check level if beam has been replaced.
- Perform adjustment, see section D.

Final worksteps

- With the power cable disconnected, reinsert customer's cassette.
- Set up original customer configuration.
- Attach peripherals.
- Perform work specific to certified weighing units, see section 2.6.
- Calibrate if need be.

2. ServicePacs

2.1 General

Use of the ServicePacs

ServicePacs are needed to

- perform the adjustment,
- load the EAROM on the balance/scale board with type and measuring cell parameters after board replacement,
- overwrite the measuring cell parameters in the EAROM after measuring cell replacement,
- clear the EAROM contents.

Special ServicePacs for the M and J series

The **ServicePac-M** has the following components:

- terminal (entry keypad),
- type cassette for balances/scales of the M series and AJ...L balances (type module M, **grey** cassette),
- adjustment cassette for balances/scales of the M series and AJ...L balances (service module M, **grey** cassette).

The **ServicePac-J** has the following components:

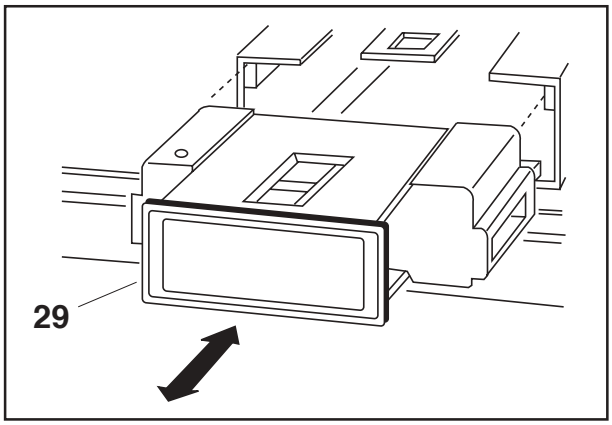
- type cassette for balances of the J series (type module J, **red** cassette), load type parameters of the AJ...L balances with the M cassette,
- adjustment cassette for balances of the J series (service module J, **red** cassette), adjust AJ...L balances with the M cassette,
- data interface to attach the terminal of ServicePac-M.
- Use the terminal of ServicePac-M as an entry keypad.

Functions of type and adjustment cassettes

Type cassette (type module)	**Adjustment cassette** (service module)
Loading type parameters and certified version	Resistance adjustment
Clearing the EAROM	Linearity adjustment
	Calibration
	Temperature compensation
	Entering measuring cell parameters

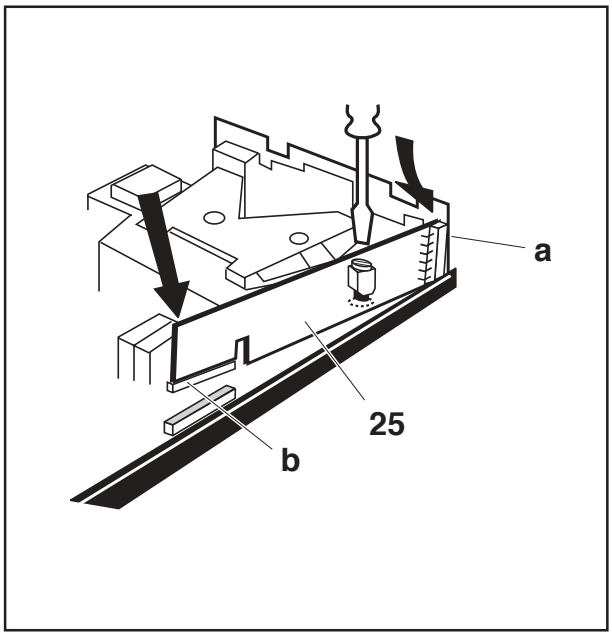
2.2 Attaching the ServicePac

M balances/scales



- Disconnect power cable.
- Withdraw customer's cassette using bracket (29) and insert type or adjustment cassette.
- Attach terminal to GM output of the balance/ scale.

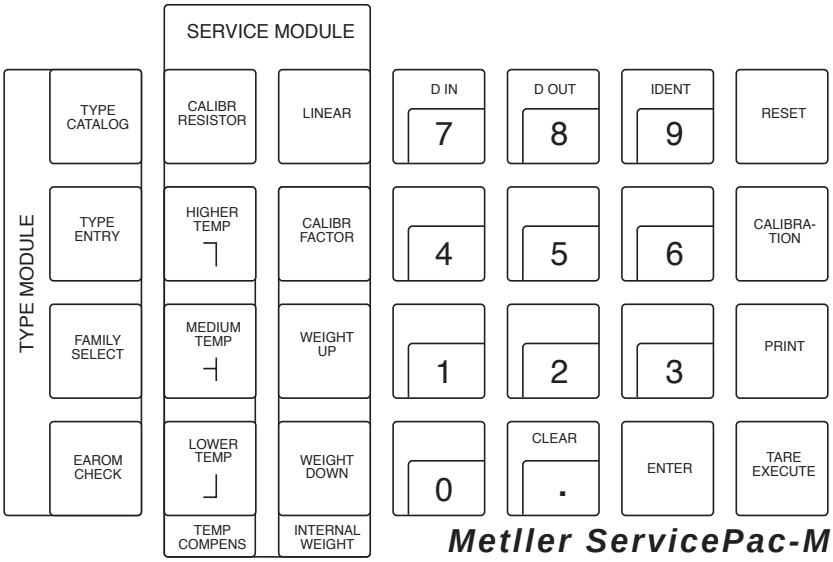
J balances



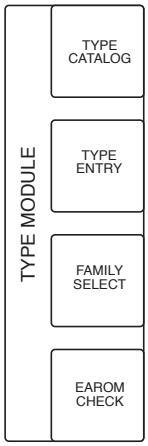
J balances have no data interface built in. To attach the ServicePac terminal, therefore, a data interface must be installed.

- Disconnect power cable.
- Lift off weighing pan and pan support, unscrew fastener screw.
- Remove tare bar and lift off upper housing vertically.
- Withdraw customer's cassette using bracket (29) and insert type or adjustment cassette.
- To install the data interface, push out the plastic insert (a) at the rear of the balance towards the rear.
- Insert board (25), plug in connector (b), fasten screws.
- Close balance and mount weighing pan.
- Connect terminal to GM output of the interface.

2.3 Keypad of ServicePac terminal



Keys with the type cassette (type module)



Display and printer list all balance/scale types whose type parameters are stored in the type cassette.

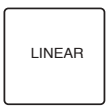
Loads the type parameters of the types in question into the EAROM. Entry of the type parameters must be confirmed twice with ENTER.

Switching between AM/CM/PM and SM types when loading the type parameters.

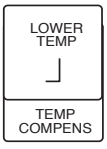
Checks the operability and the content of the EAROM.

Keys with the adjustment cassette (service module)

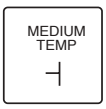
Checking and performing the resistance adjustment.



Checking and adjusting the linearity.



Start of the adjustment cycle in the temperature compensation at the lowest temperature step.



Start of the adjustment cycle in the temperature compensation at the middle temperature step.

HIGHER TEMP 7

Start of the adjustment cycle in the temperature compensation at the highest temperature step.

CALIBR FACTOR

Inactive at present

WEIGHT UP

Inactive at present

WEIGHT DOWN

INTERNAL WEIGHT

Inactive at present

General field

CALIBRA-TION

Calibration

TARE EXECUTE

In adjustment: Triggering of the next step or measurement cycle.
When display switched on: Taring.

D IN 7

Start of the entry of cell parameters.
The next number line (0...20) to be keyed in appears in the display.
If a keying error occurs during entry the number line does not change, the entry must be repeated.

D OUT 8

Printout of the stored measuring cell parameters.

IDENT 9

Printer outputs identification No. of the cell parameters stored in the EAROM.

0-9

Entry of the type designation or cell parameters.

ENTER

Conclusion of each numeric entry.

PRINT

Print command.

CLEAR .

With the type cassette: Separation between type designation and version in entry of the type, e.g. 4800.10.
With the adjustment cassette: Clearing of the last inputted digit.

RESET

With the type cassette: Clearing of the EAROM content.

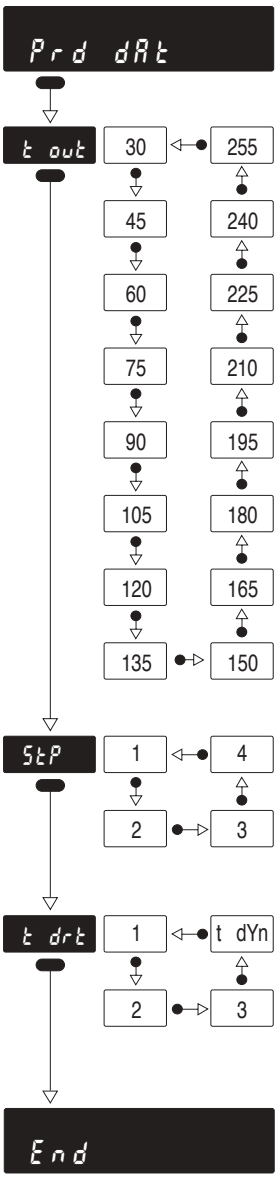
2.4 Configuration register of adjustment cassette

The "ConF" register of the adjustment cassette has the menu sections

- "SCALE",
- "I-FACE" and
- "Prd dAt".

The available settings in the menu sections "**SCALE**" and "**I-FACE**" are identical to the possible settings of the standard cassette, see operating instructions of the balance or scale.

The menu section "**Prd dAt**" contains additional parameters that can be set for service operations.



"Time out"

Max. admissible time in seconds for the performance of a measurement after its start.

"Temp. Step"

Minimum temperature difference in °C between the temperature steps (lower/ medium/higher temp.) in the temperature adjustment
Setting for service purposes: "Stp 1"

"Temp. drift"

During the adjustment, the microprocessor controls the drift of the temperature sensors with tolerances 1, 2 or 3. With "t dyn", no tolerance is set. Setting for service purposes: "t dyn".

2.5 Contents of type cassettes type module M and type module J

Type module M

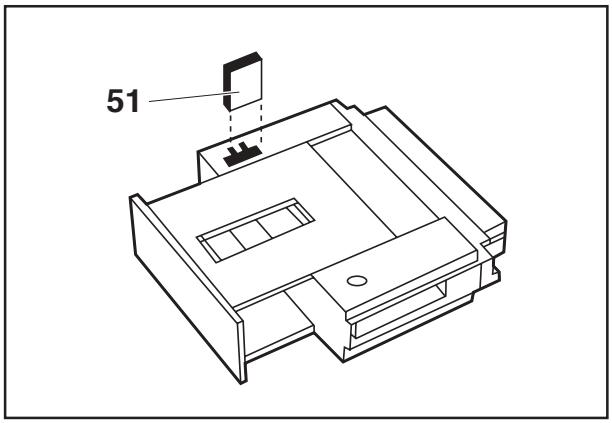
Type	Entry	Display	Entry	Display
AM50	5 0	A.50		
AM100	1 0 0	A. 100		
AJ50L	5 0	A.50		
AJ100L	1 0 0	A. 100		
AJ150L	1 5 0	A. 150		
CM200	2 0 0	C.200		
CM1200	1 2 0 0	C. 1200		
PM400C	4 0 0	C.400		
PM2000C	2 0 0 0	C.2000		
PM100	1 0 0	A. 100	FAMILY SELECT	P. 100
PM200	2 0 0	C.200	FAMILY SELECT	P.200
PM300	3 0 0	P.300		
PM400	4 0 0	C.400	FAMILY SELECT	P.400
PM460	4 6 0	P.460		
PM480	4 8 0	P.480		
PM600	6 0 0	P.600		
PM1200	1 2 0 0	C. 1200	FAMILY SELECT	P. 1200
PM2000	2 0 0 0	C.2000	FAMILY SELECT	P.2000
PM2000MC	2 1 0 0	P.2 100		
PM2500	2 5 0 0	P.2500		
PM3000	3 0 0 0	P.3000		
PM4000	4 0 0 0	P.4000		
PM4600	4 6 0 0	P.4600		
PM4800	4 8 0 0	P.4800		
PM6	6	P.6		
PM6000	6 0 0 0	P.6000		
PM6100	6 1 0 0	P.6 100		

Type module J

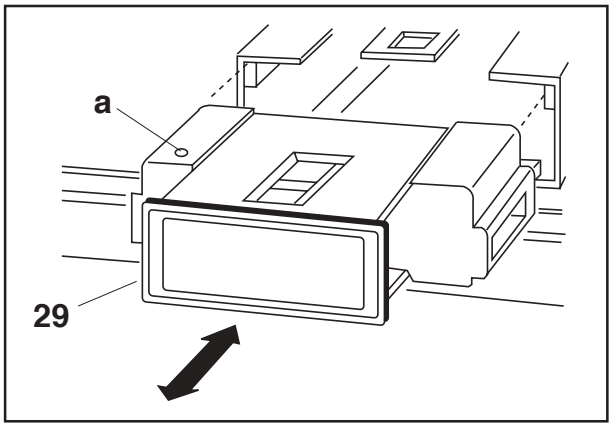
Type	Entry	Display
AJ100	1 0 0	A. 100
CJ150	1 5 0	C. 150
CJ500	5 0 0	C.500
PJ200	2 0 0	P.200
PJ300	3 0 0	P.300
PJ360	3 6 0	P.360
PJ400	4 0 0	P.400
PJ600	6 0 0	P.600
PJ2000	2 0 0 0	P.2000
PJ3000	3 0 0 0	P.3000
PJ3600	3 6 0 0	P.3600
PJ4000	4 0 0 0	P.4000
PJ6000	6 0 0 0	P.6000
PJ6	6	P.6

2.6 Special features of certified balances/scales

After servicing:



- Calibrate balance/scale with the adjustment cassette.
- Disconnect power cable, remove adjustment cassette and insert customer's cassette without shorting plug (51).
- Wait until warmed up.
- Level and calibrate.
- Set up customer's configuration.
- Disconnect power cable.
- Remove cassette and connect shorting plug (51) to both pins of the cassette.



- Insert cassette.
- Secure cassette with screw (a).
- Close balance/scale.
- Check calibration.
- Seal balance/scale if applicable.

2.7 Special features of custom versions

The type parameters of custom versions are **not** contained in the type cassette but in the appropriate balance/ scale cassette (software version V60.xx.XX, XX = 50 ... FF).

Replacing the balance/scale board

- Install new board.
- Load the basic type with the type cassette (see parameter strips or table in section F). If the basic type can not be loaded, clear the EAROM contents, see section D.
- Read in parameter strips.
- Perform adjustment.
- Calibrate with the adjustment cassette.
- Insert cassette for custom version and the correct parameters of the custom version will be read in automatically.

Replacing the measuring cell

- Install new measuring cell.
- Insert adjustment cassette.
- Attach terminal.
- Key in cell parameters.
  If the cell parameters can not be entered, clear the EAROM contents (see section D) and load the basic type (see parameter strips or table in section F).
- Perform adjustment.
- Insert cassette for custom version and the correct parameters of the custom version will be read in.
- Calibrate.

Contents

1. Troubleshooting

Fault	Possible cause	Rectification
Balance/scale can not be switched on/off	• No line voltage	
	• Fuse blown	Replace fuse
	• Connection cable of switch unit (13) or power supply unit (11) for balance/scale board not connected or defective	Plug in cable or replace
	• Power supply unit defective	Check voltage Replace power supply unit (D 2.1)
	• Detector cable has short circuit to ground	Check detector cable
	• Board defective	Check voltage Replace board (D 2.6)
	• Switch unit (13) loose/without pretensioning/not adjusted	Adjust switch unit (D 2.3)
	• Bracket/switching fork not bent properly	Adjust switch unit (D 2.3)
	• Microswitch of switch unit (13) loose or defective	Adjust/replace switch unit (D 2.3)
Taring not possible	• cf. balance/scale can not be switched off	
	• Board defective	Replace board (D 2.6)
Individual segments of the display do not light up	• Display defective	Check voltages Replace display
	• Programm cassette defective	Replace program cassette
Microfuse keeps blowing	• Wrong fuse rating	95-120 V: 125 mA slow-blow 190-240 V: 63 mA slow-blow
	• Short circuit/short circuit to ground in transformer, wiring, board	Check power consumption, move parts, check for warming up
Weighing cell (beam) does not stabilize	• Stop (19h) wrongly adjusted	Preadjust stop
	• Coil touching somewhere	Check coil Adjust stop (D 3.2)
	• Power supply	Check voltages
	• Connection cable not plugged in or loose	Plug in connection cable properly
	• Break/short circuit in coil/coil connections or not plugged in	Check coil/coil connections
	• Short circuit to ground TC sensor	Check TC sensor
	• Board defective	Replace board (D 2.6)
	• Detector	Check detector

Fault	Possible cause	Rectification
Abrupt change of the display	• Moving part of weighing cell touching somewhere	Check weighing cell
	• Loose screws on weighing cell	Check screws
	• Poor plug-in contact/poor soldering point	Check plug-in contacts, soldering points
	• Board defective	Replace board (D 2.6)
	• Detector not fastened tightly	Screw detector tight
	• Severe vibrations at weighing station	
Overload/underload display	• Stop (19h) wrongly adjusted	Preadjust stop Adjust stop (D 3.2)
	• Detector/detector cable loose/ defective	Check detector
	• Break in coil/coil connection; winding short	Check coil/coil connections
	• Wrong dead load weight, wrong pan/ platform support or wrong pan/ platform	Check counterweight, pan/platform support and pan/platform
	• Board defective	Replace board (D 2.6)
Overload display before reaching full load	• Dead load weight somewhat too small	Mount additional, nonmagnetic washer from small parts set
	• Wrong pan/platform	
Calibration not possible	• Protective cover touching some-where	Position protective cover correctly
	• Wrong test weight	Load correct test weight
	• Resistance adjustment	Repeat resistance adjustment (D 4.2)
	• Wrong reference resistance	Correct reference resistance (D 4.2)
	• Calibration blocked for certification reasons (jumper)	
	• Board defective	Replace board (D 2.6)
Underload display in resistance adjust-ment	• Coil current too low as R41 still missing	Load small weight as preload until R41 has been soldered in Load weight until zero display
Hysteresis or unsta-ble display	• Hair/fiber touching moving parts	Check moving parts
	• Loose screws on weighing cell	Check all screws
	• Detector loose/dirty/defective	Check detector
	• Flexible bearing/link tensioned/dirty/ defective	Check flexible bearing and link
	• Hanger mounted at an angle	Install hanger correctly (D 1.2)
	• Magnet system dirty	Clean magnet system (D 1.2)
	• Lateral stop touching somewhere	Check lateral stop

Fault	Possible cause	Rectification
Display drift	• Temperature compensation poor	Perform temperature compensation (D 4.2)
	• Flexible bearing/link tensioned	Remove flexible bearing and link (D 1.2)
	• Coil/magnets dirty	Clean coil/magnets
	• Detector defective	Replace detector (D 1.3)
	• Board defective	Replace board (D 2.6)
Cornerload not adjustable	• Guide defective/guide attachment tensioned/loose	Check guide/guide attachment
	• Locking plates for adjustment not loosened	Loosen locking plates
	• Setscrew/cornerload screw (19g) loose	Tighten setscrew/cornerload screw (D 1.4)
Linearity not adjustable	• Cornerload not adjusted	Check basic setting
	• Detector loose/defective	Check detector
	• Flexible bearing/link tensioned/ defective	Check flexible bearing and link
	• Board defective	Replace board (D 2.6)

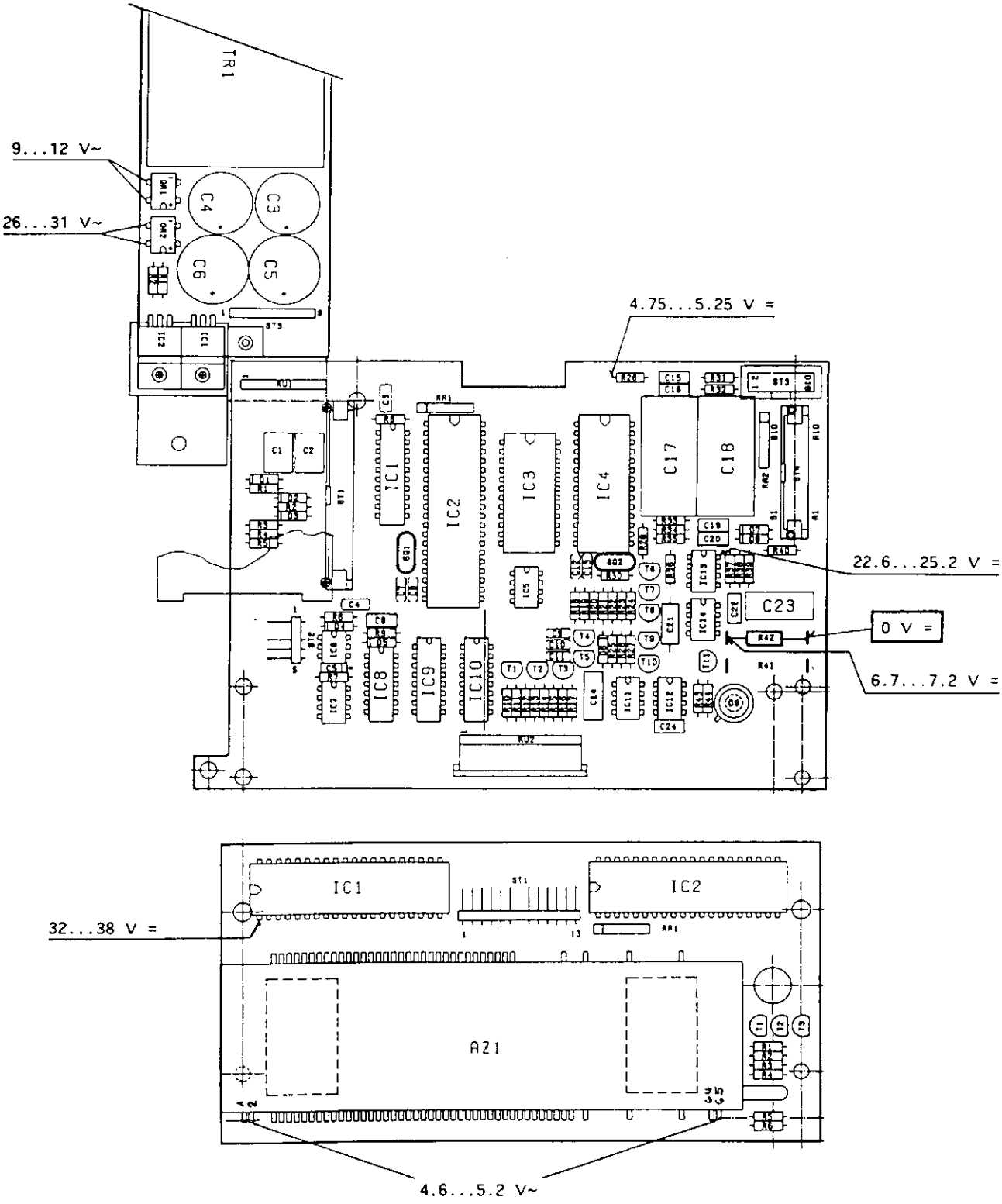
2. Error messages

Display	Meaning/cause	Rectification
E CHS	Wrong checksum • Input error in measuring cell parameters	Repeat entry
E count	• Overflow in microprocessor	Switch balance/scale off/on, repeat measurement
	• Defective	Replace board (D 2.6)
E EnPF	Sensitivity outside tolerance • Measurement error	Repeat measurement
E Input	• Wrong measuring cell data inputted	Repeat entry
E Lin	• Linearity deviation too large	Perform linearity adjustment (D 4.2)
E null	Dead load wrong • Weights are still on the weighing pan/platform when the balance/ scale requests zero	Unload weighing pan/platform, repeat measurement
	• Wrong weighing pan/platform	
	• Wrong counterweight on beam	Correct counterweight (dead load) on beam with washer
E out r	Out of Range • Dead load not correct	Check dead load
	• Cell defective	Replace cell (D 1.6)
E rES	Total resistance not appropriate for balance/scale type • Adjustment resistor R41 missing/ wrong	Solder in R41
	• Reference resistance wrong	Solder in correct reference resistance
	• Wrong type read in or test weight wrong	Check type and test weight
E tout	• Measurement time exceeded	Press tare bar, repeat measurement Alter "t out" (B 2.4)
E t_rn9	• Wrong temperature range in TC adjustment	Select different temperature step
E t_uSt	Temperature recording supplies unstable measured values • Temperature unstable	Establish stable temperature conditions
	• Temperature sensor defective	Replace temperature sensor (D 1.3)
	• Wrong setting of "t drt"	Set "t dyn" (B 2.4)

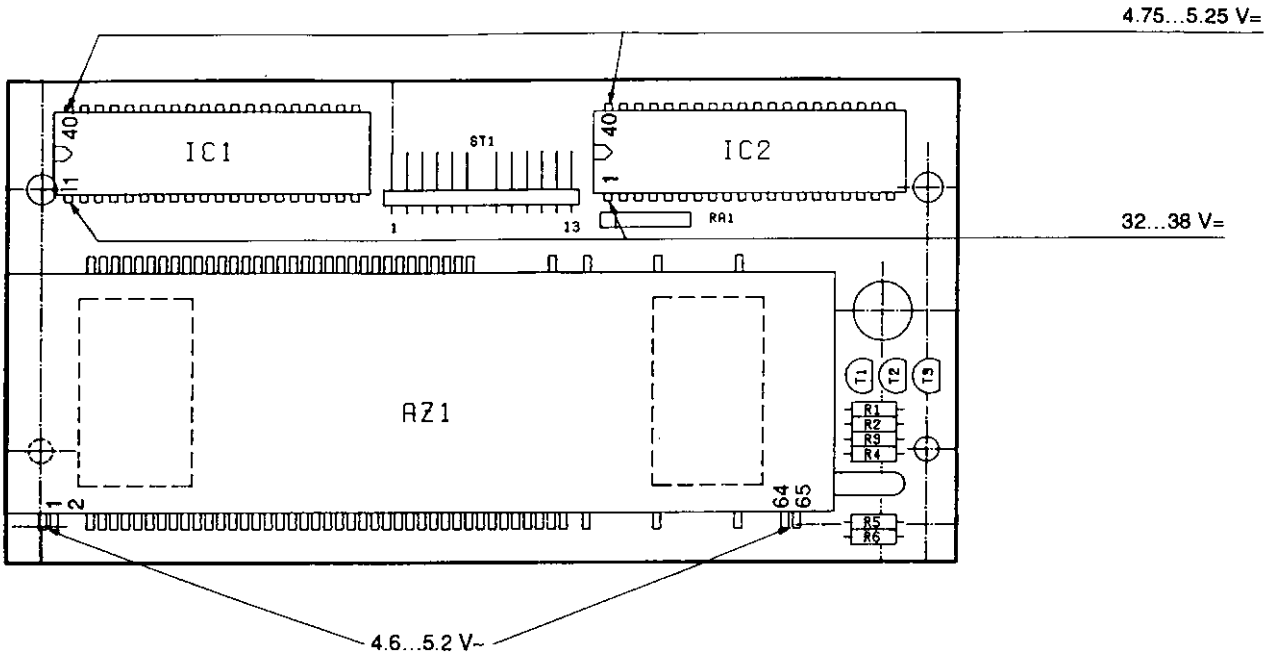
Display	Meaning/cause	Rectification
E unStb	• Balance/scale unstable	Check location Check measuring cell
Error 1, 2, 5, 6	• Fault on balance/scale board	Replace board (D 2.6)
Error 3	• Read/operational fault of cassette	Replace cassette
Error 4	• Error in temperature measurement • Measuring cell cable not plugged in	Repeat measurement Check measuring cell cable
Error 8	• No temperature adjustment	Key in measuring cell parameters Perform TC adjustment (D 4.2)
Error 9	• Wrong balance/scale type loaded	Load correct balance/scale type (D 4.1)

3 Checking voltages

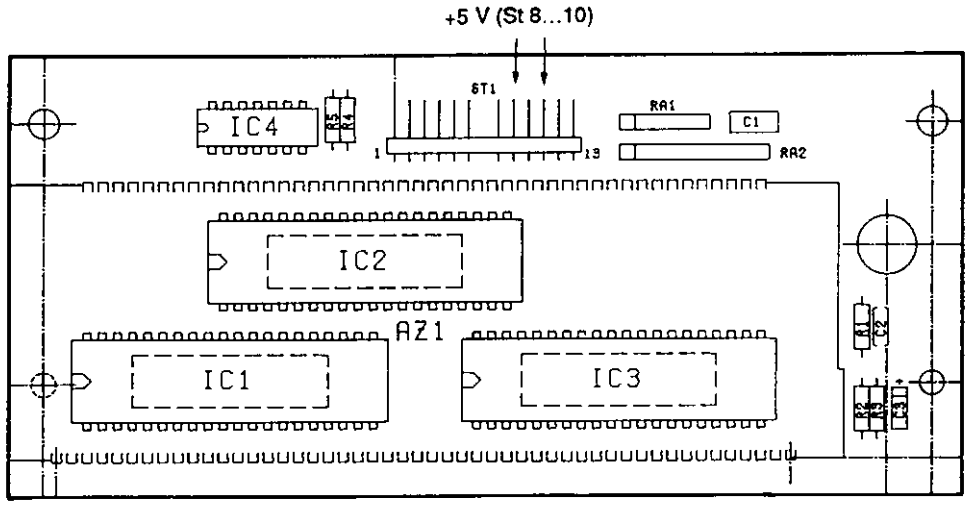
3.1 Balance/scale board



3.2 Display board, fluorescent



3.3 Display board, LCD



Contents

1. Measuring cell

1.1 Removing measuring cell

Warning:

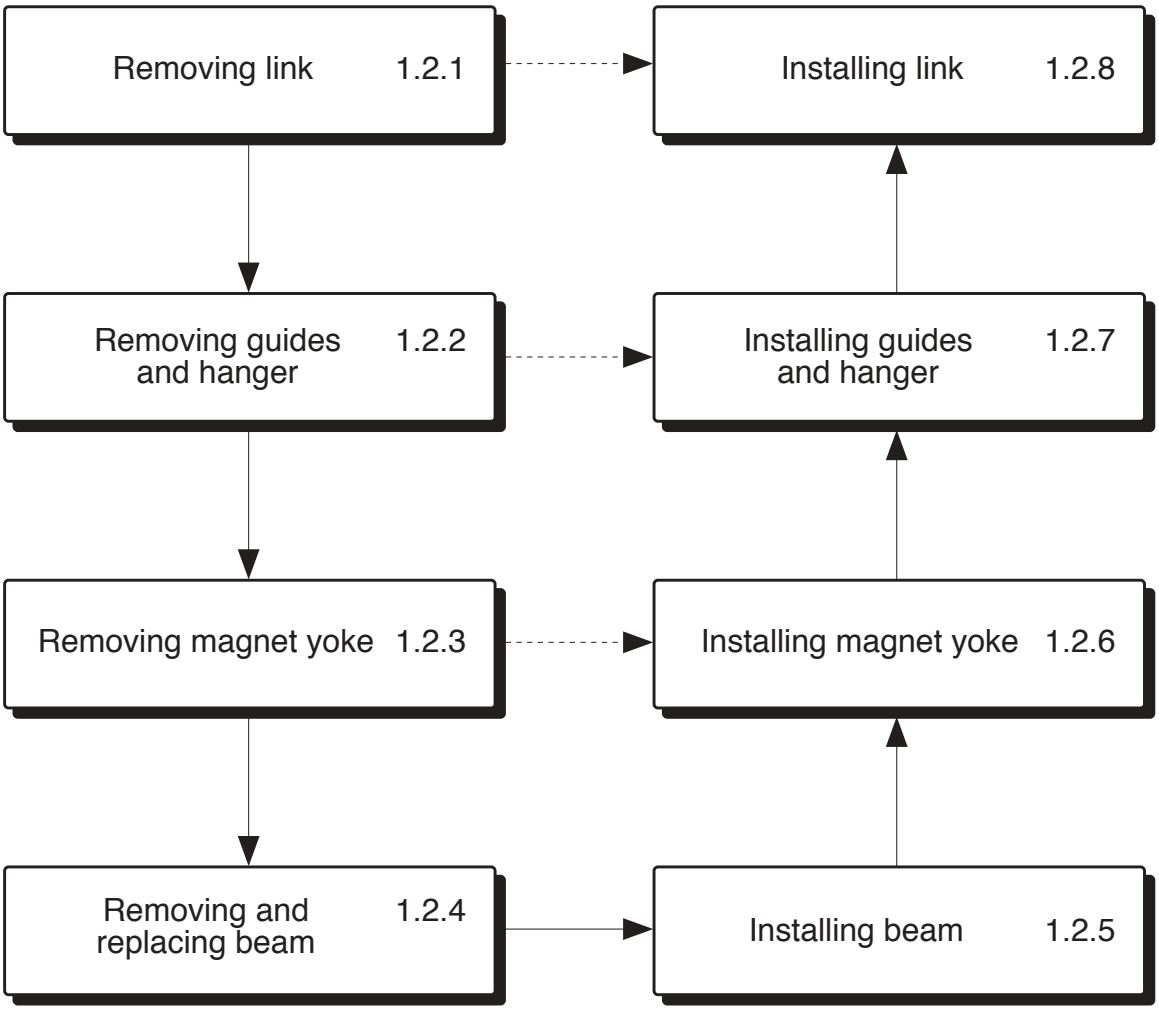
Never exert any pressure on guides (4, 5), cone (19e) or hanger!
Do not loosen or tighten any screws on guides, link (8) or hanger without first immobilizing the hanger!

- Disconnect balance/scale from power supply and open.
- Remove data interface (25).
- Unscrew cable clip from housing base, disconnect connector of ribbon cable (9) from balance/scale board (1).
- With weighing units with the high-resolution precision measuring cell, first undo the left rear screw (warning: the level drops out!), then the right front screw at the collar and remove collar.
- Place balance/scale on its side, hold measuring cell by support and remove 3 or 2 screws on housing base.
- With scales with a rectangular weighing platform, first remove platform support (21) with drip pan.
- Take out measuring cell.

1.2 Disassembling measuring cell

Overview

When disassembling the measuring cell, it is essential to proceed according to the sequence listed below. If the cell does not have to be disassembled completely, when assembling a start can be made with the part last removed.



1.2.1 Removing link

Working aids: 2 hanger shims ME-73571

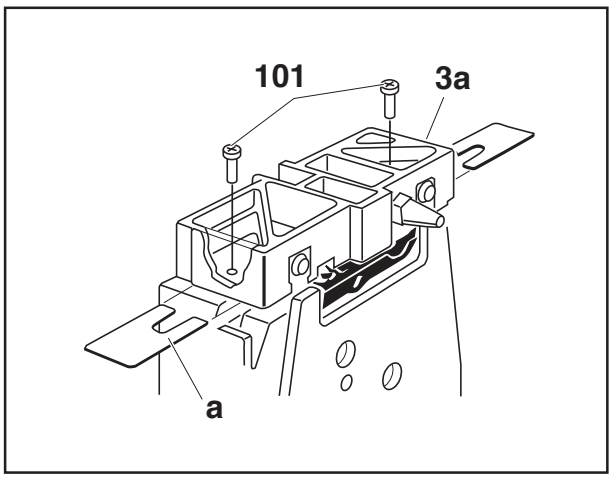
- Place measuring cell on its back.
- Unscrew socket head screws of link (8), first undo lower link screw, keep screws with associated washers in a safe place.

  Warning:

  When loosening the lower link screw, hold torsion protector. Counterclockwise rotation of the torsion protector could destroy the link.
- Take out link and beam extension with tweezers. Handle link carefully.
- Checking link.
  Place link on set square, sliding calipers or similar and check evenness.

Installing link: section 1.2.8.

1.2.2 Removing guides and hanger



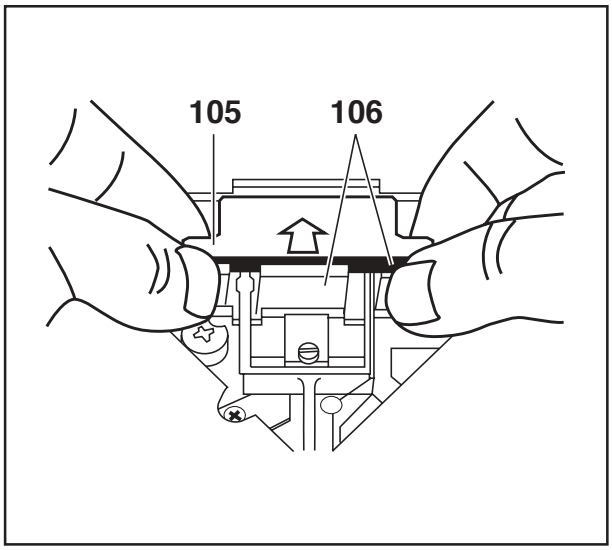
- Remove link, see section 1.2.1.
- Loosen lower guide screws (on support) of both guides; do not take out yet.
- Lift up hanger (3a) with your hand and slide the two hanger shims ME-73571 between support and hanger. Immobilize hanger with the 2 cell fastener screws (101) (M4 x 10).
- Remove lower guide screws.
- Undo upper guide screws on support and remove together with the guides.
- Demount hanger again.

Installing guides and hanger: section 1.2.7.

1.2.3 Removing magnet yoke

Warning:

Since the magnet is made of very brittle, sintered material, the greatest possible care must be exercised during the work to avoid getting splinters in your eyes! Avoid attraction of steel tools and other foreign objects!



- Remove 4 screws.
- With the measuring cell with the hanger side facing you, position index fingers from behind under both yoke protrusions (105) and support both thumbs on the rigid, vertical plate (106) of the magnet system.
- Lift out magnet yoke steadily keeping it vertical. Some force is necessary to overcome the magnetic attraction!
- Cleaning magnet system.
  Dab the two yokes and particularly edges and corners of the 4 magnets as well as the coil of the beam with adhesive tape. Exercise care in regard to the connection leads!

Installing magnet yoke: section 1.2.7.

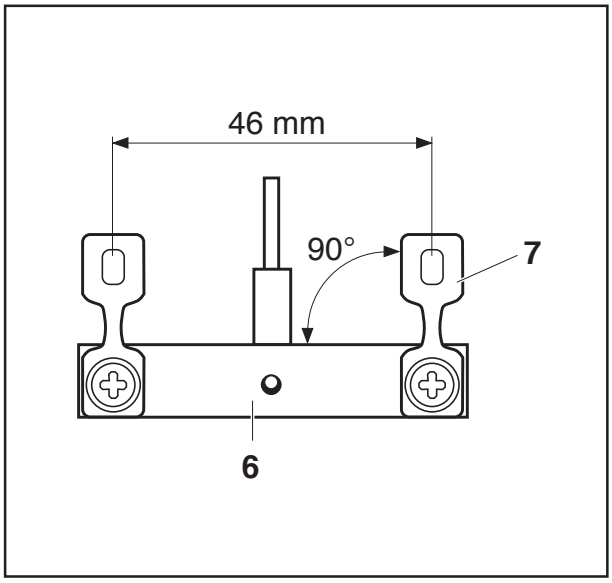
1.2.4 Removing beam

- Remove link, see section 1.2.1.
- Remove guides and hanger, see section 1.2.2.
- Remove magnet yoke, see section 1.2.3.
- Unscrew connection plate from support and screw loosely onto beam (6) with the same screw, insert screw through the other hole in the plate.
- With the precision measuring cell, do not unsolder the connection leads, do not bend; with the high-resolution precision measuring cell unsolder strips on both sides, do not bend!
- Unscrew impact guard.
- Turn stop (19h) so that the slot is over the lug on the beam. Note direction of rotation.
- Unscrew both flexible bearings (7) from support.
- Lift beam out of the measuring cell. Exercise care in regard to coil and magnets.
- Place beam upside down.

Replacing beam

- Unscrew the dead load weight from the old beam and transfer to new beam.
- With dead load weight properly seated on beam, tighten screw. The dead load must not change its position if subject to vibrations and shocks.
- Screw on new flexible bearings.

Replacing flexible bearings



- Remove link, see section 1.2.1.
- Remove guides and hanger, see section 1.2.2.
- Unscrew connection plate from beam; exercise care in regard to the connection leads!
- Lay beam (6) upside down on bench top, press down, loosen flexible bearings (7) and unscrew.
- Replace both flexible bearings, round hole on beam side, Belleville spring washers lay with the major diameter on the flexible bearing. Tighten screws only loosely.
- Press upside-down beam against the bench top, the flexible bearings must be flush with the beam, i.e. they must also be in contact with bench and be vertical to the beam. Observe 46 mm separation. Tighten screws.
- Screw connection plate loosely to beam.

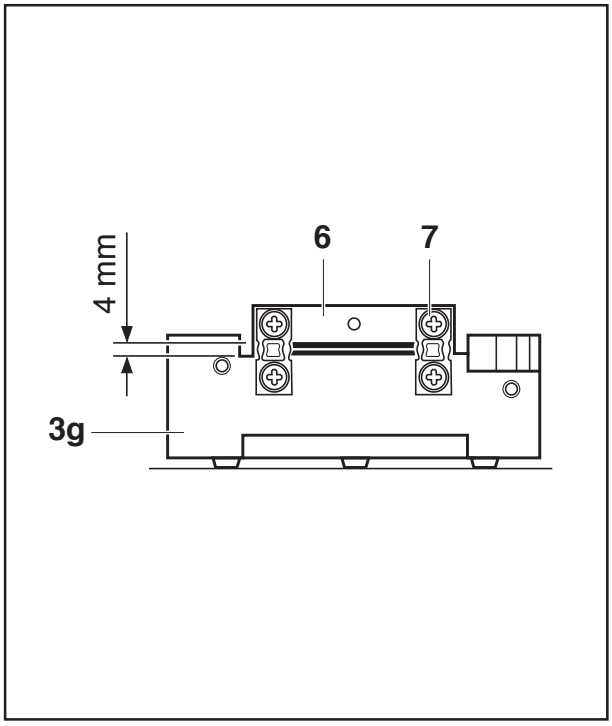
Installing beam: section 1.2.5.

1.2.5 Installing beam

Working aids: 2 spacers, e.g. 4 mm Allen key or wire/dowel with dia. 4 mm.

Warning:

Before the beam is installed, clean magnet system.

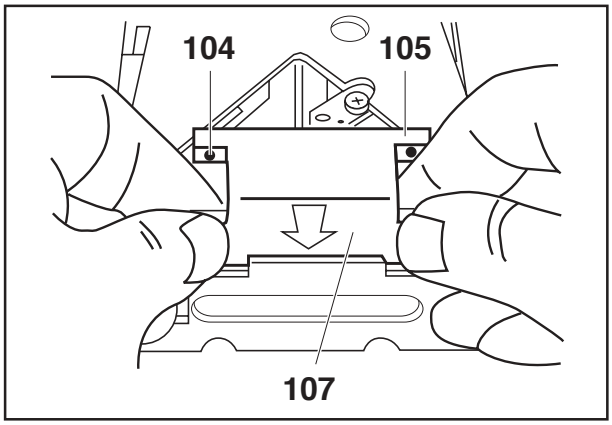


- Insert beam (6) from above in the support; exercise care with coil and flexible bearings.
- Turn stop in direction opposite to that when removing to secure the beam.
- Screw flexible bearings to support (3g) with the major diameter of the Belleville spring washers lying on the flexible bearing (7). Maintain 4 mm gap between support and beam by inserting a 4 mm Allen key or wire/dowel with dia. 4 mm in the flexible bearing. Press beam down on flexible bearing side, tighten screws.
- Insert impact guard and align so that the stud of the beam is centered in the retaining hole. Check by lateral pressure on the beam.
- Unscrew connection plate from beam and screw onto support.
- With indirect connection via a 2nd connection plate, solder on the gold wires carefully again and align parallel. Keep minimum distance 2 mm between wires and between wires and measuring cell base.

1.2.6 Installing magnet yoke

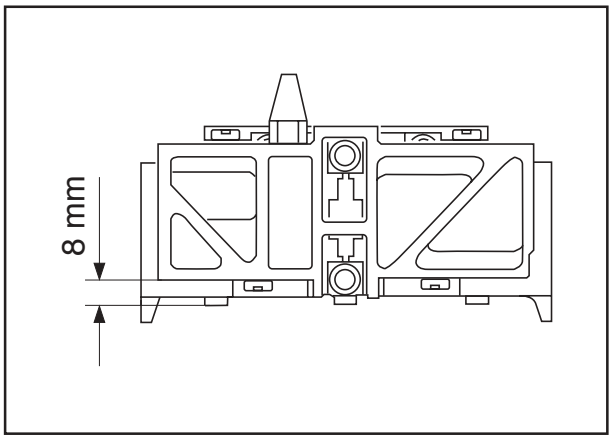
Warning:

Since the magnet is made of very brittle, sintered material, the greatest possible care must be exercised during the work to avoid getting splinters in your eyes! Avoid attraction of steel tools and other foreign objects!



- Place measuring cell on bench with magnet system facing you.
- Grip both sides of vertical plate of magnet yoke (107) and guide in sideways with the middle fingers. Insert yoke carefully from above while in contact with rear of measuring cell. Do not place fingers under the yoke protrusions (105)!
- Push yoke downward guiding it carefully both longitudinally and laterally. The repulsion of the magnets must first be overcome. When the yoke is attracted, release.
- Align yoke, tighten screws (104).

1.2.7 Installing hanger and guides



- Place measuring cell on its back.
- Position hanger shims and hanger on the support.
- Center holes in hanger with the threaded holes in support and at the same time pay attention to the gap 8 ± 0.1 mm (see illustration).
- Secure hanger with two screws M4 x 10.
- Tighten both guides (4, 5) without tensioning, aligning them with the holes of the flexible bearings.
- Remove hanger shims with the 2 M4 x 10 screws.

1.2.8 Installing link

Checking link

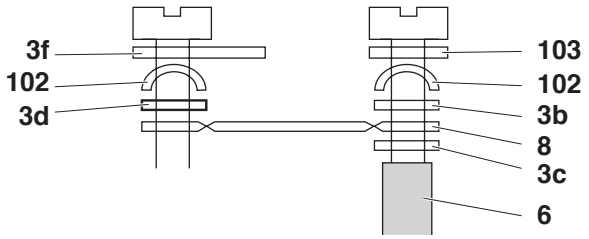
Bent links cause hysteresis, linearity errors, drift and poor reproducibility.

- Hold link at center point and check evenness with a square or sliding calipers.

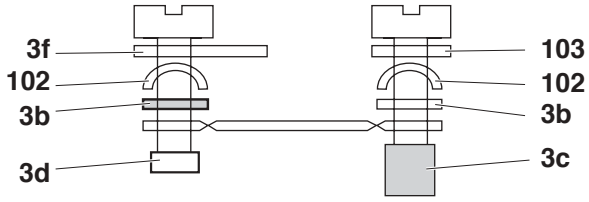
Warning:

- If in doubt, replace link!
  This also applies to faulty flexible bearings of beam and guides!
- The beam extension (3c) and pressure plate (3b) are made of special material to compensate the thermal expansion, hence use only original parts!
  Dimensions of the individual weighing unit types: see table on page 11.

Precision measuring cell



High-resolution precision measuring cell



- Place measuring cell on its back.
- Place beam extension (3c) on the beam.
- Mount link, round hole on beam side, long hole at hanger.
- Screw together as shown in illustration opposite.
- Check whether there is lateral play between screw and link.
- Tighten screw at beam (round hole), screw at hanger still loose.
  Check that link has not shifted downward in sideways direction.
- Remove hanger fastening.
- Adjust the distance between hanger and support to 8 mm with vernier calipers, see illustration on page 7. Torsion protection plates must be on the hanger at the right.
- Tighten screw.

	Pressure plate 3b	Beam extension 3c	Pressure plate 3d	Hanger extension 3e
PM100	2.0 mm	9.4 mm	–	–
PM200	2.0 mm	9.4 mm	–	–
PM300	2.0 mm	9.4 mm	–	–
PM400	2.0 mm	9.4 mm	–	–
PM460	2.0 mm	9.4 mm	–	–
PM480	2.0 mm	9.4 mm	–	–
PM600	3.3 mm	3.3 mm	–	–
PM1200	2.0 mm	5.3 mm	2.0 mm	2.0 mm
PM2000	3.3 mm	3.3 mm	–	–
PM2500	2.0 mm	2.0 mm	2.0 mm	–
PM3000	2.0 mm	2.0 mm	–	–
PM4000	2.0 mm	2.0 mm	–	–
PM4600	2.0 mm	2.0 mm	–	–
PM4800	2.0 mm	2.0 mm	–	–
PM6000	2.0 mm	–	–	–
PM6100	2.0 mm	–	2.0 mm	–
PM6	2.0 mm	–	–	–
PM400C	2.0 mm	9.4 mm	–	–
PM2000C	2.0 mm	2.0 mm	2.0 mm	–
PM2000MC	2.0 mm	2.0 mm	2.0 mm	–
AM50	4.0 mm	15.4 mm	4.0 mm	6.0 mm
AM100	4.0 mm	15.4 mm	4.0 mm	6.0 mm
CM200	4.0 mm	15.4 mm	4.0 mm	6.0 mm
CM1200	4.0 mm	13.4 mm	4.0 mm	4.0 mm
PJ200	2.0 mm	9.4 mm	–	–
PJ300	2.0 mm	9.4 mm	–	–
PJ360	2.0 mm	9.4 mm	–	–
PJ400	2.0 mm	9.4 mm	–	–
PJ600	3.3 mm	3.3 mm	–	–
PJ2000	3.3 mm	3.3 mm	–	–
PJ3000	2.0 mm	2.0 mm	–	–
PJ3600	2.0 mm	2.0 mm	–	–
PJ4000	2.0 mm	2.0 mm	–	–
PJ6000	2.0 mm	–	–	–
PJ6	2.0 mm	–	–	–
AJ100	4.0 mm	15.4 mm	4.0 mm	6.0 mm
AJ50L	4.0 mm	15.4 mm	4.0 mm	6.0 mm
AJ100L	4.0 mm	15.4 mm	4.0 mm	6.0 mm
AJ150L	4.0 mm	15.4 mm	4.0 mm	6.0 mm
CJ150	4.0 mm	15.4 mm	4.0 mm	6.0 mm
CJ500	4.0 mm	15.4 mm	4.0 mm	6.0 mm

1.3 Replacing detector and TC sensor

- There are 2 types of TC sensors.
- Before performing any operations on the detector, check that the stop is adjusted and the coil is in order!
- To replace the detector or the detector cable, the measuring cell is not disassembled.

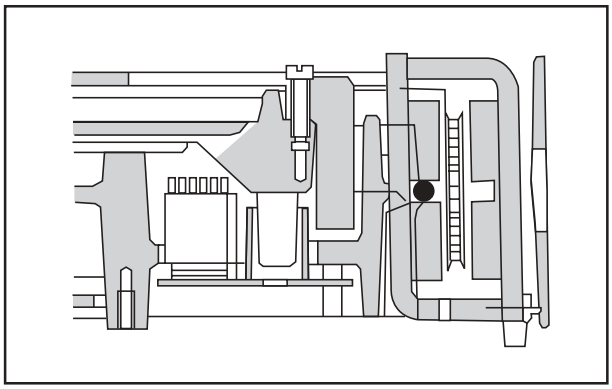
Type A - with screw-mounted TC sensor

The existing temperature sensor must remain in the balance/scale for the TC adjustment; the detector cable is also left in place.

- Detach cable clip from support; unscrew temperature sensor and detector on base of cell, keep grommet and insulation of sensor in a safe place.
- Push in ribbon cable by approx. 2 cm, take out the detector downward and detach from cable. Unsolder temperature sensor.
- Connect new detector to ribbon cable of measuring cell aligning the coding of the cable connector with the tip of the detector board. Insert detector board while feeding in the ribbon cable and fix so that the detector vane is in the middle of the detector slot. Mount existing temperature sensor with insulation support and grommet, solder in and fasten.
- Use an ohmmeter to check that there is no short circuit with the magnet!
- Align ribbon cable so that the beam can not touch it and fasten to support with cable clip.

Version B - detector with TC sensor in the magnet system (after summer 1986)

The existing sensor must remain in the balance/scale for the TC adjustment; the detector cable is also left in place.



- Detach cable clip from support.
- Mark polarity of connection leads (110) of the TC sensor, then unsolder.
- Replace detector as described for the case of the screw-mounted TC sensor. Solder in connection leads of the TC sensor; ensure correct polarity.
- Check that detector and temperature sensor are firmly fastened, that the detector cable is securely plugged in and fastened to the support with the cable clip.

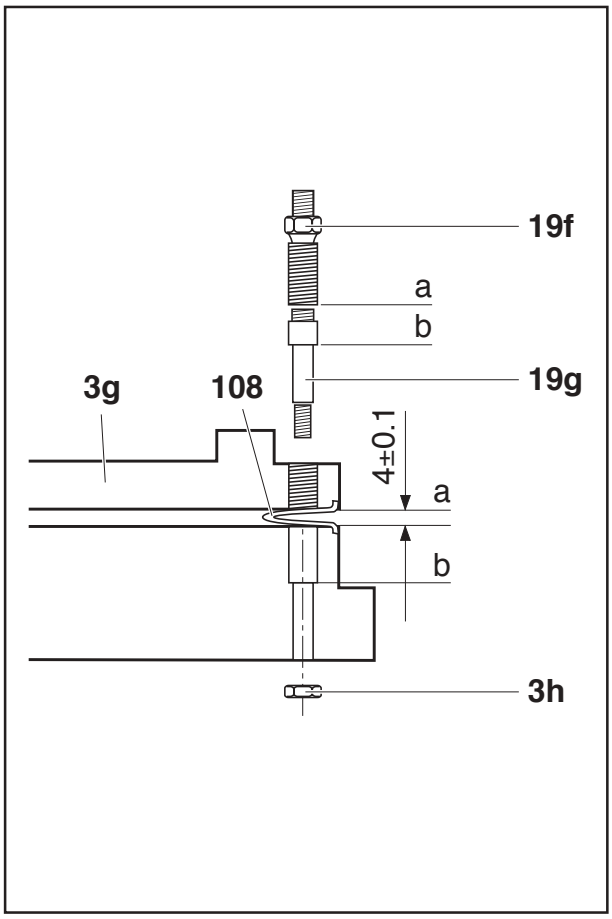
Warning:

- Replacement of the detector can have an adverse influence on the temperature compensation (TC) of the zero point. If repair is performed in a service center, a subsequent TC adjustment should be performed.
- After replacing the detector a lineary adjustment must be performed.

Temperature sensor

The temperature sensor is not a spare part.
Since the replacement measuring cells are thermally adjusted, METTLER advises replacing the cell if the temperature sensor is faulty.

1.4 Removing and installing cornerload screw and setscrew



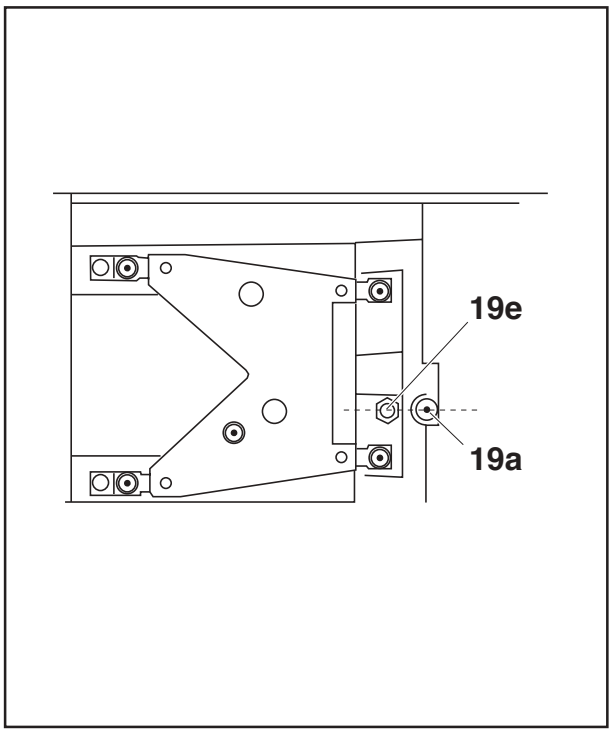
- Remove measuring cell (see section 1.1).
  With weighing units with the precision measuring cell, remove locking plate and cornerload spring (108).
- Remove nut (3h), then unscrew the setscrew (19g) together with cornerload screw (19f).
- Grease threads of setscrew (19g) and cornerload screw (19f), then screw both parts together until the stop.
- Now screw cornerload screw with setscrew into the support (3g) until flush with surface at "a".
- Hold cornerload screw, screw in setscrew (19g) until it makes contact with "b".
- Measure 4 mm gap. If it is too small, turn setscrew until it is 4 ± 0.1 mm. If gap is greater than 4 mm, unscrew setscrew the appropriate distance (1 turn = 0.7 mm). Screw nut (3h) onto setscrew and tighten loosely. The cornerload screw must not rotate.
- Insert cornerload spring (108), mount locking plate. Tighten only the bottom screws!
- Check gap 4 ± 0.1 mm again, it may have increased owing to the cornerload spring (108).
- If distance 4 ± 0.1 mm is correct, tighten nut (3h) fully. While doing so, hold setscrew (19g) with a screwdriver.

Adjustment of cornerload screw and setscrew, see subsection 3.3.

1.5 Replacing measuring cell

- Remove defective measuring cell, see subsection 1.1 in this section.
- Install new measuring cell, see subsection 1.6 in this section.
  You will find a new cover plate and the type parameters of the new measuring cell (same identification No. "INR") in the packaging of the replacement cell.
- Stick the parameter sticker of the relevant balance/scale type over the existing parameter sticker; the other parameter stickers are not needed.
- Perform adjustment, see subsection 4 in this section.

1.6 Installing measuring cell



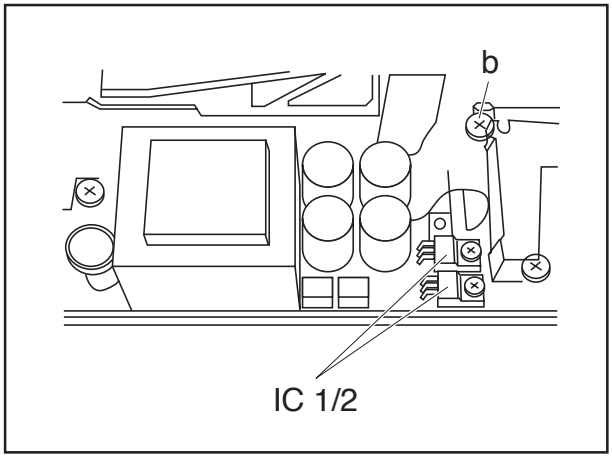
- Before installation, check that the link screws, all flexible bearing screws on support and hanger (upper and lower guide), the detector as well as the lock nuts are firmly tightened.
- When fastening the measuring cell in the lower housing, align it so that the locking plates of the cornerload are centered in front of the openings in the rear panel and the measuring cell is parallel to the lower housing.
- Cone (19e) should be centered behind support (19a).
- With weighing units having the high-resolution precision measuring cell, mount collar around the measuring cell. Check that foam strips are in order and no moving parts touch the collar.

Warning:

Never exert any pressure on guides (4, 5), cone (19e) or hanger (3a)!
Do not loosen or tighten any screws on guides, link (8) or hanger without first immobilizing the hanger!

2. Other assemblies and parts

2.1 Power supply unit



- Remove cassette, disconnect line connections ST1/2 and ribbon cable connector.
- First remove the 3 outer screws, then the 2 inner ones. Do **not** undo voltage regulators IC1/2.
- Unscrew screw (b) of the balance/scale board by a few turns.
- Raise cassette guide slightly and take out power supply unit sideways.

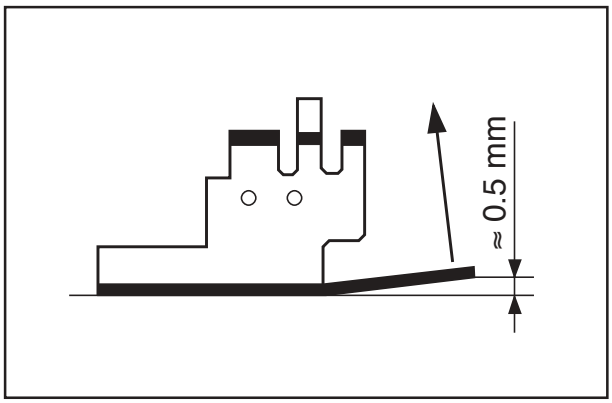
Installation of the power supply is in the reverse order.

- Voltage selector setting on new power supply unit must be the same as on the old unit.

2.2 Control bar

- Hold balance/scale firmly and press on housing behind the front glass to remove tare bar.
  With all fingertips of one hand hold the bar underneath and pull lower edge forward. Plastic part snaps out, then lift up.
- Mount bar by pushing over the switch bracket until the plastic projections snap in.
- Adjusting the switch unit, see section 2.3.

2.3 Switch unit



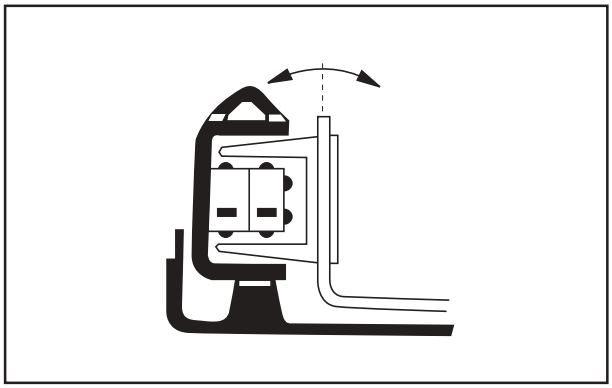
Removing switch unit

- Pull off flat connector, remove lock nut and rear screw.
- Unscrew screw on lower housing until the switch unit can be withdrawn backward.

Installing switch unit

- Bend up rear flat part of mount approx. 0.5 mm, this ensures pretensioning when adjusting.
- After insertion of the switch unit, tighten screw firmly.

Adjusting switch unit



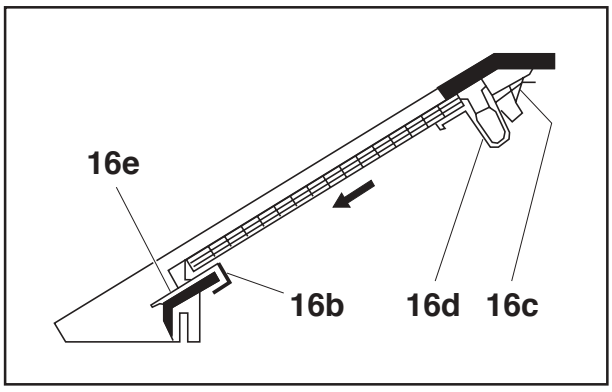
- Horizontally:
  Switching fork prongs must be parallel to top and bottom surfaces of the microswitches. If necessary, bend stirrup.
- Vertically:
  Adjust lock nut so that the travel of the control bar is approximately the same upward and downward.

2.4 Front glass

Removing front glass

- Bend up seating locks slightly with a small screwdriver where they contact the stud and remove.
- Remove clip, take out glass inward, remove clamping strip and cover strip.

Installing front glass



- Position cover strip (16e) and slide clamping strip (16b) over it from inside.
- Insert glass and push in to base of clamping strip in the direction of the arrow.
- Attach clip (16d), push new seating locks (16c) over studs and use to fasten clip.

2.5 Level

- Disassemble level.
- Level balance/scale with the help of a reference level (on the balance/scale housing).
- Mount new level and align appropriately by bending the level holder.
- Calibrate balance/scale.

2.6 Balance/scale board

- Disconnect balance/scale from power supply, take out customer's cassette.
- Disengage display, disassemble data output, take off 4 ribbon cable connectors, disassemble board.
- Transfer reference resistor R42 to replacement board.
- Screw on replacement board, plug in 4 flat connectors, install data output, engage display.
- Perform adjustment, see section 4 on page 21.

3. Settings

3.1 General

- Before every adjustment, check that the measuring cell is mechanically in order.
- Test weights and tolerances, see section F.
- Before the setting operations, the weighing unit must be switched on for long enough to ensure that no noticeable temperature drift appears.

3.2 Beam stop

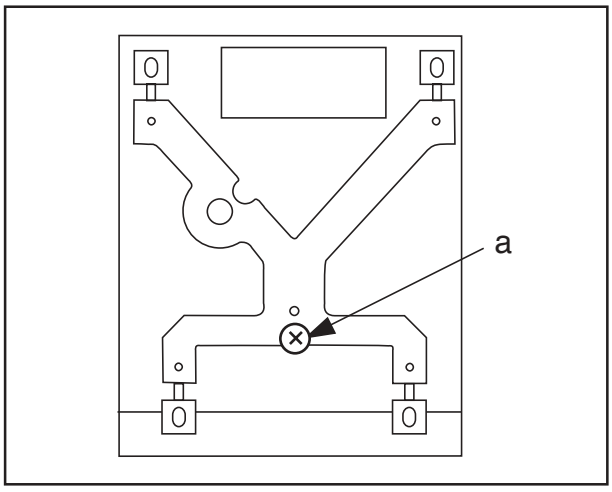
- Switch on balance/scale, unscrew stop until the display just changes.
- Now screw in stop a bare 1/2 turn; exact rotation: 150°.

Warning:

The notch in the stop must not be positioned directly over the lug of the beam! With a brass stop, undo/tighten the setscrew at the side if installed!

3.3 Leveling

With AM/CM/AJ/CJ balances and scales, the level can be adjusted front and rear by turning the leveling screw.



- Tare balance/scale.
- Place approx. 1 mm underlay under balance/ scale at rear, note deviation in display.
- Place approx. 1 mm underlay under balance/ scale at front, note deviation in display.
- Adjust leveling screw (a) until both deviations are about the same.

3.4 Cornerload

Preparation

- Take off cover plate. Undo the four upper screws of the two locking plates through the openings in the rear and retighten loosely.

Care:

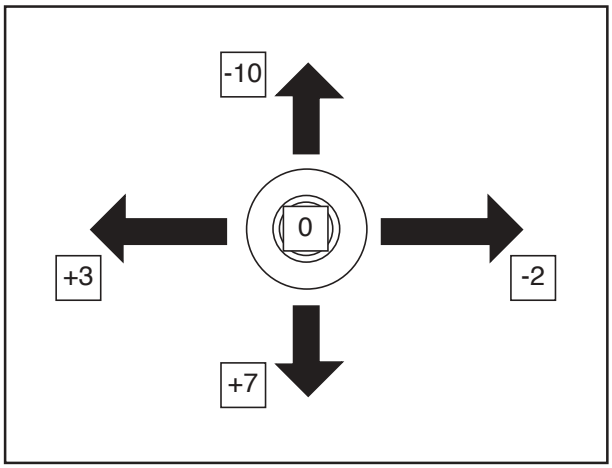
When repairing and adjusting several balances/scales at the same time, never interchange the cover plates for they carry the stickers with the measuring cell parameters.

Hysteresis check

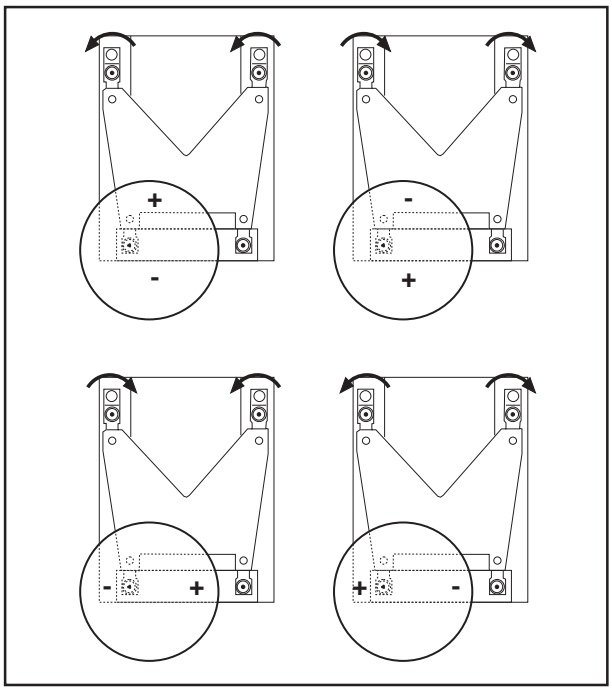
- Push down pan/platform until full load and then unload.
- Tare.
- Using a brush, raise pan/platform slightly and then press downward slightly.

In all cases, the balance/scale should return to zero display.

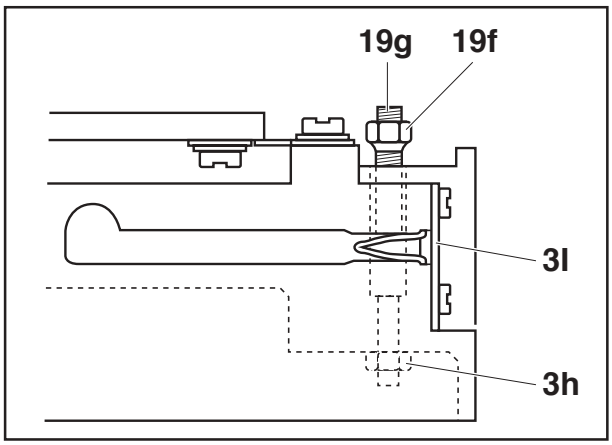
Adjusting cornerload



- Undo the 4 upper screws of the locking plates.
- Load test weight in the middle of the weighing pan/platform.
  If several weights are needed, place one on top of the other.
- Tare.
- Slide weight backward, forward, left and right until weighing pan groove or platform edge. Note display values (deviation from zero) with sign, e.g, rear -10, front +7, etc.
- Compare recorded error values with tolerance specifications in the table in section F.



- Correct errors by turning cornerload screws (19f), see illustration.
- Combine correction of longitudinal and transverse errors (add rotary movements).



Warning:

The setscrew (19g) must not turn! If so, disassemble measuring cell and tighten lock nut (3h).

- After adjusting the cornerload, tighten the 4 screws of the locking plates!
- Mount cover plate.
- Check cornerload several times to ensure that no changes have occurred.

4. Adjustment

On completion of the repair work, the balance/scale must be adjusted.

Note

Before inserting the type or service cassette, record the customer's configuration parameters in the list in section F or print them out!

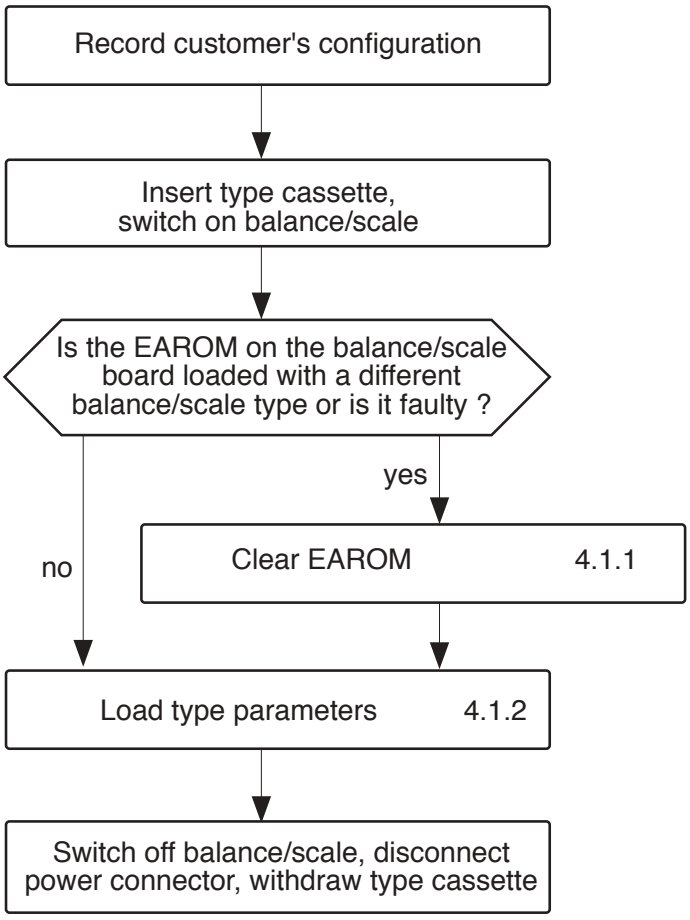
4.1 Adjustment with the type cassette

The type cassette must be inserted only if the type parameters have to be loaded. This is the case if

- the balance/scale board has been replaced or
- the EAROM content is faulty.

Overview

You will find a detailed description of the individual steps of the adjustment in the specified subsections.



4.1.1 Clearing EAROM

Balance/scale display	Actions at service keypad
tYP.PAC	Press and hold RESET key (approx. 4 sec) until
rESEt flashes	Press ENTER key (within 4 sec)
EMPTY or	The EAROM is cleared
FAIL	Repeat or replace PCB

4.1.2 Loading type parameters

Example: PM4000, OIML certified

Balance/scale display	Actions at service keypad
tYP.PAC	Press TYPE ENTRY key
tYPE	Enter type and certification code* Key sequence [4] [0] [0] [0] [.] [1] [0] ENTER
P.4000. 10	Press ENTER key again
i.o. or	if the measuring cell parameters are present
UnconP	if the measuring cell parameters still have to be entered

Warning:

With PM100, PM200, PM400, P1200 and PM2000, the FAMILY SELECT key also has to be used to select the correct family, see table in section B, subsection 2.5.

* Code .00 Normal balance/scale, code need not be entered
Code .10 Certified balance/scale with blockable calibration and configuration
Code .20 Certified balance/scale, calibration facility

National versions of certification types

Code .11, Code .21 Certified balances/scales, the Netherlands
Code .13, Code .23 Certified balances/scales, USA and Canada
Code .24 France

Further information regarding code in section F.

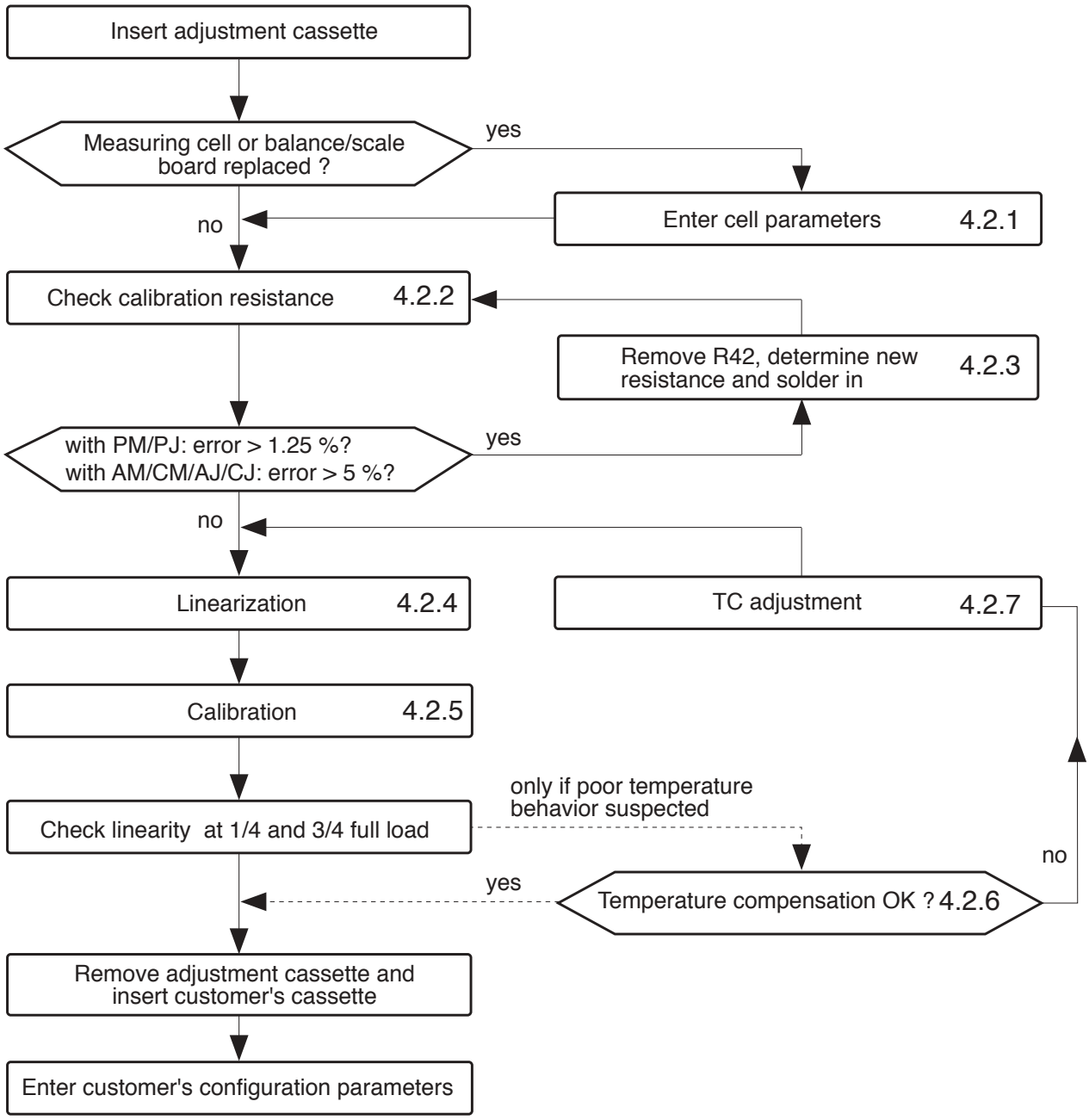
4.2 Adjustment with the adjustment cassette

Note

Before inserting the adjustment cassette, record the customer's configuration parameters in the list in section F or print them out!

Overview

You will find a detailed description of the individual steps in the specified subsections.



4.2.1 Entering cell parameters

The measuring cell parameters, balance/scale type, linearization and temperature compensation are contained in 21 5-7 digit numbers. These numbers are printed on the parameter sticker on the inside of the cover plate.

Actions at service keypad	**Balance display**
Press D IN key	-00-
Enter digit sequence of line 00 and close with ENTER key	-01-
Enter digit sequence of lines 01 - 19 and close in each case with ENTER key	-02- . . . -20-
Enter digit sequence of line 20 and close with ENTER key	-OFF-
Press tare bar	Display test

4.2.2 Checking calibration resistance

Example: PM4000

Actions at service keypad	**Balance display**	
Press CALIBR.RESISTOR key	-r-	
Press tare bar	4000.00 g	flashes
Load requested calibration weight	-0.45 %	
Press tare bar	0.00 g	flashes
Remove calibration weight	i.o.	E rES

4.2.3 Determining calibration resistance

The calibration resistance can be calculated from the following formula:

$$R42 = \frac{\text{loaded weight} \cdot \text{reference resistance}^{*)}}{\text{error}}$$

Example: PM4000

Actions	Balance display
Press tare bar	0.00 g
Load control weight	4103.78 g

$$R42 = \frac{4000\ g \cdot 530\ \Omega}{103.78\ g} = 20428\ \Omega \approx 20.4\ k\Omega$$

4.2.4 Linearity adjustment

Example: PM4000

Actions at service keypad	Balance display
Press LINEARITY key	PUSH flashes
Press down pan until full load and release	2000.00 g flashes
Load half load	4000.00 g flashes
Load full load	Lin cor
Remove weights	

*) See table in section F.

4.2.5 Calibration

Example: PM4000

Actions at service keypad	Balance display
Press CALIBRATION key	4000.00 g flashes
Load calibration weight (full load)	0.00 g flashes
Remove weights	i.o.

4.2.6 Checking temperature compensation

Example: PM4000

Actions at service keypad	Balance display
Switch on balance and allow to warm up for 5 minutes	0.03 g
Tare	0.00 g
Load full load (4000 g) and note/print out full load display	3999.96
Remove weight	0.00 g
Press key [4] Note/print out temperature value 297904	297904 t
Tare and allow balance to warm up for 2 hours Note zero point change	0.00 g ... 0.05 g
Tare	0.00 g
Load full load and note/print out full load display	4000.03 g
Press key [4] and note/print out temperature value	3 12 108 t

Evaluation

$$\text{Temperature difference in °C} = \frac{\text{difference in temperature values}}{2000}$$

$$\text{Zero point drift} = \frac{\text{zero point change}}{\text{temperature difference}}$$

$$\text{Sensitivity drift} = \frac{\text{difference in full load displays}}{\text{temperature difference}}$$

Tolerances for zero point and sensitivity drift, see section F.
If the balance exceeds the tolerance by a factor of 1.5 to 2, the temperature adjustment must be performed.

Evaluation of the example

$$\text{Temperature difference} = \frac{312108 - 297904}{2000} \text{ °C} = 7 \text{ °C}$$

$$\text{Zero point drift} = \frac{0.05 \text{ g}}{7 \text{ °C}} = 0.0071 \text{ g/°C}$$

$$\text{Tolerance zero point drift} = \frac{0.16 \text{ g}}{10 \text{ °C}} = 0.016 \text{ g/°C} > 0.0071 \text{ g/°C}$$

$$\text{Sensitivity drift} = \frac{4000.03 \text{ g} - 3999.96 \text{ g}}{7 \text{ °C}} = \frac{0.07 \text{ g}}{7 \text{ °C}} = 0.01 \text{ g/°C}$$

$$\text{Tolerance sensitivity drift} = \frac{0.16 \text{ g}}{10 \text{ °C}} = 0.016 \text{ g/°C} > 0.01 \text{ g/°C}$$

The determined zero point and sensitivity drifts are thus within the prescribed tolerances.

4.2.7 Performing temperature compensation

Example: PM4000

Settings in the configuration register	Balance display
Set temperature step to 1	t StP 1
Set temperature drift to dynamic	t dYn

Test (clears the old TC parameters)

Actions at service keypad	Balance display
Press HIGHER TEMP key	-tESt-
Press tare bar	2000.00 g flashes
Load half load	4000.00 g flashes
Load full load	0.00 g flashes
Remove weights	i.a.

Adjustment at the highest temperature step

Actions at service keypad	Balance display
Allow balance to warm up for approx. 4 hours, press key [4] Note/print out temperature display	3 12 108 t
Press HIGHER TEMP key	-COMP-
Press tare bar	P C0 7
Press down pan until full load and release	2000.00 g flashes
Load half load	4000.00 g flashes
Load full load	i.a.
Remove weights	P C0

Adjustment at the lowest temperature step

Actions at service keypad	Balance display
Place balance for approx. 4 hours in refrigerator Press key [4] and note temperature value	283700 t
Press LOWER TEMP key	-COMP-
Press tare bar	P C0
Press down pan until full load and release	2000.00 g flashes
Load half load	4000.00 g flashes
Load full load	i.o.
Remove weights	P C0

Adjustment at middle temperature step

Actions at service keypad	Balance display
Press key [4]	284000 t
Allow balance to warm up to mean value of both temperature values	297904 t
Press MEDIUM TEMP key Press tare bar	P C0
Press down pan until full load and release	2000.00 g flashes
Load half load	4000.00 g flashes
Load full load	i.o.
Printout of temperature values, weight values and temperature coefficients	Print C C0 7

Exiting the temperature adjustment

Actions at service keypad	Balance display
Press MEDIUM TEMP key, press tare bar	C C° -1
Press down weighing pan until full load and release	2000.00 g flashes
Load half load	4000.00 g flashes
Load full load	ALL i.O.
Remove weights	0.00 g
Press D OUT key	tc dAtA
Printout of new cell parameter strip	0.00 g
Copy new cell parameter ship and fix it in the balance	

Is my service manual really up to date?

A t the bottom right of the title page you will find the date of issue. If you know the date of the latest edition, you can thus see whether your service manual is up to date.

If this is not the case, the latest service bulletin has not been filed. (The service bulletins represent a continuous supplement to the service manual and keep it up to date.)

The service bulletin always includes a new title page for the service manual, new pages and pages to be exchanged, as well as a new contents page for section E. All these documents have the same, latest date of issue at the bottom of the page.

First edition of the service manual "PM/AM/CM/J": February 1991 (02/91)

Contents section E

Date of issue

TECHNICAL DOCUMENTATION

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METTLER TOLEDO

Service Bulletin AM/PM/CM/J Balances and Scales

Supplement to service manual ME-702459A: PM5003 Comparator

Contents

1. Overview

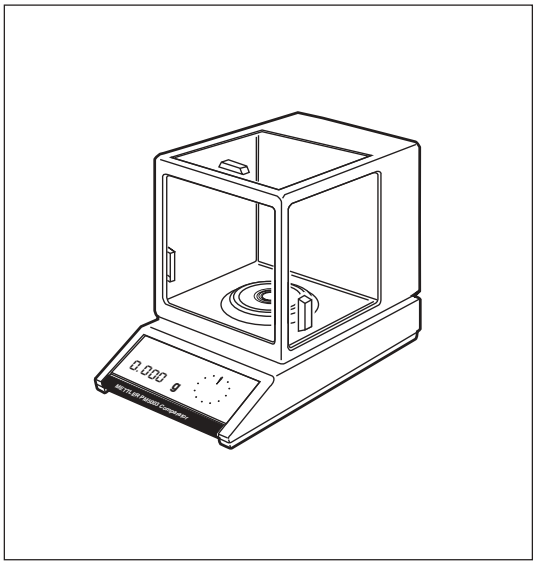
This service bulletin describes the servicing of the PM5003 Comparator Balance. The PM5003 has a resolution of 1 mg with a weight range of 5100 g.

Filing recommendation:
- Service bulletin without enclosures in section E
- Enclosures according to filing recommendation in section 5 of this bulletin

P704955

 ME-704955 Printed in Switzerland 9107/38.12

Edition: July 1991



The PM5003 Comparator in brief

The PM5003 is a mass comparator balance. It thus has a very good reproducibility and the deviation with a cornerload in the upper weight range is very low.

These special features have been achieved by the following measures:

- Weighing cell with enhanced accuracy
- Glass draft shield (no disturbing air currents)
- Equipping the balance with an LCD (warms up less than a fluorescent display)
- Weighing pan with circular markings as an aid in loading the weighing sample in a central position
- If need be, mounting of the Mini-LevelMatic plate on the weighing pan for an even lower weight deviation of a cornerload in the lower range

2. Repairs and adjustment

Differences to normal balances

In general, the procedure is that described in the service manual section "Checking", point 2.7 (special features of custom versions).

After a board change, the PM5003 type data should be loaded by inserting the PM5003 program cassette and switching on the balance briefly. (The PM5003 is not in the type cassette of the ServicePac.)

The deviation of a cornerload must be adjusted with **full load** in accordance with the table in section 4. The **reproducibility** must not exceed the standard deviation (10 weighings) of **1.5 mg** with a load of 5000 g.

Replacing the weighing cell

dead load/leveling weight

The dead load/leveling weight must be transferred to the new weighing cell from the old cell (see exploded view diagram of the precision measuring cell, item 27a, service manual, section "Spare parts").

Minimum deviation with cornerload

If the deviation of max. 20 mg with a 1 kg cornerload is too great for a particular application, this value can be reduced when the automatic load-centering "Mini-LevelMatic plate" is mounted on the weighing pan. It can be ordered as an accessory.

3. Spare parts list, packing

PM5003 spare parts (differences to PM6100)

				PM5003 ≈PM6100
Item	Designation			**ME-No.**
3	Measuring cell, adjusted			***600143***
14a	1	Key (control bar PM5003)		216441
16	Front glass set (for LCD)			
	a)	1	front glass	
	b)	1	clamping strip	
	c)	4	seating locks	
	d)	2	clips	
	e)	1	cover strip	600022
18	Weighing pan (with circular markings)			216445
24	Display board (LCD)			34130
28	Program cassette PM5003			216443

Changed numbers or text are in bold italic print (Oct. 2001)

4. Technical data and adjustment tolerances

4.1 Weighing range, readability, cornerload

	Weighing range	**Readability**			**Reproducibility**	**Cornerload** 1)	
		Program cassette	Adjustment 2) réglage	Factor	4)	Test weight	Tolerance
PM5003 Comparator	5100 g	0.001 g	0.001 g	1	1.5 mg	5000 g 2000 g 1000 g	8 mg 20 mg 5) 20 mg 5)

4) Standard deviation in 10 weighings with 5000g

5) Control values, Adjustment only at 5000 g

4.2 Linearity, calibration weight, temperature compensation, resistance adjustment

	Linearity 1)		**Calibration weight**	**Temperature compensation** 1)			**Resistance adjustment**
	Tolerance up	3) down		Test weight	Tol.zero / 10 °C	Tol.sens./ 10 °C	Reference resistor
PM5003 Comparator	10 mg	20 mg	5000 g	5000 g	150 mg	100 mg	480 Ω/ 520 Ω/ 560 Ω

1) Manufacturing tolerances, adjustment cassette inserted
2) With the adjustment cassette, the readability is higher by this factor than with the program cassette
3) Admissible display error, after adjustment of the zero point, at full load

5. Enclosures with filing recommendation

Please replace the old table of contents of the service bulletin and the title page of the service manual by the new versions enclosed.

The annual number of units sold is not expected to be so high. For this reason, the PM5003 has not been entered in the complete service manual (spare parts lists, data tables). All information is thus contained directly in section E.

TECHNICAL DOCUMENTATION

Adress **Mettler-Toledo AG, CH-8606 Greifensee**
Telephone **01-944 22 11**
Telefax **01-944 31 90**
Telex **826150 mig ch**

Service bulletin

Electronic Precision Balances and Scales METTLER AM/PM/CM/J Series

Supplement to service manual
Electronic Precision Balances and Scales AM/PM/CM/J Series ME-702459A

Filing recommendation:

Please exchange and file the following pages

- Cover
- Section A: Pages 13–36
- Section E: Service bulletin

P704811

 ME-704811 Printed in Switzerland 9306/38.12

Referencelist Service Manual including Service Bulletin for Laboratory Products
Actual Status July 1995

Device	**Number**	**DS-Code**		**Pages Print date**	
AM/PM/CM/J-Serie, PM5003 Comp.	**702459A**	**08.12**	**Title**		**06/93**
AM/PM/CM/J/PM5003	704955	38.12	General		02/91
AM/PM/CM/J-Serie new Spare Parts list	704811	38.12	A	1-4	02/91
				5-12	01/91
				13-38	06/93
			B	1-14	02/91
			C	1-10	02/91
			D	1-30	02/91
			E	1	06/93
				2	Blank pages
				704955	07/91
				704811	06/93
			F	1-18	02/91
				34127	
				34125B	
				33577A	
				33576A	
				33685	
				33684	
				33693	
				33694	
				34133	
				34131	
				34130	
				34128	
				34160	
				34163	
				33675	
				33677	
				34157	
				34159	

Contents

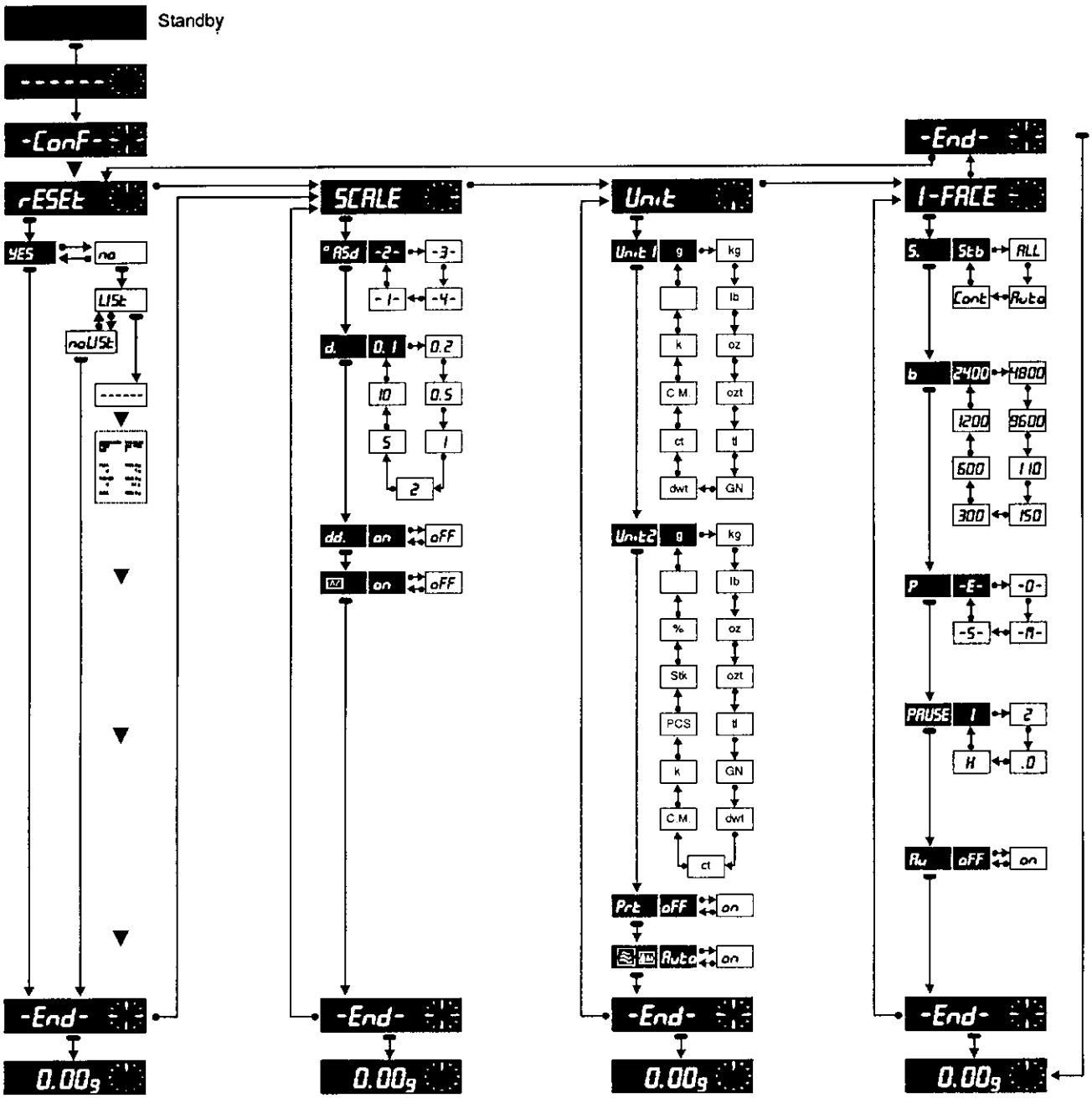
1. List for customer's configuration

Note

Please print out the existing configuration **before** starting the service work or enter it in the list so that the balance/scale can be configured in the same manner after servicing.

Make copies of the list for your own use.

Customer's configuration



2. Technical data and adjustment tolerances

2.1 Technical data and adjustment tolerances of the M series

	Weighing range		Readability				Cornerload	
	Normal	Fine range	Normal	Fine range	Service module	Factor	Test weight	Tolerance
PM100	110 g	–	1 mg	–	0.5 mg	2	100 g	3 mg
PM200	210 g	–	1 mg	–	0.5 mg	2	100 g	3 mg
PM300	310 g	–	10 mg	–	1 mg	10	200 g	4 mg
PM400	410 g	–	1 mg	–	1 mg	1	200 g	3 mg
PM460	410 g	60 g	10 mg	1 mg	1 mg	1 (10)	200 g	3 mg
PM480	410 g	80 g	10 mg	1 mg	1 mg	1 (10)	200 g	3 mg
PM600	610 g	–	10 mg	–	5 mg	2	500 g	10 mg
PM1200	1200 g	–	1mg	–	0.5 mg	1	500 g	3 mg
PM2000	2100 g	–	10 mg	–	5 mg	2	1 kg	30 mg
PM2500	2100 g	500 g	10 mg	1 mg	1 mg	1 (10)	1 kg	4 mg
PM3000	3100 g	–	100 mg	–	10 mg	10	2 kg	100 mg
PM4000	4100 g	–	10 mg	–	10 mg	1	2 kg	30 mg
PM4600	4100 g	600 g	100 mg	10 mg	10 mg	1 (10)	2 kg	30 mg
PM4800	4100 g	800 g	100 mg	10 mg	10 mg	1 (10)	2 kg	30 mg
PM6000	6100 g	–	100 mg	–	50 mg	2	2 kg	300 mg
PM6100	6100 g	–	10 mg	–	10 mg	1	4 kg	20 mg
PM6	6.1 kg	–	1 g	–	50 mg	20	4 kg	400 mg
AM50	51 g	–	0.1 mg	–	0.1 mg	1	30 g	0.2 mg
AM100	110 g	–	0.1 mg	–	0.1 mg	1	50 g	0.3 mg
CM200	200 ct	–	0.001 ct	–	0.001 ct	1 (50)	30 g	0.002 ct
CM1200	1100ct	200 ct	0.01 ct	0.001 ct	0.001 ct	1 (10)	100 g	0.003 ct
PM400C	410 g	–	10 mg	–	1 mg	2	200 g	3 mg
PM2000C	2000 g	–	10 mg	–	5 mg	2	1 kg	3 mg
PM2000MC	2000 g	–	1 mg	–	1 mg	1	1 kg	3 mg

	Linearity[1]		Calibration weight			Temperature compensation	
	Tolerance (up)	(down)	Normal balances	Certified balances	Service module	Tol.zero point 10 °C	Tol.sens 10 °C[2]
PM100	2 mg	2 mg	100 g	100 g	100 g	20 mg	4 mg
PM200	2 mg	2 mg	100 g	200 g	200 g	20 mg	8 mg
PM300	3 mg	4 mg	100 g	300 g	300 g	20 mg	12 mg
PM400	2 mg	4 mg	200 g	200 g	400 g	20 mg	16 mg
PM460	3 mg	4 mg	100 g	200 g	400 g	20 mg	16 mg
PM480	2 mg	4 mg	100 g	200 g	400 g	20 mg	16 mg
PM600	10 mg	15 mg	500 g	500 g	500 g	200 mg	30 mg
PM1200[3]	2 mg	4 mg	1 kg	1 kg	1200 g	25 mg	25 mg
PM2000	20 mg	20 mg	1 kg	2 kg	2 kg	200 mg	80 mg
PM2500	2 mg	4 mg	1 kg	1 kg	2 kg	40 mg	40 mg
PM3000	30 mg	40 mg	1 kg	2 kg	3 kg	200 mg	200 mg
PM4000	20 mg	40 mg	2 kg	2 kg	4 kg	200 mg	180 mg
PM4600	30 mg	40 mg	1 kg	2 kg	4 kg	200 mg	180 mg
PM4800	20 mg	40 mg	1 kg	2 kg	4 kg	200 mg	180 mg
PM6000	200 mg	200 mg	2 kg	4 kg	6 kg	1000 mg	400 mg
PM6100	20 mg	40 mg	4 kg	4 kg	6 kg	300 mg	220 mg
PM6	200 mg	250 mg	2 kg	4 kg	6 kg	600 mg	300 mg
AM50[3]	0.2 mg	0.4 mg	50 g	50 g	50 g	2.5 mg	1 mg
AM100[3]	0.2 mg	0.4 mg	100 g	100 g	100 g	3.5 mg	2.5 mg
CM200[3]	0.002 ct	0.004 ct	20 g	20 g	20 g	0.015 ct	0.01 ct
CM1200[3]	0.002 ct	0.004 ct	100 g	100 g	200 g	0.025 ct	0.025 ct
PM400C	2 mg	4 mg	200 g	200 g	400 g	20 mg	18 mg
PM2000C[3]	20 mg	40 mg	1 kg	1 kg	2 kg	40 mg	40 mg
PM2000MC	20 mg	40 mg	1 kg	1 kg	2 kg	40 mg	40 mg

[1] The specified tolerance is the admissible display error at 1/4, 1/2 and 3/4 full load when the zero point and full load display are free from error. After a linearity adjustment, always check at 1/4 and 3/4 full load.

[2] Test weight always same as full load.

[3] Calibration weight of accuracy class E2.

	Resistance adjustment		Link installation			Beam installation	
	Reference resistor		Washer	Extension	Link thickness	Dead load weight	Flexible bearing thickness
PM100	***1.85 k***	5 ppm/°C	2.0 mm	9.4 mm	0.09 mm	2.8 g	0.07 mm
PM200	***1.85 k***	5 ppm/°C	2.0 mm	9.4 mm	0.09 mm	2.8 g	0.07 mm
PM300	800 Ω	5 ppm/°C	2.0 mm	9.4 mm	0.09 mm	14.5 g	0.07 mm
PM400	800 Ω	5 ppm/°C	2.0 mm	9.4 mm	0.09 mm	14.5 g	0.07 mm
PM460	800 Ω	5 ppm/°C	2.0 mm	9.4 mm	0.09 mm	14.5 g	0.07 mm
PM480	800 Ω	5 ppm/°C	2.0 mm	9.4 mm	0.09 mm	14.5 g	0.07 mm
PM600	***680***	5 ppm/°C	3.3 mm	3.3 mm	0.09 mm	10.0 g	0.12 mm
PM1200	480, 520 Ω[1)]	1 ppm/°C	2.0 mm	5.3 mm	0.07 mm	15.0 g	0.07 mm
PM2000	***680***	5 ppm/°C	3.3 mm	3.3 mm	0.09 mm	10.0 g	0.12 mm
PM2500	420, 440, 480 Ω	1 ppm/°C	2.0 mm	5.3 mm	0.05 mm	15.0 g	0.09 mm
PM3000	530 Ω	5 ppm/°C	3.3 mm	3.3 mm	0.09 mm	14.5 g	0.12 mm
PM4000	530 Ω	5 ppm/°C	2.0 mm	2.0 mm	0.09 mm	14.5 g	0.12 mm
PM4600	530 Ω	5 ppm/°C	2.0 mm	2.0 mm	0.09 mm	14.5 g	0.12 mm
PM4800	530 Ω	5 ppm/°C	2.0 mm	2.0 mm	0.09 mm	14.5 g	0.12 mm
PM6000	480 Ω	5 ppm/°C	2.0 mm	2.0 mm	0.11 mm	25.5 g	0.17 mm[2)]
PM6100	400, 420, 440 Ω[1)]	1 ppm/°C	2.0 mm	2.0 mm	0.07 mm[3)]	25.5 g	0.11 mm[2)]
PM6	480 Ω	5 ppm/°C	2.0 mm	2.0 mm	0.11 mm	25.5 g	0.17 mm[2)]
AM50	840, 880, 920 Ω	1 ppm/°C	4.0 mm	15.4 mm	0.07 mm	7.5 g	0.07 mm
AM100	840, 880, 920 Ω	1 ppm/°C	4.0 mm	15.4 mm	0.07 mm	7.5 g	0.07 mm
CM200	840, 880, 920 Ω	1 ppm/°C	4.0 mm	15.4 mm	0.07 mm	7.5 g	0.07 mm
CM1200	480, 520 Ω[1)]	1 ppm/°C	4.0 mm	13.4 mm	0.07 mm	7.5 g	0.07 mm
PM400C	800 Ω	5 ppm/°C	2.0 mm	9.4 mm	0.09 mm	14.5 g	0.07 mm
PM2000C	420, 440, 480 Ω[1)]	1 ppm/°C	2.0 mm	5.3 mm	0.05 mm	15.0 g	0.09 mm
PM2000MC	420, 440, 480 Ω[1)]	1 ppm/°C	2.0 mm	5.3 mm	0.05 mm	15.0 g	0.09 mm

Changed numbers or text are in bold italic print (Oct. 2001)

[1)] Rectangular resistor
[2)] Flexible bearing with double web
[3)] Wide rolling point

2.2 Technical data and adjustment tolerances of the J series

	Weighing range		Readability				Cornerload	
	Normal	Fine range	Normal	Fine range	Service module	Factor	Test weight	Tolerance
PJ200	210 g	–	1 mg	–	0.5 mg	2	100 g	2 mg
PJ300	310 g	–	1 mg	–	1 mg	1	200 g	2 mg
PJ360	310 g	60 g	10 mg	1 mg	1 mg	1 (10)	200 g	3 mg
PJ400	410 g	–	10 mg	–	1 mg	10	200 g	3 mg
PJ600	610 g	–	100 mg	–	5 mg	20	500 g	20 mg
PJ2000	2100 g	–	10 mg	–	5 mg	2	1 kg	20 mg
PJ3000	3100 g	–	10 mg	–	10 mg	1	2 kg	20 mg
PJ3600	3100 g	600 g	100 mg	10 mg	10 mg	1 (10)	2 kg	30 mg
PJ4000	4100 g	–	100 mg	–	50 mg	2	2 kg	150 mg
PJ6000	6100 g	–	100 mg	–	50 mg	2	4 kg	250 mg
PJ6	6.1 kg	–	1 g	–	50 mg	20	4 kg	400 mg
AJ100	110 g	–	0.1 mg	–	0.1 mg	1	50 g	0.2 mg
AJ50L	50 g	–	0.1 mg	–	0.1 mg	1	30 g	0.2 mg
AJ100L	110 g	–	0.1 mg	–	0.1 mg	1	50 g	0.2 mg
AJ150L	150 g	–	0.1 mg	–	0.1 mg	1	100 g	0.2 mg
CJ150	150 ct	–	0.001 ct	–	0.001 ct	1	30 g	0.002 ct
CJ500	500 ct	–	0.001 ct	–	0.001 ct	1	50 g	2 mg

	Linearity[1]		Calibration weight			Temperature compensation	
	Tolerance (up)	(down)	Normal balances	Certified balances	Service module	Tol.zero point 10 °C	Tol.sens 10 °C[2]
PJ200	1.5 mg	2 mg	100 g	200 g	200 g	20 mg	8 mg
PJ300	2 mg	4 mg	100 g	300 g	300 g	15 mg	12 mg
PJ360	3 mg	4 mg	200 g	300 g	400 g	15 mg	12 mg
PJ400	3 mg	4 mg	100 g	200 g	400 g	16 mg	16 mg
PJ600	20 mg	25 mg	500 g	500 g	600 g	150 mg	30 mg
PJ2000	15 mg	20 mg	1 kg	2 kg	2 kg	200 mg	80 mg
PJ3000	20 mg	40 mg	2 kg	2 kg	4 kg	150 mg	120 mg
PJ3600	30 mg	40 mg	1 kg	2 kg	4 kg	150 mg	120 mg
PJ4000	100 mg	200 mg	1 kg	2 kg	3 kg	600 mg	200 mg
PJ6000	100 mg	200 mg	2 kg	4 kg	6 kg	600 mg	300 mg
PJ6	200 mg	250 mg	2 kg	4 kg	6 kg	600 mg	300 mg
AJ100	0.2 mg	0.4 mg	100 g	100 g	100 g	3 mg	2 mg
AJ50L	0.2 mg	0.4 mg	150 g	50 g	50 g	2.5 mg	1 mg
AJ100L	0.2 mg	0.4 mg	100 g	100 g	100 g	3 mg	2 mg
AJ150L	0.2 mg	0.4 mg	100 g	100 g	100 g	4.5 mg	1.5 mg
CJ150	0.002 ct	0.004 ct	20 g	40 g	40 g	0.02 ct	0.01 ct
CJ500	0.002 ct	0.004 ct	100 g	100 g	100 g	0.02 ct	0.01 ct

[1] The specified tolerance is the admissible display error at 1/4, 1/2 and 3/4 full load when the zero point and full load display are free from error. After a linearity adjustment, always check at 1/4 and 3/4 full load.

[2] Test weight always same as full load.

	Resistance adjustment		Link installation			Beam installation	
	Reference resistor		Washer	Extension	Link thickness	Dead load weight	Flexible bearing thickness
PJ200	***1.85 k***	5 ppm/°C	2.0 mm	9.4 mm	0.09 mm	2.8 g	0.07 mm
PJ300	800 Ω	5 ppm/°C	2.0 mm	9.4 mm	0.09 mm	14.5 g	0.07 mm
PJ360	800 Ω	5 ppm/°C	2.0 mm	9.4 mm	0.09 mm	14.5 g	0.07 mm
PJ400	800 Ω	5 ppm/°C	2.0 mm	9.4 mm	0.09 mm	14.5 g	0.07 mm
PJ600	***680***	5 ppm/°C	3.3 mm	3.3 mm	0.09 mm	10.0 g	0.12 mm
PJ2000	***680***	5 ppm/°C	3.3 mm	3.3 mm	0.09 mm	10.0 g	0.12 mm
PJ3000	530 Ω	5 ppm/°C	2.0 mm	2.0 mm	0.09 mm	14.5 g	0.12 mm
PJ3600	530 Ω	5 ppm/°C	2.0 mm	2.0 mm	0.09 mm	14.5 g	0.12 mm
PJ4000	480 Ω	5 ppm/°C	3.3 mm	3.3 mm	0.09 mm	14.5 g	0.17 mm[1)]
PJ6000	480 Ω	5 ppm/°C	2.0 mm	2.0 mm	0.11 mm	25.5 g	0.17 mm[1)]
PJ6	480 Ω	5 ppm/°C	2.0 mm	2.0 mm	0.11 mm	25.5 g	0.17 mm[1)]
AJ100	880, 840, 920 Ω	1 ppm/°C	6.0 mm	15.4 mm	0.07 mm	7.5 g	0.07 mm
AJ50L	880, 840, 920 Ω	1 ppm/°C	6.0 mm	15.4 mm	0.07 mm	7.5 g	0.07 mm
AJ100L	880, 840, 920 Ω	1 ppm/°C	6.0 mm	15.4 mm	0.07 mm	7.5 g	0.07 mm
AJ150L	680, 720, 760 Ω	1 ppm/°C	6.0 mm	15.4 mm	0.07 mm	7.5 g	0.07 mm
CJ150	880, 840, 920 Ω	1 ppm/°C	6.0 mm	15.4 mm	0.07 mm	7.5 g	0.07 mm
CJ500	880, 840, 920 Ω	1 ppm/°C	6.0 mm	15.4 mm	0.07 mm	7.5 g	0.07 mm

Changed numbers or text are in bold italic print (Oct. 2001)

[1)] Flexible bearing with double web

2.3 Error limits of test weights following OIML No. 20/EC tolerances

Nominal value	Class E2 (≤ NIST* Class S)	Class F1 (≈ NIST Class M)
1 mg	±0.006 mg	±0.020 mg
2 mg	±0.006 mg	±0.020 mg
5 mg	±0.006 mg	±0.020 mg
10 mg	±0.008 mg	±0.025 mg
20 mg	±0.010 mg	±0.03 mg
50 mg	±0.012 mg	±0.04 mg
100 mg	±0.015 mg	±0.05 mg
200 mg	±0.020 mg	±0.06 mg
500 mg	±0.025 mg	±0.08 mg
1 g	±0.030 mg	±0.10 mg
2 g	±0.040 mg	±0.12 mg
5 g	±0.050 mg	±0.15 mg
10 g	±0.060 mg	±0.20 mg
20 g	±0.080 mg	±0.25 mg
50 g	±0.10 mg	±0.30 mg
100 g	±0.15 mg	±0.5 mg
200 g	±0.30 mg	±1.0 mg
500 g	±0.75 mg	±2.5 mg
1 kg	±1.5 mg	±5 mg
2 kg	±3.0 mg	±10 mg
5 kg	±7.5 mg	±25 mg
10 kg	±15 mg	±50 mg

* NIST = National Institute of Standards and Technology, Washington, D.C.

3. Custom versions

3.1 Software versions

- When the weighing unit is switched on, after the display test the current software number appears as a six-digit number divided into two groups.
- The program cassettes and the individual EPROM chips are inscribed with the first four characters of the software number (e.g. V10.42).

1st group	**Program type**
10	Standard (for weighing units of the M series)
11-19	Pac applications (for weighing units of the M series)
20-29	Standard (for weighing units of the J series)
30	Standard (for special certified weighing units, to national codes)
31-39	Pac applications (for weighing units of the M series, France only)
50	Standard (does not load type parameters in EAROM)
51-59	Pac applications (for weighing units of the M series, to national codes)
60-69	Standard (also loads type parameters for special weighing units)
80-89	Type parameters (loads EAROM for weighing units of the M/J series)
90-99	Service, development and production

2nd group	**Software version/number of the custom version**
0-99	Version of last software update (with certified weighing units also national version)

3rd group	**Operating mode (category of EAROM loading in the weighing unit)**
00	Normal weighing unit
10	Certified weighing unit with blockable calibration and configuration
11-19	Certified weighing unit (to national codes)
20	Certified weighing unit, calibration facility
21-29	Certified weighing unit (to national codes)
50-FF	Special weighing units, also letter code

For normal and certified weighing units, the type parameters are contained in the type cassette.
With special weighing units, these parameters are contained in the special standard software.

When the type parameters of certified and special weighing units are loaded, the code for the operating mode must be entered in addition to the weighing unit type, see section 3.2.

3.2 Overview of special programs (as of June 1990)

Software of versions V50.XX.XX does not change the EAROM contents.

Version	Description	Replacement
ME-930073 V50.32	Attachment of PM balances/scales to old DL40	
ME-930111 V50.43	with 200 ms data output update time application: consumption measurements	
ME-930109 V50.43	without ASD in taring	
ME-930110 V 50.43	no * in animal weighing string	V10.45
ME-930100 V50.42	FIX 20 as piece count reference	
ME-930091 V10.42	Autostart together with the CL310 Multiplexer	ME-930124 V50.45
ME-930125 V50.42	without CL software handshake	
ME-930088 V50.42	Standard Remote - Autostart - Calibration via the interface - Faster display update (approx. 106-133 ms) - Faster data output update (approx. 60 ms) - "M" commands for filter etc.	 ME-930125 V50.45 V10.45 ME-930124 V50.45 ME-930124 V50.45 V10.45 or ME-930124 V50.45
ME-930022 V50.45	Dispensing /consumption software - Restart - Taring without stability detection - Full range display with 0.1 g DeltaRange balances/scales	 V10.45
ME-930124 V50.45	Standard Remote - Autostart - Display - data output update - Data output every 60 ms - CA, TI, M commands as with V10.45	

3.3 Overview of customized balances/scales (as of June 1990)

Software of versions V60.XX.XX does not change the EAROM contents.

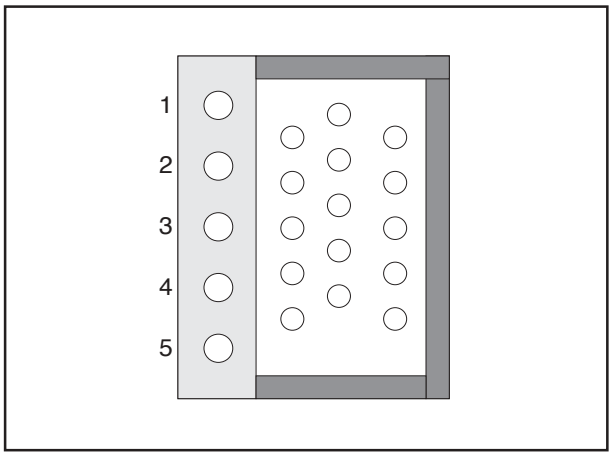
	Cassette	Software version
PJ3000 tael Singapore - no cal - calibration weight 3 kg	ME-33731	V60.42.62 V60.42.83 V60.42.5a
PJ3000 tael Hong Kong - new factor	ME33729	V60.42.61
PJ3000 tael Taiwan - g unit 1	ME-33727	V60.42.60 V60.42.6e
PJ400 tael Hong Kong - new factor	ME-33725	V60.42.59
PJ400 tael Taiwan - g unit 1	ME-33721	V60.42.57
PJ600 Gold	ME-33737	V60.42.65
PJ3600 Gold	ME-33733	V60.42.63
PJ4000 Gold	ME-33735	V60.42.64
Education EJ2001	ME-33758	V60.42.67
Education EJ201	ME-33756	V60.42.58
Part (PM6000-F/P)	ME-33999	V60.43.76
PM2200-1 - with g/lb/bu and %	ME-33457 ME-216253	V60.42.87 V60.45.7f
CJ500	ME-33607	V60.42.89
PJ1000tl-S	ME-216205	V60.42.6d
PJ1000tl-H - new factor	ME-216201	V60.42.6c
PJ1000-T	ME-216203	V60.42.6b
PJ4000F	ME-216225	V60.45.7B
PM6 - P (Post Portugal)	ME-33497	V60.45.7C
RA311 (Reference balance), PJ - from PM460 RA3110 (Reference balance)	ME-216232 ME-216236 ME-216233	V60.45.7D V60.45.7D V60.45.7E
PM6/PB	ME-216125	V60.45.8F
PJ6000-FP PM6000-FP	Front glass PPG Front glass PPG	

	Cassette	Software version
PJ3000-TH	ME-216159	V60.42.A5
PM6000-FB PJ6-FB (Australia, Berger)	(blue housing) ME-216254	V60.45.A7
College 150	Front glass	
College 3600	ME-216428	V60.40.AA

4. Component diagrams and schemes

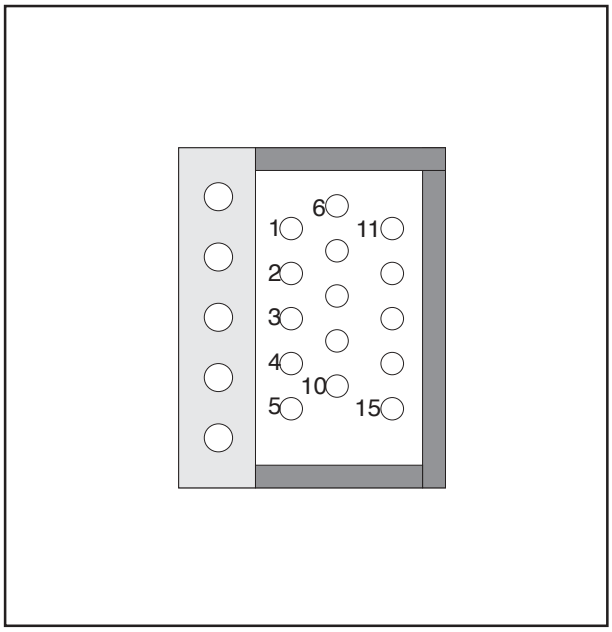
4.1 Pin assignment of solderable connector ME-33930

Assigned METTLER coding

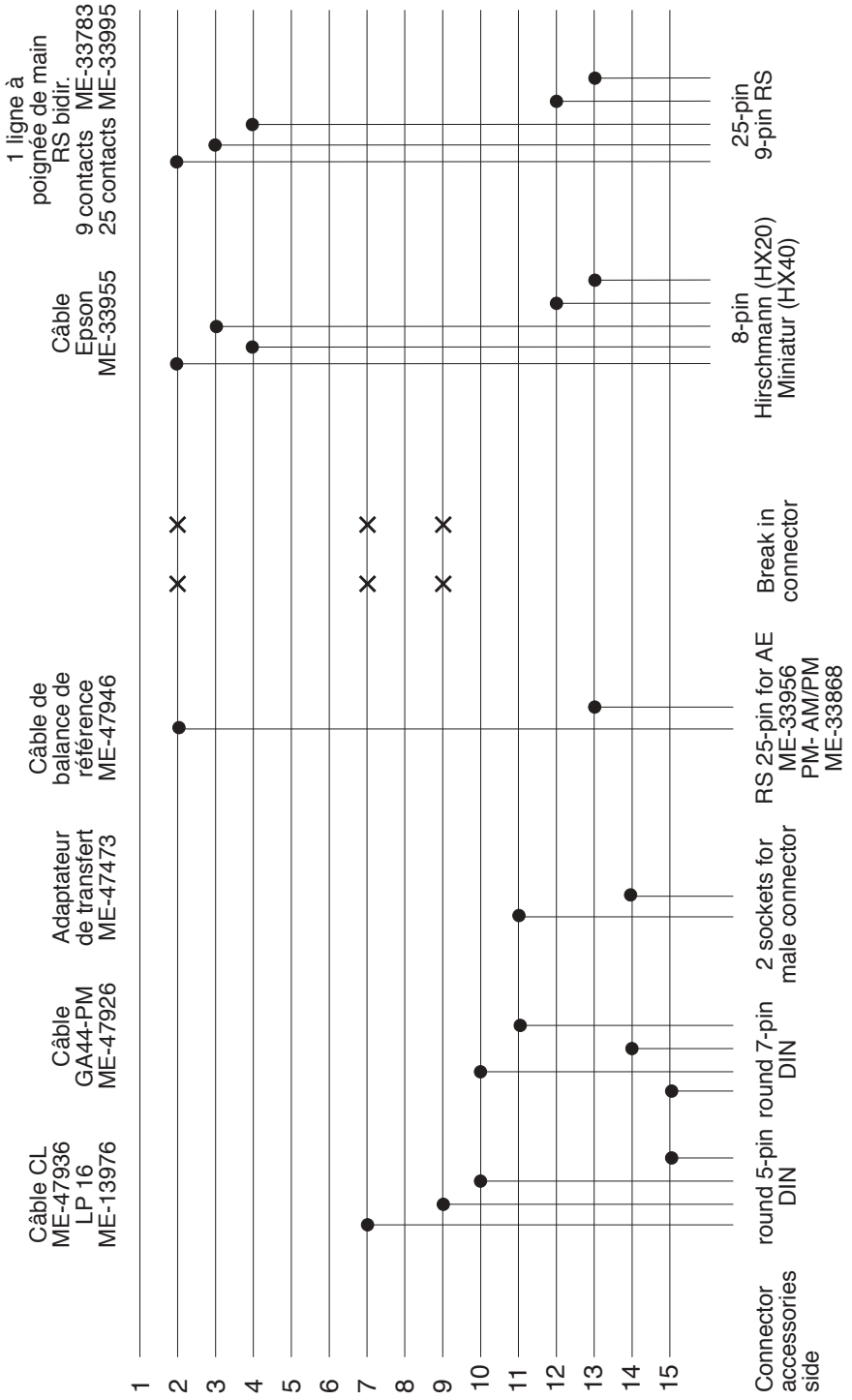


1, 2	AT, re-zero connector
1, 3	Data I/O
1, 4	Ex scales, Data I/O
1, 5	PE Pac
2, 3	AT Pac
2, 4	SM terminal, GM
2, 5	Reserve
2, 3, 4	PM Pac
3, 4	assigned by PM Pac
3, 5	Ex scales, Pac, GM
4, 5	Reserve

Pin assignment of RS and CL interface



Pin	1	Reserve
Pin	2	RS IN
Pin	3	Reserved RS DTR
Pin	4	Reserved RS CTS-
Pin	5	Reserved RS
Pin	6	Shield
Pin	7	CL IN+
Pin	8	Reserved RS
Pin	9	CL IN-
Pin	10	CL OUT-
Pin	11	0 V
Pin	12	RS out
Pin	13	RS COM
Pin	14	Transfer
Pin	15	CL OUT+


1 ligne à
poignée de main
RS bidir.
9 contacts ME-33783
25 contacts ME-33995
Câble
Epson
ME-33955
Câble de
balance de
référence
ME-47946
Adaptateur
de transfert
ME-47473
Câble
GA44-PM
ME-47926
Câble CL
ME-47936
LP 16
ME-13976
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Connector
accessories
side
round 5-pin
DIN
round 7-pin
DIN
2 sockets for
male connector
RS 25-pin for AE
ME-33956
PM- AM/PM
ME-33868
Break in
connector
8-pin
Hirschmann (HX20)
Miniatur (HX40)
25-pin
9-pin RS

4.2 Boards

Board	Component diagram	Electrical scheme
Balance/scale board PM	ME-34127	ES-34125
Balance/scale board high-resolution M balances/scales	ME-33577	ES-33576
Balance board PJ	ME-33685	ES-33684
Balance board AJ, CJ	ME-33693	ES-33694
Display board M balances/scales (FD)	ME-34133	ES-34131
Display board M balances/scales (LCD)	ME-34130	ES-34128
Power supply	ME-34160	ES-34163
Data interface with HW handshake	ME-33675	ES-33677
Data interface without HW handshake	ME-34157	ES-34159