1996

Technical Manual
and
Parts Catalog

INTRODUCTION

This publication is provided solely as a guide for individuals who have received METTLER TOLEDO Technical Training in servicing the METTLER TOLEDO product.

Information regarding METTLER TOLEDO Technical Training may be obtained by writing to:

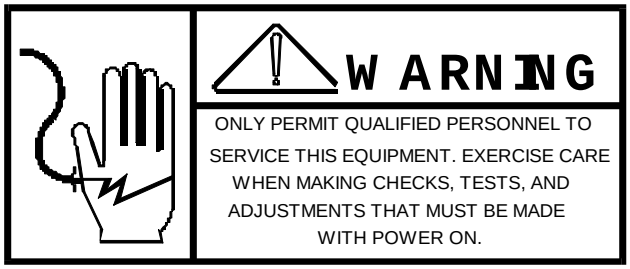
METTLER TOLEDO
Training Center
P.O. Box 1705
Columbus, Ohio 43216
(614) 438-4400

PRECAUTIONS

- **READ** this manual before operating or servicing this equipment.

- **ALWAYS REMOVE POWER** and wait at least 30 seconds **BEFORE** connecting or disconnecting any internal harnesses. Failure to observe these precautions may result in damage to, or destruction of the equipment.

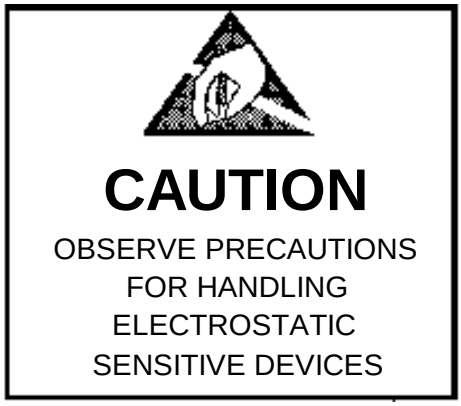
- **ALWAYS** take proper precautions when handling static sensitive devices.



- **DO NOT** connect or disconnect a load cell scale base to the equipment with power connected or damage will result.

- **SAVE** this manual for future reference.

- **DO NOT** allow untrained personnel to operate, clean, inspect, maintain, service, or tamper with this equipment.



- **ALWAYS DISCONNECT** this equipment from the power source before servicing.

- **CALL** METTLER TOLEDO for parts, information, and service.

1. GENERAL DESCRIPTION

The Model 1996 is a digital scale base for general purpose industrial applications ranging from 25lb (15kg) to 100lb (60kg) capacity. The 1996 base is intended for use with the Models 8510, 8520 and 8530 DigiTOL Indicators. The unit is also compatible with the Model 8582 parts counter as a remote scale for sampling or bulk counting.

2. SPECIFICATIONS

A. PHYSICAL DESCRIPTION

The 1996 scale is comprised of the following major components:

A. Die Cast Base Assembly

The 12.12" (310mm) X 13.62" (350mm) X 4.15" (110mm) die cast aluminum base, is charcoal black in color. Four, screw attached, top adjustable mounting feet are included.

B. Die Cast Platter Support (Spider)

The spider is provided with rubber tips (fro friction platter mount) and rubber center support. It mounts directly to the digital load cell with two socket head cap screws. The level bubble is located in the platter support casting.

3. Digital Load Cell

The weight sensor is a 30kg, 60kg or 140kg digital load cell. The digital load cell module utilizes a moment insensitive counterforce combined with analog and digital electronics to provide weight information to the indicator at a fixed rate of 8.8 times per second.

4. Carbon Steel Platter

The 12.57" (320mm) X 14.1" (360mm) platter is removable for cleaning and for veiwing the level bubble.

B. ELECTRICAL SPECIFICATIONS

The power to operate the digital load cell is provided by the digital indicator or parts counter connected to the Model 1996 base. The power requirement of the 1996 is 18 volts DC to 24 volts DC maximum at 30 milliamps maximum.

C. ENVIRONMENTAL SPECIFICATION

1. TEMPERATURE AND HUMIDITY

a. Operating Range

The scale is designed to meet specifications over a temperature range 14 degrees F to 104 degrees F (-10 to 40 degrees C) with a humidity range from 5 to 90% non-condensing.

b. Shipping Range

The scale is designed to withstand a temperature range of -40 degrees C to +70 degrees C with a humidity range from 5 to 95% non-condensing without damage.

2. APPLICATION

a. The Model 1996 is designed for use in a general purpose atmosphere, for indoor applications where dirt, oil or water are not present.

b. The Model 1996 is not designed for hose-down applications. Typical examples of mis-application of the scale include, but are not limited to:

i. Immersions
ii. Hosedown
iii. Splashing liquids
iv. Corrosive chemical environments

Toledo Scale manufactures other scales that are suitable for “hosedown” applications

c. The maximum allowable cable length between the Model 1996 base and the scale or indicator is 50 feet (16m). The cable specified for use is the Toledo Scale 20 gauge load cell cable, part number 510620 370.

3. HAZARDOUS AREAS

WARNING

Do not install or use the Model 1996 base in locations classified as Hazardous by the National Electrical Code (NEC) because of combustible or explosive atmosphere. RE: National Fire Protection Association Standard NFPA 496.

D. FACTORY NUMBER GUIDE

FACTORY NUMBER	LOAD CELL CAPACITY	Suggested Scale Indication
1996 - 0001	30 KG	25lb X 0.005 / 15kg X 0.005
1996 - 0002	60 KG	50lb X 0.01 / 30kg X 0.01
1996 - 0003	140 KG	100lb X 0.02 / 60kg X 0.02

3. INSTALLATION PROCEDURE

A. UNPACKING

1. Examine the shipping box for any signs of damage. IF SHIPPING DAMAGE IS FOUND, MAKE A CLAIM WITH THE CARRIER IMMEDIATELY.

2. Open the shipping carton and remove the platter from the top of the packing shell.

3. Remove the top packing shell and lift the Model 1996 from the box.

CAUTION

GRASP THE MODEL 1996 BY THE BASE NOT THE SUB-PLATTER FOR LIFTING OR DAMAGE TO THE LOAD CELL MAY RESULT.

4. Remove and retain the ten foot inter-connecting cable (# 130115 00A) packed with the unit.

5. Place the Model 1996 on a level, stable surface. Retain the packing material for future transport of the scale.

B. CONNECTIONS

The only external connection required to the Model 1996 Base is the inter-connecting cable to the indicator or scale. This cable is used to provide power to the digital load cell and also to transmit the weight information from the digital load cell. The Model 1996 utilizes a 9-pin plug on the bottom of the base for this connection. A ten-foot cable (# 130115 00A) is packed with the digital base for this purpose. Attach the cable using the following instructions:

1. Turn the Model 1996 upside down on a flat surface.

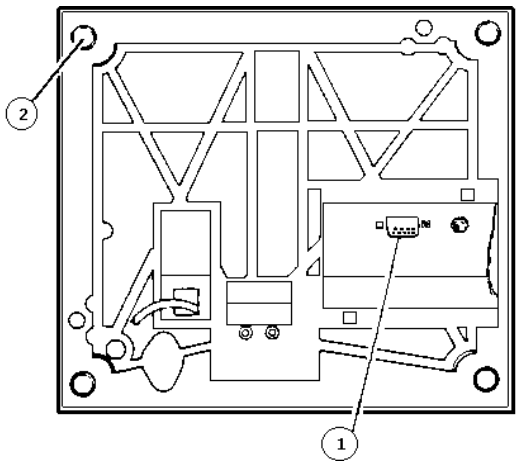


FIGURE 1

2. Attach the 9-pin connector end of the enclosed cable (PN 130115 00A) to the 9-pin plug (item 1) shown in Figure 1. Secure with the two screws included with the connector. Section 5 of this manual shows the pinconfiguration of the 9-pin connector J2 if a cable longer than 10 feet (3m) must be made.

NOTE: The maximum allowable cable length between the Model 1996 base and the scale or indicator is 50 feet (16m). The cable specified for use is the Toledo Scale 24 gauge load cell cable, PN 510624370.

3. Invert the Model 1996 to its normal operating position.

4. Attach the remaining end of the interconnecting cable to the indicator or scale with which the Model 1996 base will be used. Refer to the inter-connecting information in Section 5 of this manual and in the technical manual of the indicator or scale used for termination instructions.

C. SET - UP

1. Place the Model 1996 Base in the location where it will be used. Apply power to the indicator or parts counter that will be used with the 1996.

2. Refer to Figure 1. Level the scale by turning the adjustable feet (item 2) on the bottom of the base in or out. Adjust the feet so the scale does not rock. The correct position of the level bubble (located on the sub-platter) when the Model 1996 is level as shown in Figure 2.

3. Place the platter on top of the sub-platter. The base will be ready for calibration after a 30-minute warm-up period with power applied to the indicator or parts counter being used with the 1996.

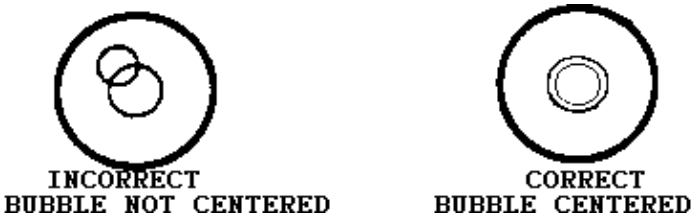


FIGURE 2

4. Refer to the technical manual of the applicable indicator for operating instructions.

4. MECHANICAL ADJUSTMENTS

Before making any adjustments to the Model 1996, the base must be exercised two times by placing a full-capacity test weight load on the platform.

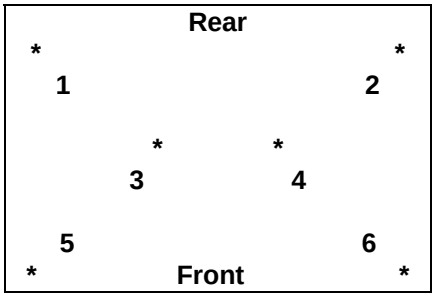
A. OVERLOAD ADJUSTMENT

There are a total of six overload stops to protect the load cell. These overload stops are factory adjusted and should not require re-adjustment unless the load cell or sub-platter has been replaced. If an adjustment is necessary, follow the steps outlined below. The platter must be removed to access the overload stops.

1. Use round wire gauges. DO NOT USE FLAT GAUGES.

2. Adjust the overload screws to the correct gap setting shown in Chart 1 referencing the positions shwon in Figure 3. Follow these steps.

   a. Tighten the screw until the gap is smaller than the wire gauge
   b. Hold the wire gauge against the gap with a slight pressure.
   c. Loosen the screw, slowly, until the wire gauge snaps through the gap.



(*) Indicates overload stop position.

FIGURE 3

MODEL 1996 - 0001 25lb / 15kg Capacity		MODEL 1996 - 0001 25lb / 15kg Capacity		MODEL 1996 - 0001 25lb / 15kg Capacity	
POSITION#	**OVERLOAD GAP IN INCHES**	**POSITION#**	**OVERLOAD GAP IN INCHES**	**POSITION#**	**OVERLOAD GAP IN INCHES**
1	.059 ± .002	**1**	.119 ± .002	**1**	.219 ± .002
2	.059 ± .002	**2**	.058 ± .002	**2**	.176 ± .002
3	.080 ± .002	**3**	.019 ± .001	**3**	.028 ± .001
4	.018 ± .001	**4**	.014 ± .001	**4**	.017 ± .001
5	.018 ± .001	**5**	.075 ± .002	**5**	.131 ± .002
6	.044 ± .002	**6**	.057 ± .002	**6**	.100 ± .002

B. SHIFT TEST

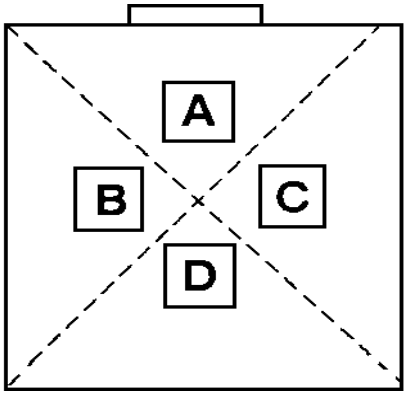
A shift test is required to verify that all sections of the scale platform weigh within tolerance. If the Model 1996 does not pass the shift test, verify overload stop settings before replacing the load cell. No shift adjustment is possible. The following procedure has been condensed from the 1988 National Bureau of Standards Handbook 44.

1. BENCH OR COUNTER SCALE

Place test weights equal to one-half scale capacity at positions A, B, C and D sequentially as shown in Figure 4.

Positions A, B C and D are centered halfway between the center and the edges of the platform.

FIGURE 4



2. TOLERANCE TABLE

The following table shows the tolerances in d (divisions) for each shift test. Reference sections T.N.3.1. (Table 6), T.N.3.2. and T.1.2. (Table 5) of Handbook 44 for more information.

Scale Capacity		**Shift Test Weight**	**Acceptance Tolerance**	**Maintenance Tolerance**	**Class III Shift Tolerance**
lb	5,000d	2,500d	± 1.5d	± 3.0d	Must agree within the absolute value of the Maintenance Tolerance
kg	3,000d	1,500d	± 1.0d	± 2.0d	"

5. INPUT / OUTPUT CONNECTIONS

The 9-pin connector (J3) on the bottom of the Model 1996 base is used as the input and output connector. Refer to Figure 5. Communications to and from the Model 1996 are via RS-422. This 9-pin connector has the following pin assignments.

1996 J3 Pin	Signal Description	Wire Color	*8520 Terminals	8530 Desk/Rack	8530 Wall	8582 Desk/Wall
1	RxD A	red	RxD A	1	A	1
4	BATT IN	white	n.c.	n.c.	n.c.	n.c.
5	+20V	green	+18V	5	E	5
6	TxD B	yellow	TxD B	6	F	6
7	GND	blue	GND	7	G	7
8	TxD A	black	TxD A	8	H	8

n.c. - no connection

NOTE: The 1996 does not use RxD B.

NOTE: The 8520 Digital Weight Display has screw terminal blocks for connecting the digital load cell. The terminal blocks are located inside of the 8520 and are labeled with the same terminology as the 1996 signal description as shown above.

NOTE: The maximum allowable cable length between the Model 1996 base and the scale or indicator is 50 feet (16m). The cable specified for use is the Toledo Scale 24 gauge load cell cable, part number 510624 370.

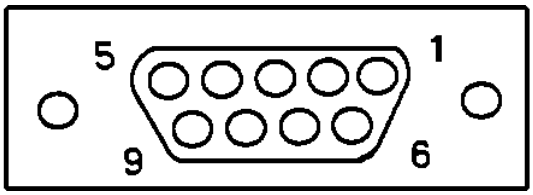


FIGURE 5

J3 PIN	SIGNAL DESCRIPTION
1	RxD A
4	RxD B
5	+20V
6	TxD B
7	GND
8	TxD A

6. MAINTENANCE AND TROUBLESHOOTING

A. CLEANING

WARNING

DO NOT SPRAY LIQUIDS OR FLUIDS DIRECTLY ONTO THE UNIT. HAZARD OF ELECTRICAL SHOCK OR BURN.

1. Unplug power cord from the digital indicator to remove power to the scale base.
2. Sray a mild cleaner onto a cloth and wipe all exterior surfaces

CAUTION

DO NOT USE SOLVENTS OR CHEMICALS ON THE PAINTED SURFACES. THESE MAY HARM THE SURFACES.

B. TROUBLESHOOTING

1. GENERAL

a. If operational difficulties are encountered, obtain as much information as possible regarding the particular trouble, as this may eliminate a lengthy, detailed checkout procedure.

b. Knowledge of what function the different parts in a system perform (as well as what a part need to perform their specific function) will aid in isolating the specific part causing the problem

i. The 1996 receives a raw DC voltage and serial transmissions from the digital display or parts counter which is interfaced to the 1996. In return the 1996 suplies the digital indicator or parts counter with transmissins that represent the weight present at the scale. Troubleshooting in this case is determining if the 1996 is receiving what it needs to function. If the needed DC voltage and transmissions are being supplied, the 1996 has a problem internally.

ii. Internally the 1996 consists of a digital load cell and an inter-connecting harness. The digital load cell converts the weight to an analog voltage then to serial digital information (A to D cycle) that the digital indicator or parts counter cna receive and convert to a valid weight display.

The following information will aid in locating problem areas if operating problems occur:

2. SEQUENCE OF COMMUNICATION

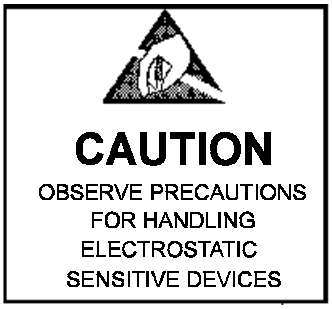
The following is a short summary of the sequence of communication between the Model 1996 base and a Toledo Scale digital indicator or parts counter. This sequence may help indiagnosing a problem.

Step 1: When power is applied the digital indicator or parts counter provides +20VDC to the Model 1996 digital load cell.

Step 2: The digital load cell regulates a +5VDC supply from the +20VDC voltage.

Step 3: The digital indicator or parts counter transmits information to the digital load cell. This will occur once after applying power to the digital indicator or parts counter.

Step 4: The digital load cell performs an A to D cycle then it will begin transmitting weight data to the digital indicator or parts counter.



3. VOLTAGE MEASUREMENTS

a. Table 1 shows the voltages that should be ovserved with a DVM when using the 1996 with the 8520 and 8530 Indicators and the 8582 Parts Counter.

8520		8530	8582
+20VDC MIN	20VDC (25mV)	16.3VDC (25mV)	20.7VDC (75mV)
+20VDC MAX	20VDC (25mV)	19.9VDC (25mV)	27.9VDC (75mV)
RxD __	+4.5 to 5 VDC	+4.5 to 5VDC	+4.5 to 5VDC
TxD / TxD	+4.1 to 4.7VDC	+4.1 to 4.7VDC	+4.1 to 4.7VDC

b. To get maximum benefit from Table 1 read the following:

- For the 8530 and 8582, the point of easiest access for measuring the voltages inTable 1 is at the connector on the load cell cable assembly that was soldered onat installation. The metal body of the connecotr must be removed to access the pins.

- For the 8520, the point of easiest access for measuring the voltages in Table 1 is the TB1 terminal strip that is plugged into the Logic PCB.

- The 20VDC MIN is the voltage measured with the minimum acceptable AC input (102VAC) applied to the digital display or parts counter. The 20VDC MAX is the voltage measured with the maximum acceptable AC input (132VAC) applied. The voltage measured when checking 20VDC should be between the MIN and MAX values. The voltages in parenthesis are maximum acceptable AC ripple voltages.
- The RxD voltage is measured with respect to logic ground.

- TxD / $\overline{\text{TxD}}$ voltages are measured with the plus meter lead on TxD and the minus lead on TxD. This voltage should be fluctuating between the voltages recorded in Table 1.

c. Chart 2 shows potential problem areas for voltages out of range with the information given in Table 1.

CHART 2

20VDC	20VDC is generated by the Logic PCB in both the 8520 and 8530. The 20VDC inthe 8582 is generated by the Digital Scale PCB.
RxD	RxD is generated by the Logic PCB in both the 8520 and 8530. The RxD in the 8582 is generated by the Digital Scale PCB.
TxD / $\overline{\text{TxD}}$	TxD is generated by the digital load cell in the 1996.

d. If the voltages are within the parameters of Table 1, measure RxD to logic ground again, but this time while turning power on to the digital indicator or parts counter. The voltage should start at 0VDC then climb to between 3.4 to 3.6VDC and plateau there for about half a second. This will confirm that the indicator or parts counter is transmitting necessary infromation to the load cell when power is first turned on.

C. LOAD CELL REPLACEMENT

The digital load cell is secured to the base by two allen-head screws. To remove the cell follow these steps:

1. Remove AC power from the base by unplugging the line cord from the scale or indicator to which the Model 1996 is connected.

CAUTION

Wait 30 seconds after removing power to the indicator or parts counter before unplugging the load cell cable.

2. Remove the platter by lifting up gently at opposite ends.

3. Loosen and remove the two allen head bolts that secure the platter support (spider) to the top of the load cell.

4. Turn the scale on its side to access the load cell bolts on the bottom of the base.

5. Remove the two allen head bolts that secure the load cell to the base while holding the load cell in place with one hand.

6. Disconnect the load cell harness & remove the load cell. Refer to the **CAUTION** note above. To re-install a digital load cell, follow these same six steps in reverse order. When tightening the allen-head bolts, refer to the tightness specification label on the sub-platter of the Model 1996.

7. GENERAL INFORMATION

A. SPARE PARTS LISTING

It is recommended that a spare digital load cell be kept in stock to keep down time to a minimum. The cells are available through you local Authorized Toledo Scale Service representative.

Part Number	Description	Qty.
(*) 132583 00A	30kg, (1996 - 0001)	AR
(*) 132585 00A	60kg, (1996 - 0002)	AR
(*) 132589 00A	140kg, (1996 - 0003)	AR

(*) - May have a letter prefix.
AR - As required depending upon factory number.

B. ACCESSORIES

1. Interconnecting Cable - 10 feet (3m) open ended one end.

Part Number - 130115 00A
Factory Number - 0900 - 0245

NOTE: An interconnecting cable is supplied standard with the 1996.

2. 9-Pin Mating Connector

Part Number - 125819 00A
Factory Number - 0917 - 0117