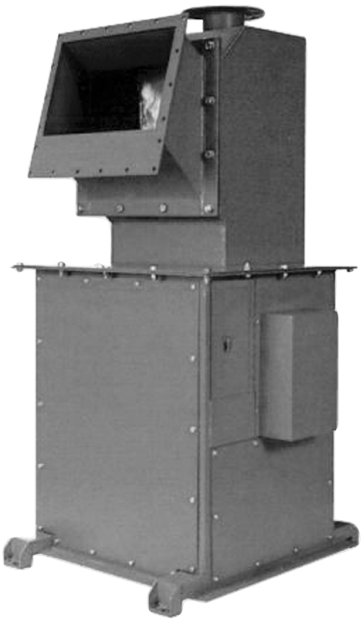
Instruction Manual • September 2003



milltronics

MA SERIES

SIEMENS

Safety Guidelines

Warning notices must be observed to ensure personal safety as well as that of others, and to protect the product and the connected equipment. These warning notices are accompanied by a clarification of the level of caution to be observed.

Qualified Personnel

This device/system may only be set up and operated in conjunction with this manual. Qualified personnel are only authorized to install and operate this equipment in accordance with established safety practices and standards.

Warning: This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.

Note: Always use product in accordance with specifications.

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2.0 INSTALLATION

The Impact Scale is shipped from the factory in four (4) basic parts:

(a) the main body
(b) the sensing plate (complete with mounting hardware)
(c) the check pulley(complete with calibration cable)
(d) the Impact Scale Amplifier, (I.S.A.)

INSTALL THE FLOWMETER AS FOLLOWS:

2.1 Mount the flowmeter as shown on the installation drawing provided my Milltronics. It is essential that all mounting legs be supported by the same structural steel at the same elevation.

In short, the Impact Scale should be mounted level and free of vibration.

2.2 Remove the side covers below the load cells on either end and install the sensing plate as shown on page 9.

2.3 When the sensing plate has been completely installed, remove the load cell blocking bolts. (see page 10)

2.4 Connect the Impact Scale to the Impact Scale Amplifier (I.S.A.) as shown on Drawing 20A1290 or Page 29 of PL-164. The interconnecting cable should be Beldon 8425, 8504 or equivalent 5 conductor cable.

2.5 Apply power to the I.S.A. The rate indicator should move between zero and 100% as the sensing plate is moved back and forth and should return to the same rest position under static conditions. Plate movement is less than 3 mm maximum.

2.6 Zero the amplifier by means of the coarse and fine "zero" adjustments. True zero is attained when both fine zero indicating lights, mounted between the coarse and fine adjustments, are illuminated to equal brilliance.

2.7 NOTE:

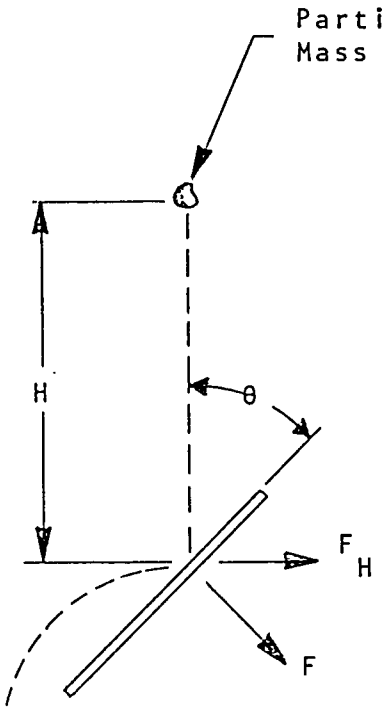
On all installations it is important to limit the air flow through the sensing plate. In order to prevent problems with air circulation, venting may be required above and/or below the flowmeter.

OR: The horizontal component of the impact force on the plate is directly proportional to the flow rate of material over the plate.

The Milltronics Impact Scale applies this horizontal force to one or more strain gauge load cell. The load cell converts this movement to an electrical signal which is proportional to that force.

1.0 THEORY OF OPERATION

The Milltronics Impact Scale was designed to work on the principles of momentum and impact. If a particle of mass (m) is dropped from a height (h) on to a plate which is inclined (θ) degrees from the vertical, it will hit the plate with a velocity V_1, be deflected, and bounce off with a velocity V_2.



When the particle hits the plate, it will impart an impulse to the plate which is proportional to change in velocity of the particle.

Impulse imparted to plate = charge of momentum of particle.

Impulse = Force x length of time applied = Ft.

$$\text{Momentum} - m(v_1 - v_2)$$

$$Ft = m(v_1 - v_2)$$

$$Ft = \frac{w}{g}(v_1 - v_2)$$

Where $v_1 = f(h)$

$v_2 = f(h, \theta, u, e)$

u = coefficient of friction between plate and particle

e = coefficient of elasticity of particle

For a given set of conditions, h, θ, u, and e will all be constants.

$$Ft = wk$$

$$F = k\frac{w}{t}$$

where F = force on the plate

$\frac{w}{t}$ = flow rate of particles

k = constant = f(h,θ, u, e)

The mechanism of the Milltronics Impact Scale is designed to measure only the horizontal component (F_H) of the impact force (F).

$$F_H = F \cos \theta$$

$$F_H = k\frac{w}{t}\cos\theta$$

$$= K_1 W$$

3.0 CALIBRATION

Following installation as outlined above, the Milltronics Impact Scale must be calibrated. The calibration is done by comparing the flowmeter reading to the actual measured flow and adjusting for any discrepancies. To achieve this, proceed as follows:-

3.1 Note the registration calculated in section 2.6.4. (5) of electronic instructions (PL-164).

3.2 Run a sample of material over the flowmeter and catch and weigh it. This sample run should be of at least three (3) minutes duration at a rate of 50% or more of the full scale flowrate. Compare the weight of the material to the count on the totalizer to arrive at flow factor of weight per count ($\frac{W}{C}$).

3.3 Mount the calibration pulley as shown on page 10. Attach a weight, by means of the cable provided, over the calibration pulley, to the mechanism. This weight should be approximately 30 grams per ton per hour of full scale flow rate and must give at least 50% indication.

3.4 Compare the calculated factor $\frac{W}{C}$ to the registration and adjust the "SPAN" controls on the amplifier accordingly.

Example: Assume -

1. Desired registration is 20 lb/count.
2. Weight of test sample was 10,000 lb.
3. Count on totalizer during test run was 400.
   Calculated factor $\frac{W}{C} = \frac{10,000}{400} = 25 \frac{lb}{C}$
4. Indication on meter was 60% with test weight attached.

Now the "SPAN" controls must be adjusted until the indicator reading is $\frac{25}{20}$ X 60% = 75%

3.5 Record the test weight and the indicator reading after the "SPAN" adjustment. Future calibrations can be done by attaching the same weight and confirming that the same indicator reading is obtained.

3.6 Remove the calibration pulley, resecure the calibration pin access door, and store the calibration pulley for future use.

4. DAMPING

The indicator can be stabilized by adjusting the "DAMPING" control on the front of the amplifier. With the switch on the "0" position, there is minimum electrical damping. A "3" setting gives maximum damping.

5. LOAD DISTRIBUTION COMPENSATION CALIBRATION (OPTIONAL)

This calibration may be required in cases where the flow pattern of the material creates a non-linear output. Tests must be run to determine if this option is required.

After the normal calibration procedures, at a flow rate between 75% and 100% of rated flow, have been completed, run another test at 40% to 50% of rated flow. Calculate the flow factor $\frac{W}{C}$ and compare it to the registration.

Example: Registration is 10 Kg/C.
Test sample 4000 Kg
Test count 385

$$\text{Flow factor} = \frac{W}{C} = \frac{4000}{385} = 10.4$$

Since the actual count (385) is less than that required (400) which would give the correct flow factor, positive compensation is required (see section 6 of electronics bulletin PL-164).

To Adjust the L.D.C. Board

1. Hang a weight on the calibration pulley equivalent to approximately 90% indicated with the switch in the "NO COMP" position.

2. Switch to the "+ COMP" position and adjust the "CROSS" control to the reading in (1).

3. Switch to the "NO COMP" position.

4. Change the weight on the calibration pulley to get a reading of approximately 45%.

5. Switch to the "+ COMP" position and adjust the "COMP" control for the required amount of compensation.

"+ COMP" Reading = "NO COMP" X $\frac{\text{flow factor}}{\text{registration}}$

Example:

if the "NO COMP" reading in (4) was 46% and flow factor, as calculated above was 10.4, then,

"+ COMP" reading = 46 X $\frac{10.4}{10}$ = 47.84

if the negative compensation is required, substitute "- COMP" for "+ COMP".

Example:

Registration = 1 Lb/C

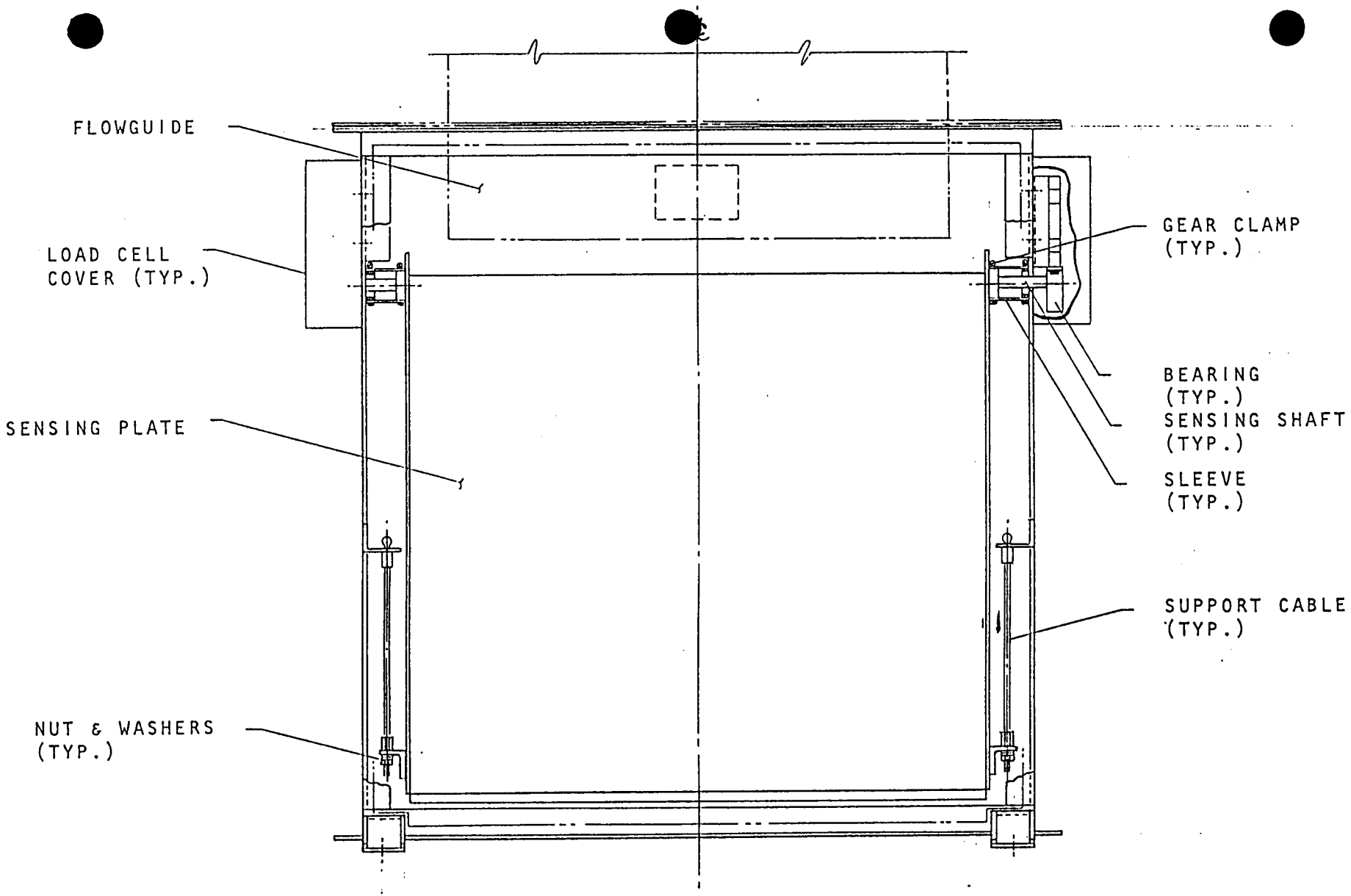
Test Sample = 315 lb.

Test count = 321

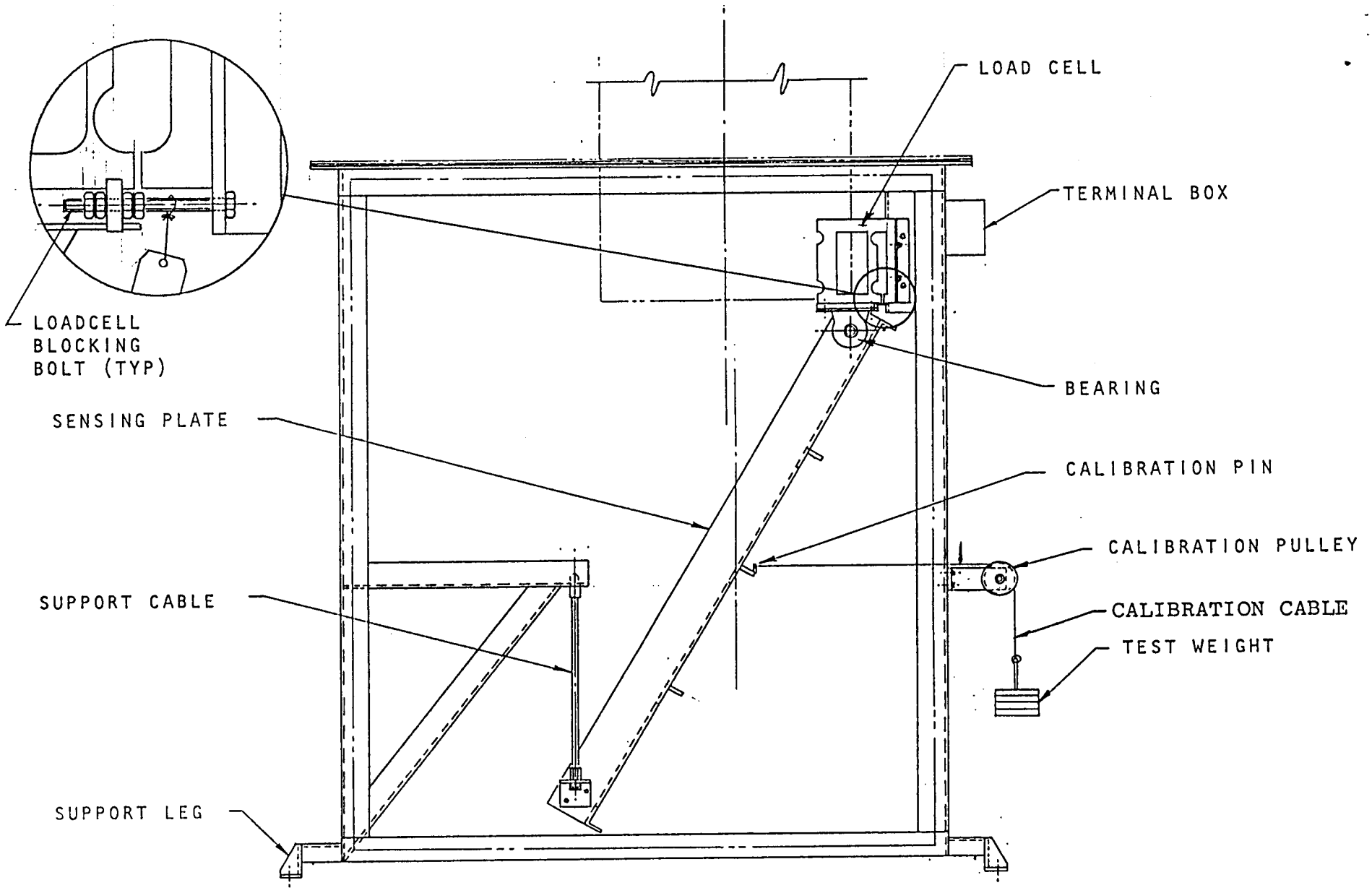
Flow factor = 0.98

MAINTENANCE

These scales are basically maintenance free. The only maintenance required is the replacement of the polyurathane sensing plate liner. During the changing of the same, it is best that the sensing plate be removed. The load cells should be blocked at this time with the load cell blocking bolts in order to prevent over stressing of the load cells.



SENSING PLATE INSTALLATION



SENSING PLATE & CALIBRATION PULLEY ARRANGEMENT

6.0 RECOMMENDED SPARE PARTS

a)	(2)	PILLOW BLOCK BEARING
b)	(1)	CALIBRATION PULLEY
c)	(2)	LOAD CELL COVER
d)	(2)	LOAD CELL
e)	(2)	SENSING PLATE SUPPORT CABLE
f)	(2)	FLEXIBLE SLEEVE
g)	(1)	I. S. A.
h)	(1)	BARRIER STRIPS (IF REQ'D.)

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