

Achieving Optimal Results from Your Industrial Weighing System



Your Host

Jim Haldeman
Business Development Manager
Process Instrumentation
Lesman Instrument Co
jimh@lesman.com

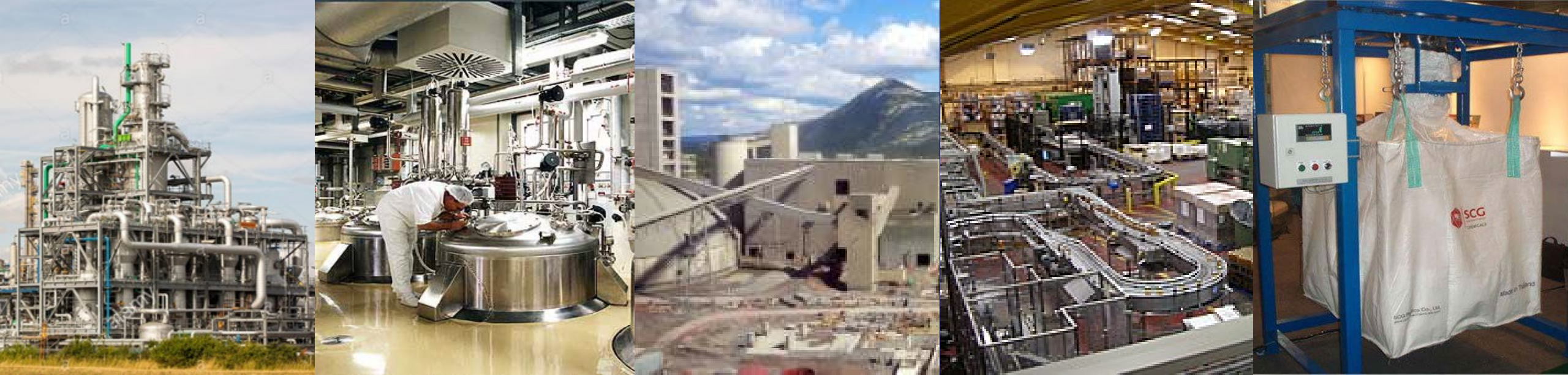


Featured Speaker

John Dronette
Product Manager
Weighing Technology and Process Protection
Siemens
john.dronette@siemens.com



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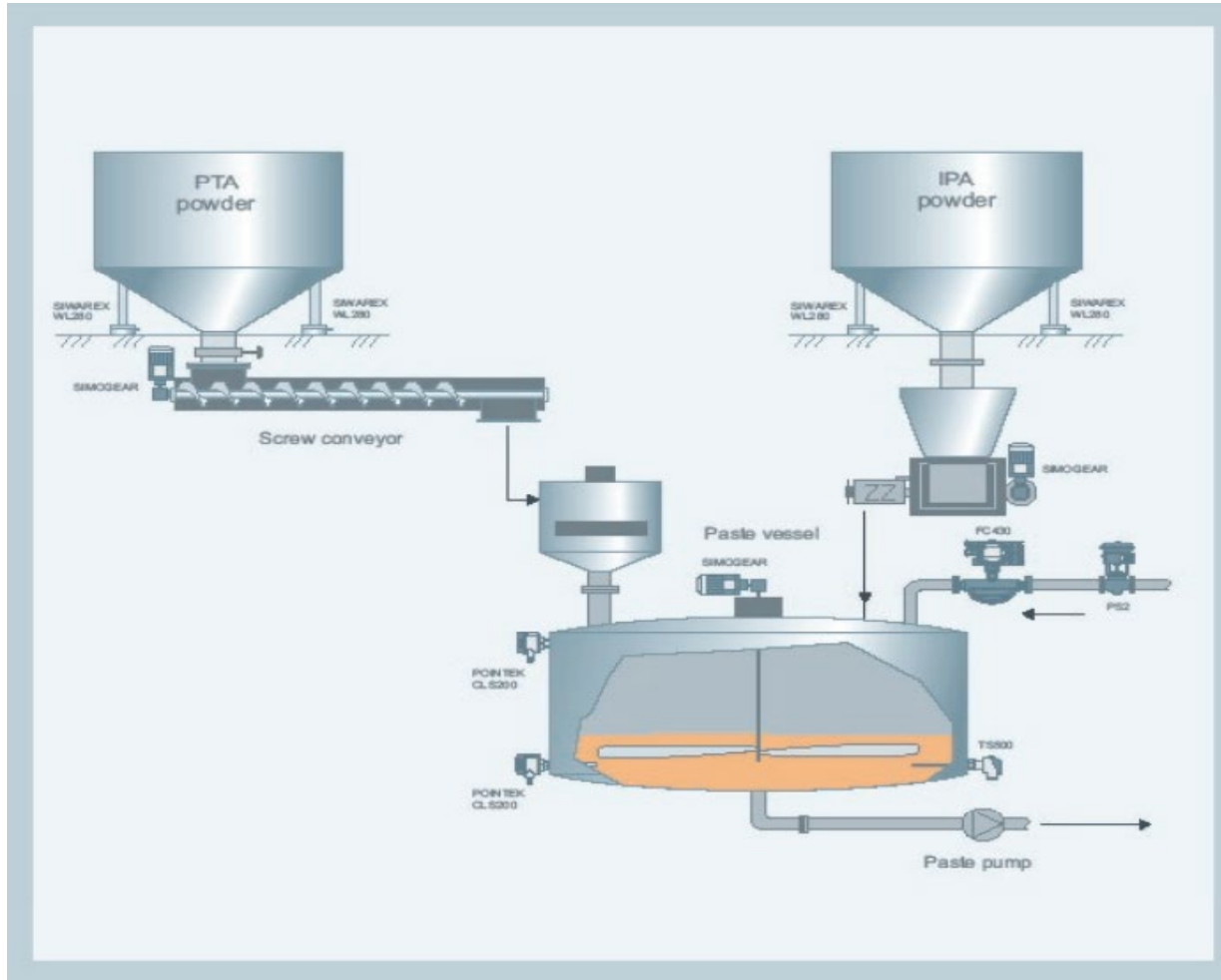
Achieving Optimal Results from Your Industrial Weighing System

Index / Agenda

- Types of industrial scales
- Strain gauge load cells principal of operation
- Load cell types and uses of each
- Installation requirements
- Load cell diagnostics
- Common sources of error
- Application examples

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Why Weigh?



Process control

- Reduced need to reprocess
- Reduces scrap

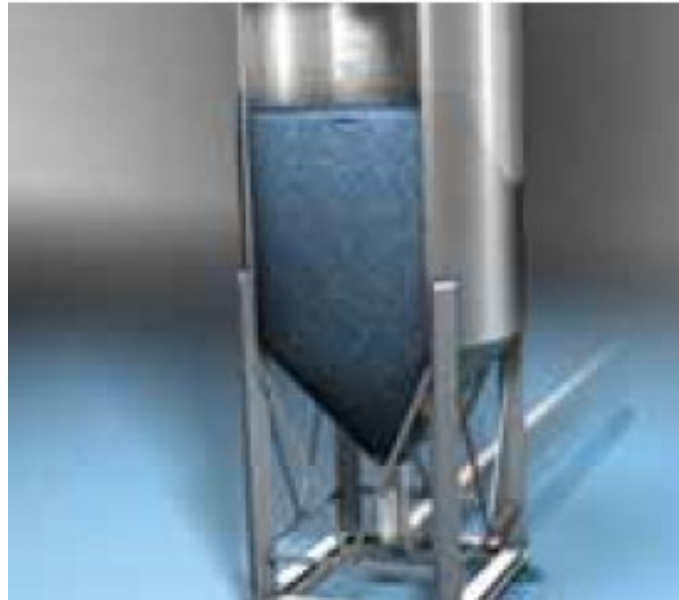
Inventory control

- Ordering raw materials
- Production scheduling
- Fiscal responsibility

Custody transfer

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Types of Industrial Scales



Non-automatic scales

- Requires the intervention of an operator during the weighing process
- Includes scales such as:
 - Platform
 - Bin weighing

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Types of Industrial Scales



Automatic scales

- The scale can complete the measurement without operator intervention.
- Includes scales such as:
 - Batching
 - Filling
 - Checkweigher



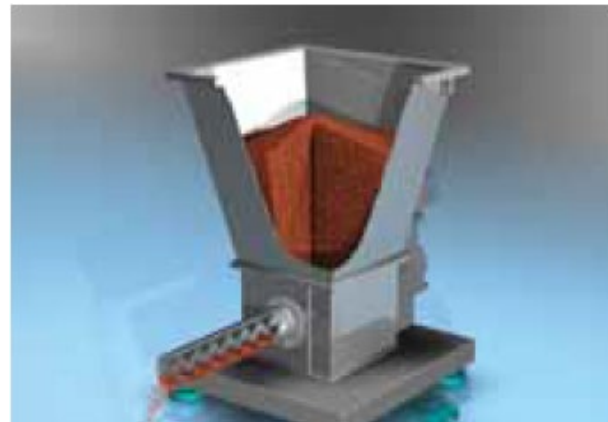
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Types of Industrial Scales



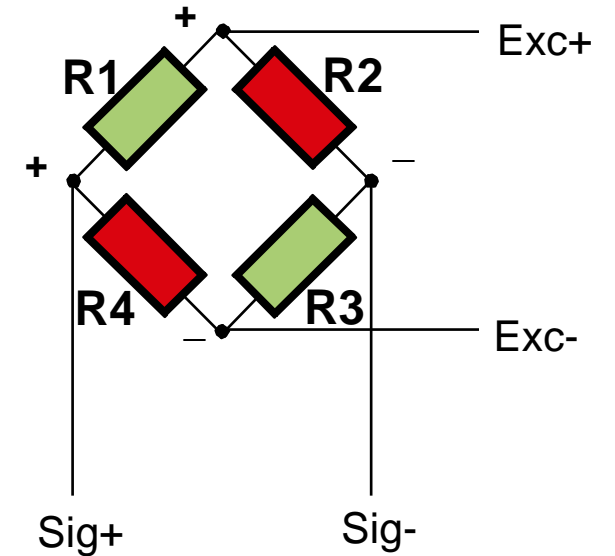
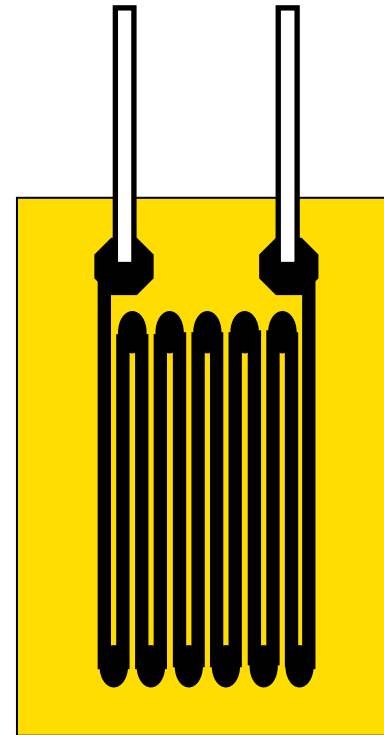
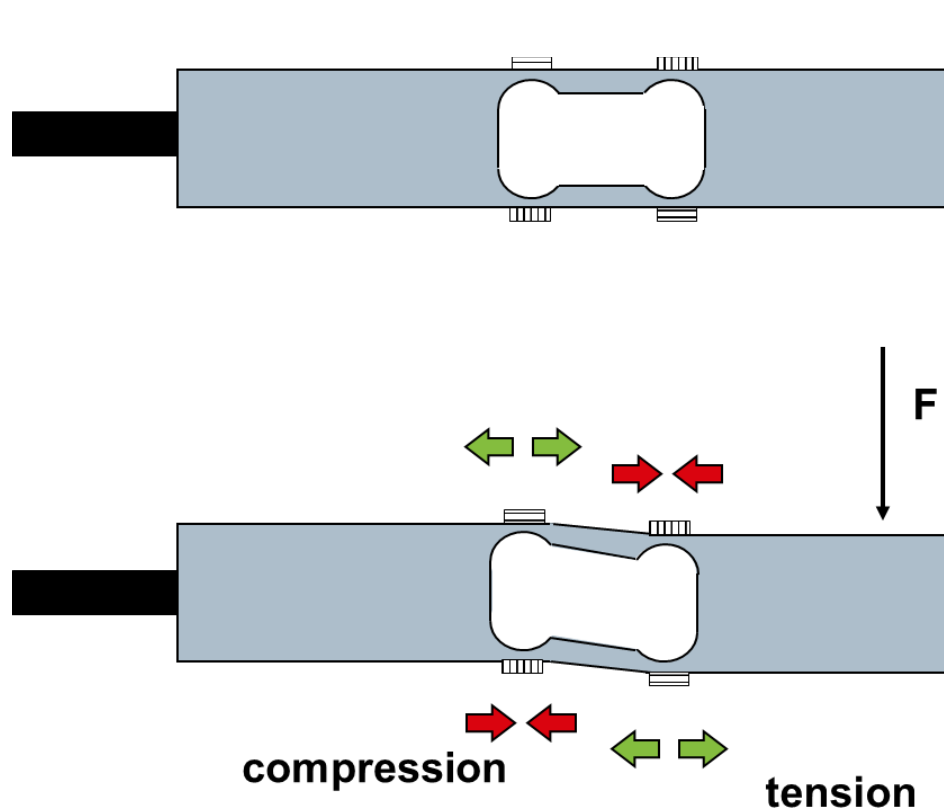
Continuous scales

- Measure material in bulk as it is moved in the process
- Measure rate and accumulated total
- Includes scales such as
 - Belt scales
 - Solids flow meters
 - Loss-in-weight feeders (LiW)



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Load Cell Theory



For the scale to operate properly, the installation has to allow for a slight deflection

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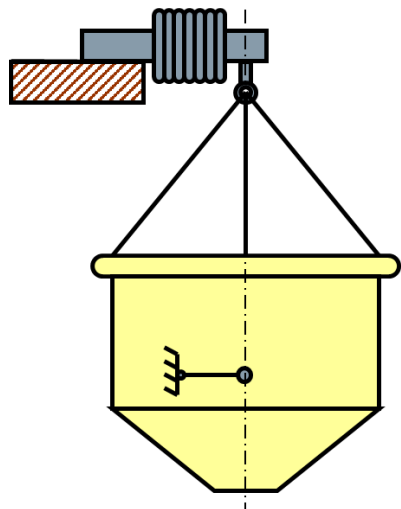
Load Cell Types

Single Point	Bending Beam, shear beam	Compression	Tension
Small platforms (one load cell per application)	Large platforms, small bins and hoppers	Large bins and hoppers, and vehicle scales	Crain and hanging scales
Capacity 1 lb - 1000 lb	Capacity 20 lb – 35 ST	Capacity 150 lb – 500 ST	Capacity 100 lb– 10 ST
			

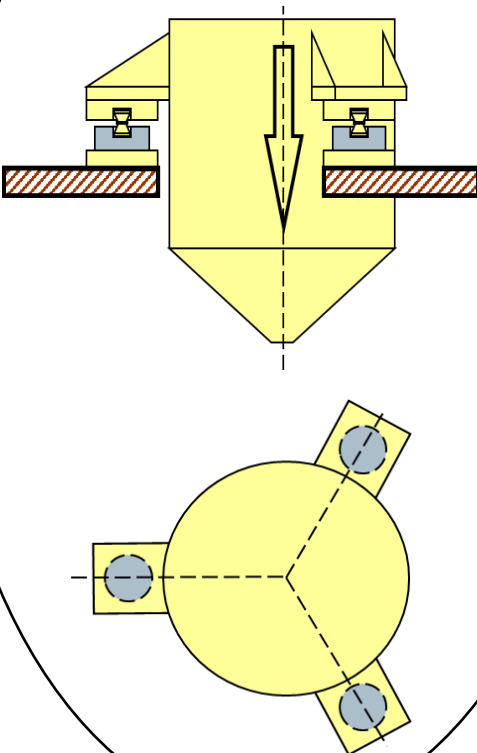
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Bearing Systems

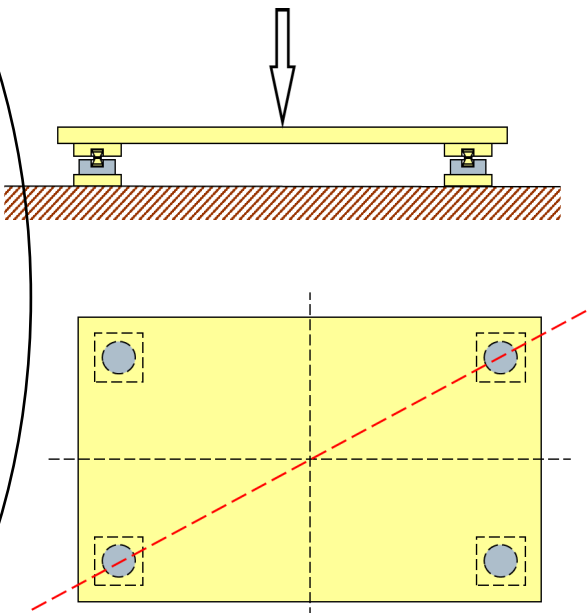
Single Point Bearing



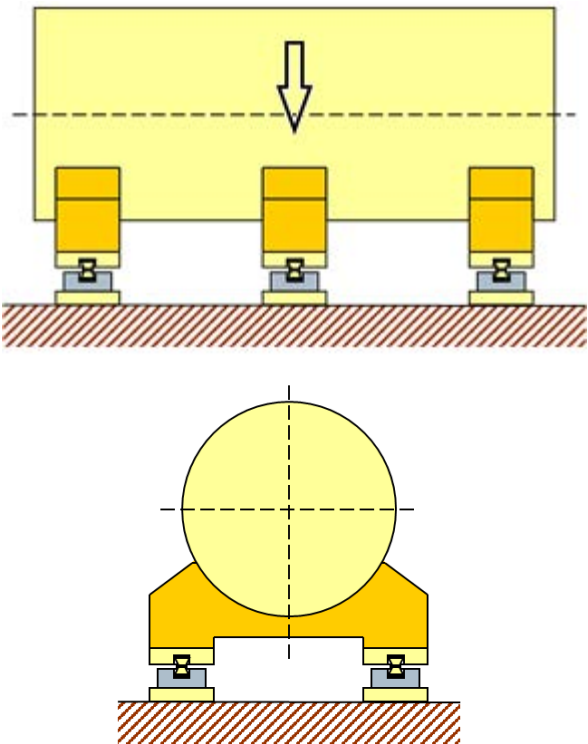
Three Point Bearing



Four Point Bearing



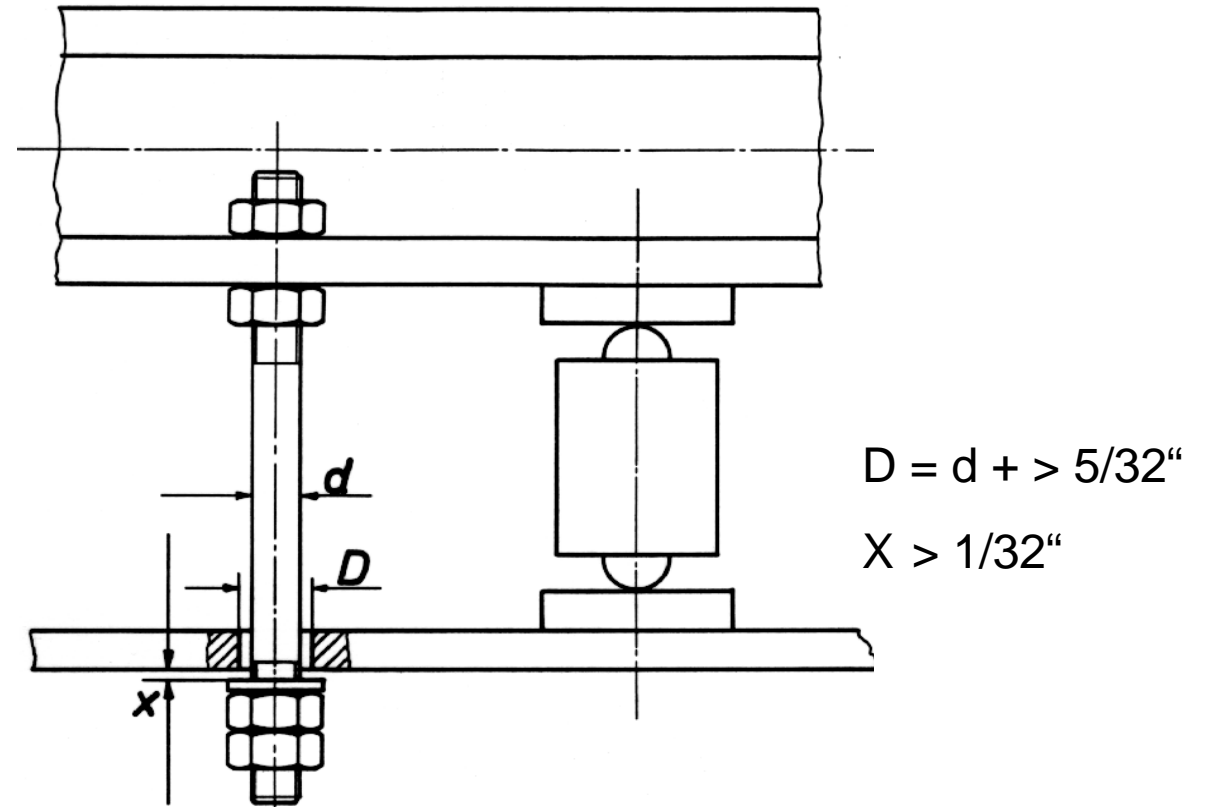
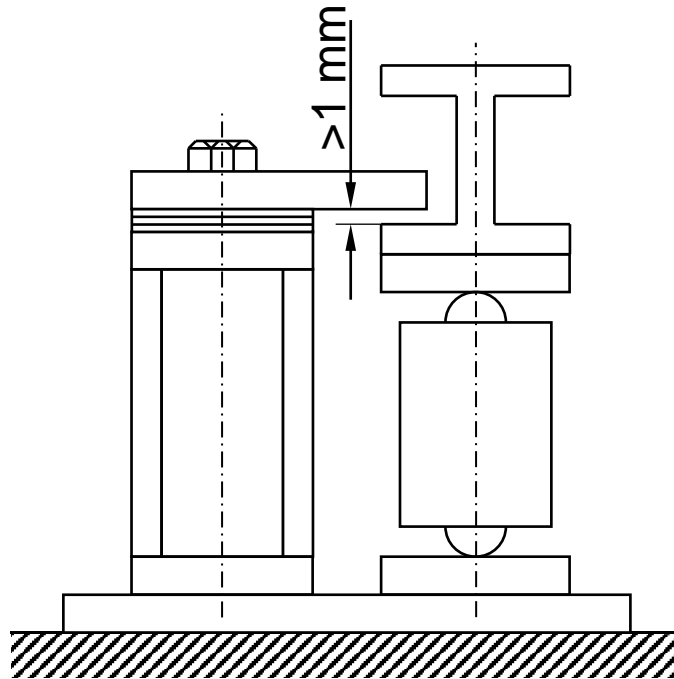
Multiple Point Bearing



The load carrier must float on top of the load cells

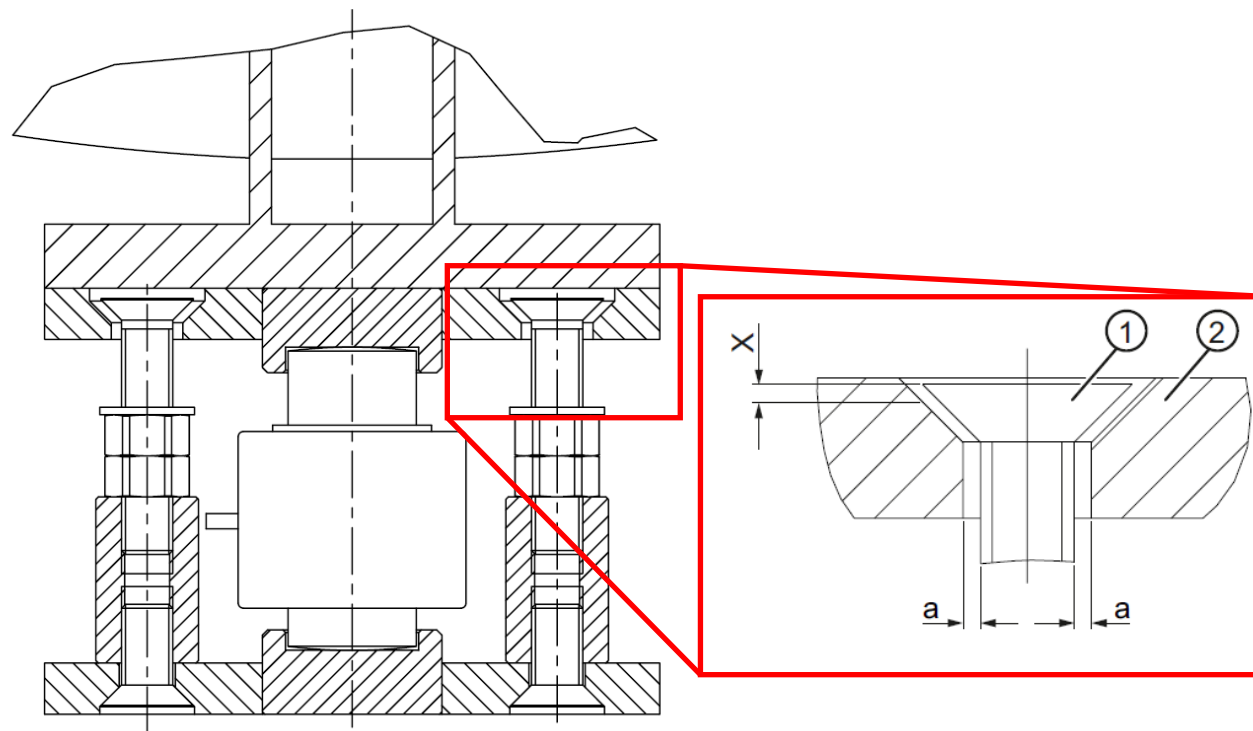
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Installation Requirements



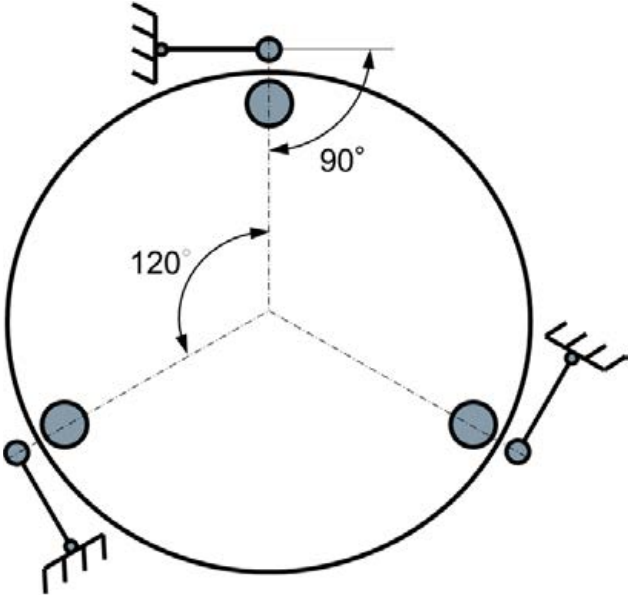
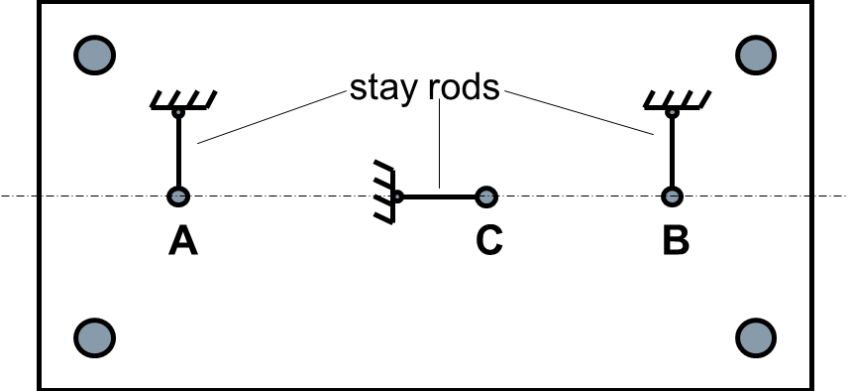
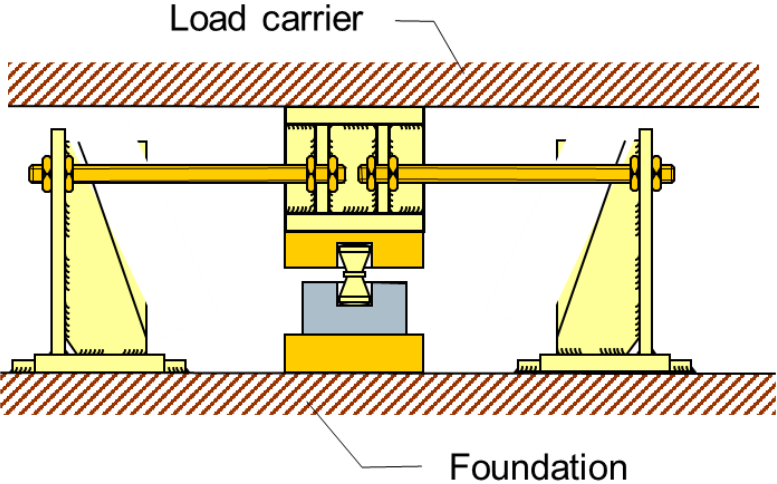
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Installation Requirements



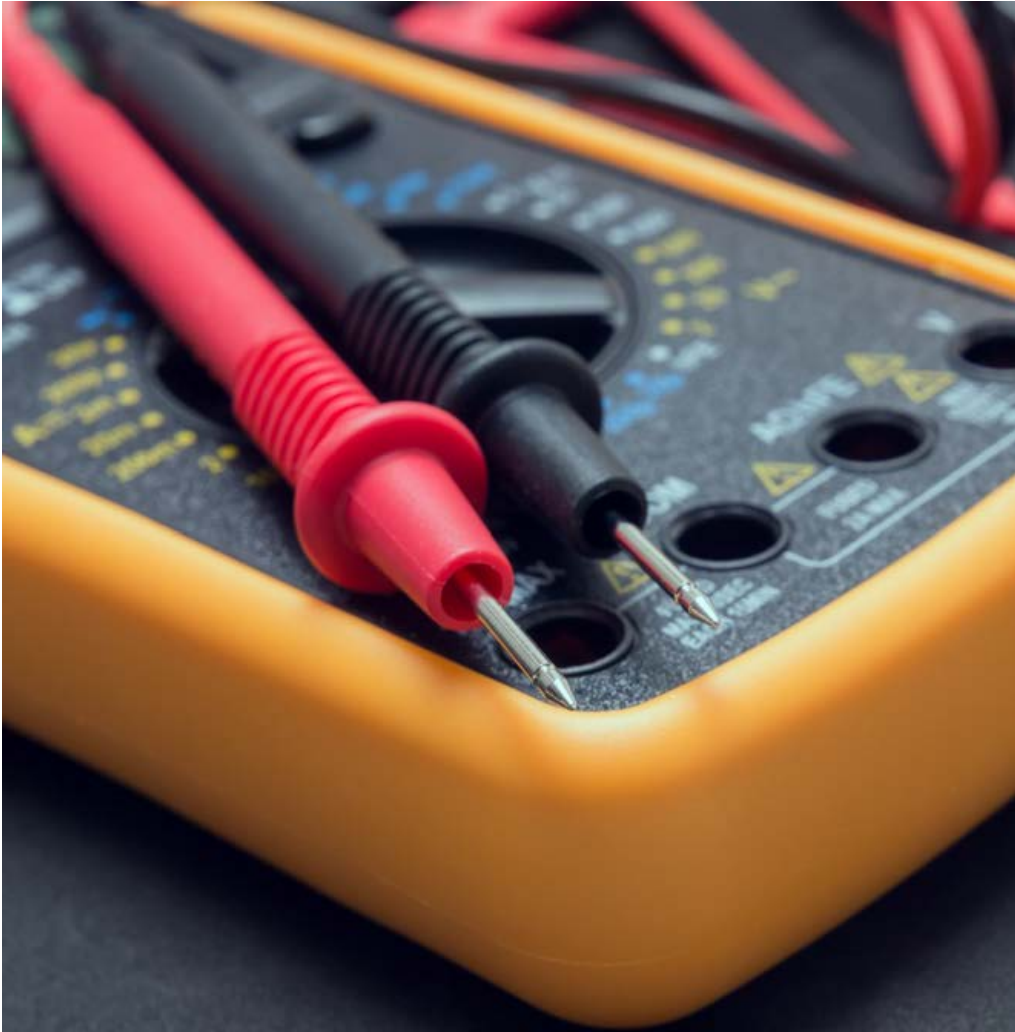
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Installation Requirements



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Load Cell Diagnostics



Load cell outputs

- A load cell that is operation properly will provide a mV output that proportional to the load applied.
- Load cell output is determined by
 - Characteristic value (C_n)
 - Load cell excitation
 - Load cell capacity
 - Load applied
- The characteristic value is usually specified in millivolts of output per volt of excitation (mV/V)
- Characteristic value = 2 mV/V
- Load cell excitation = 10 V
- Load cell capacity = 500 lb
- Output at 500 lb = 20 mV
- Output at 250 lb = 10 mv

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Load Cell Diagnostics



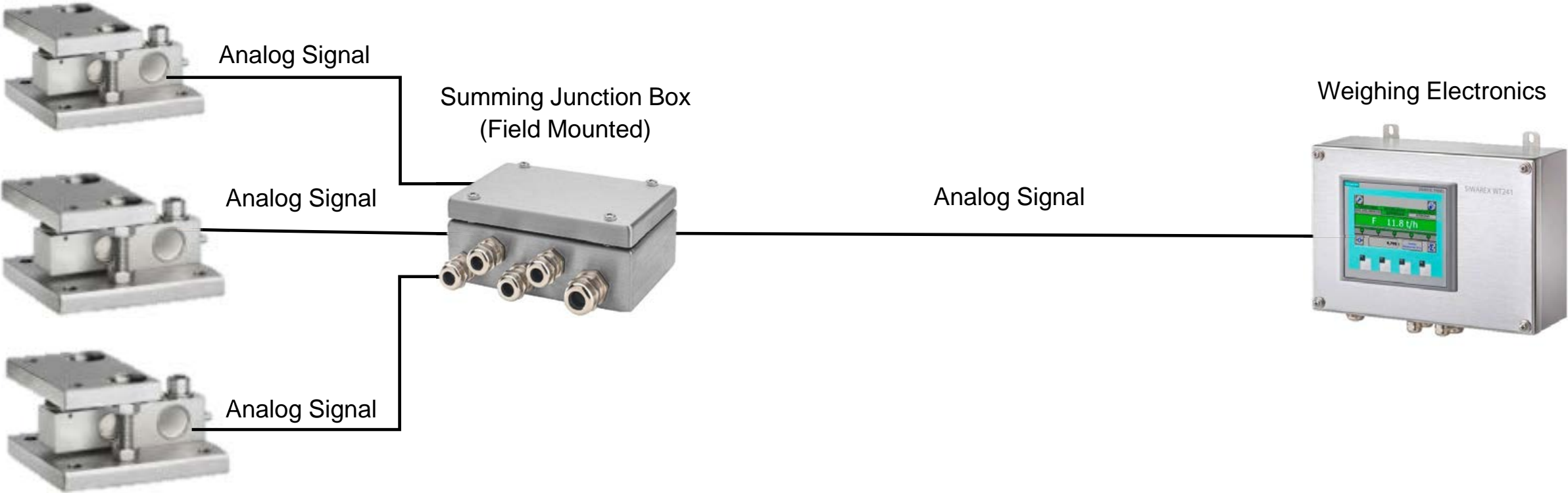
Most modern weighing electronics monitor load cells for:

- Wire breakage
- Load cell output too low
- Load cell output too high
- Correct excitation

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Load Cell Diagnostics

Analog junction box weighing system

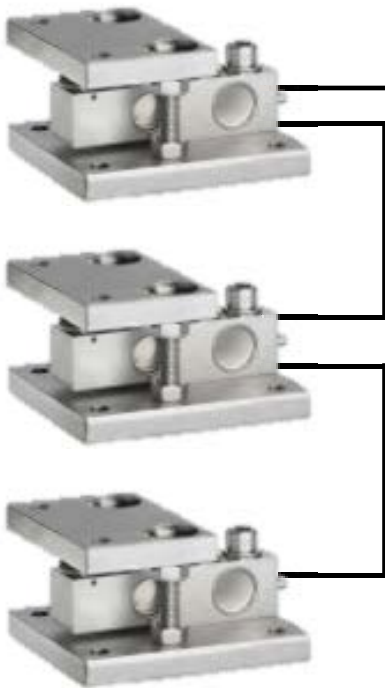


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Load Cell Diagnostics

Digital load cell weighing system

Digital Load Cells with
signal conditioner built in



Digital Signal

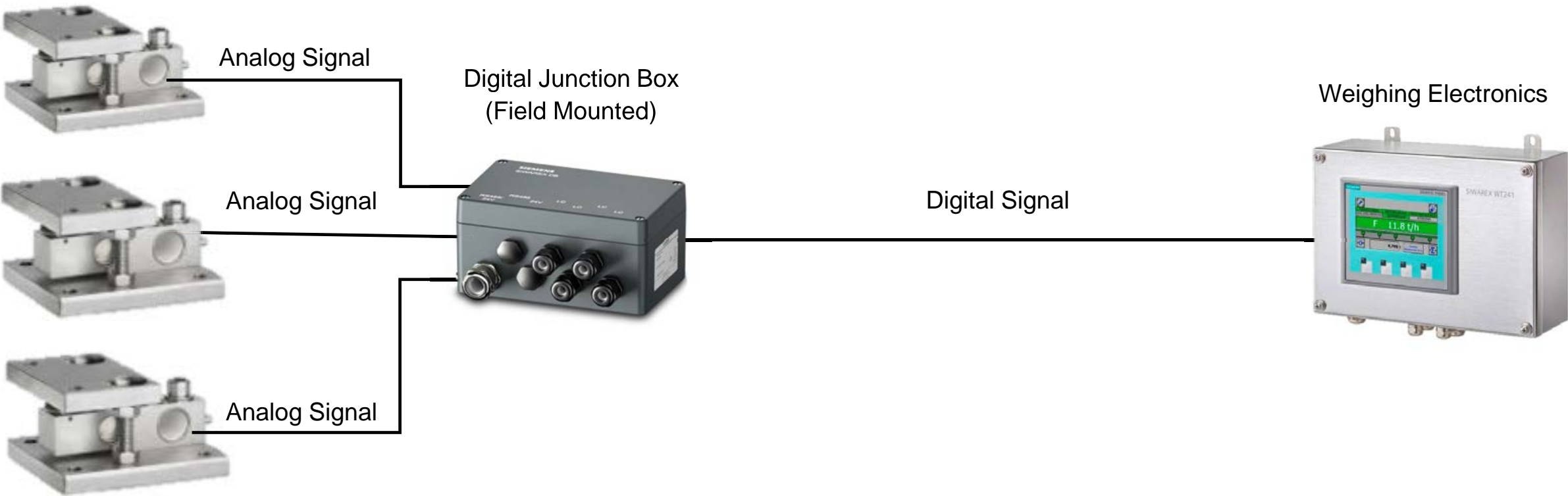
Weighing Electronics



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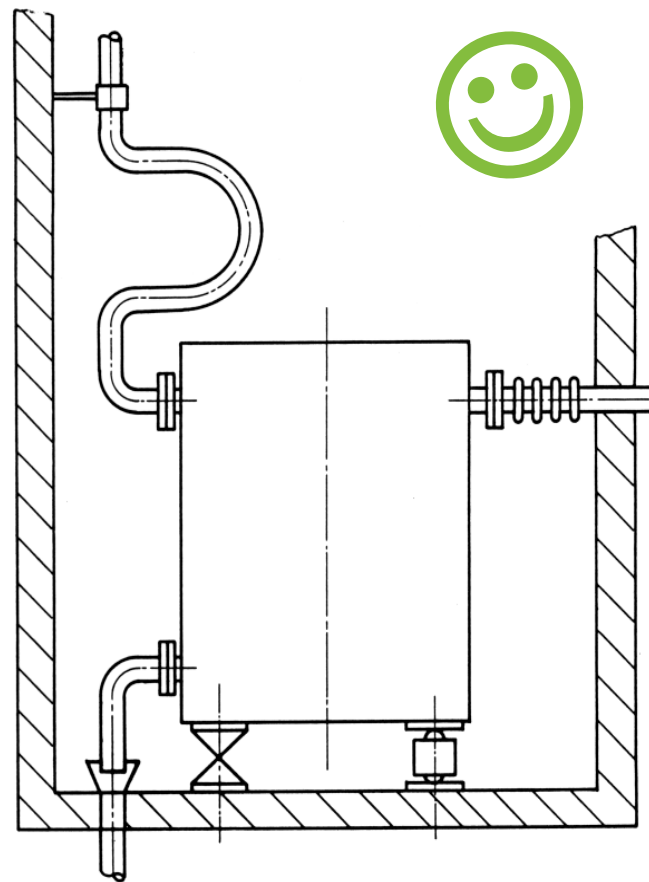
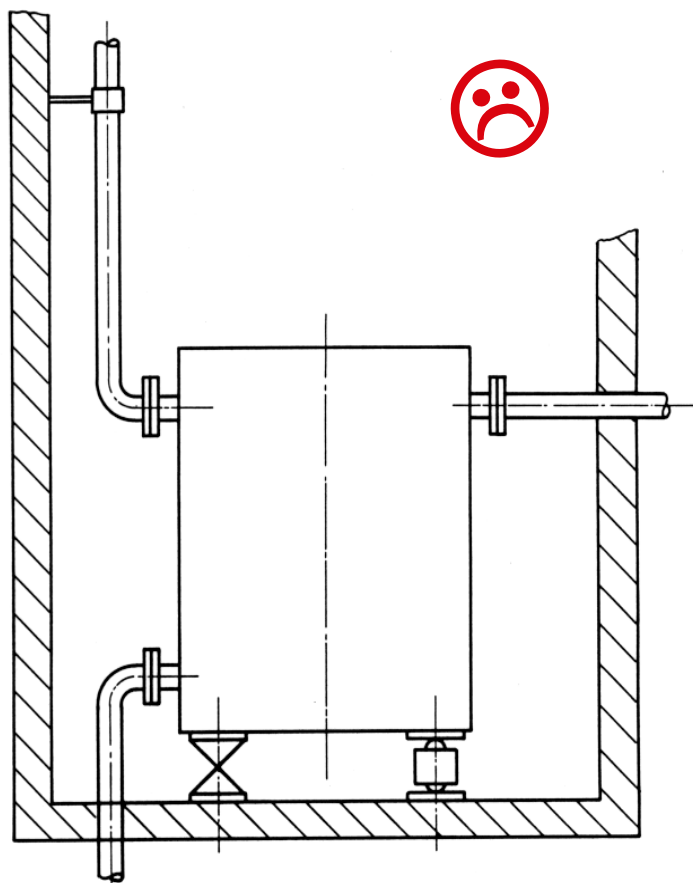
Load Cell Diagnostics

Digital junction box weighing system



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Common Sources of Error

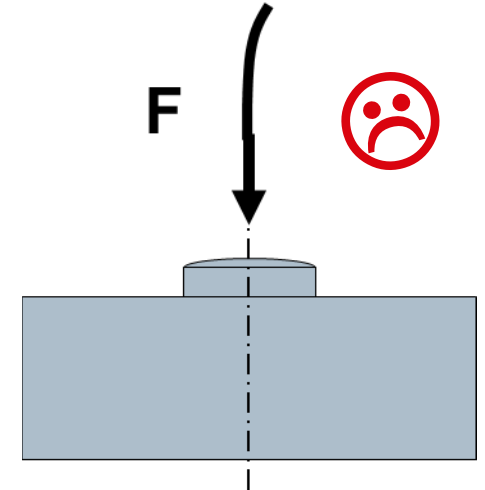
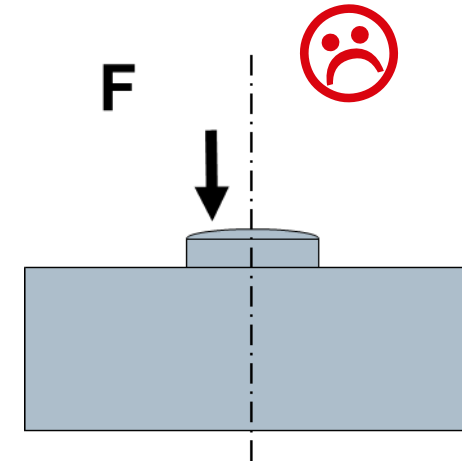
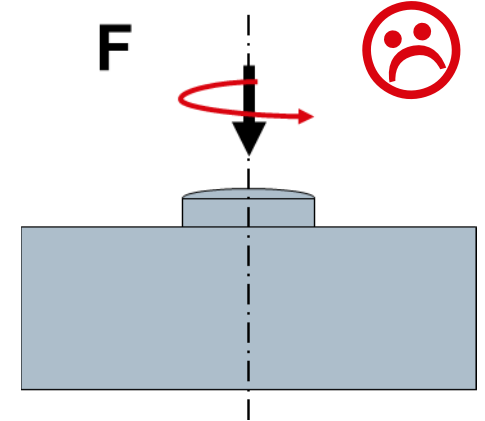
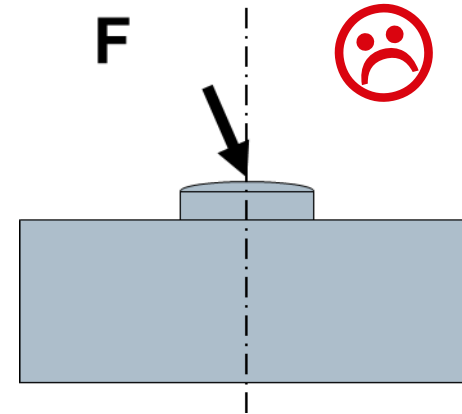
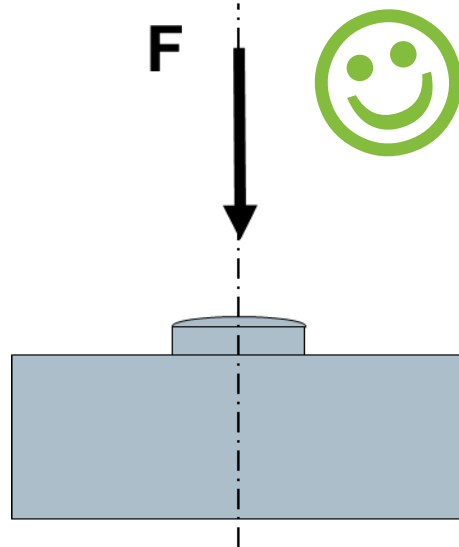


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Common Sources of Error

Load application must be:

- in measuring direction
- centered
- without torque
- without leverage forces

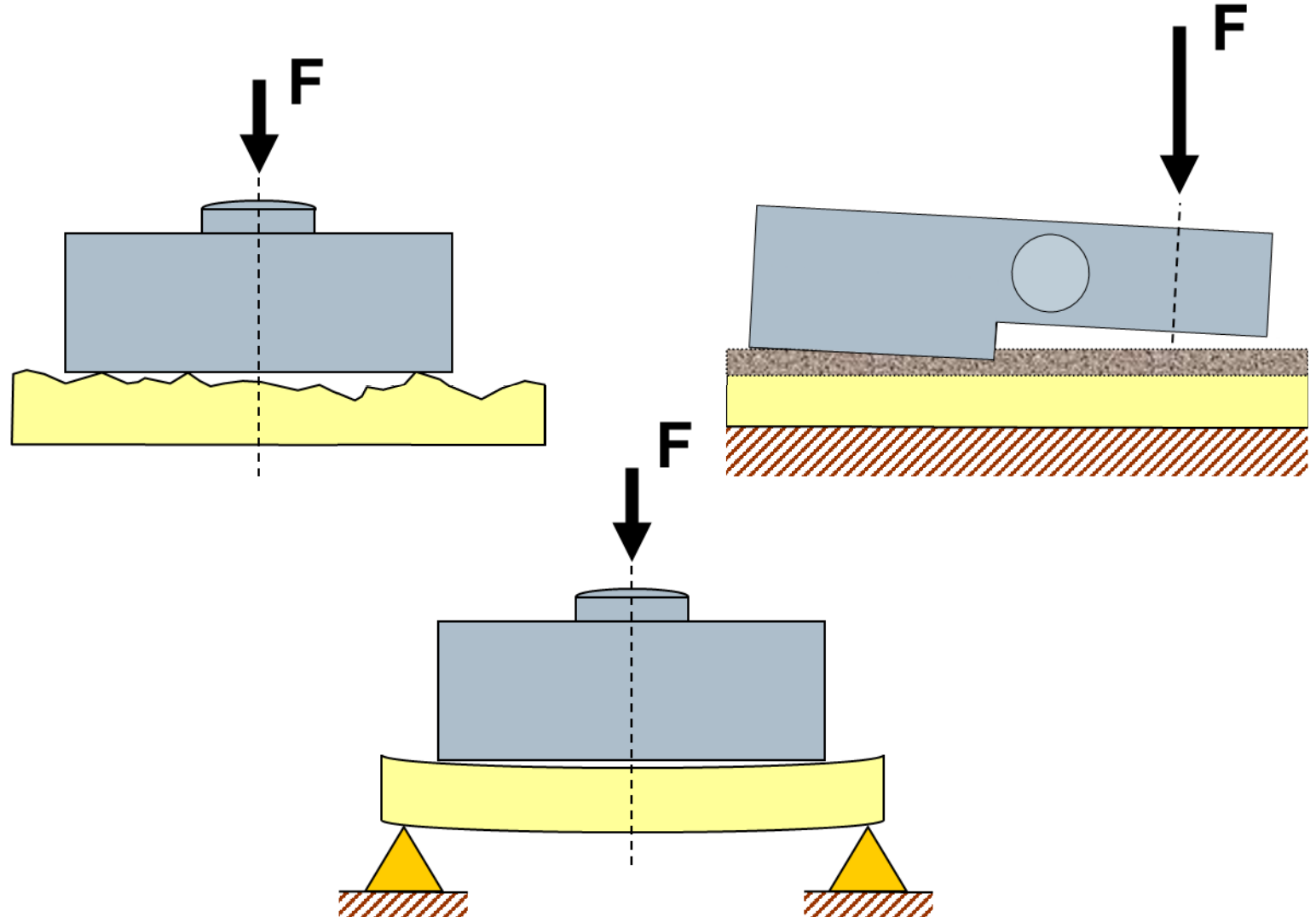


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Common Sources of Error

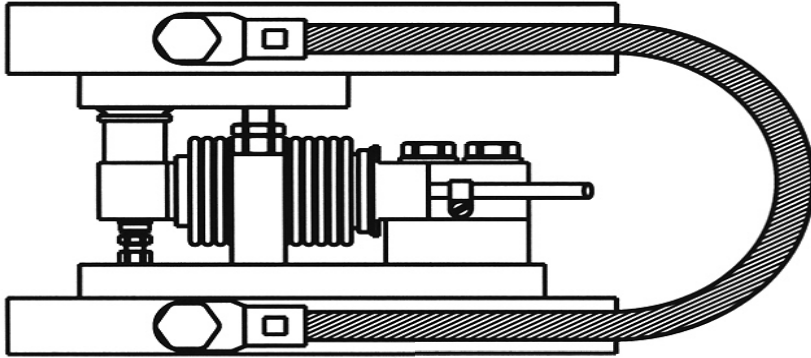
Load cell mounting surface should be:

- Level
- Flat
- Rigid enough to prevent from deforming under load



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Common Sources of Error



EMC Protection

- The load receiver must float on top of the load cells
- The only electrical path to ground is through the load cells



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Application Example 1



Customer

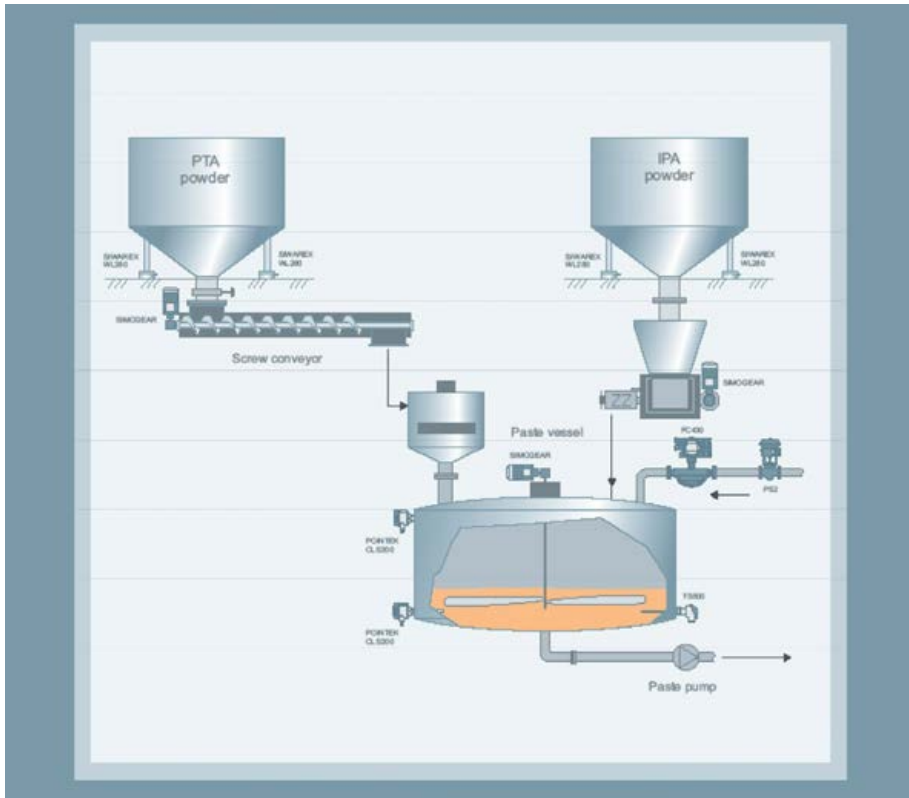
- Industry: PET (Polyethylene terephthalate) production

Challenge

- PET is manufactured mixing PTA, IPA and glycol in specific ratios
- The customer was experiencing a high level of scrap matter due to inaccuracies in the blending process

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Application Example 1



Benefit

- After implementation of the system, the customer found a considerable reduction in scrap, increasing their efficiency by 27%



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Application Example 2



Customer

- Industry: Grain handling
- Location: North Carolina

Challenge

- Overloading a transport vehicle leaves two options
 - Remove part of the material, which is very difficult
 - Risk expensive fines
- To eliminate the risk of overloading a vehicle, a common practice is to fill the vehicle to 90% of capacity
 - This increases shipping cost by 10%

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Application Example 2



This application exists in most bulk handling facilities

- Grain, loading trucks and rail cars
- Limestone, loading rail cars
- Chemical/fertilizer, loading ships
- Sand, loading rail cars
- Plastics, loading rail cars
- Roofing granules, loading rail cars
- Municipal sludge

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Application Example 2



Solution

- Using a Siemens WF200 solids flow meter and an SF500, the customer now measures the material as it is put into the vehicle
 - This allow the vehicle to be filled to 99% of its capacity without risking overloading the vehicle

Benefits

- Reduced shipping cost by 9%
- Verification of billing scale
- Reduced equipment wear

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Application Example 2

This application can be done with multiple products



Belt Scales



Bin Weighing



Solids Flow Meter

| Contact

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John Dronette

Product Manager

RC-US DI PA MI PRM MKT

2060 Detwiler Rd

Harleysville, PA 19438

Country

Phone +1 817-932-0285

E-mail john.dronette@siemens.com

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