

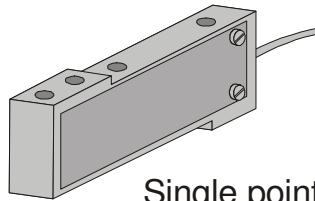
CHOOSING THE RIGHT LOAD CELL

Honeywell
SENSOTEC

Honeywell

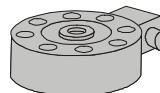
Types of Load Cells

Bending Beam



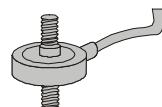
Single point weighbeam

Shear Beam



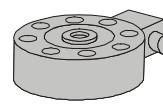
Shear pancake

Miniature



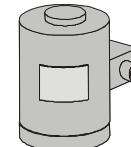
Diaphragm

Diaphragm

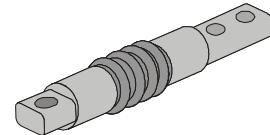


Diaphragm pancake

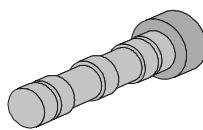
Column



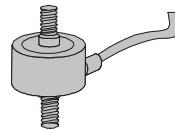
Single Column



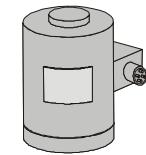
Bending Beam



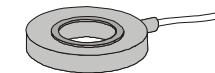
Clevis Pin



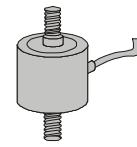
Bending Beam



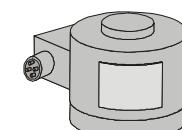
Cannister



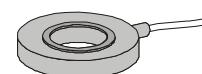
Donut



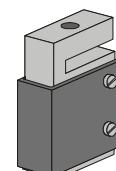
Column



Multiple Column



Donut



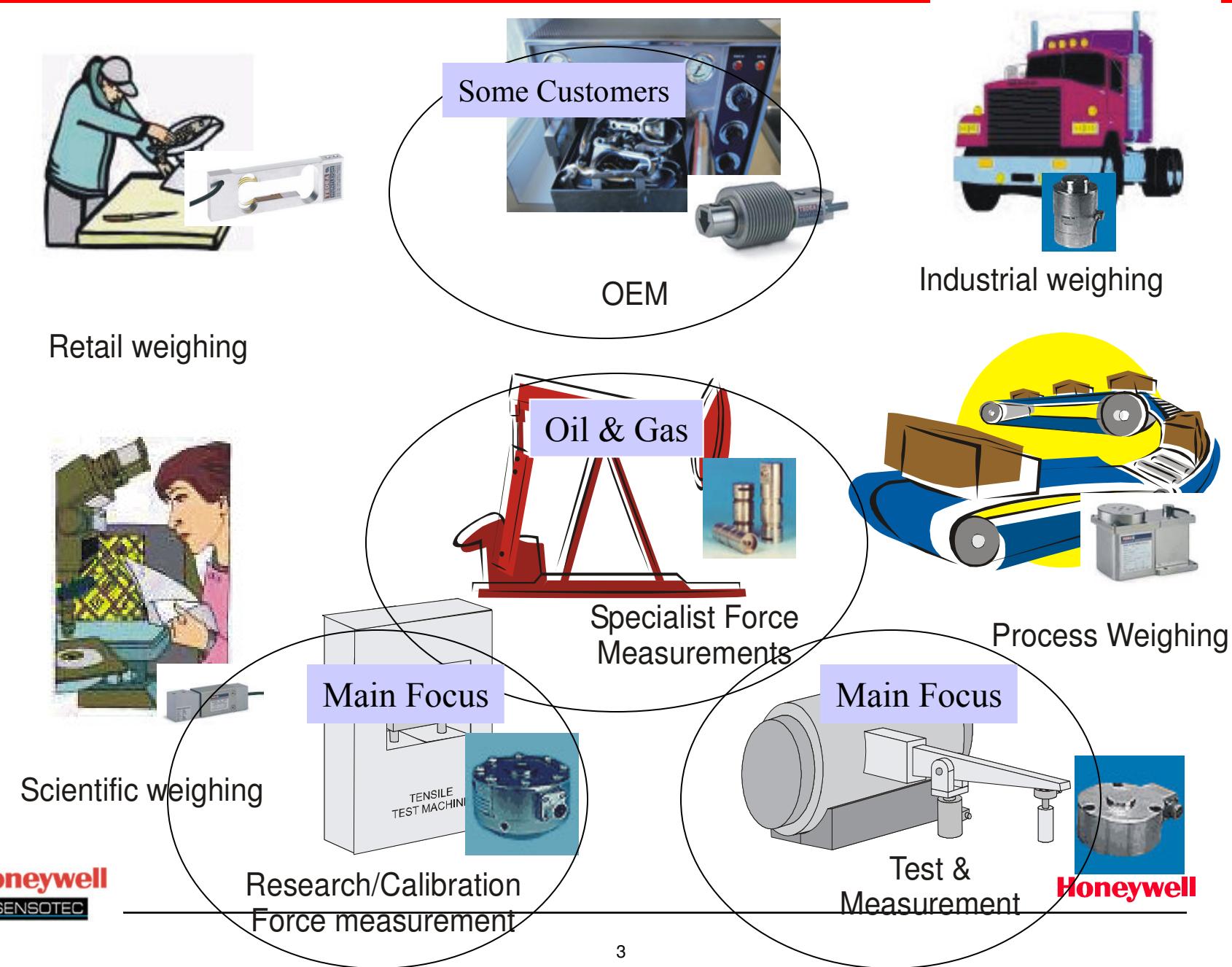
S Type

Honeywell

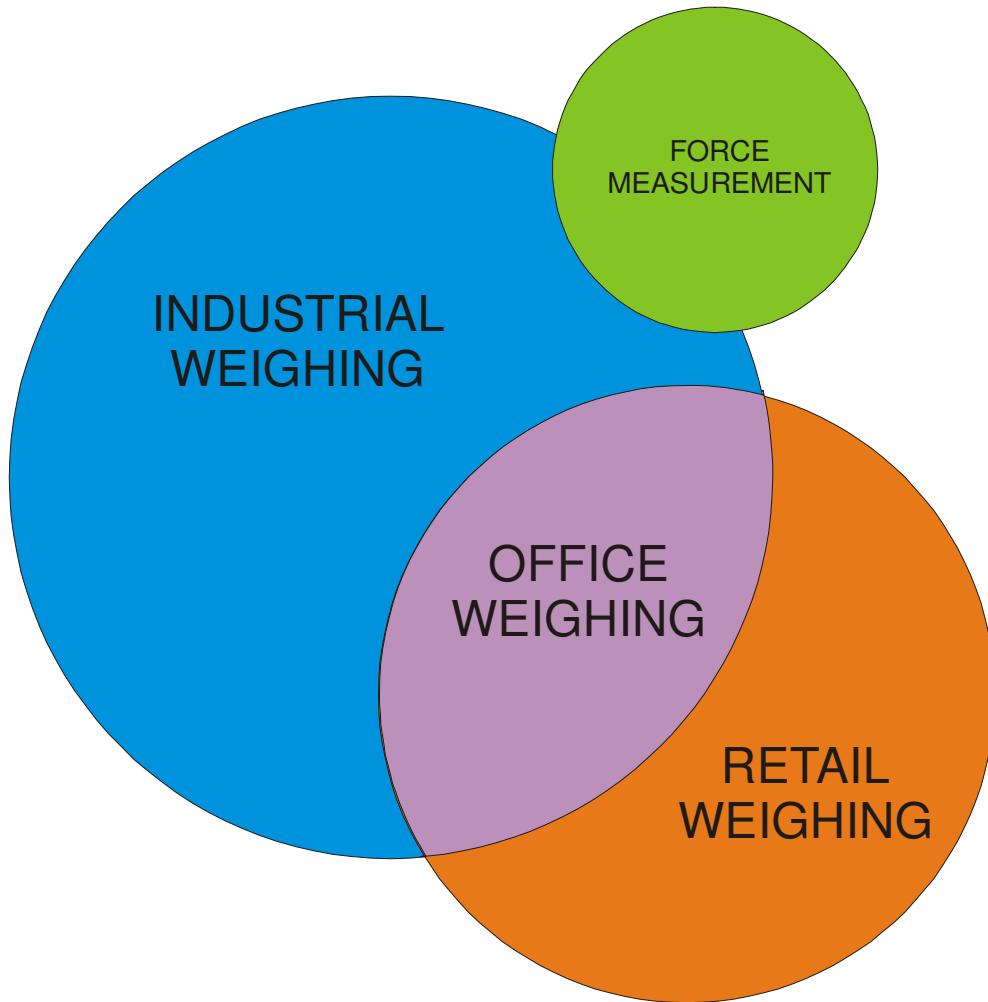
SENSOTEC

Honeywell

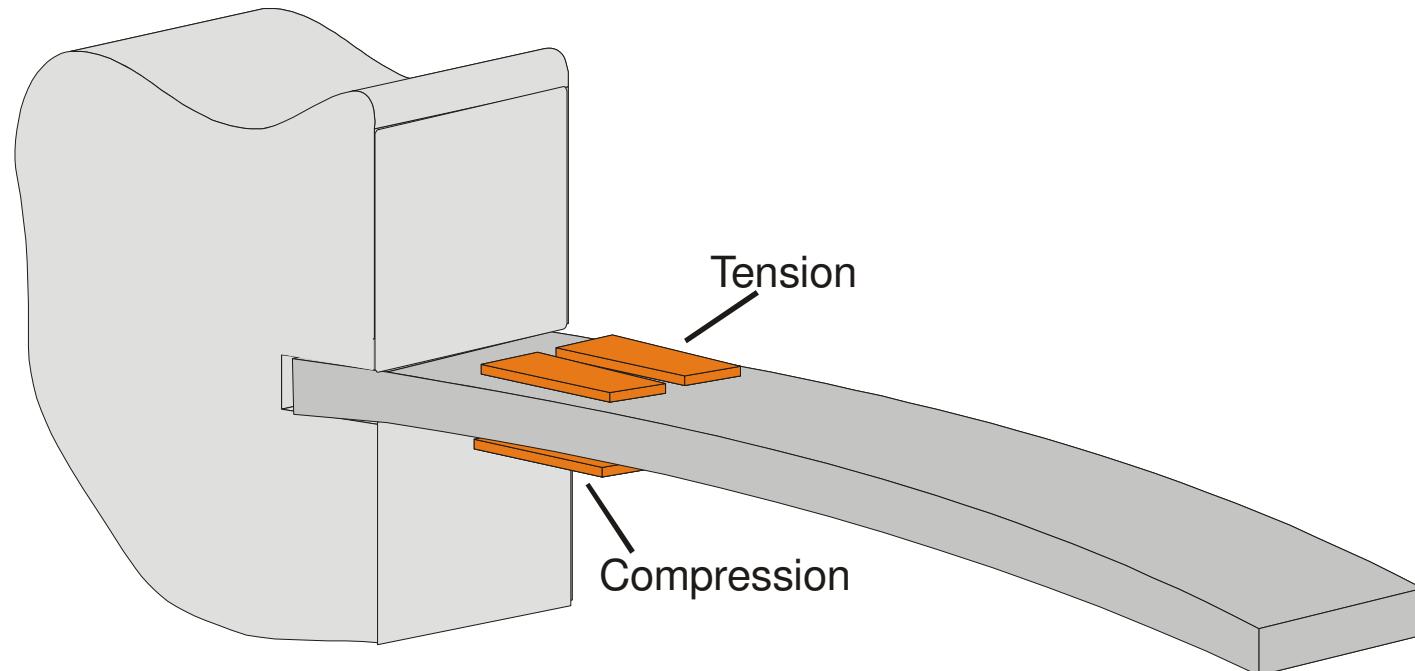
Application Segments



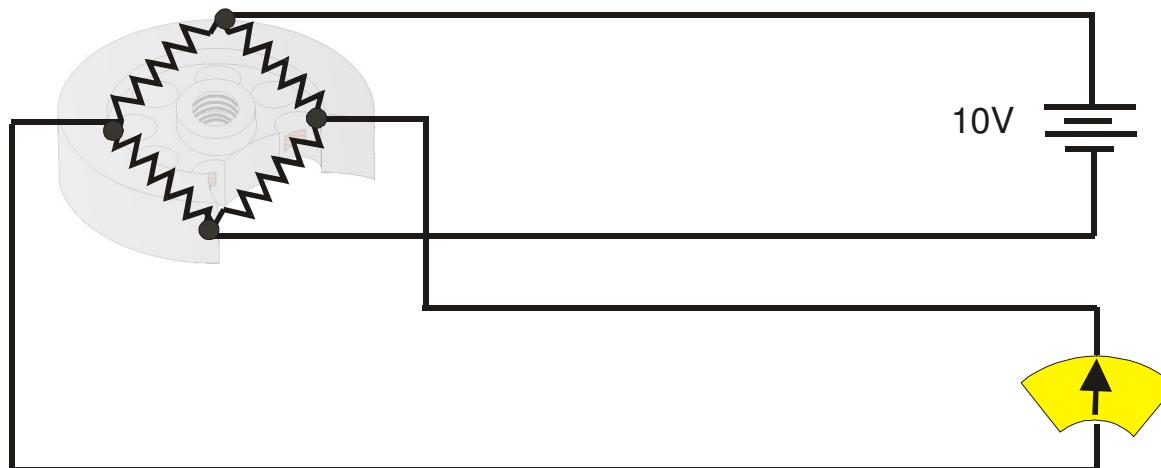
Application Segments



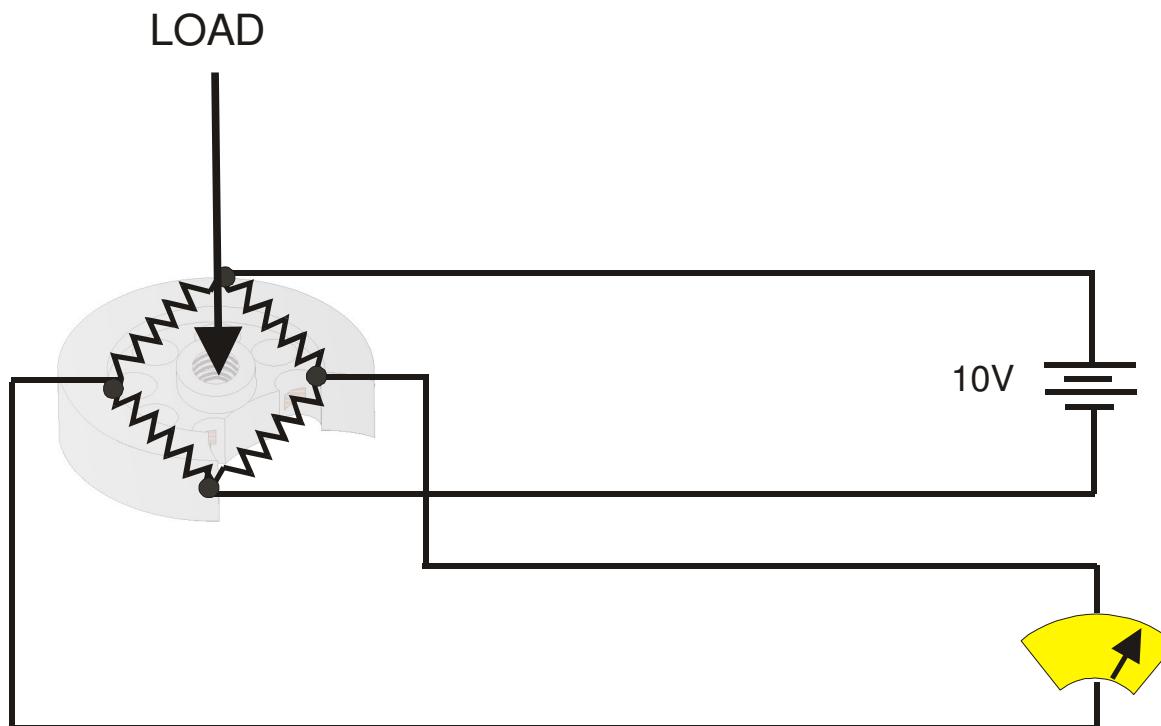
Principle of the Load Cell



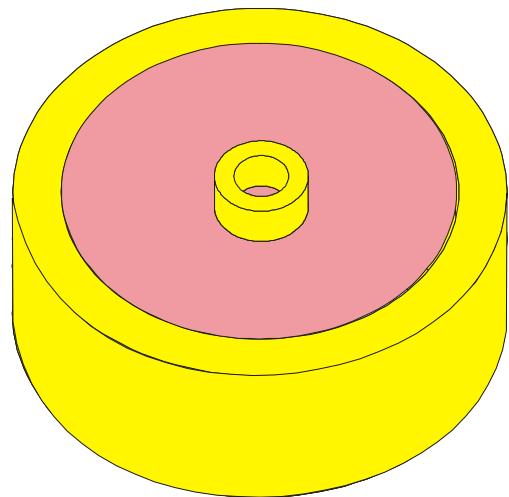
Principle of the Load Cell



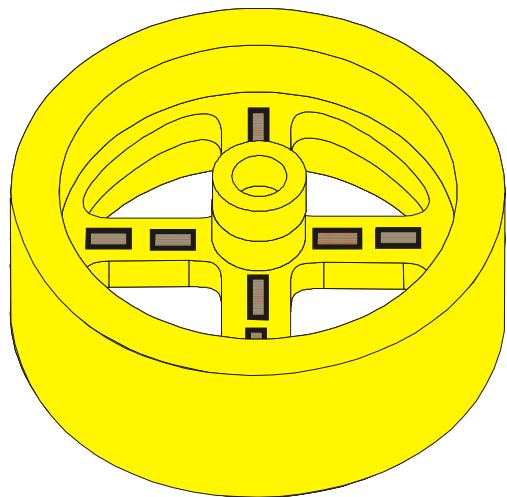
Principle of the Load Cell



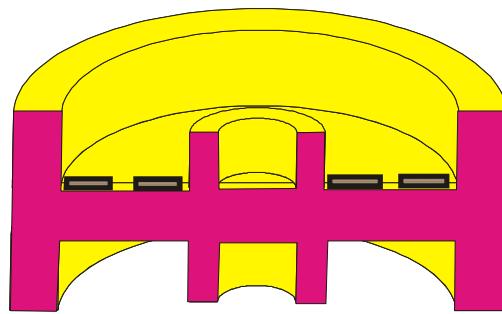
How a Load Cell is Constructed



How a Load Cell is Constructed



How a Load Cell is Constructed

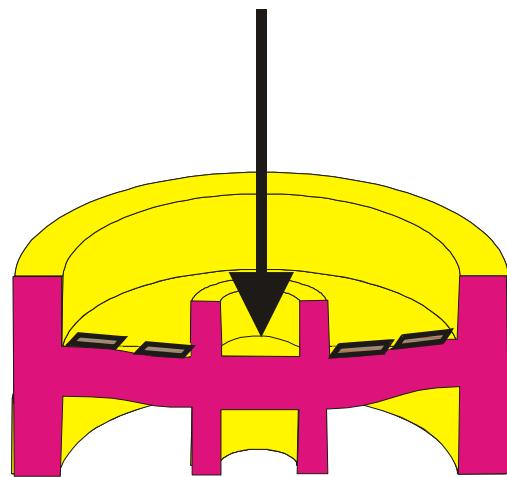


Honeywell

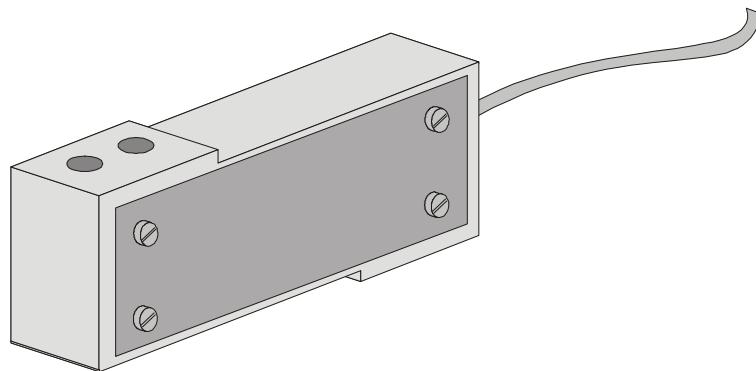
SENSOTEC

Honeywell

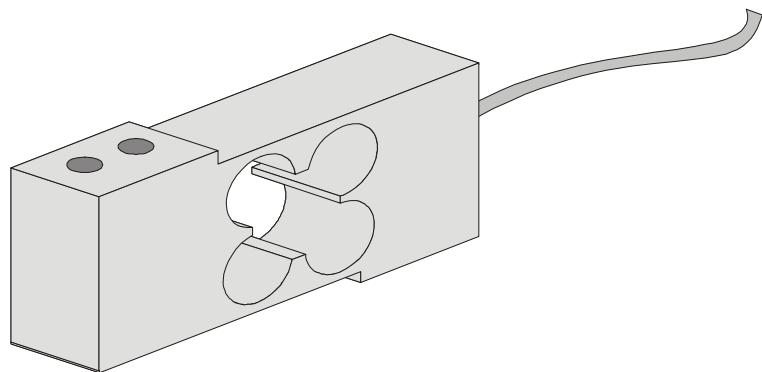
How a Load Cell is Constructed



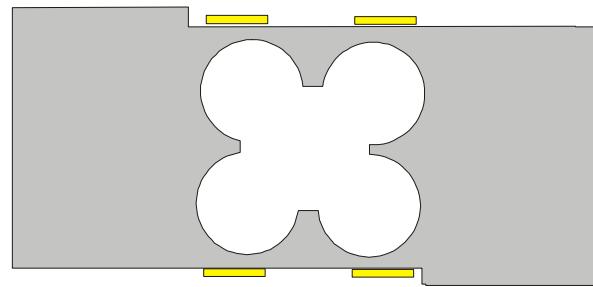
How a Load Cell is Constructed



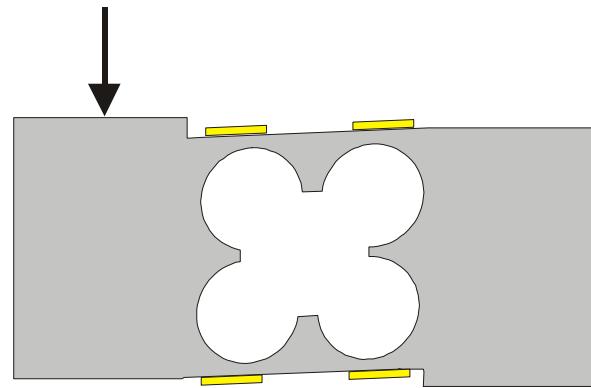
How a Load Cell is Constructed



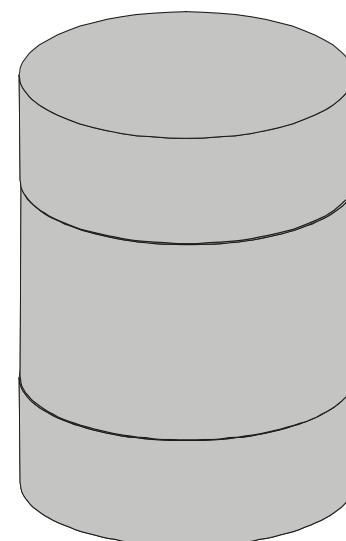
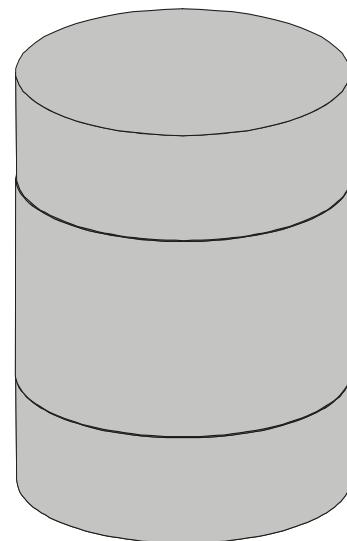
How a Load Cell is Constructed



How a Load Cell is Constructed



How a Load Cell is Constructed

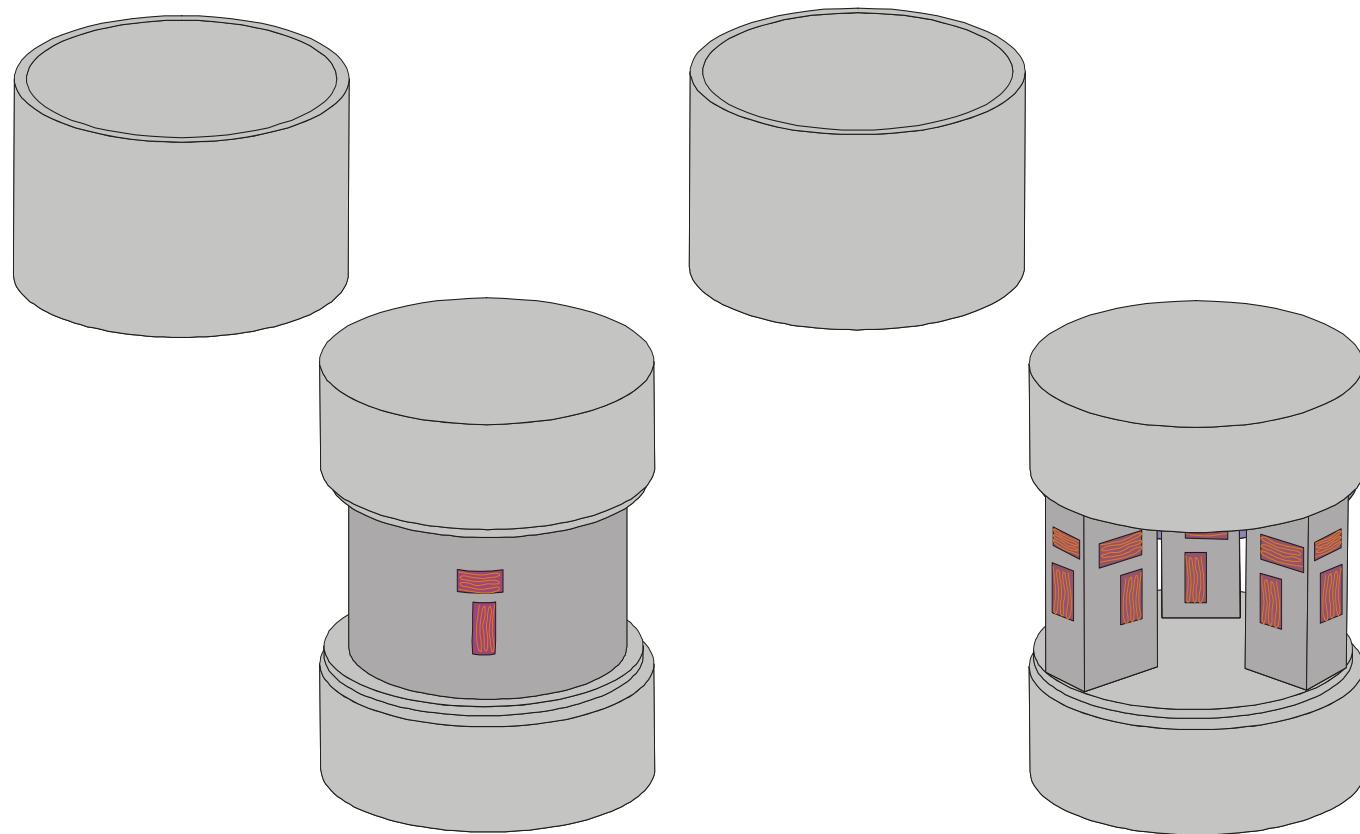


Honeywell

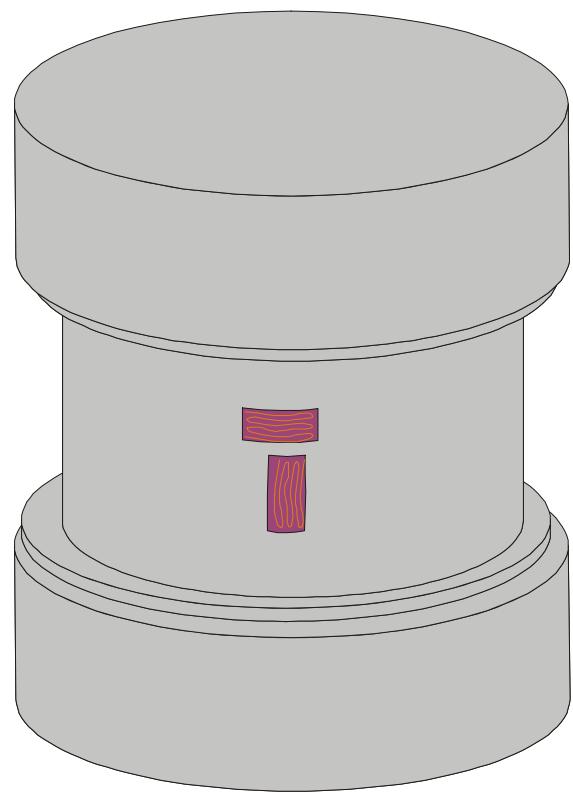
SENSOTEC

Honeywell

How a Load Cell is Constructed



How a Load Cell is Constructed

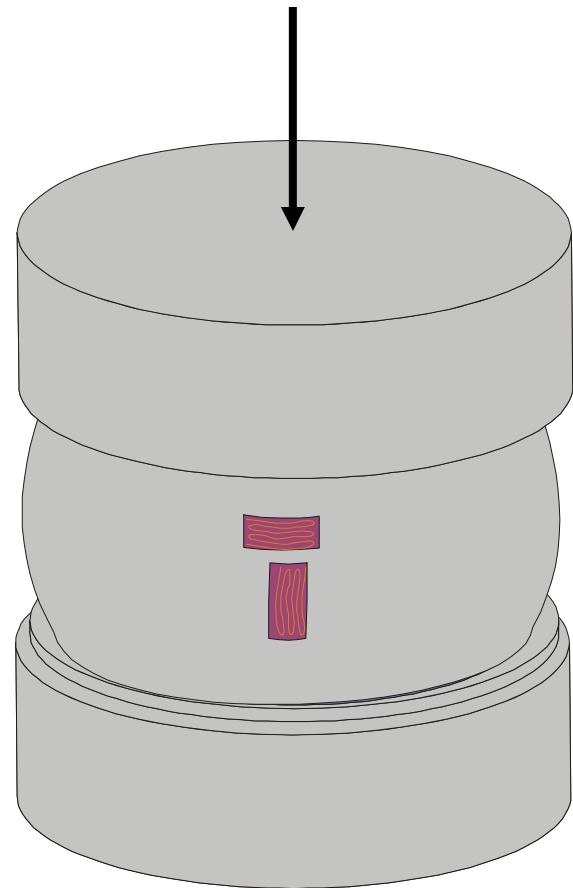


Honeywell

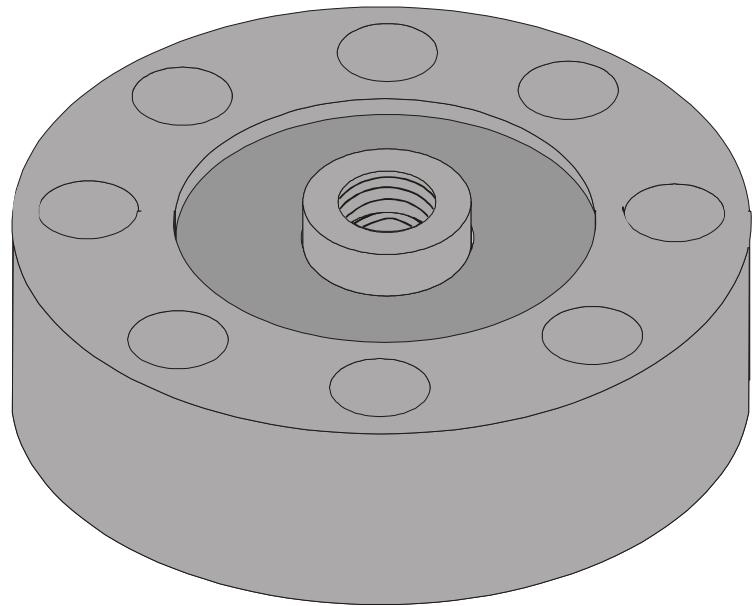
SENSOTEC

Honeywell

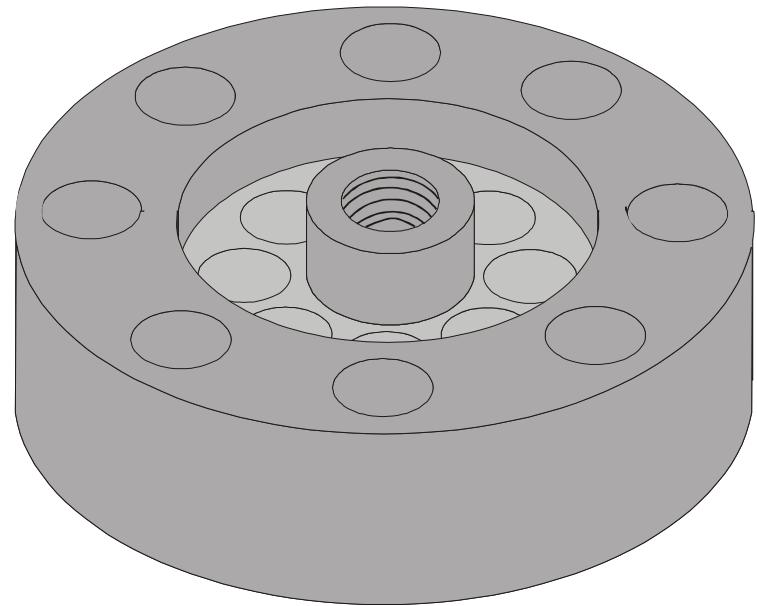
How a Load Cell is Constructed



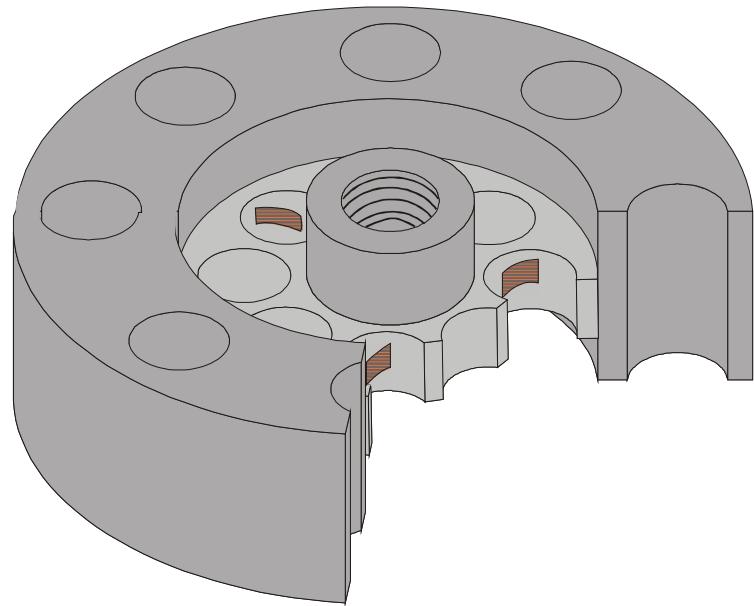
How a Load Cell is Constructed



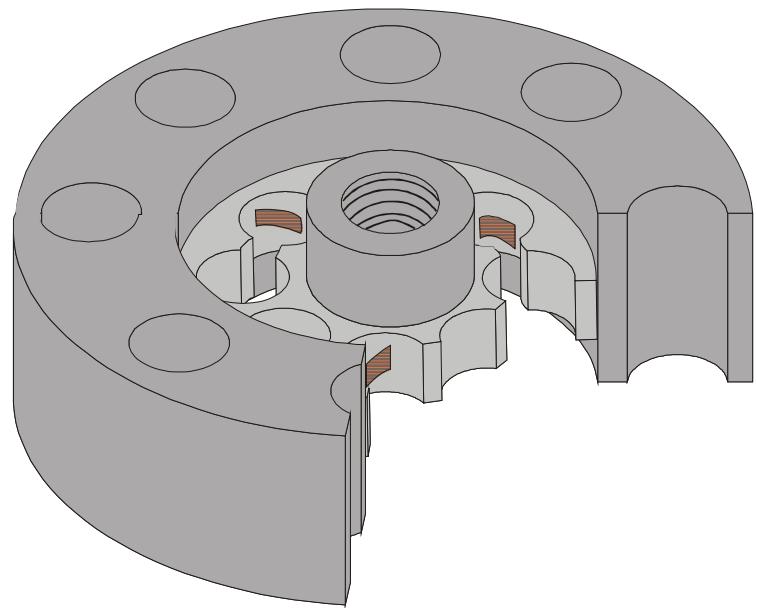
How a Load Cell is Constructed



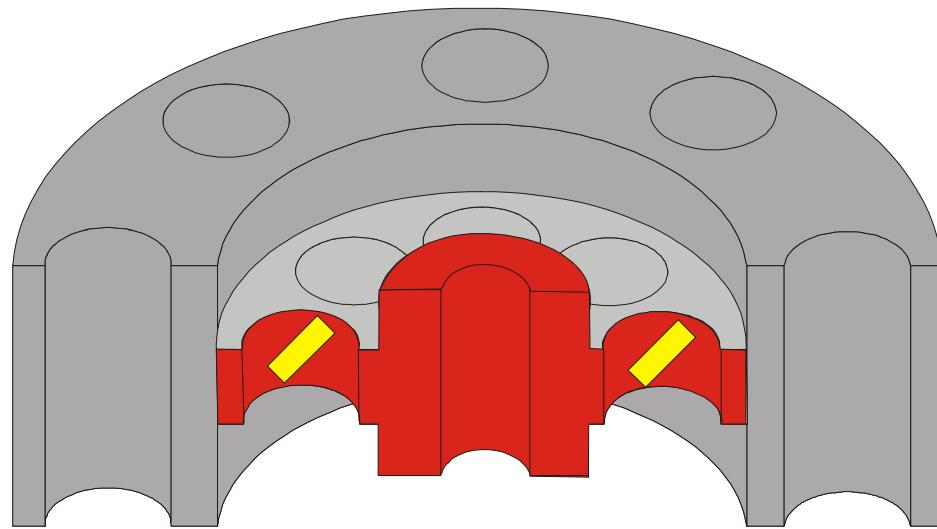
How a Load Cell is Constructed



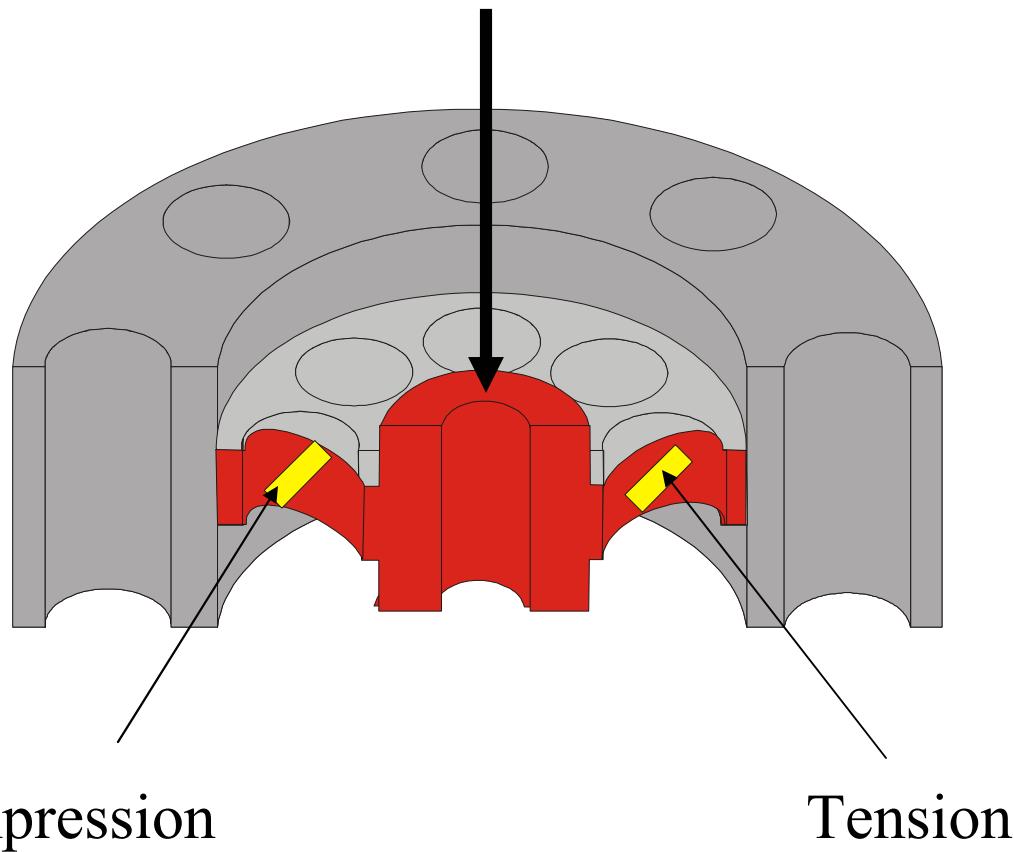
How a Load Cell is Constructed



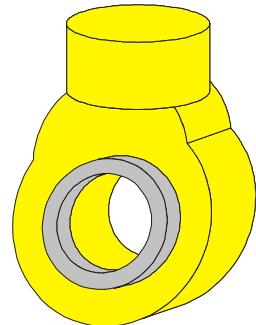
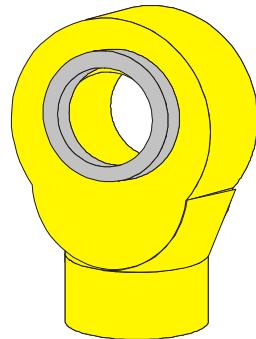
How a Load Cell is Constructed



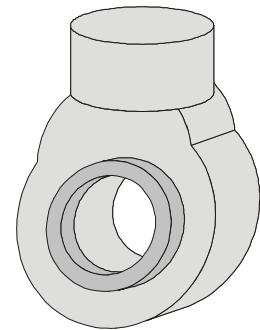
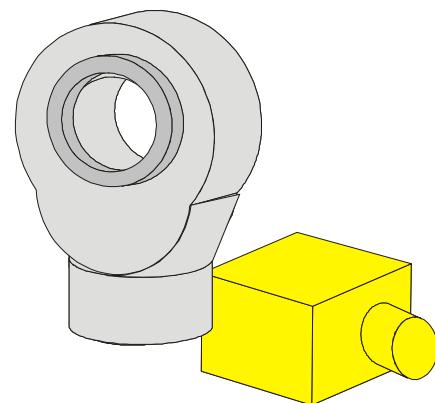
How a Load Cell is Constructed



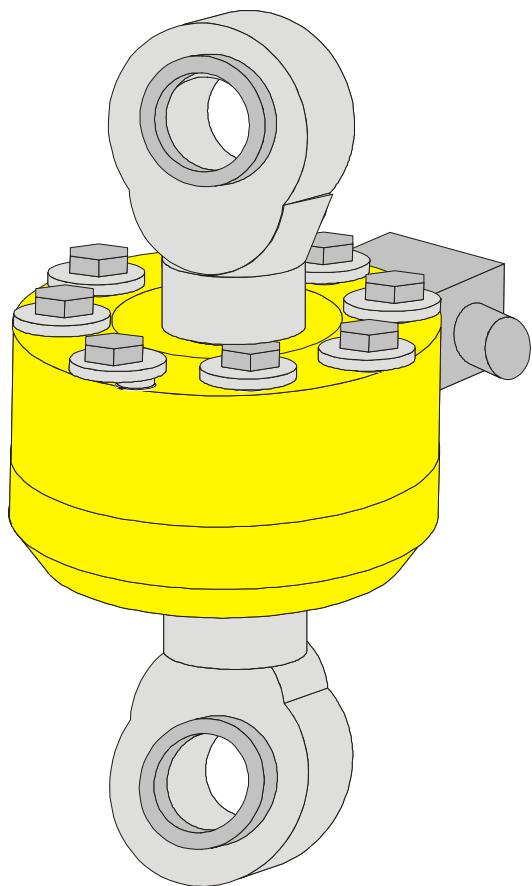
Elements of a Load Cell



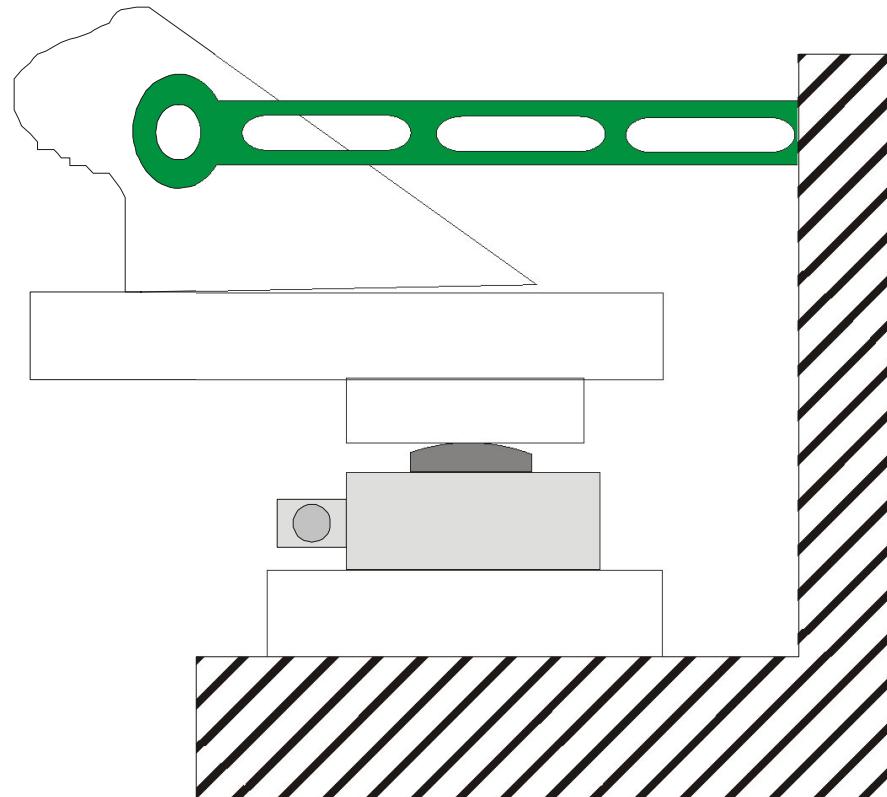
Elements of a Load Cell



Elements of a Load Cell

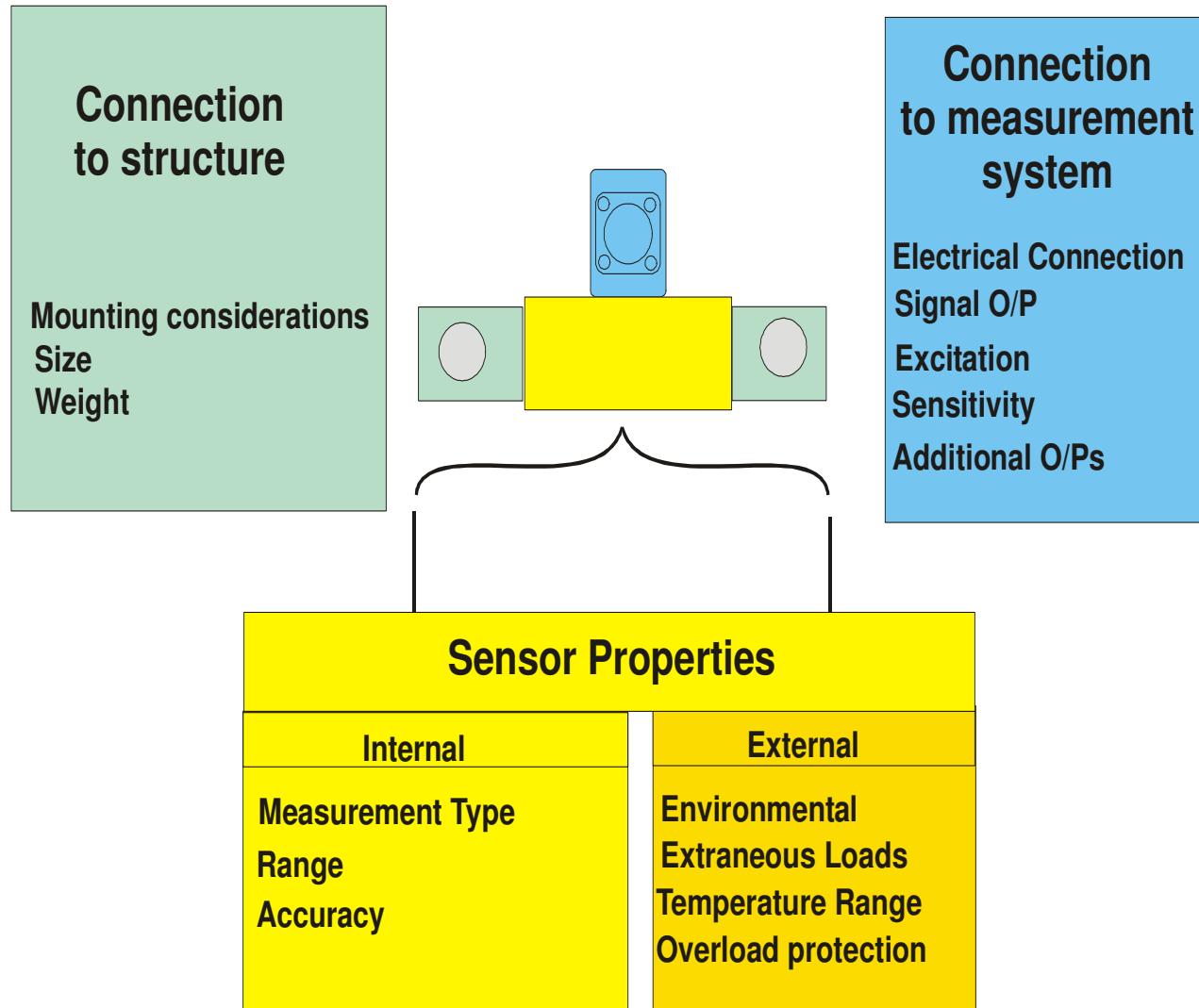


Unique Load Cell Characteristic



Load Cells form part of the structure that they are measuring

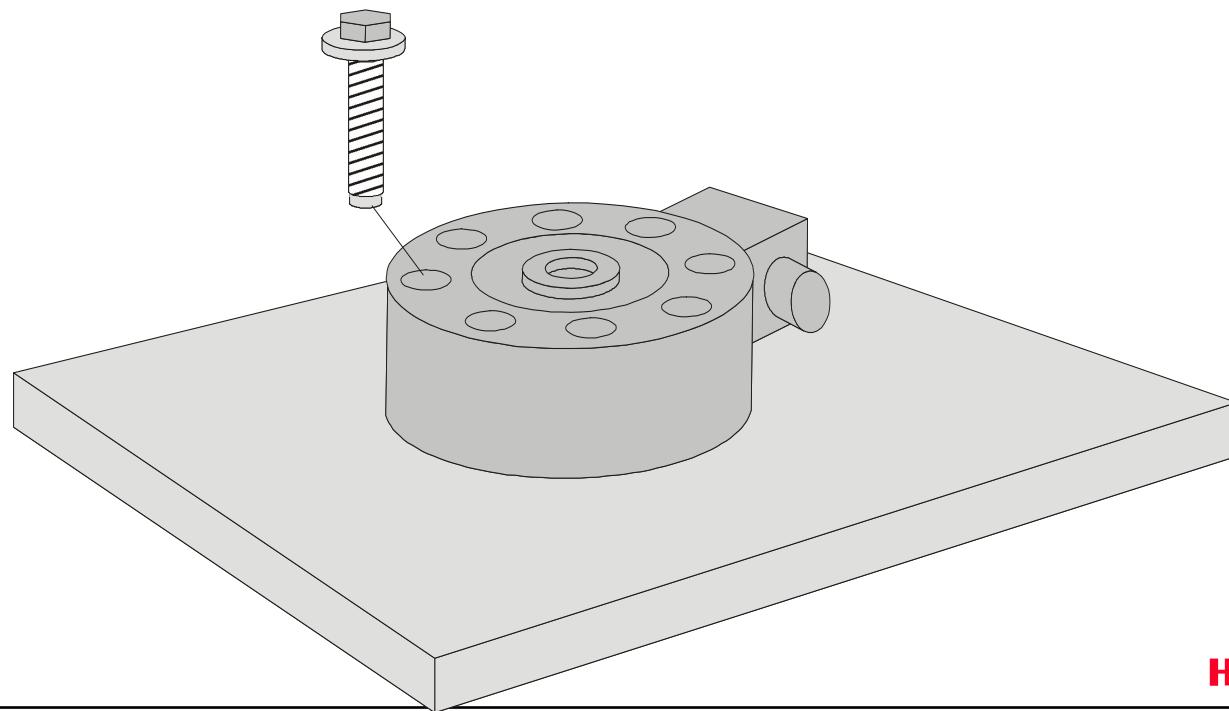
Load Cell Specifications



Specifying a Load Cell

- So many combinations of specs are mutually exclusive: Specifying a load cell is trading one performance criteria against another.
 - Example Pick 3 and you compromise the fourth
 - High load capacity
 - Small size
 - High accuracy
 - Immunity to extraneous loads

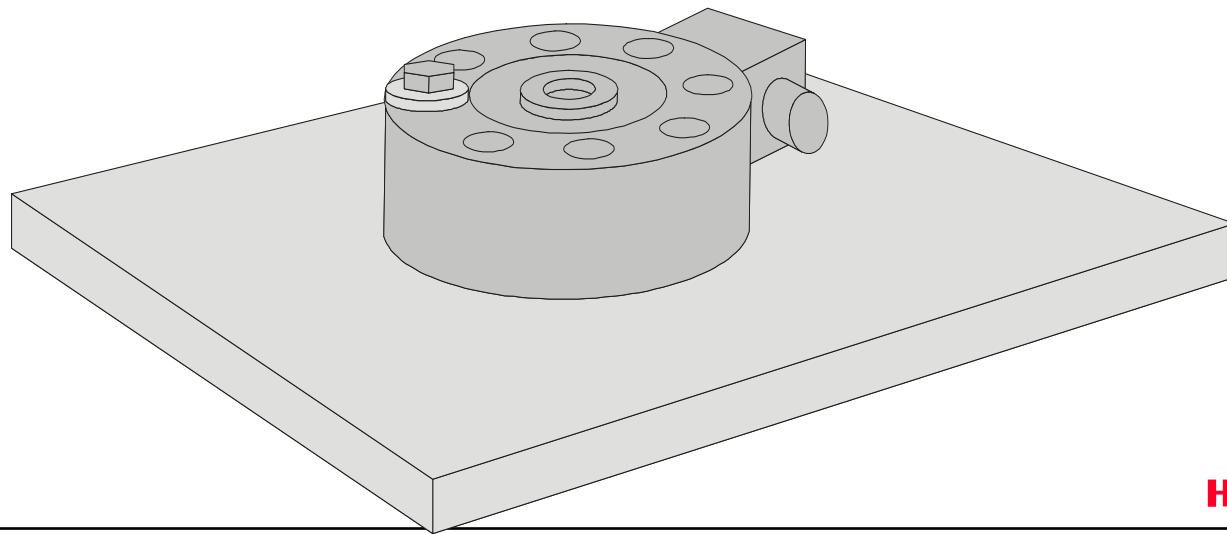
Mounting



Honeywell
SENSOTEC

Honeywell

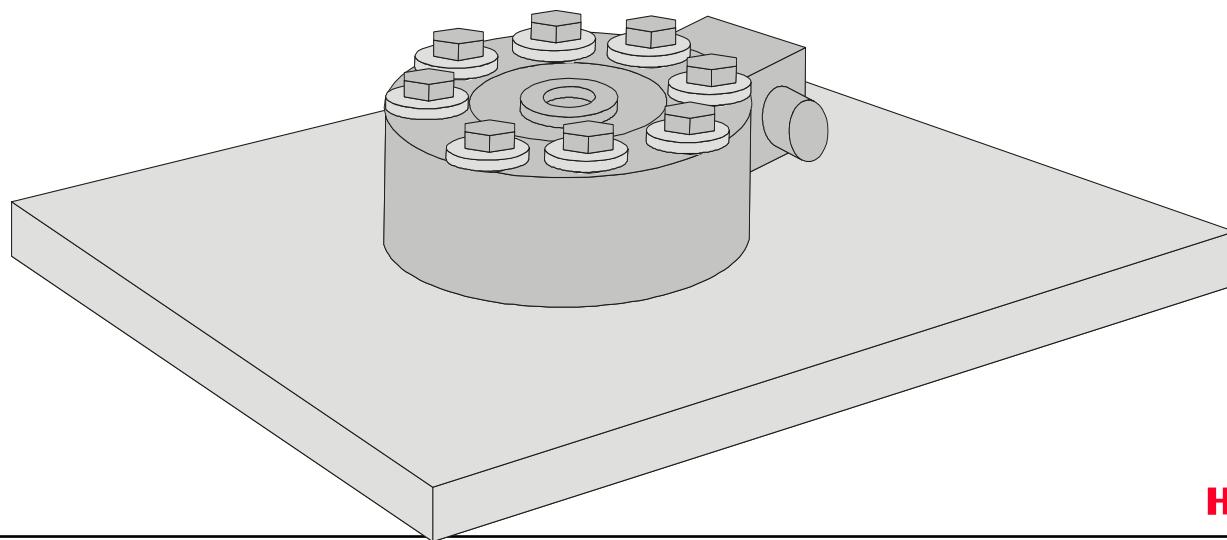
Mounting



Honeywell
SENSOTEC

Honeywell

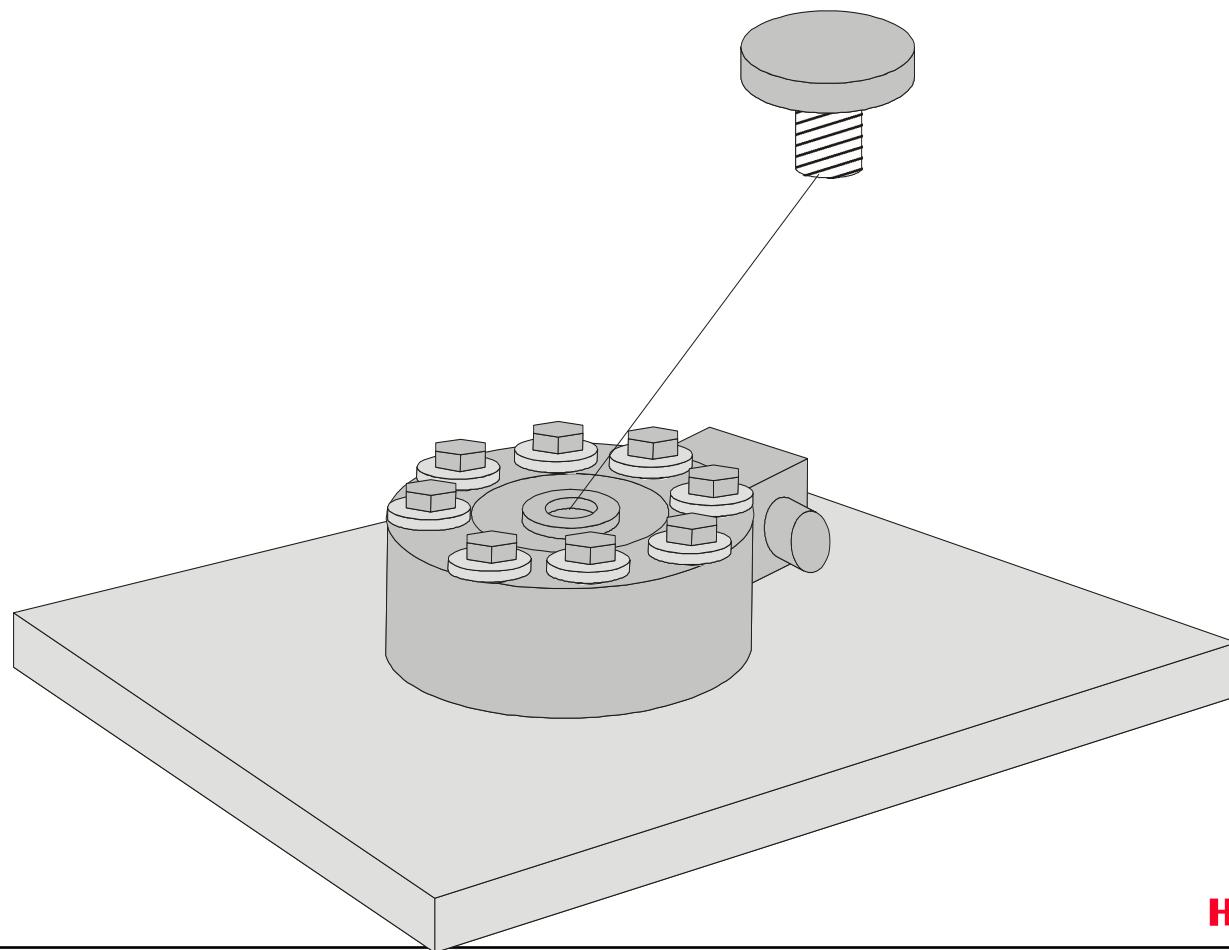
Mounting



Honeywell
SENSOTEC

Honeywell

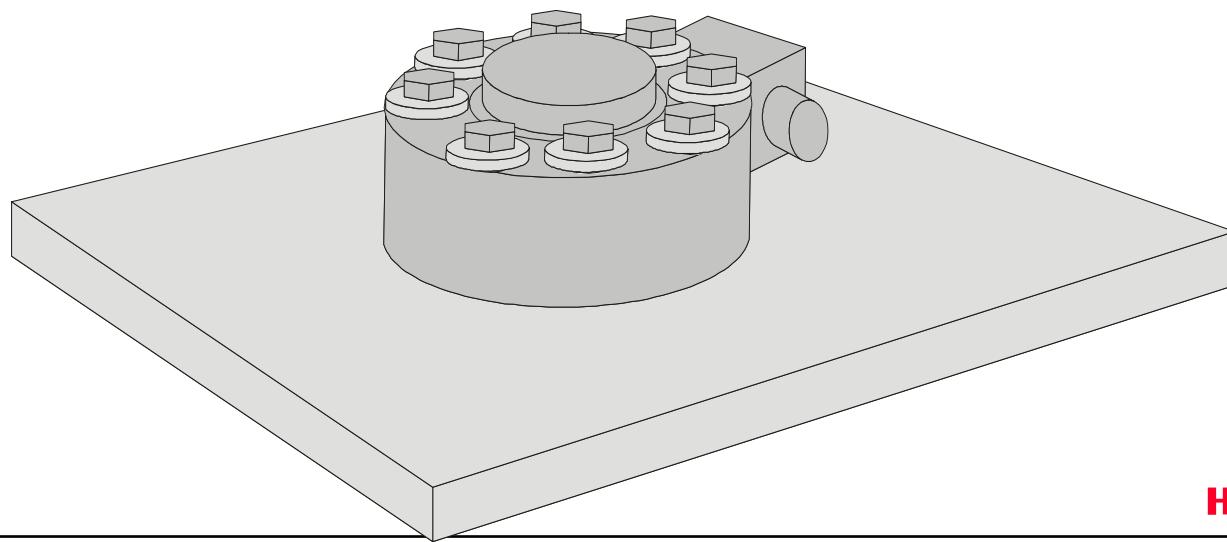
Mounting



Honeywell
SENSOTEC

Honeywell

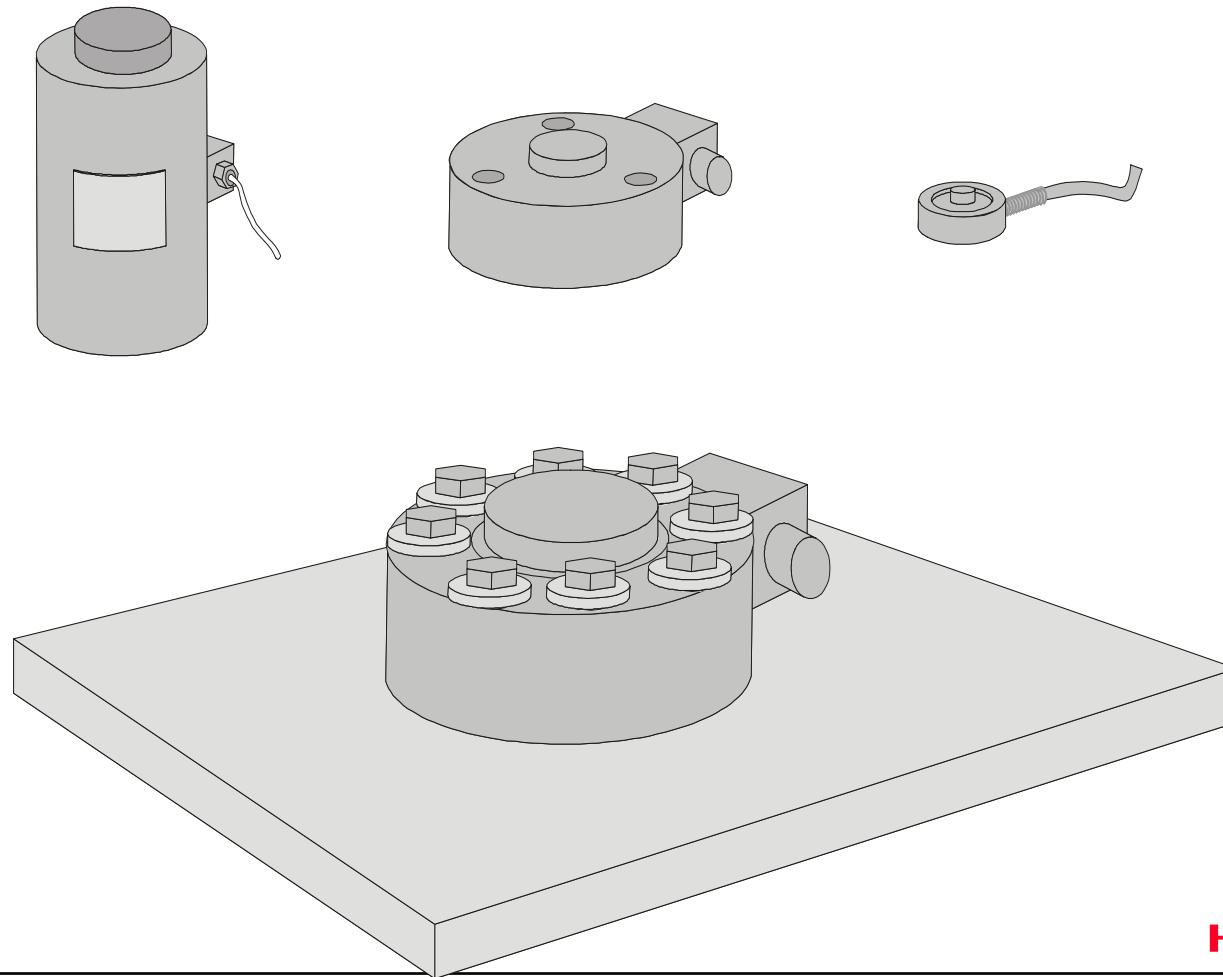
Mounting



Honeywell
SENSOTEC

Honeywell

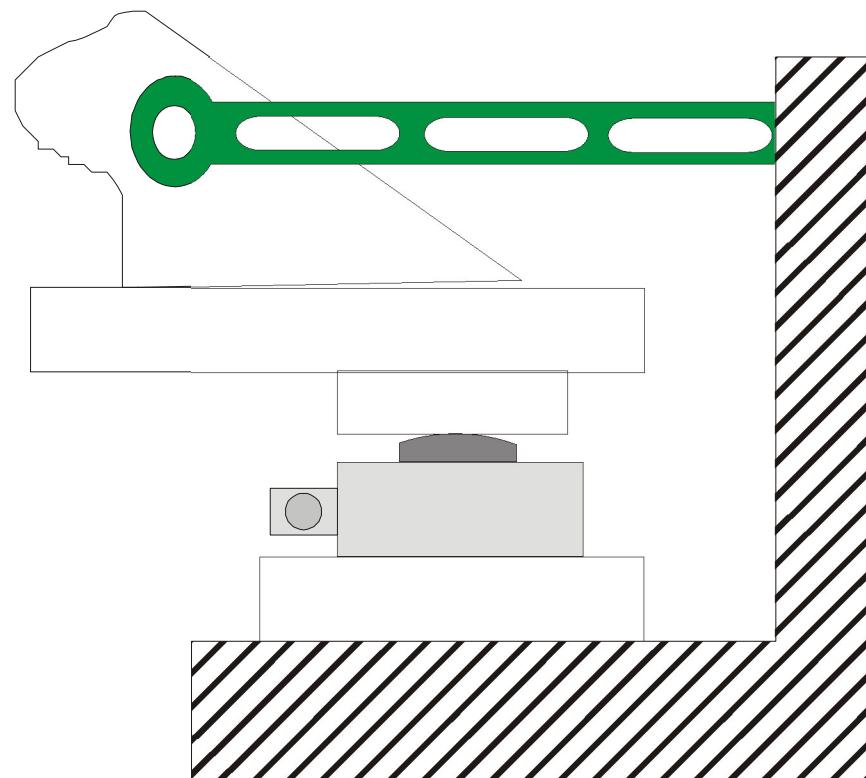
Mounting



Honeywell
SENSOTEC

Honeywell

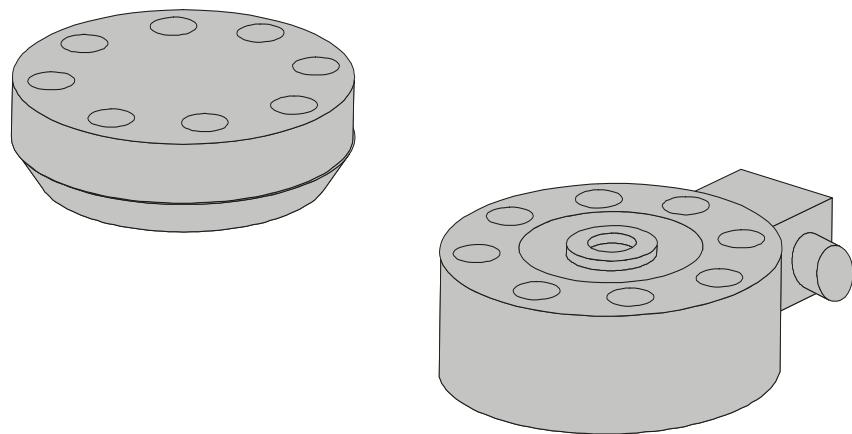
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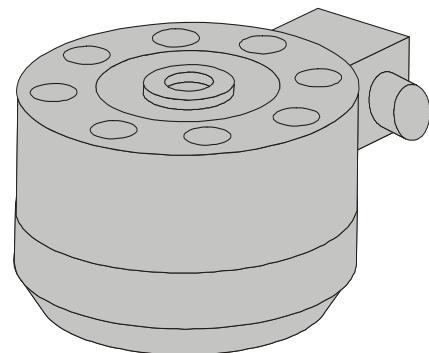
Honeywell
SENSOTEC

Honeywell

Mounting



Mounting

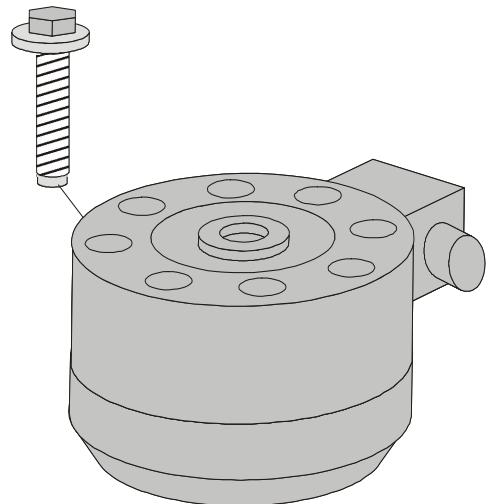


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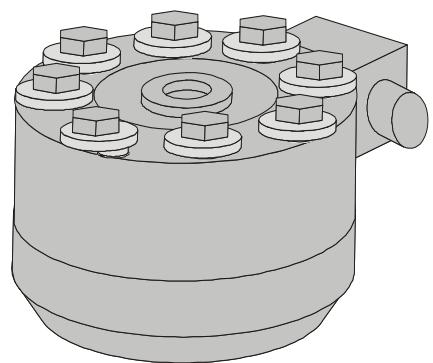
SENSOTEC

Honeywell

Mounting



Mounting

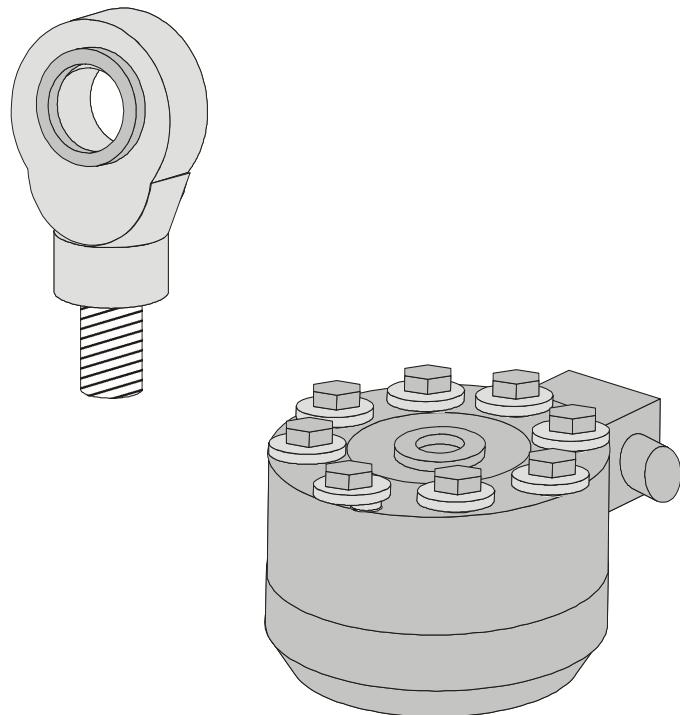


Honeywell

SENSOTEC

Honeywell

Mounting

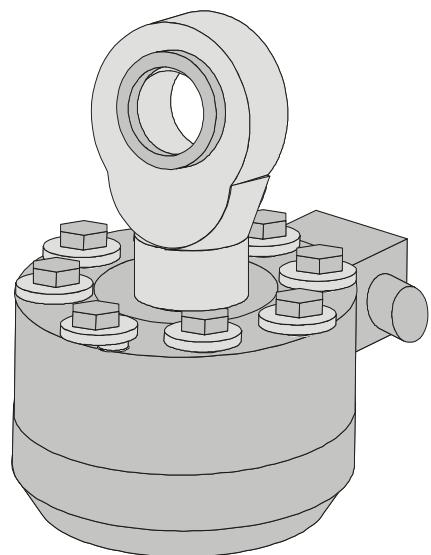


Honeywell

SENSOTEC

Honeywell

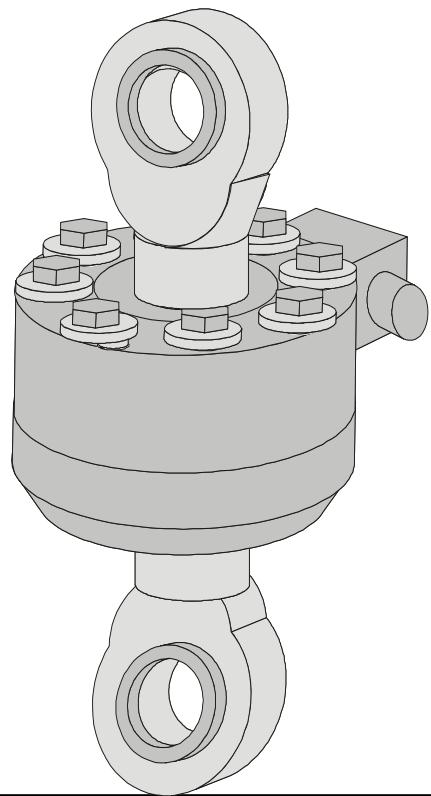
Mounting



Honeywell
SENSOTEC

Honeywell

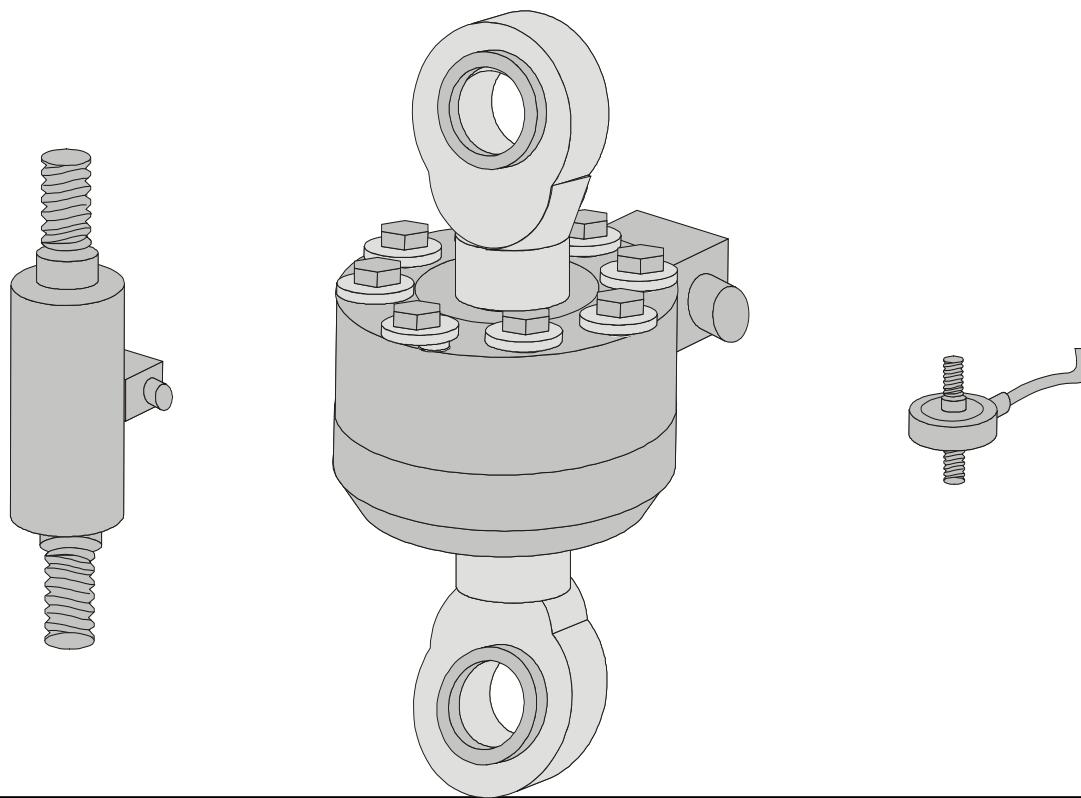
Mounting



Honeywell
SENSOTEC

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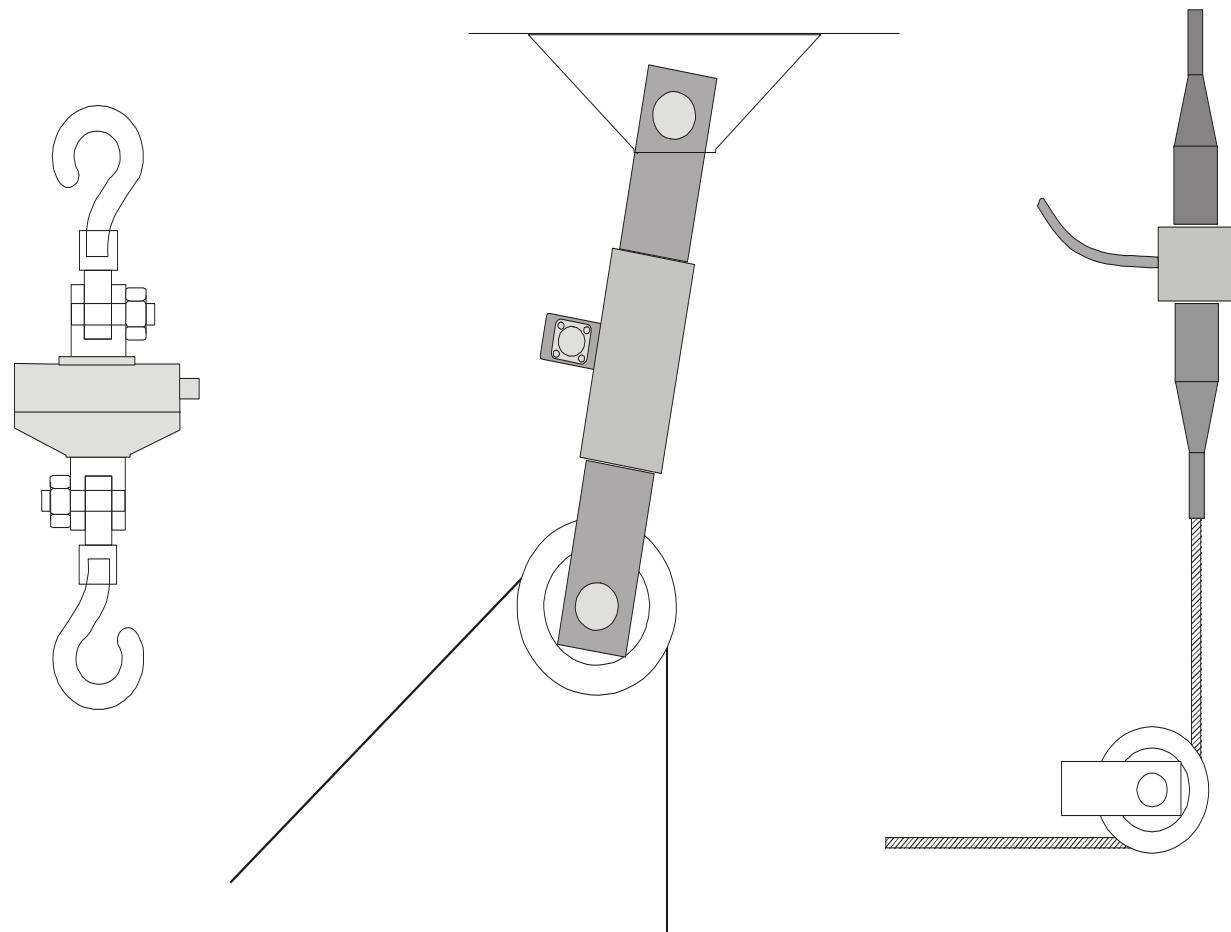
Mounting



Honeywell
SENSOTEC

Honeywell

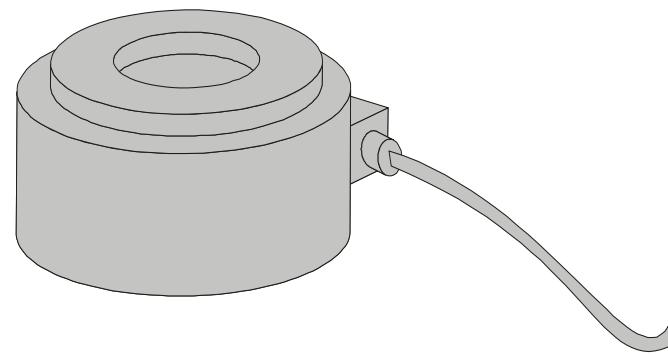
Mounting



Honeywell
SENSOTEC

Honeywell

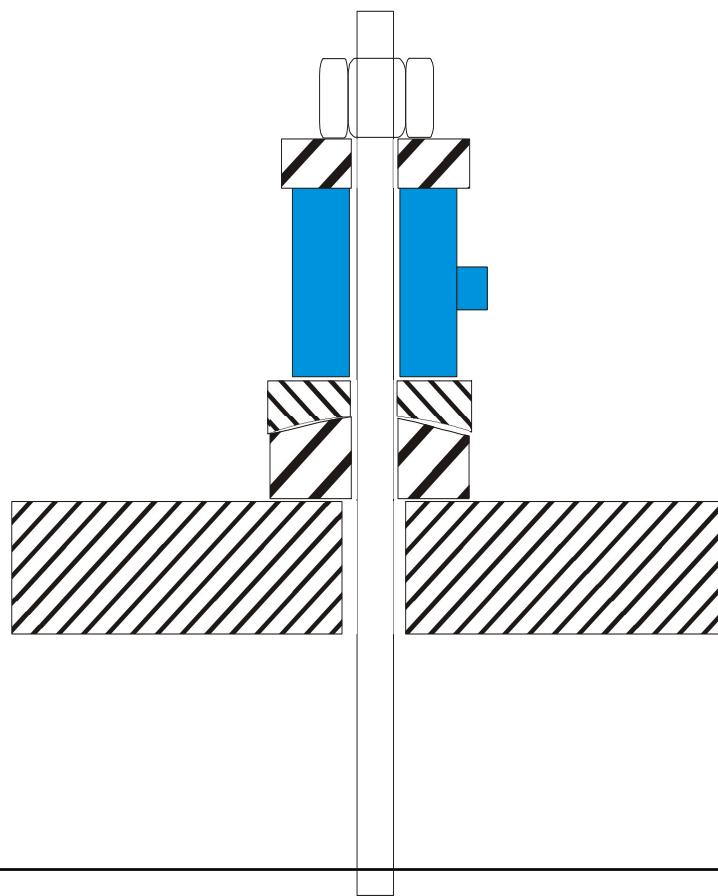
Mounting



Honeywell
SENSOTEC

Honeywell

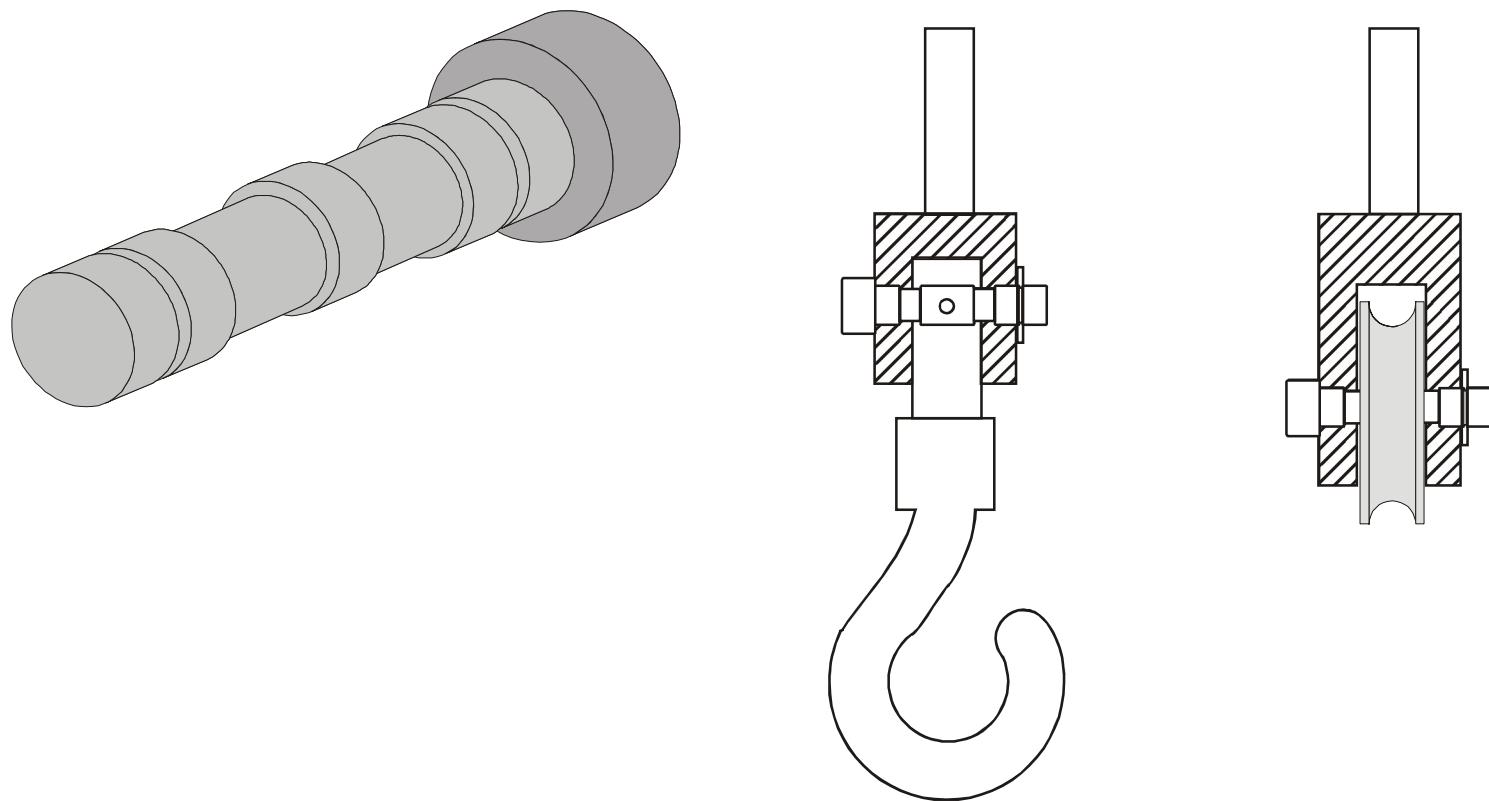
Mounting



Honeywell
SENSOTEC

Honeywell

Mounting

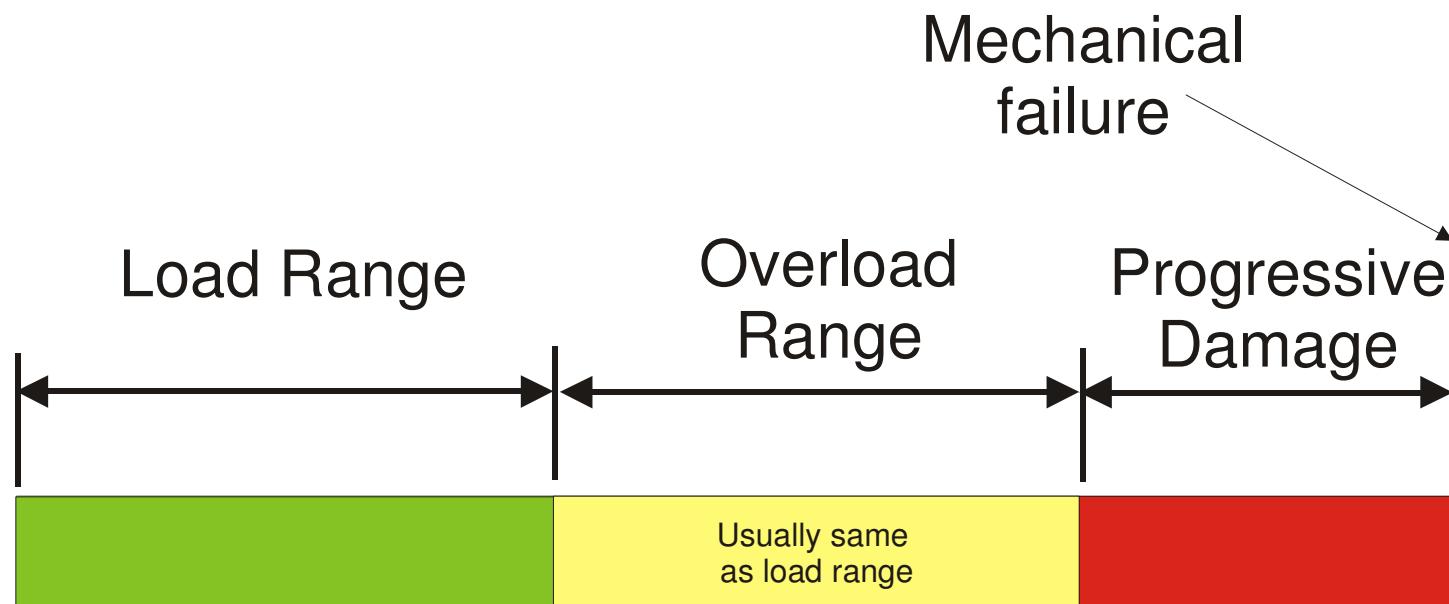


Honeywell

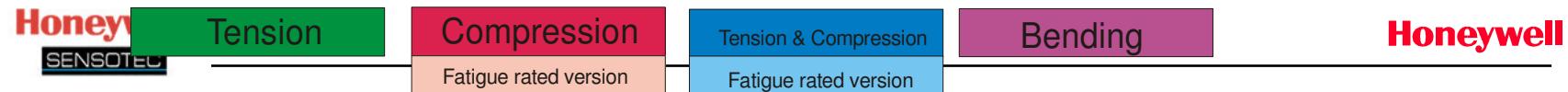
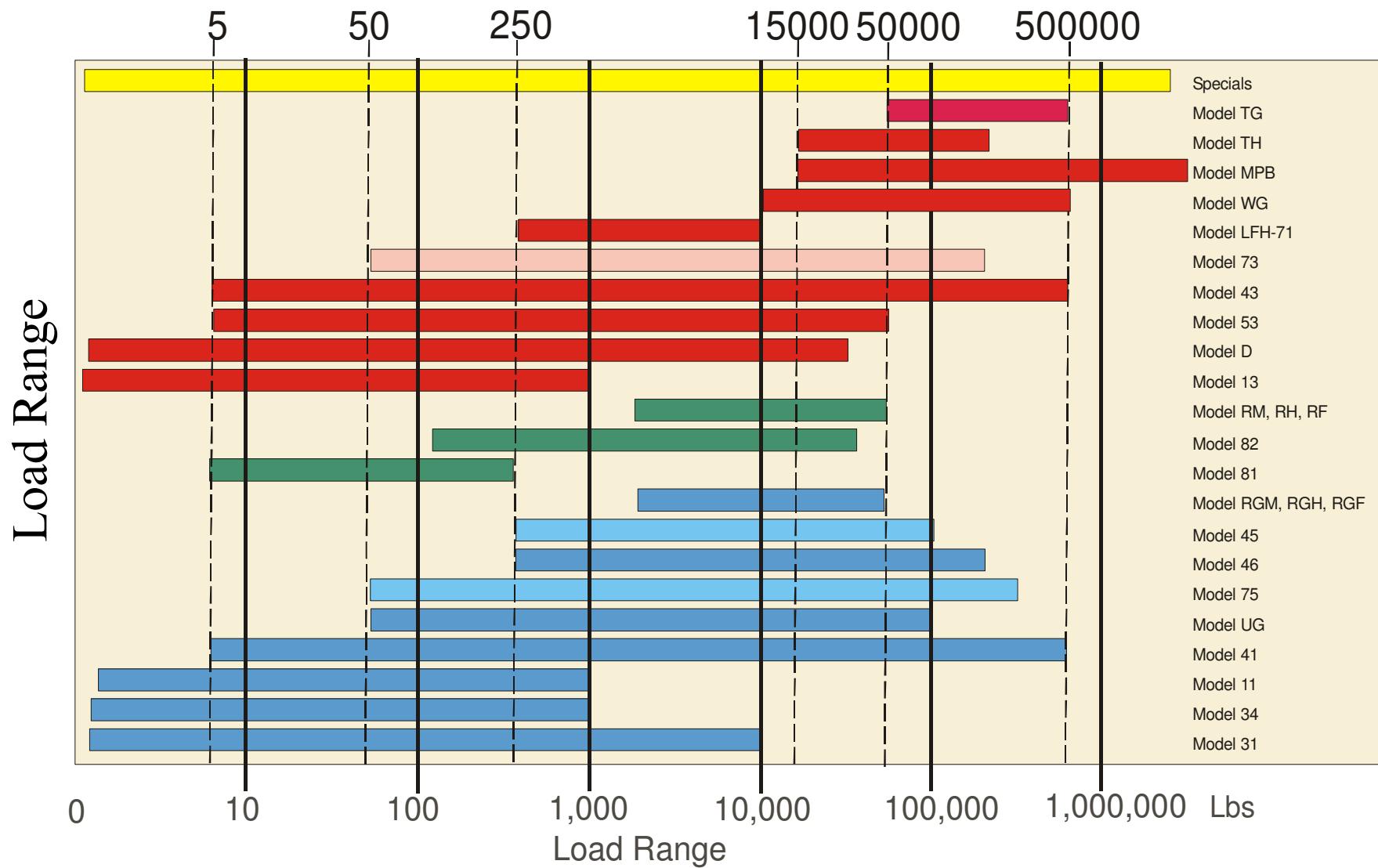
SENSOTEC

Honeywell

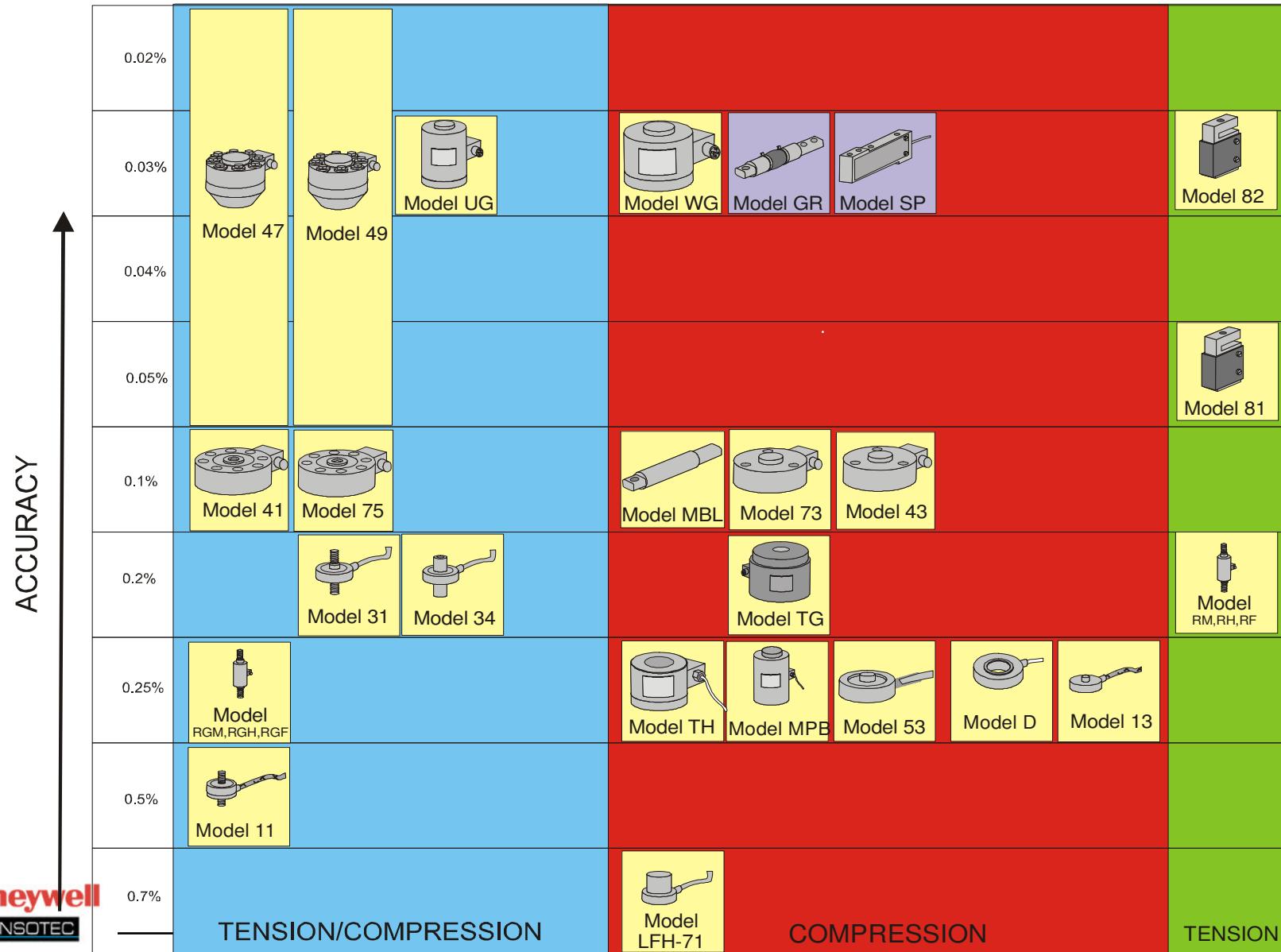
Load Range



Load Range



Accuracy

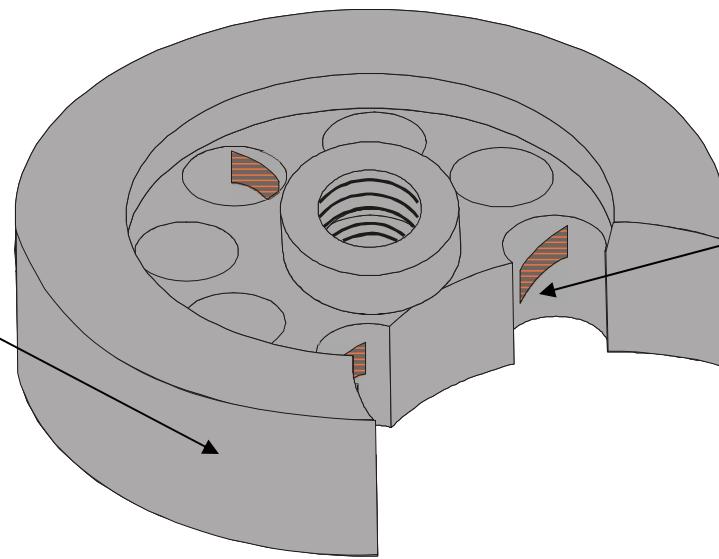


Physical Size

	100,000 lbs	10,000 lbs	1,000 lbs	100 lbs	10lbs
TENSION/COMPRESSION					
COMPRESSION					
TENSION					

Fatigue Rating

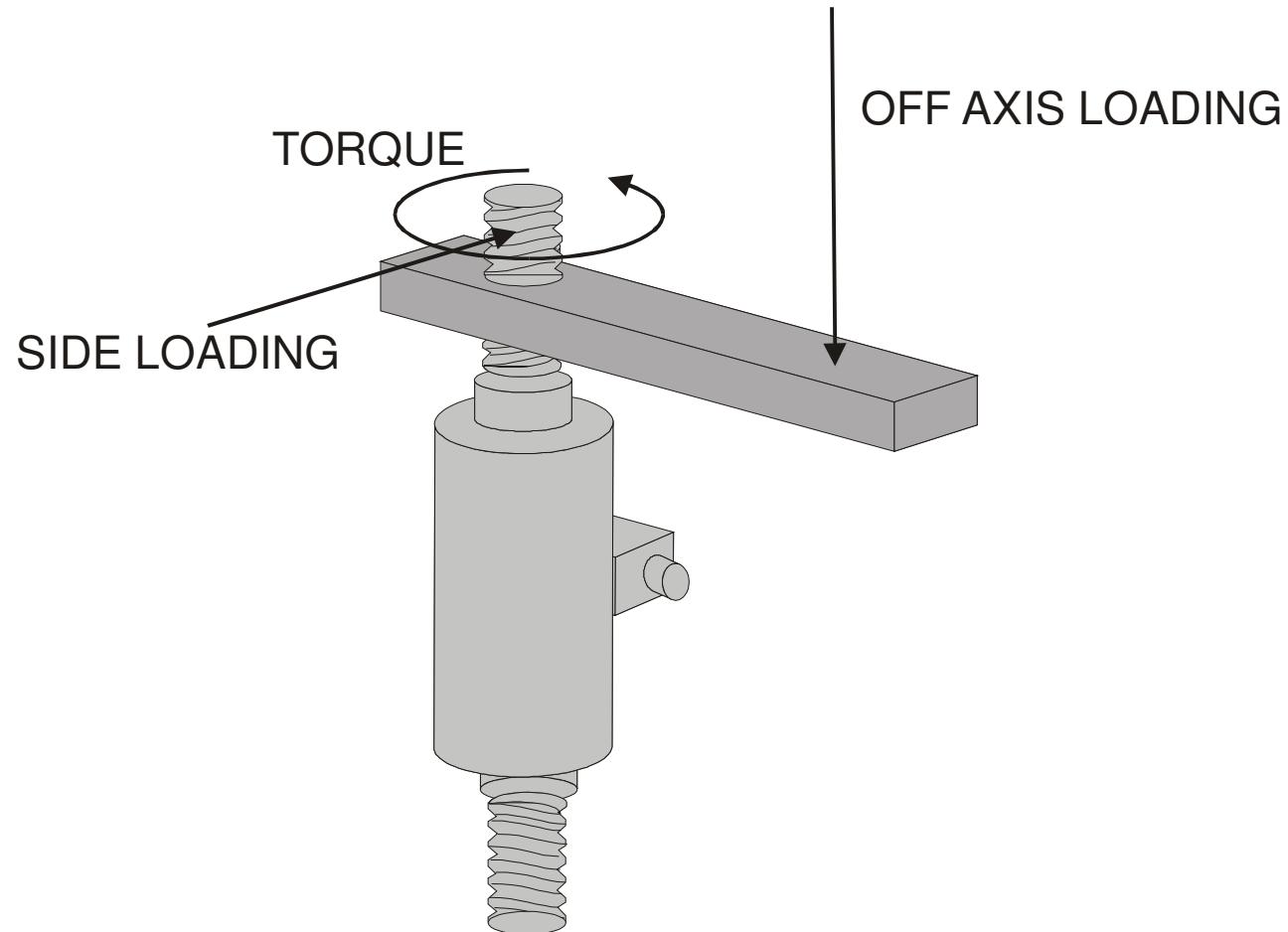
High stress points reduced by strain gage placement to highest stress area. Structure cross sections increased



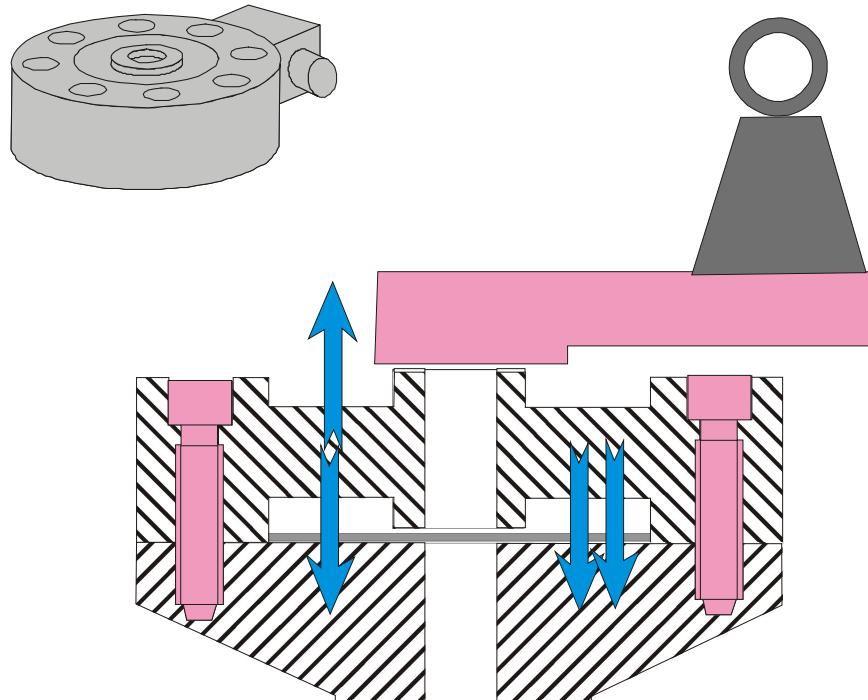
Stress Levels Reduced below non-fatigue Rated load cells -Lower sensitivity

Fatigue rated to 1000 million cycles compared to 1 million cycles

Extraneous Loading



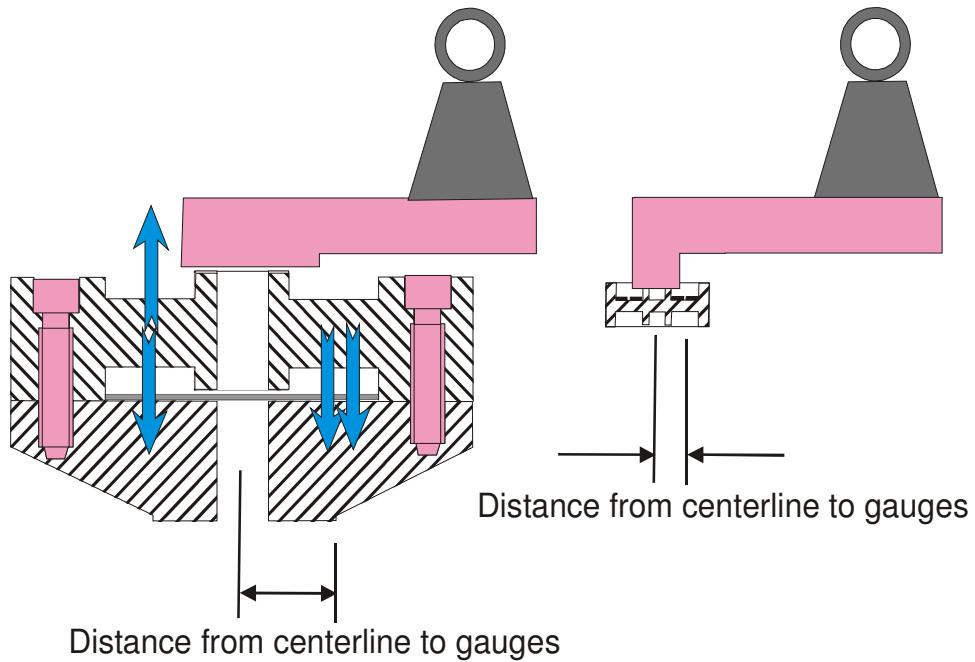
Extraneous Loading



Pancake design

Pancake Style load cells have excellent off axis immunity
Typically 20% side load gives less than x% error

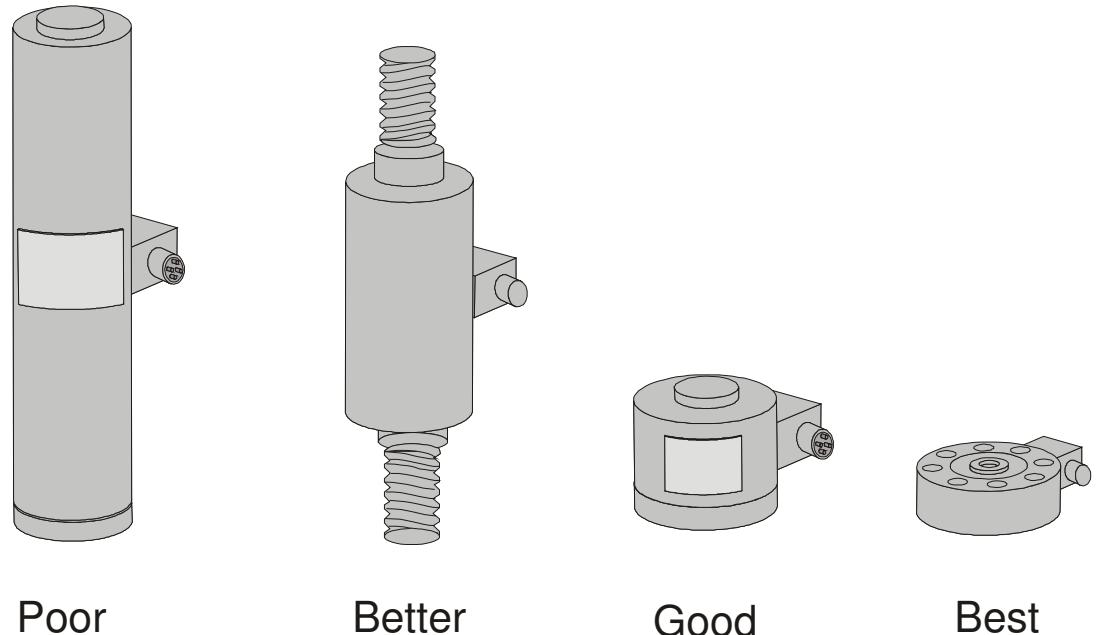
Extraneous Loading



Poor off axis
performance due to
dimensional geometry

Miniature design

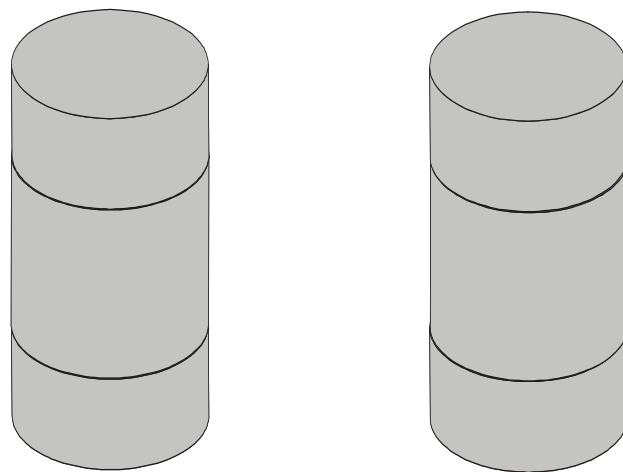
Extraneous Loading



The larger the width to height ratio the higher the immunity to side load

Column design

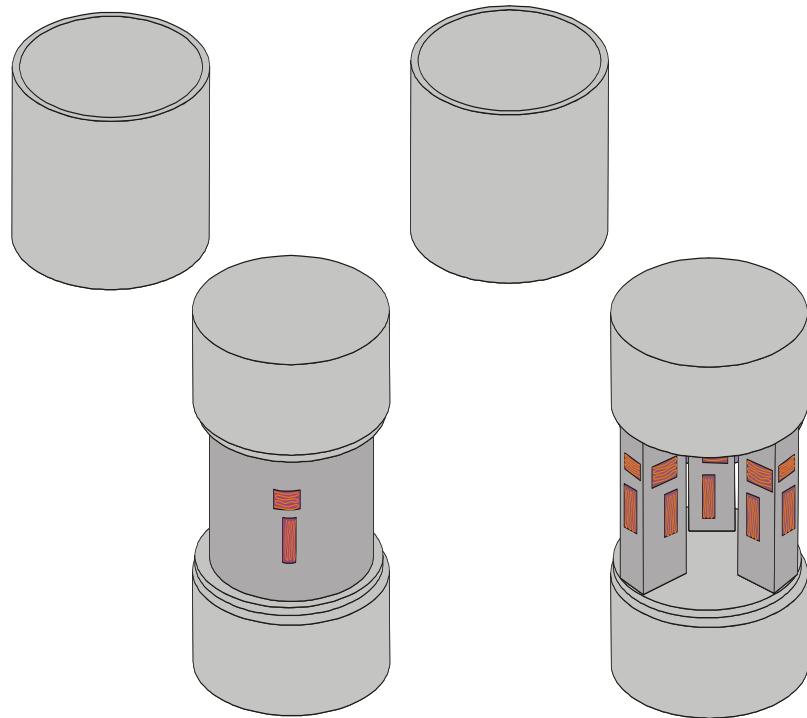
Extraneous Loading



Multiple column cells can reduce effects of off axis loading

Column design

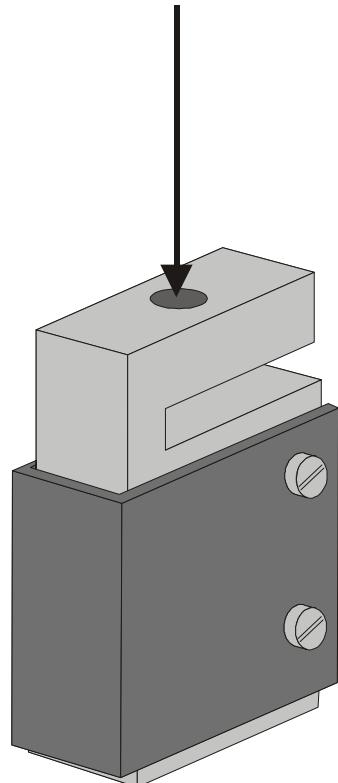
Extraneous Loading



Multiple column cells can reduce effects of off axis loading

Column design

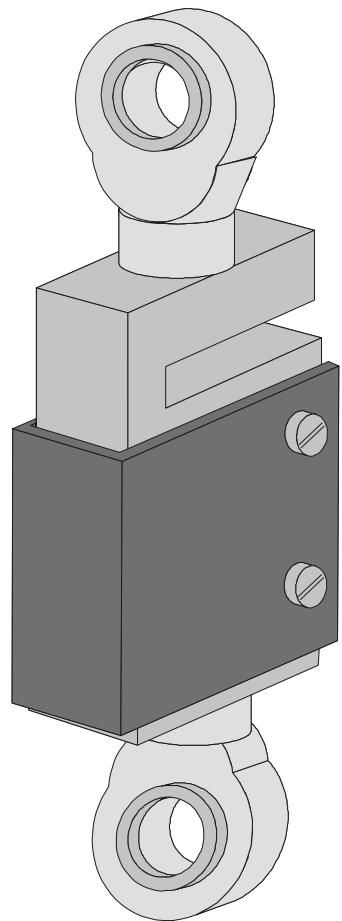
Extraneous Loading



S Beam designs are poor in side loading immunity and therefore poor in compression

S Beam design

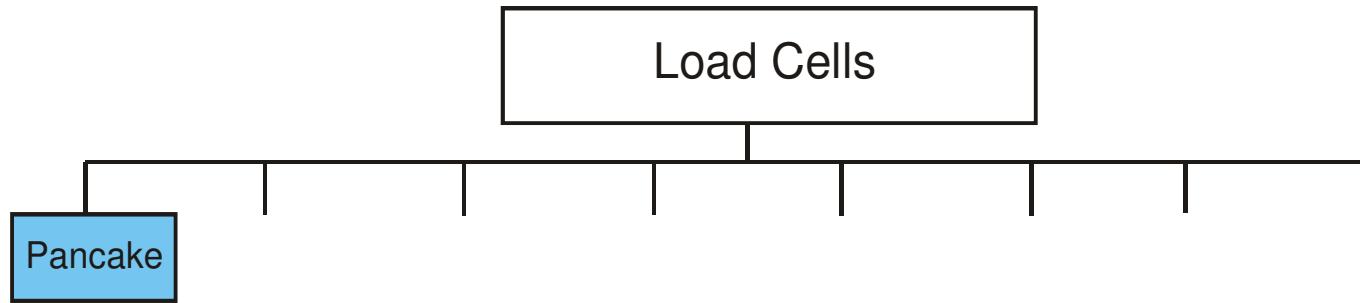
Extraneous Loading



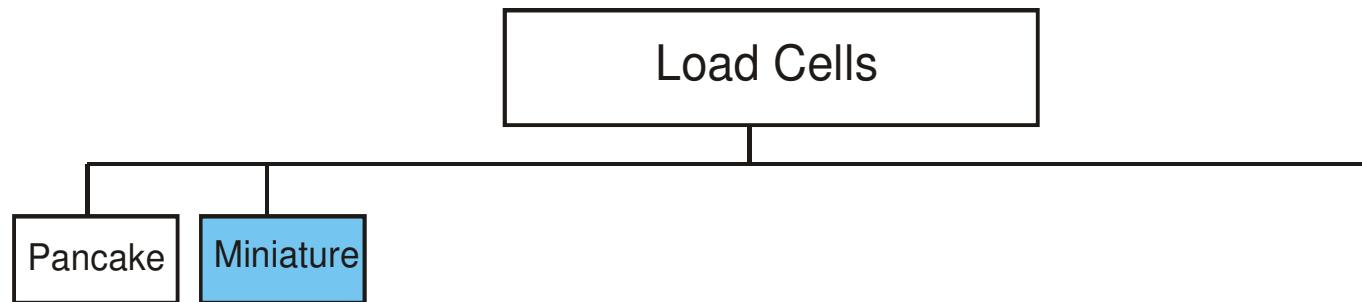
S Beam design

The use of load cells in tension and with rod end bearings eliminates side loading

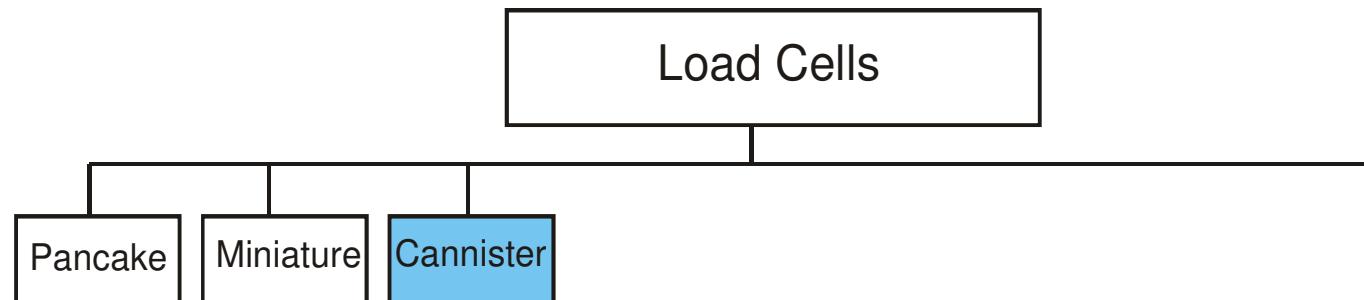
Product Range



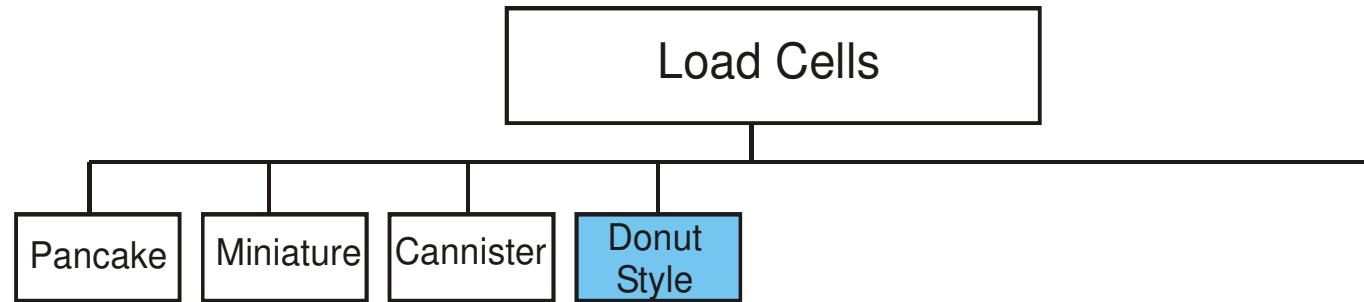
Product Range



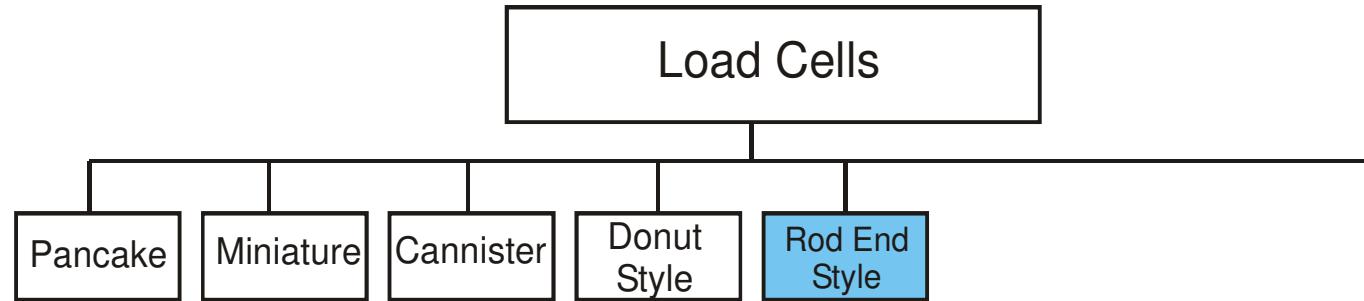
Product Range



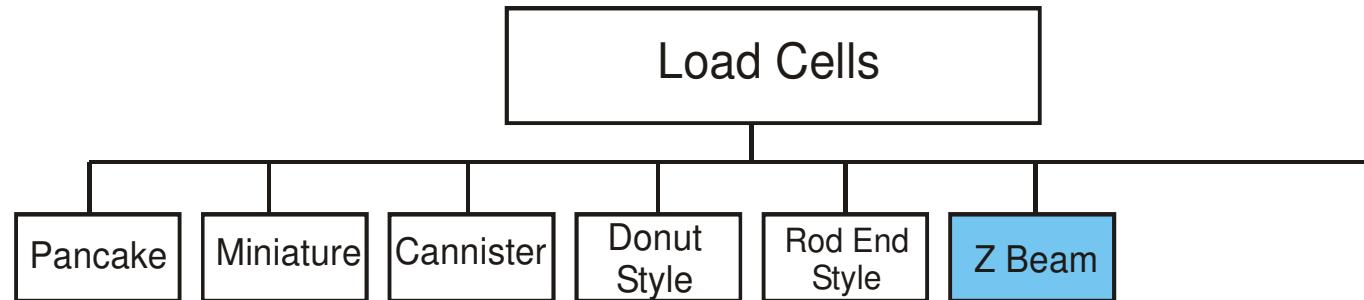
Product Range



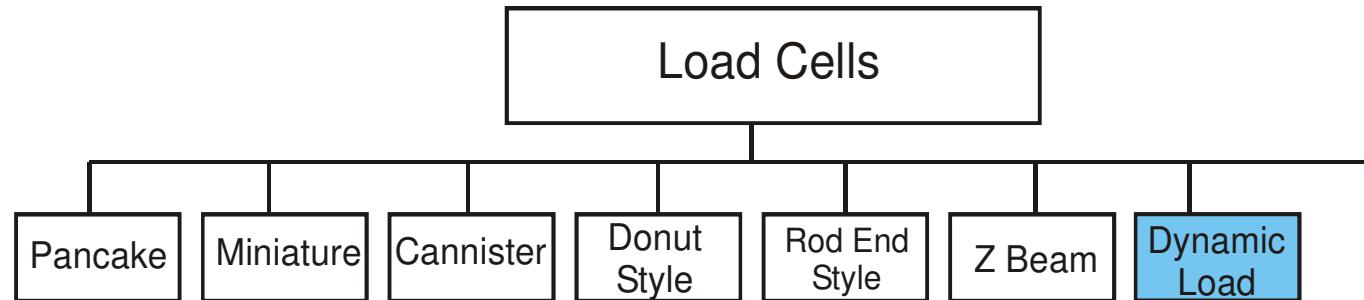
Product Range



Product Range



Product Range

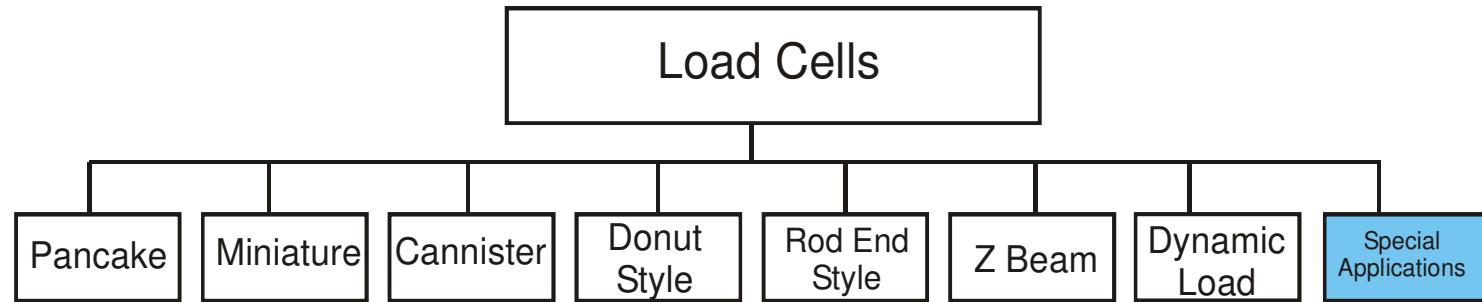


Honeywell

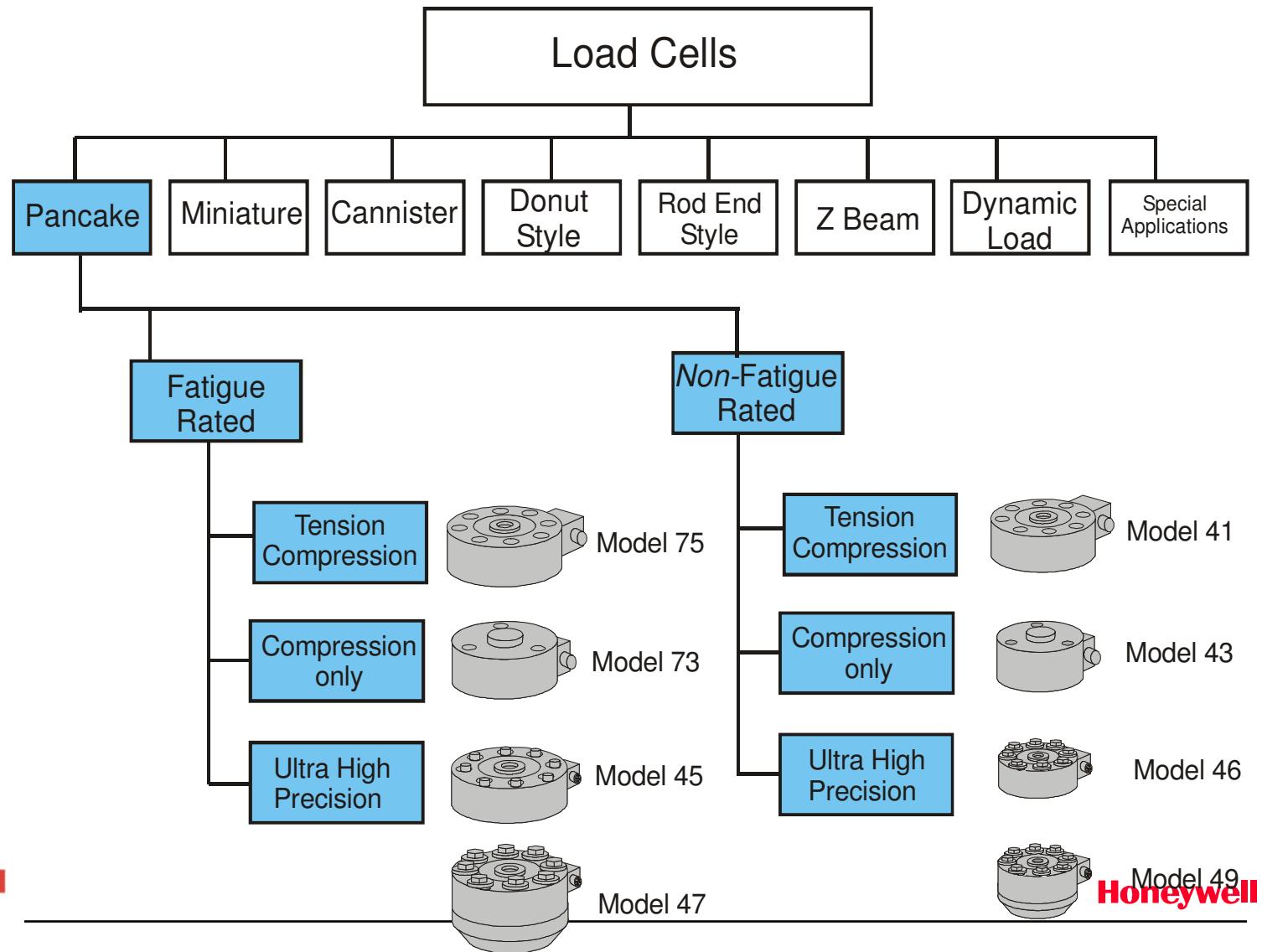
SENSOTEC

Honeywell

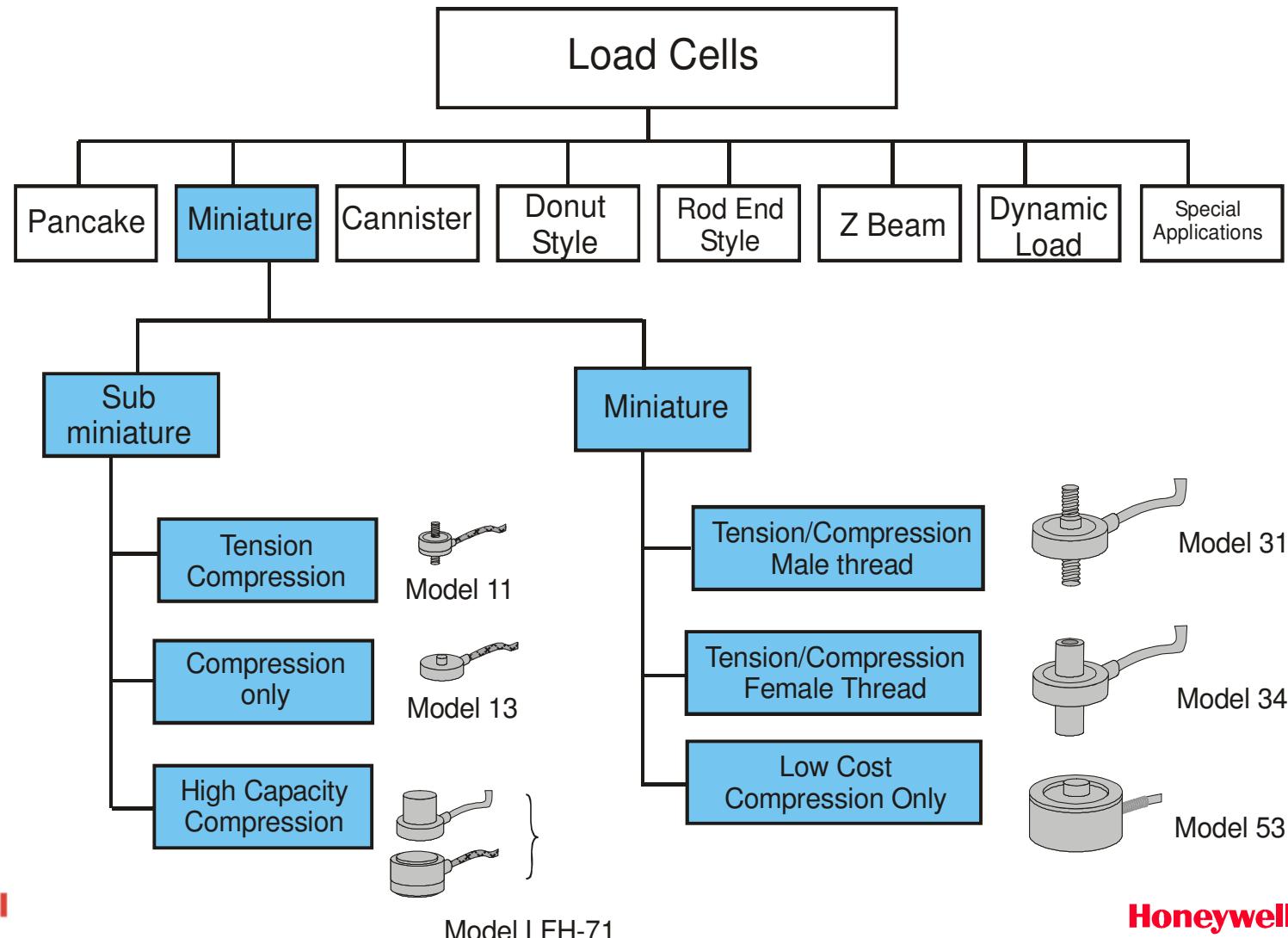
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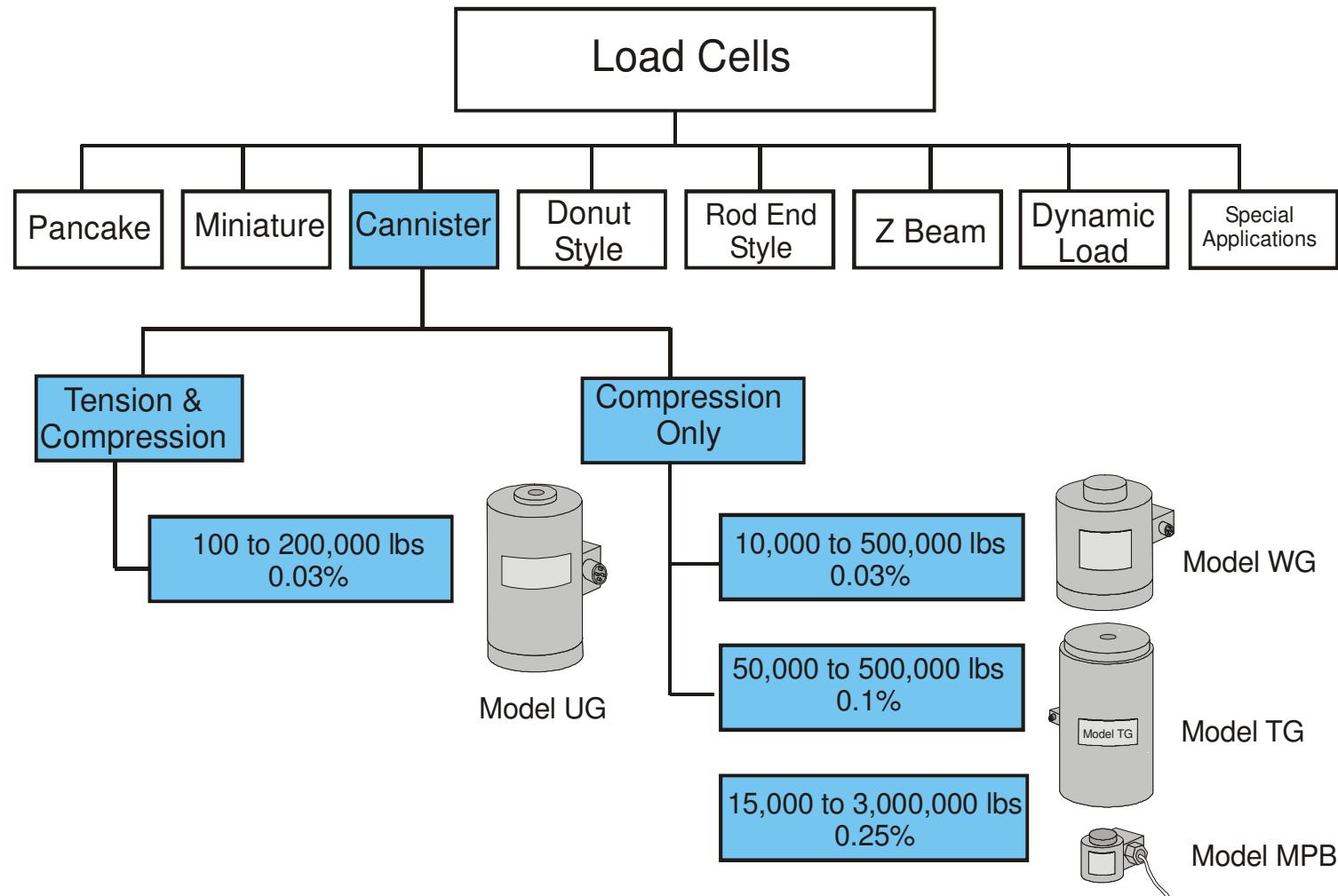
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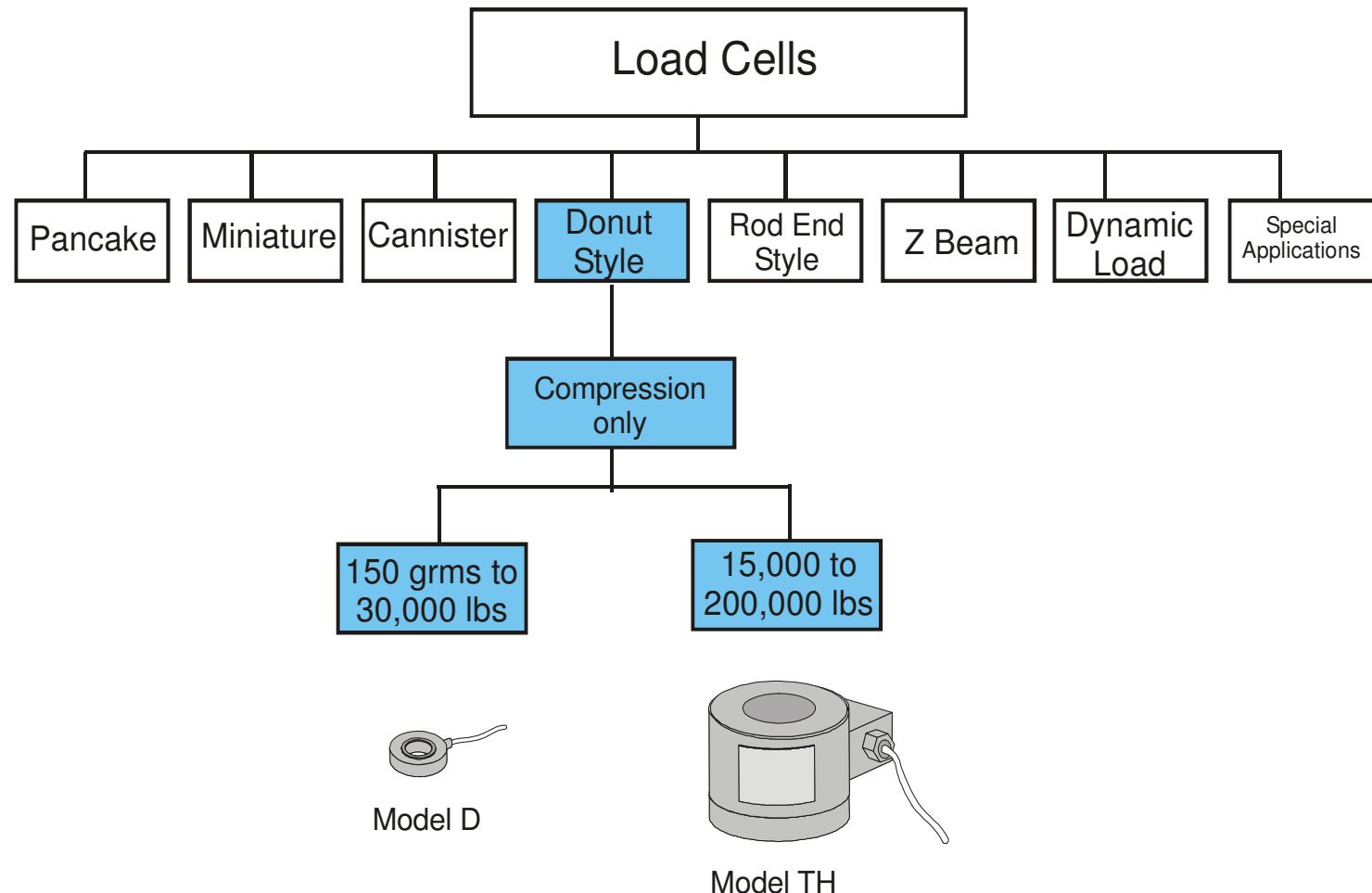
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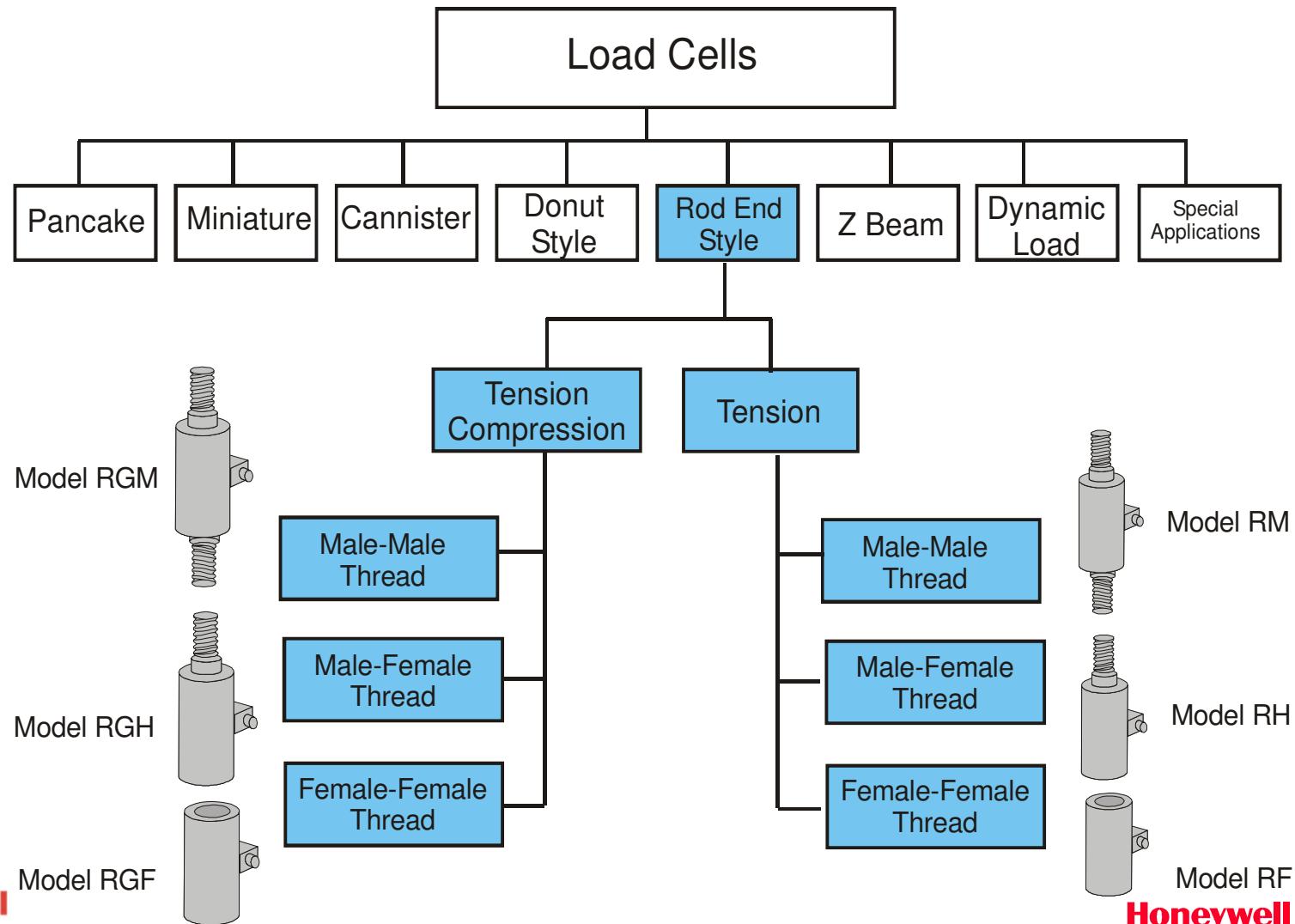
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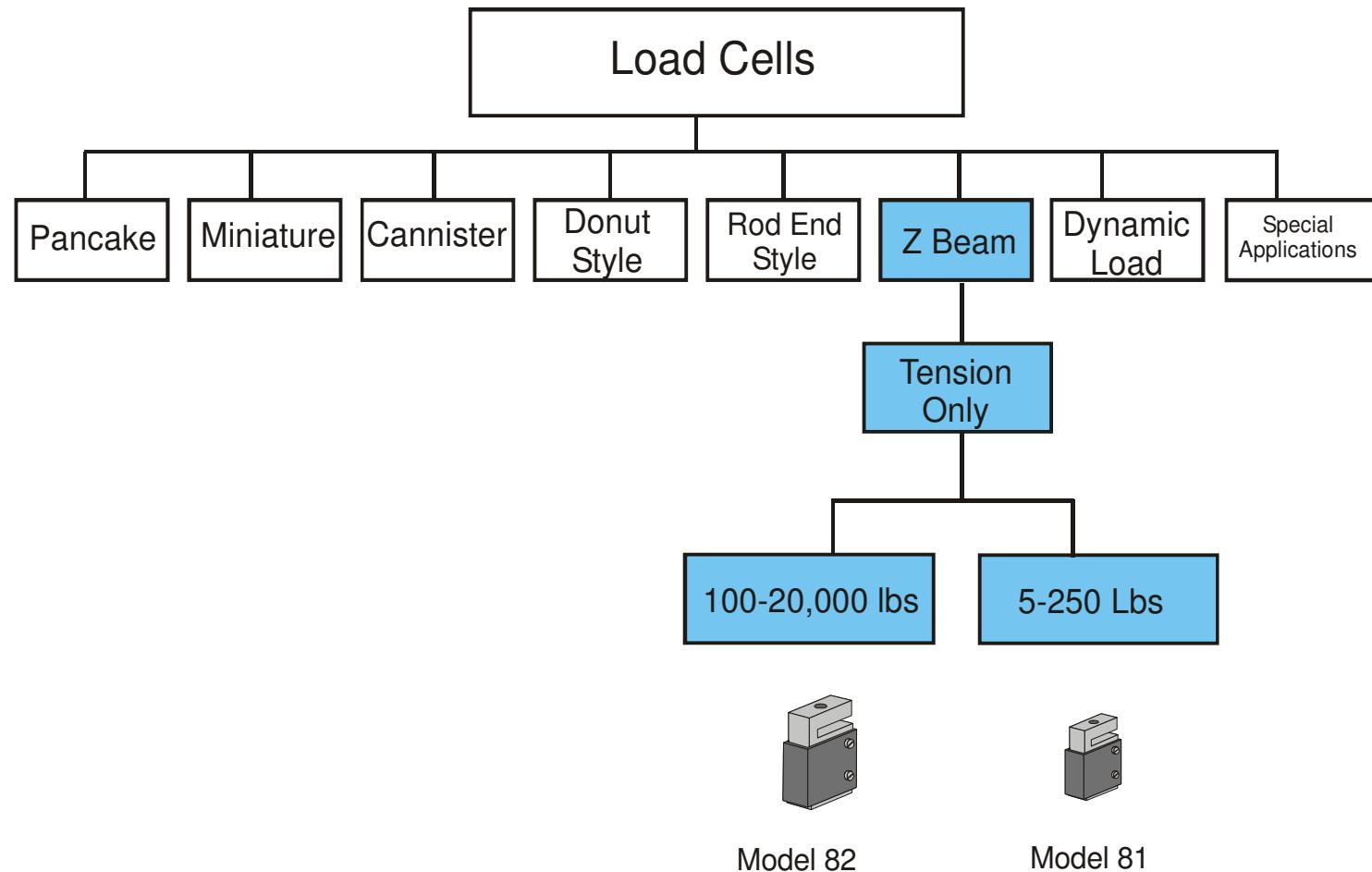
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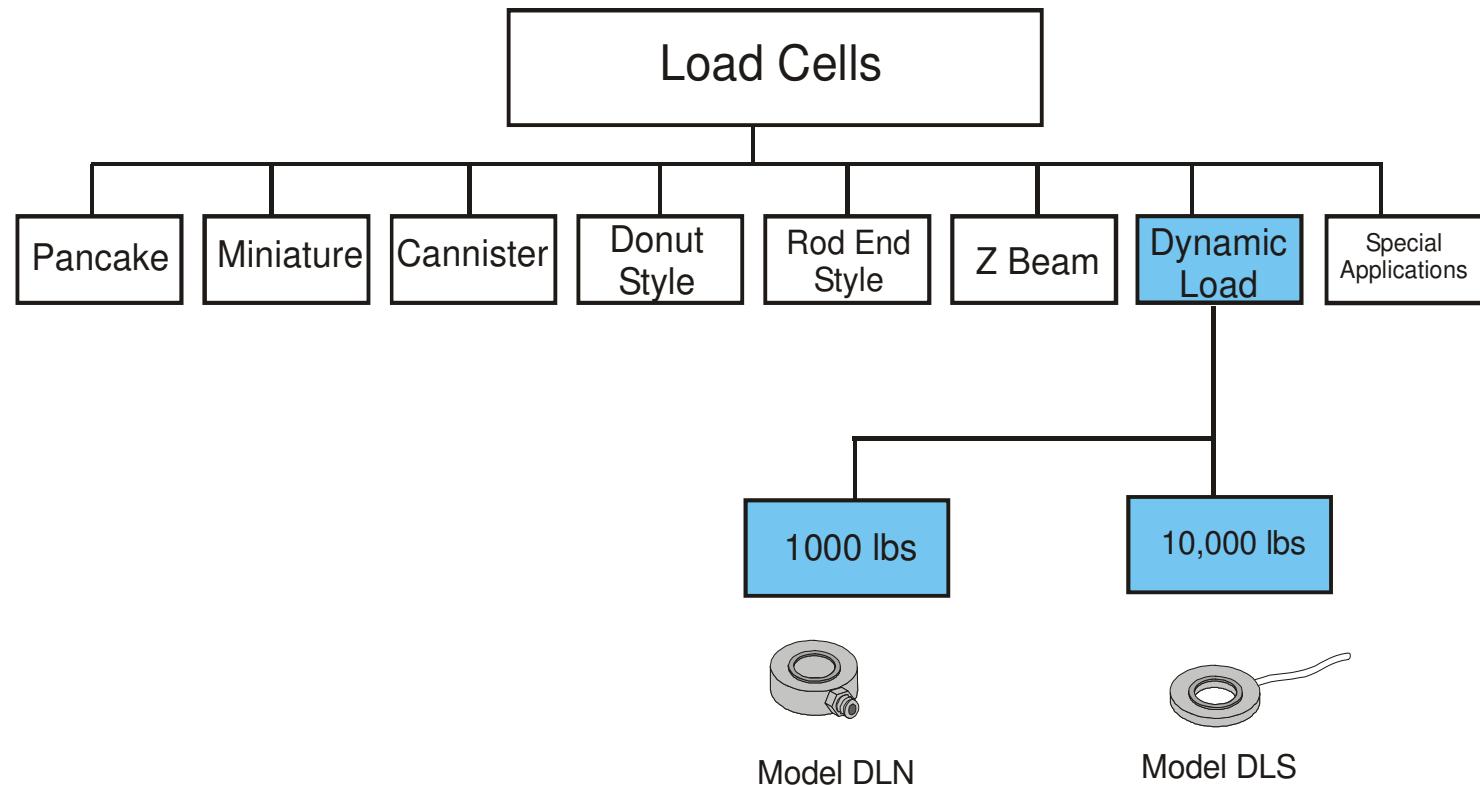
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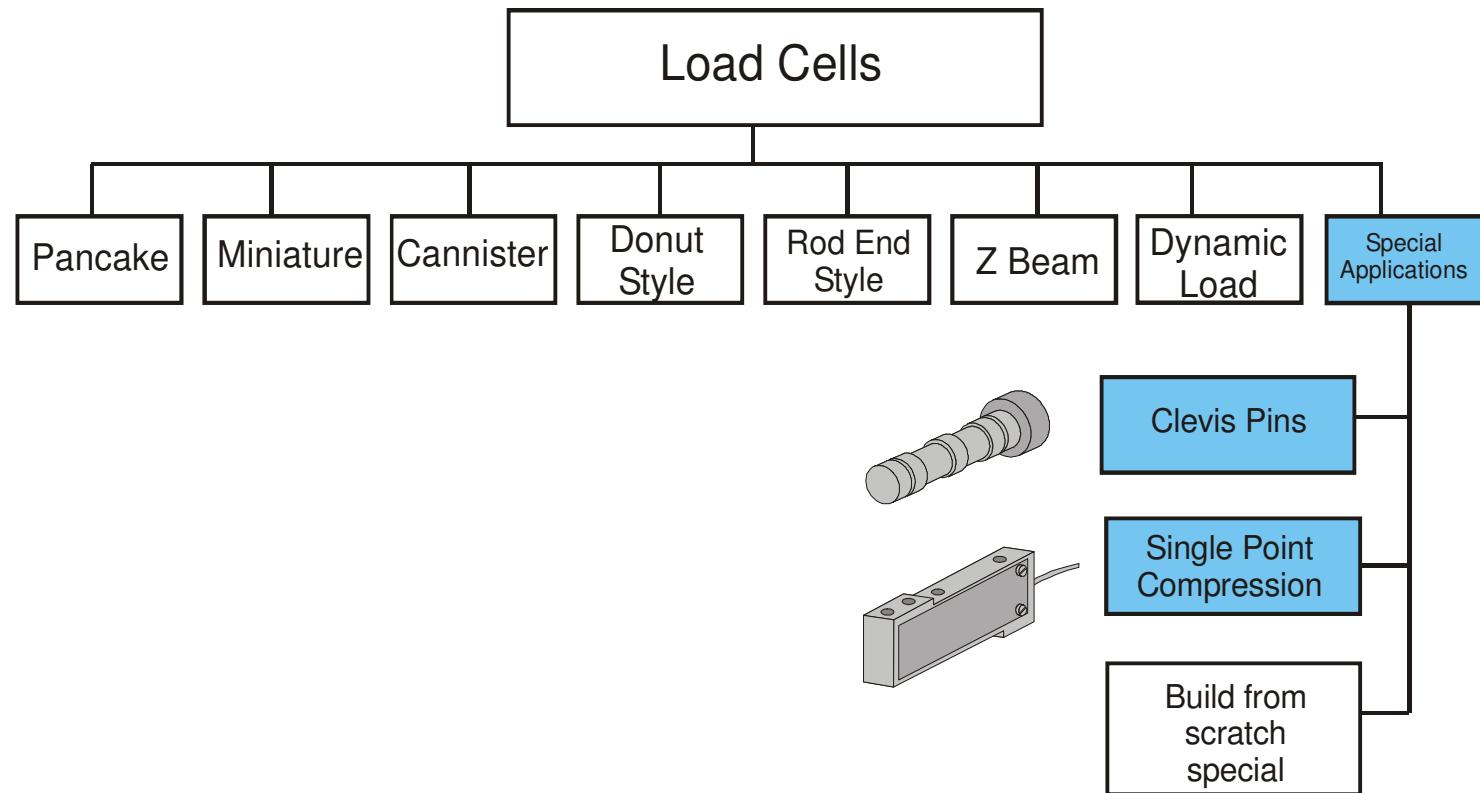
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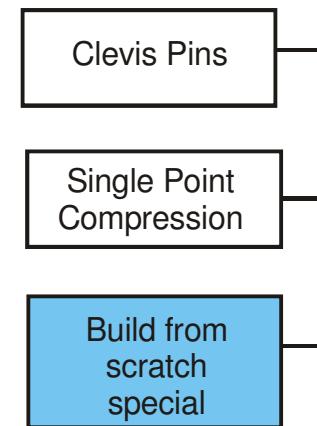
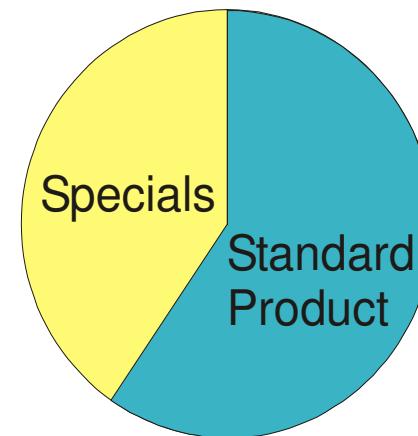
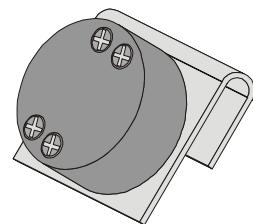
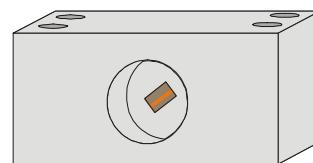
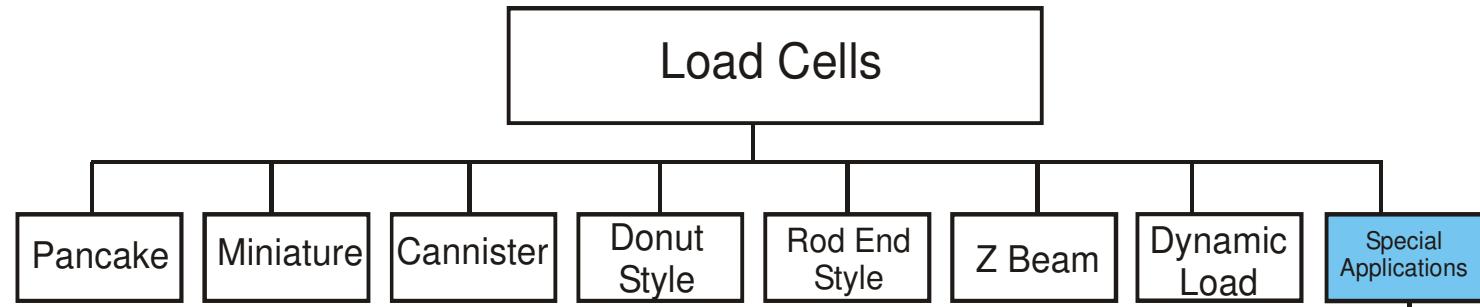
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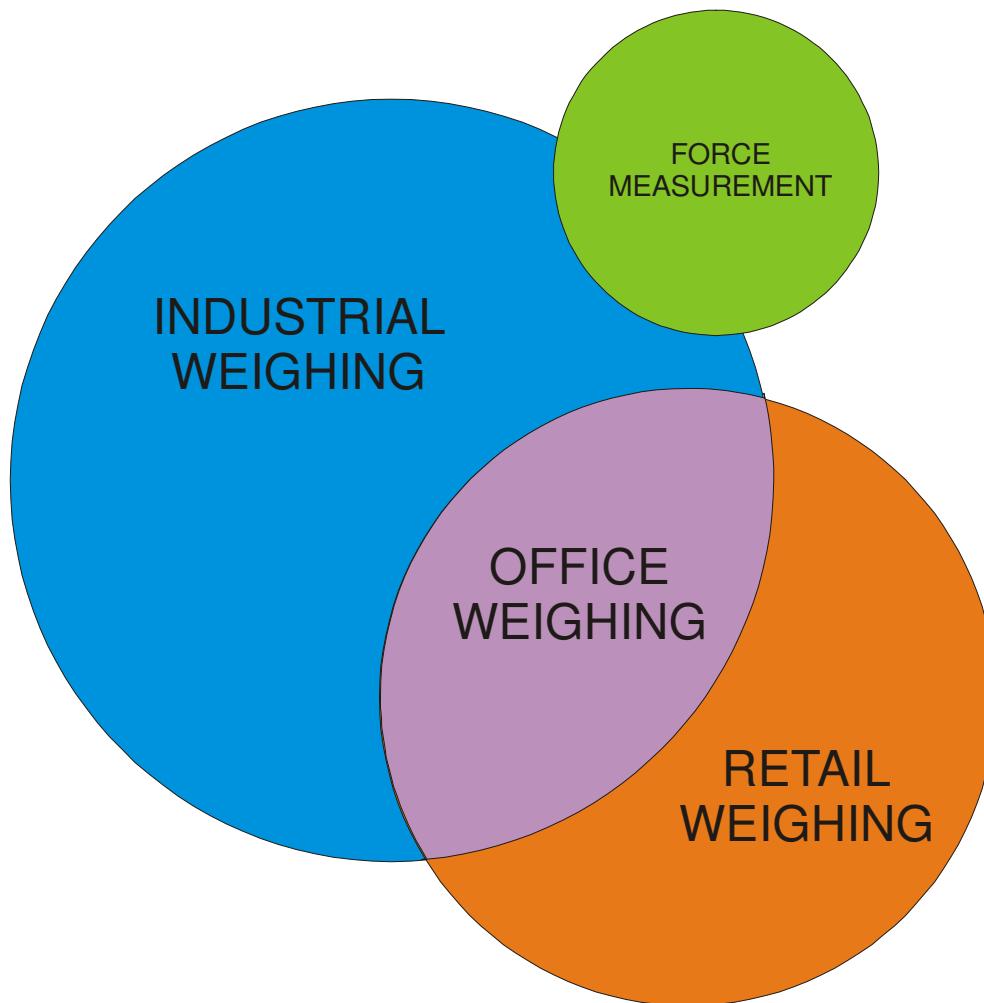
Product Range



Product Range



Market Segments: Weighing



Market Segments: Weighing vs Force Measurement

Force

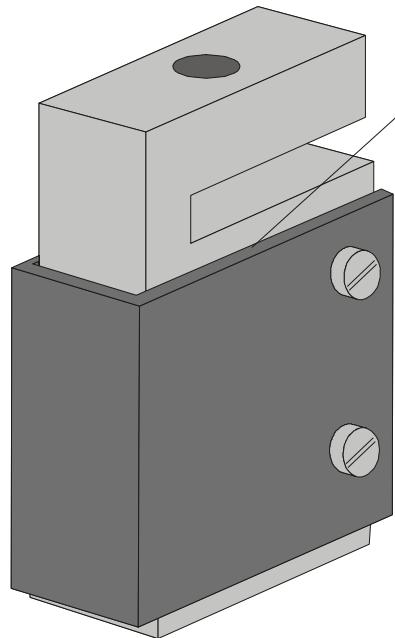
- Fast Response
- Long fatigue life
- Large temp range
- Majority: Industrial
- Minority: Hostile
- Low compliance
- Low to medium volume
- Medium to high accuracy
- NIST traceable

Weighing

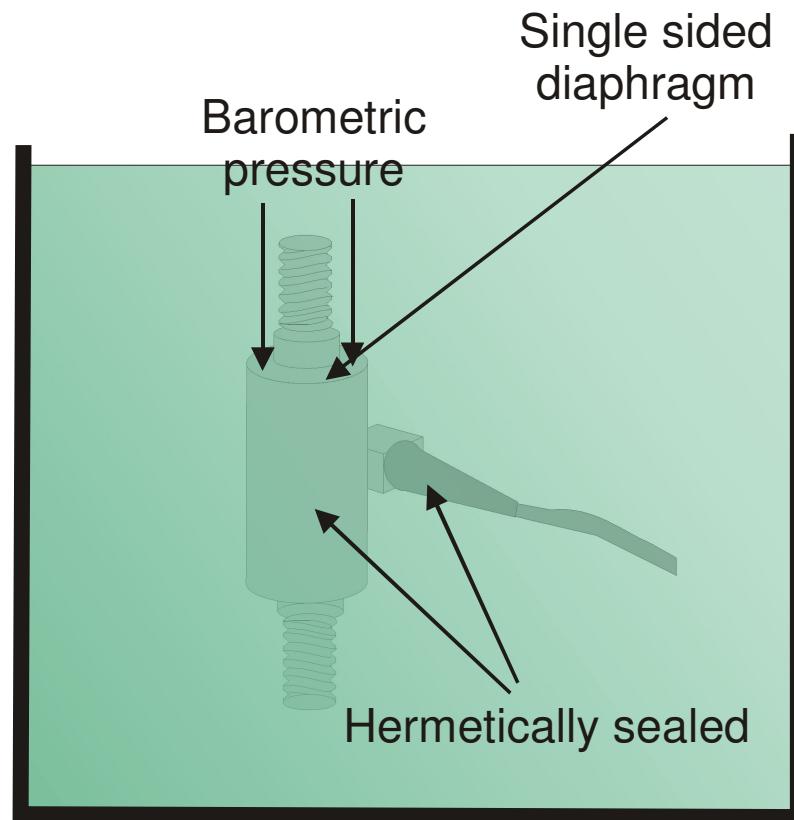
- DC response
- Low cycle life
- Limited temperature range
- Majority: room environments
- Minority: salt and water
- Large deflections
- High volume
- High accuracy
- Low cost
- ‘Legal for trade’

Environmental

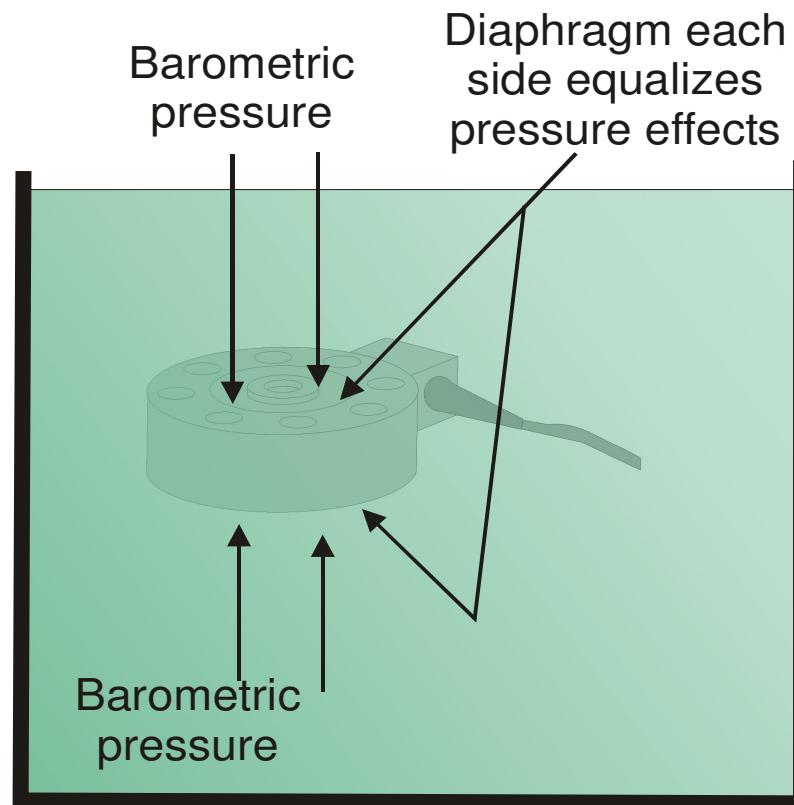
Difficult to seal



Environmental



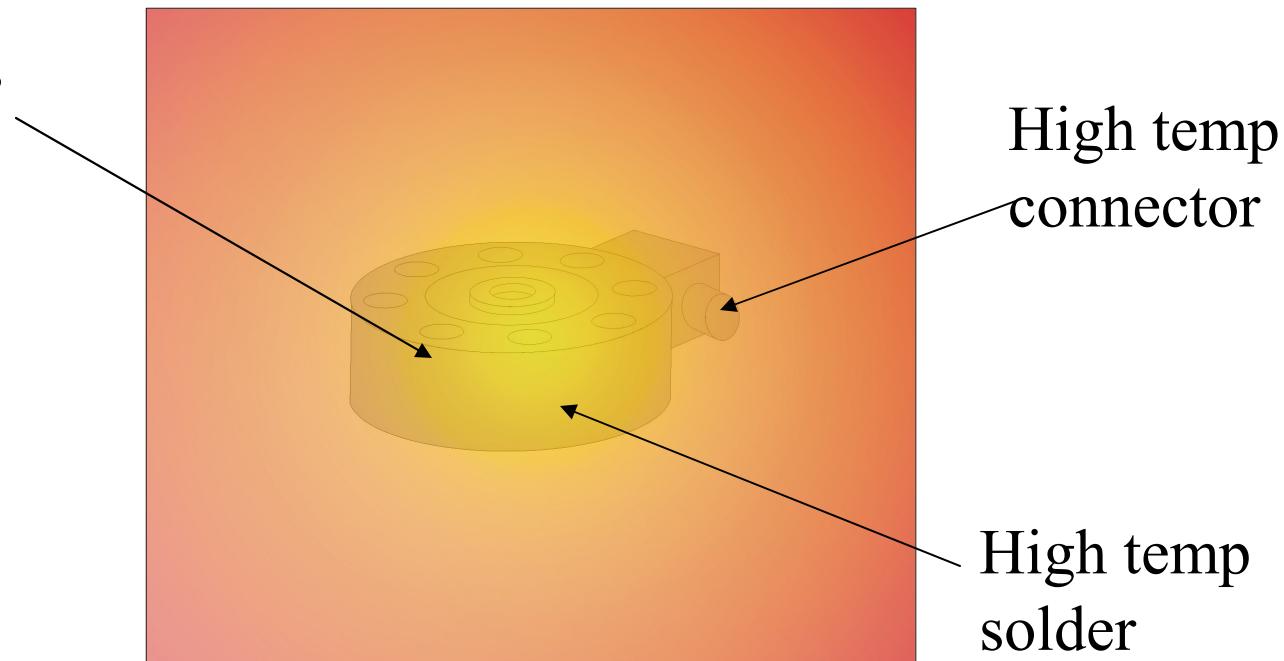
Environmental



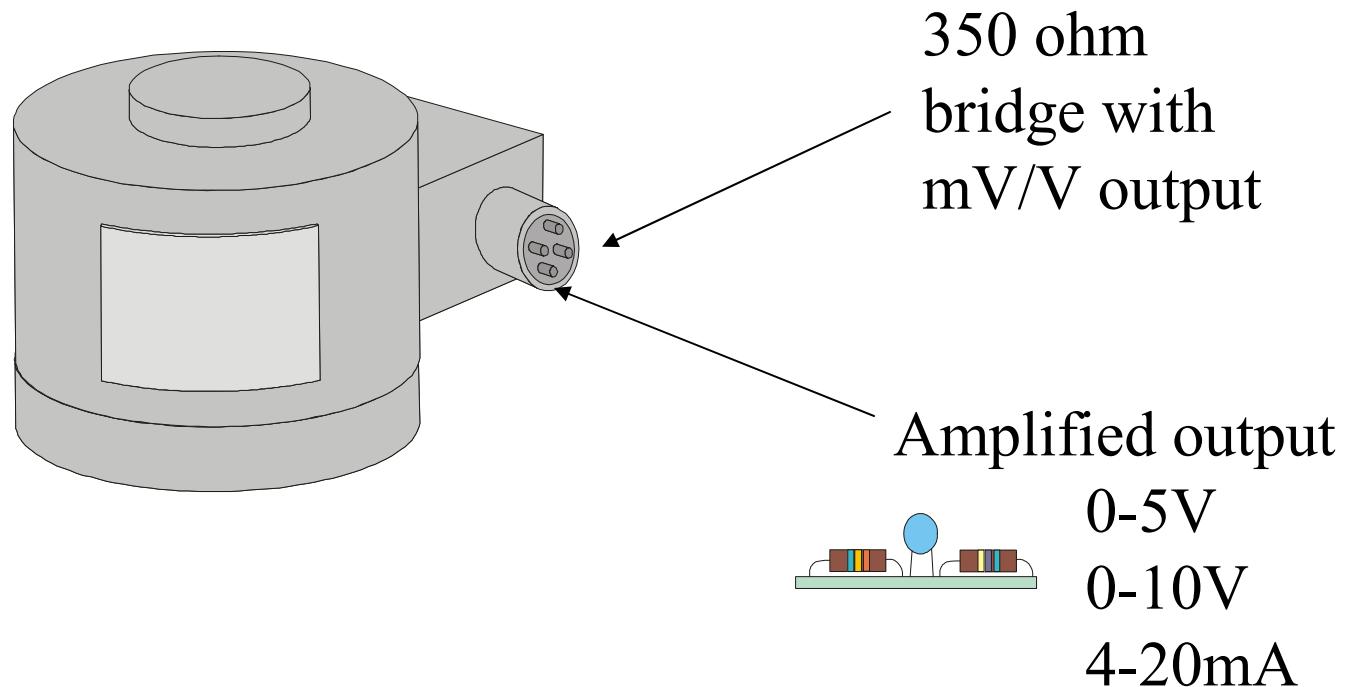
Environmental

Aluminum only good to 120°F
Stainless good to 500°F

High temp
strain gages

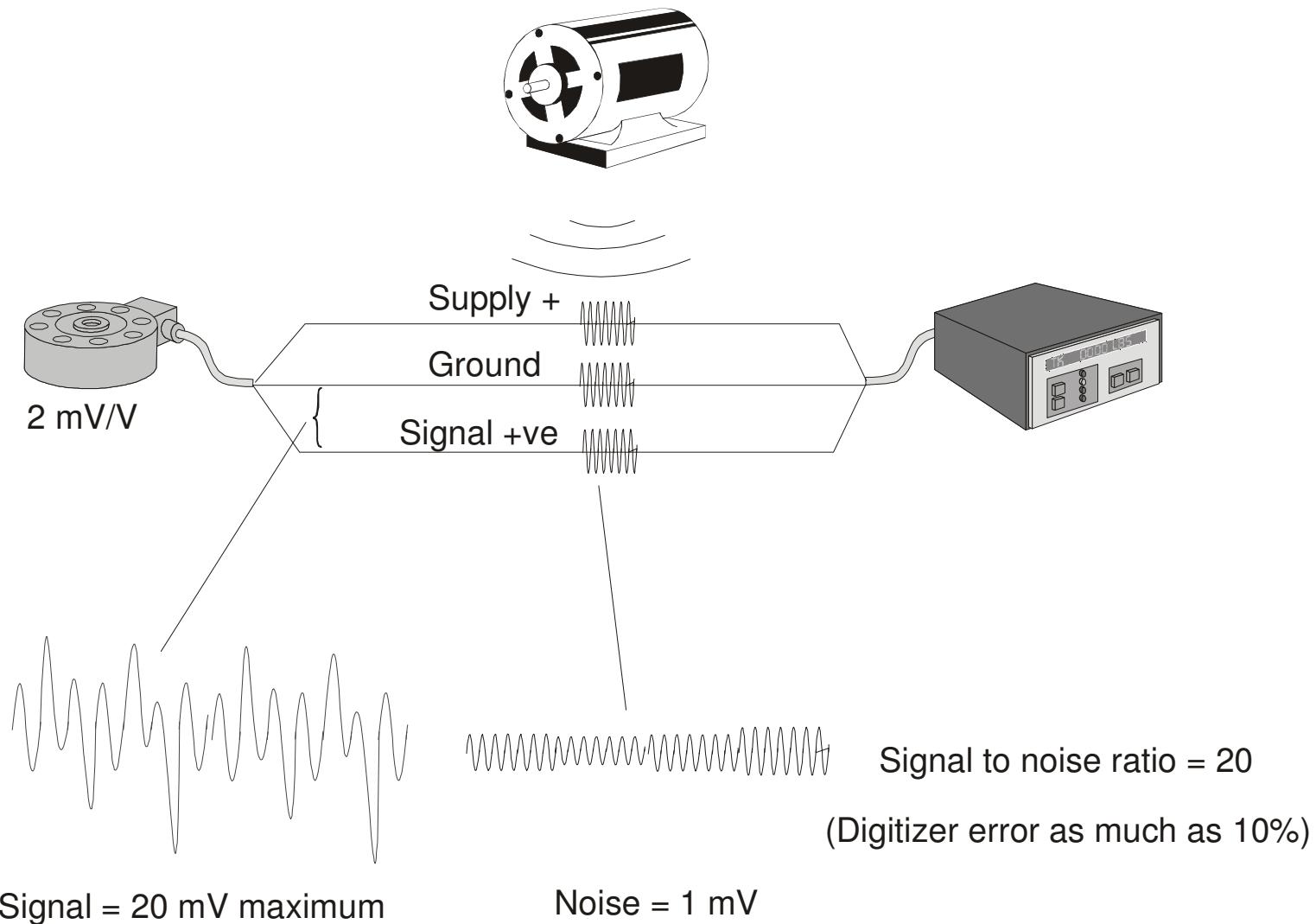


Electrical



Note: Miniature and high temperature load cells do not have amplified outputs

Noise Immunity

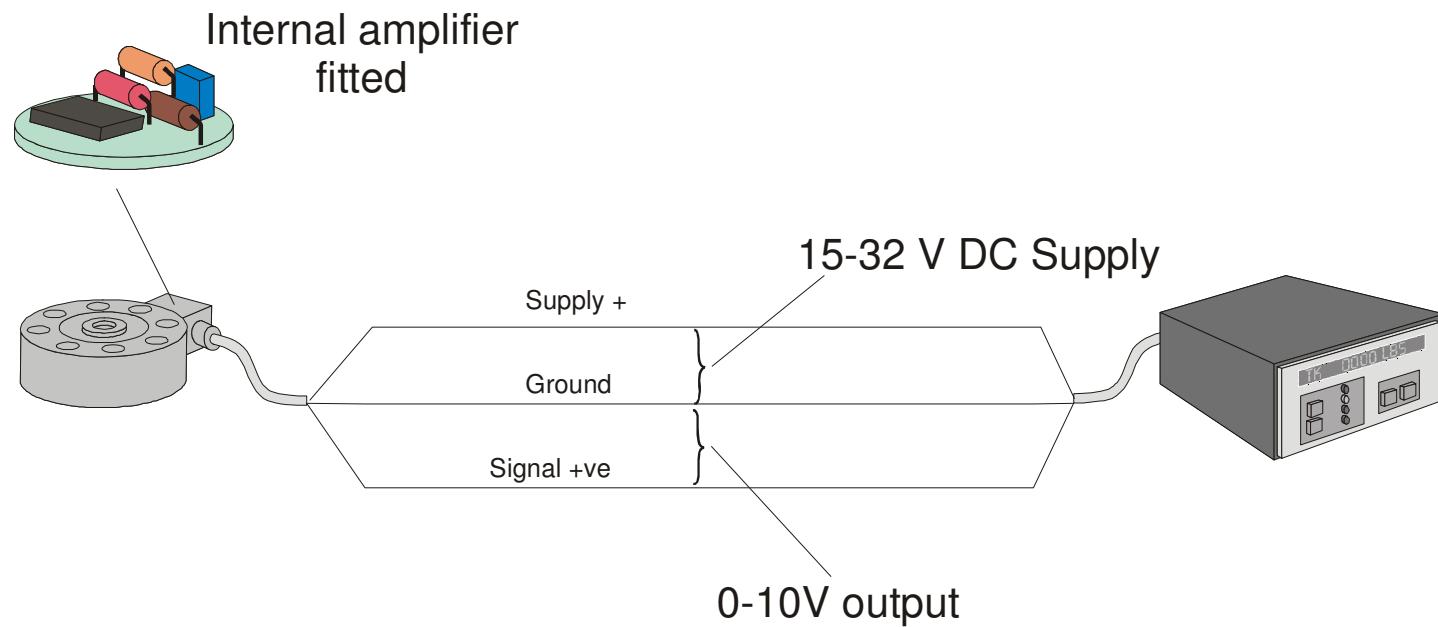


Honeywell

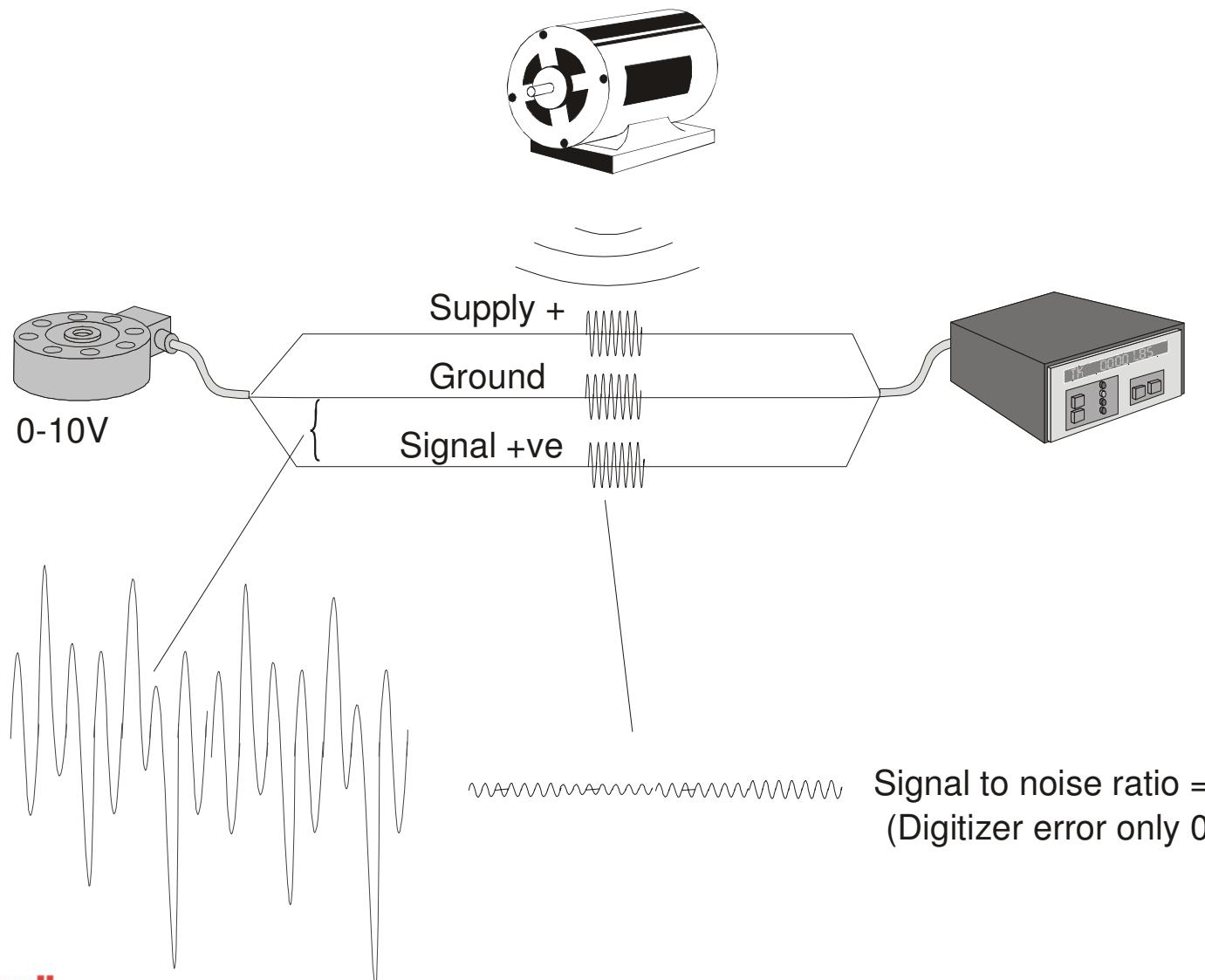
SENSOTEC

Honeywell

Noise Immunity



Noise Immunity



Honeywell

SENSOTEC

Honeywell