WEIGH SYSTEM TECHNOLOGY

BLH NOBEL
A VPG Brand

# KIS Beam Weigh Modules
# Installation Instructions

TM029
Rev
6/10/21
Doc 35130

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# SECTION 1. Introduction

## 1.1 INTRODUCTION

This manual provides general information, installation, operating, and service information for BLH Nobel KIS-1, -2, and -3, Load Beam transducers. Primary attention will be given to the KIS Weigh Module (Figure 1), which is a combination of the KIS Load Beam and associated mounting hardware.

## 1.2 PRODUCT DESCRIPTION

### 1.2.1 The KIS Beam

BLH Nobel KIS Beams are precision transducers for measurement of weight and other forces. The beams contain bonded strain gages which are stressed by applied shear forces.- he strain gages produce changes in the electrical outputproportional to the applied force.

KIS Beams offer the inherent advantage of all strain gage devices -excellent stability, high accuracy, reliability, and infinite resolution. They contain no moving parts or fluids; and are environmentally protected against dust and liquids. The beams are available with full-scale ranges from 0.5 - 500kN (110 - 112,500 lbs).

The load bearing elements are machined from high strength steel and are designed for a uniform, repeatable stress distribution where the strain gages are bonded to the beam.

The KIS Load Beam design incorporates an outer 'sleeve' that can be viewed as a second cantilever (Figure 2), rigidly attached to the free end of the first cantilever. This unique 'double cantilever' design gives the KIS beam many advantages over conventional bending and shear beam designs. Rather than applying force at the free end of the beam, the load point is brought back to a position directly over the gaged area. This results in a bending 'moment' very close to zero across the gaged area. Since a shear beam is designed to measure shear force, not bending force, any reduction in bending moment stress increases the accuracy of the measurement. The second cantilever also is effective at isolating load application point stresses from the active element.

Small detection, double cantilever design, and absence of moving parts give BLH Nobel KIS Beams excellent high frequency response for dynamicforce measurements.

**Figure 1. KIS Weigh Module Configurations**

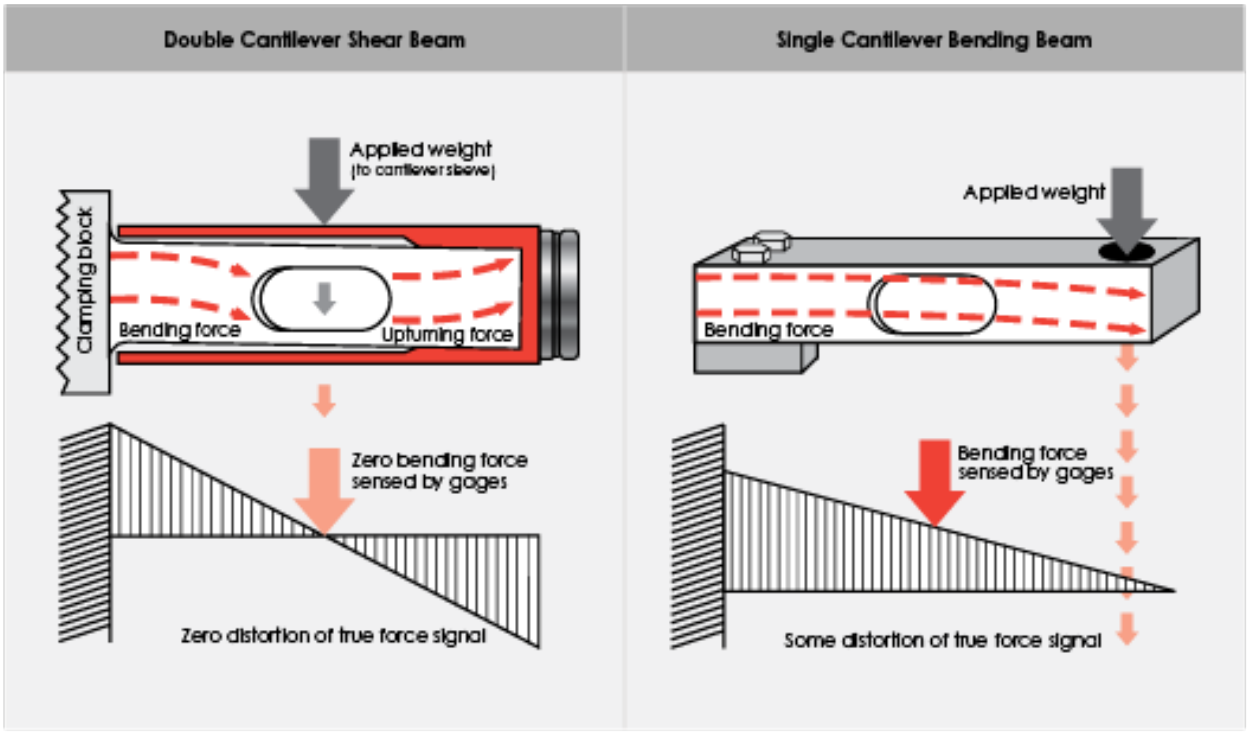



**Figure 2. Double Cantilever Design.**

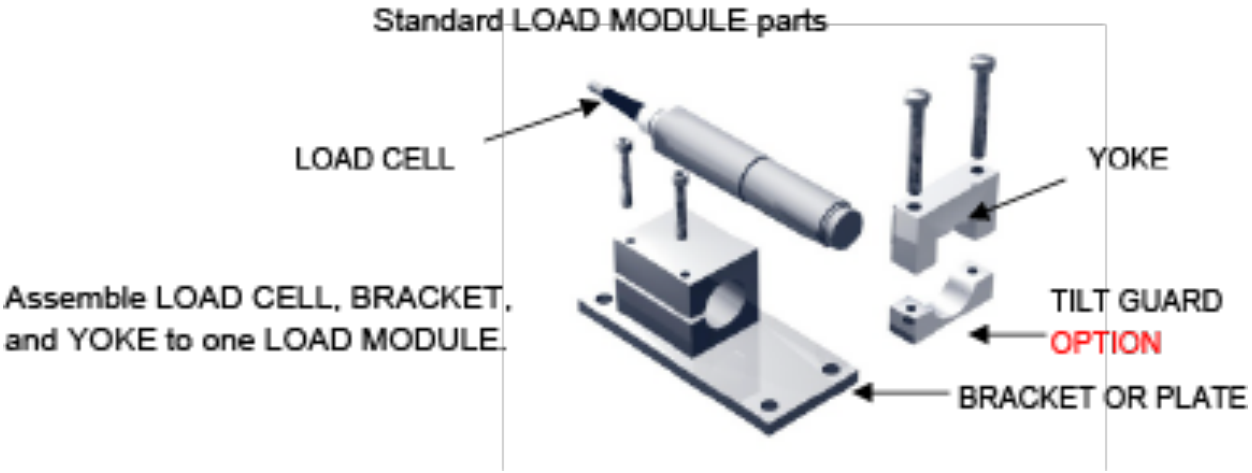



**Figure 3. KIS Load Beam Transducer Components.**

### 1.2.2 **Mounting Hardware**

KIS Weigh Module mounting hardware consists of a single piece cast mounting base and a retainer-yoke (Figure 3). The KIS Load Beam is installed in the base and turned to orient the arrow on the wrench flat (at the cable end of the beam) with the applied load. Typically, the load is vertical (tank, bin, hopper, etc.) and orientation is made with a spirit level across the reference plane. Rotate Beam to level and clamp with the bolts in the mounting base, split block. The retainer- yoke is positioned at, or as close as possible, to the recommended load point on the KIS Load Beam and bolted to the vessel being weighed. Mounting hardware design simplifies installation while eliminating the need for vessel stay and check rods.

## 1.3 KIS BEAM ACCESSORIES.

Accessories described and illustrated are typically used for industrial process weighing. For information concerning special requirements, contact BLH Nobel.

### 1.3.1 **Safety Stop Spacer**

Supplied as a kit (spacer and retaining ring, Figure 4) Safety Stop Spacers correspond in size to the selected KIS Beam. Spacer tubes limit travel of the retainer-yoke and structure being weighed, but allowing normal thermal expansion of tank or vessel.

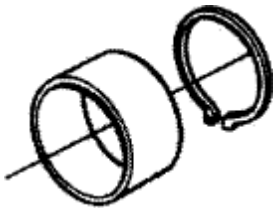


**Figure 4. Safety Stop Spacers.**

### 1.3.2 **Dummy Beams**

Dummy beams are solid steel shafts with the same dimensions as the corresponding KIS Beam, used in place of the KIS Beam during the installation process. Use of a Dummy Beam eliminates the risk of damage to the precision KIS Beam due to stray welding currents and/or mechanical impact.

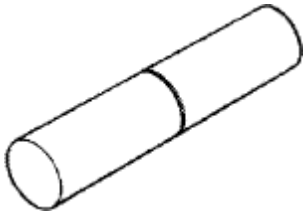


**Figure 5. Dummy Beam.**

### 1.3.3 **Thermal Insulation Kits**

Thermal insulation kits (pad, plate, and mounting hardware) reduce heat conduction from a heated vessel to the KIS Load Beam allowing beam temperatures to remain close to ambient for maximum accuracy. The pads are made of rigid laminate with extremely low conductivity. BLH Nobel recommends using insulation kits if thevessel mount exceeds 52C (130F). Figure 6provides outline dimensions for thermal insulation kits. One kit is required for each system weigh module.

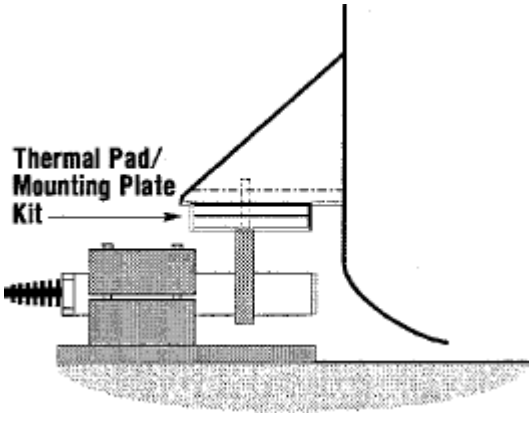



**Figure 6. Thermal Insulation Kit.**

### 1.3.4 **Mounting Plate Kits**

BLH Nobel sells weigh module mounting plates to simplify KIS installation. A mounting plate kit is identical to the thermal insulation kit, without thethermal pad. All mounting plate dimensions are presented in Figure 1-5 (all dimensions apply except 'F', for correct 'H' subtract 'F'). Each kit

includes a painted steel plate and mounting hardware. One kit is required for each system weigh module.

See thermal pad kit outline Figure 6 for standard dimensions.

## 1.4 KIS WEIGH MODULE SPECIFICATIONS

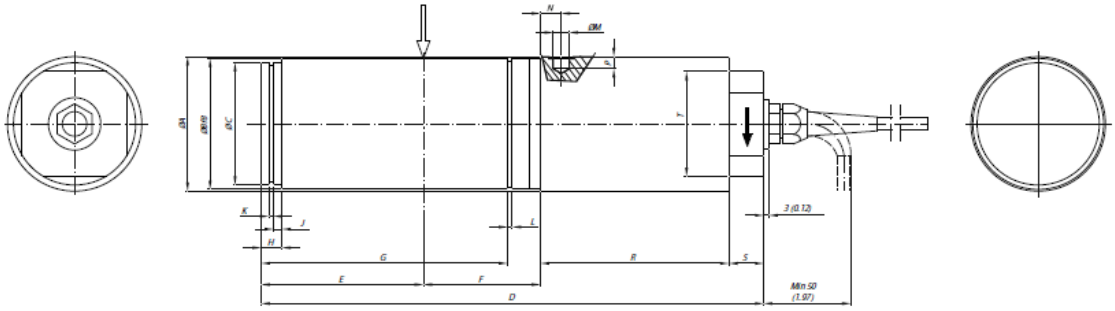
### 1.4.1 KIS-1 Specifications

The KIS-1 load cell has several features that clearly distinguish it from other load cells. It is easy to install and extremely accurate, even when subjected to dynamic process forces and severe environmental conditions. All KIS load cells can be ATEX/IECEx/FM/CSA certified for use in explosive atmospheres. Outline dimensions are provided in Figure 7. Features include:

- Capacity range: 50, 100, 200, 300, and 500kN (11.2K, 22.4K, 44.9K, 67.5K, and 112.4Klb)
- Simple installation
- Moveable load point
- Withstands very high lateral forces
- Extremely accurate and rugged
- ATEX/FM/CSA certified for hazardous locations

Applications for the KIS-1 include:

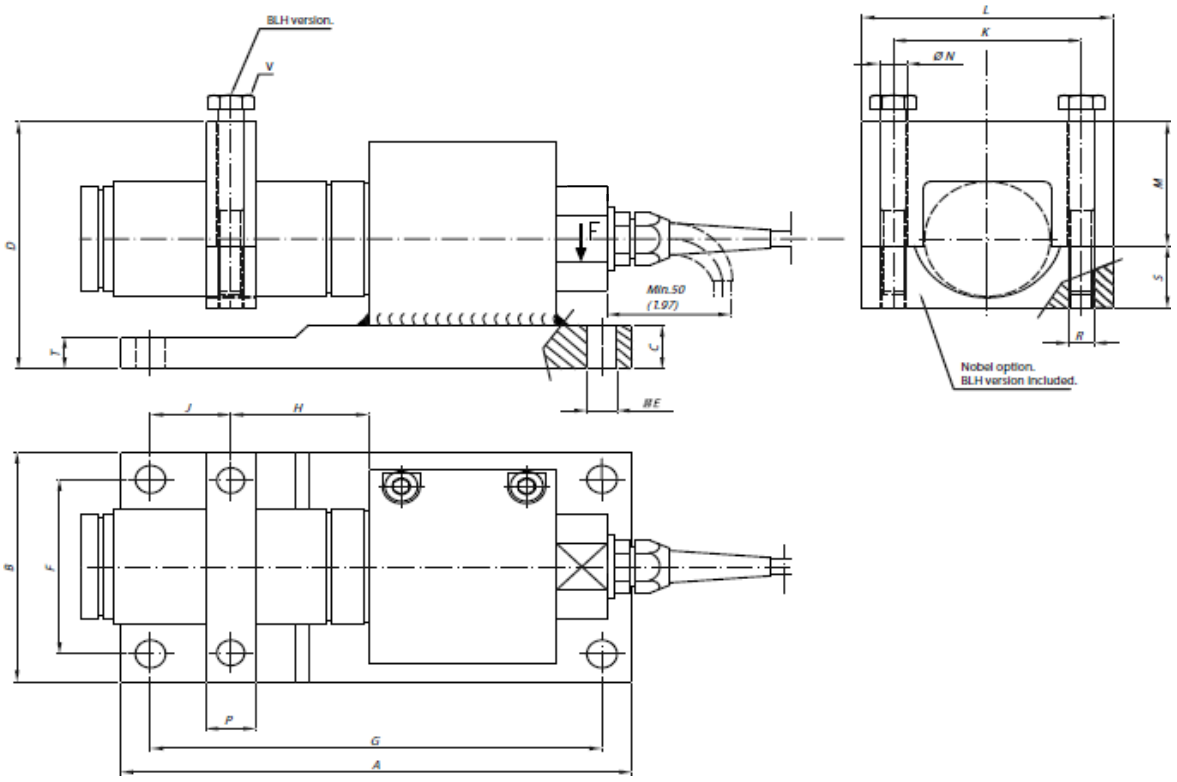
- Large silo and storage bins
- Reactor and mixing vessels
- Conveyor belts
- High-capacity force measurement systems



| RANGE kN | ØA | ØB | ØC | D | E | F | G | H | J | K | L | ØM | N | P | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50 (11.2k) | 77 (3.03) | 75 (2.95) | 70 (2.76) | 291 (11.46) | 93 (3.66) | 65 (2.56) | 141.3 (5.56) | 12 (.47) | 5 (.20) | 2.65 (.10) | 2.65 (.10) | 9.1 (.36) | 14 (.55) | 7 (.28) | 110 (4.33) | 20 (.79) | 60 (2.36) |
| 100 (22.4k) | 92 (3.62) | 90 (3.54) | 82 (3.23) | 315 (12.40) | 107 (4.21) | 65 (2.56) | 155.4 (6.12) | 15 (.59) | 6 (.24) | 2.65 (.10) | 3.15 (.12) | 12.6 (.50) | 17 (.67) | 8 (.31) | 120 (4.72) | 20 (.79) | 70 (2.76) |
| 200 (44.9k) | 101 (3.98) | 100 (3.94) | 90 (3.54) | 346 (13.62) | 128 (5.04) | 65 (2.56) | 175.8 (6.92) | 15 (.59) | 6 (.24) | 3.15 (.12) | 3.15 (.12) | 15.7 (.62) | 19 (.75) | 8.5 (.33) | 130 (5.12) | 20 (.79) | 80 (3.15) |
| 300 (67.5k) | 101 (3.98) | 100 (3.94) | 90 (3.54) | 346 (13.62) | 128 (5.04) | 65 (2.56) | 175.8 (6.92) | 15 (.59) | 6 (.24) | 3.15 (.12) | 3.15 (.12) | 15.7 (.62) | 19 (.75) | 8.5 (.33) | 130 (5.12) | 20 (.79) | 80 (3.15) |
| 500 (112.4k) | 142 (5.59) | 140 (5.51) | 130 (5.12) | 450 (17.72) | 165 (6.50) | 75 (2.95) | 212.8 (8.38) | 35 (1.38) | 20 (.79) | 4.15 (.16) | 4.15 (.16) | 15.7 (.62) | 30 (1.18) | 8.5 (.33) | 180 (7.09) | 27 (1.06) | 80 (3.15) |

Dimension shown in MM (inch)

**Figure 7. Outline Dimensions for KIS-1.**




| RANGE kN | A | B | C | D | ØE | F | G | H | J | K | L | M | ØN | P | T | R | S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50 (11.2k) | 280 (11.02) | 150 (5.91) | 30 (1.18) | 152 (5.98) | 16 (.63) | 115 (4.53) | 245 (9.65) | 65 (2.56) | 45,5 (1.79) | 115 (4.53) | 150 (5.91) | 72 (2.83) | 18 (.71) | 30 (1.18) | 30 (1.18) | M16 M16 | 43 (1.69) |
| 100 (22.4k) | 310 (12.20) | 170 (6.69) | 40 (1.57) | 173 (6.81) | 22 (.87) | 130 (5.12) | 270 (10.63) | 65 (2.56) | 63 (2.48) | 126 (4.96) | 160 (6.30) | 85 (3.35) | 22 (.87) | 40 (1.57) | 26 (1.02) | M20 M20 | 50 (1.97) |
| 200 (44.9k) | 340 (13.39) | 180 (7.09) | 50 (1.97) | 199 (7.83) | 25 (.98) | 140 (5.51) | 300 (11.81) | 65 (2.56) | 71 (2.80) | 146 (5.75) | 190 (7.48) | 95 (3.74) | 25 (.98) | 50 (1.97) | 32 (1.26) | M24 M24 | 57 (2.24) |
| 300* (67.5k) | 340 (13.39) | 180 (7.09) | 50 (1.97) | 199 (7.83) | 25 (.98) | 140 (5.51) | 300 (11.81) | 65 (2.56) | 71 (2.80) | 175 (6.89) | 220 (9.02) | 105 (4.13) | 26 (1.02) | 53 (2.09) | 32 (1.26) | M24 M24 | 56 (2.20) |
| 500* (112.4k) | 480 (18.90) | 280 (11.02) | 60 (2.36) | 315 (12.40) | 33 (1.30) | 220 (8.66) | 420 (16.54) | 75 (2.95) | 108 (4.25) | 240 (9.45) | 300 (11.81) | 150 (5.91) | 26 (1.02) | 70 (2.76) | 60 (2.36) | M24 M24 | 91 (3.58) |

*is provided with loading ring

| RANGE kN | V |
|---|---|
| 50 | M16-2X120 (4.724) LG |
| 100 | M20-2.5X140 (5.512) LG |
| 200 | M24-3X160 (6.299) LG |
| 300 | Not available |
| 500 | Not available |

**Figure 7. con't. Outline Dimensions and Specifications for KIS-1.**

| SPECIFICATIONS | |
|---|---|
| **PARAMETER** | **VALUE** |
| **PERFORMANCE** | |
| **Rated load (RL)** | 50, 100, 200, 300, 500 kN |
| **Combined error (terminal)** | ±0.03% RO |
| **Repeatability** | 0.01% RO |
| **Overload,* safe** | 200% RL, 150% RL for 300 kN and 500 kN |
| **Overload,* ultimate** | 300% RL, 200% RL for 300 kN |
| **Uplift, safe** | 70% RL |
| **Uplift, ultimate** | 85% RL |
| **Side load,* safe** | 100% RL, 50% RL for 300 kN and 500 kN |
| **Side load,* ultimate** | 200% RL, 100% RL for 300 kN and 500 kN |
| **Input voltage, recommended** | 5-10 VDC or VAC |
| **Input voltage, maximum** | 18 VDC or VAC |
| **Input resistance** | 350 Ω ±3 Ω |
| **Output resistance** | 350 Ω ±0.5 Ω |
| **Rated output (RO)** | 2.040 mV/V |
| **Tolerance of RO** | ±0.1% RO |
| **Zero balance** | ±1% RO |
| **Tolerance of shunt calibration values** | 0.1% of value; actual output defined on unit calibration sheet |
| **Creep at RL after 30 minutes** | ±0.04% RL |
| **Temperature range (wider temperature range available upon request)** | –40 to +105°C<br>–40 to +220°F |
| **Temperature effect, on output (–10°C to +50°C)** | ±0.0015% of output/°C<br>±0.0008% of output/°F |
| **Temperature effect, on zero balance (–10°C to +50°C)** | ±0.003% RO/°C<br>±0.0017 % RO/°F |
| **Insulation resistance at 200 VDC** | >4 GΩ |
| **Material: load cell, 50 kN** | Stainless steel (Nobel version), yellow chromate steel (BLH version) |
| **Material: load cell, 100–500 kN** | Yellow chromate steel, stainless steel as an option |
| **Material: bracket, yoke and tilt guard** | Yellow chromate steel, stainless steel as an option |
| **Electrical connection** | 10m shielded four conductor cable |
| **Degree of protection** | IP67 |
| **APPROVALS** | |
| ATEX, IECEx, FM, CSA certified versions are available upon request. For details contact blhnobel@vpgsensors.com. | |

* Referring to recommended loading point

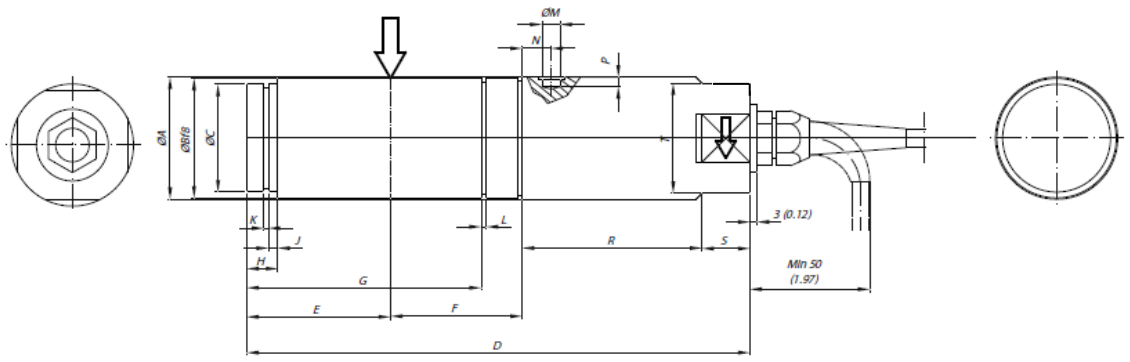
### 1.4.2 **KIS-2 Specifications**

The KIS-2 load cells have several features that clearly distinguish them from other load cells. They are easy to install and extremely accurate, even when subjected to dynamic process forces and severe environmental conditions. All KIS load cells can be ATEX/IECEx/FM/CSA certified for usein explosive atmospheres. Outline dimensions are provided in Figure 8. Features of the KIS-2 include:

- Capacity range: 0.5, 2, 5, 10, 20, 30, and 50kN (112, 450, 1.12K, 2.25K, 4.5K, 6.75K, and 11.2Klb)
- Simple installation
- Moveable load point
- Withstands very high lateral forces
- Extremely accurate and rugged
- ATEX/IECEx/FM/CSA certified for hazardouslocations

Applications of the KIS-2 include:

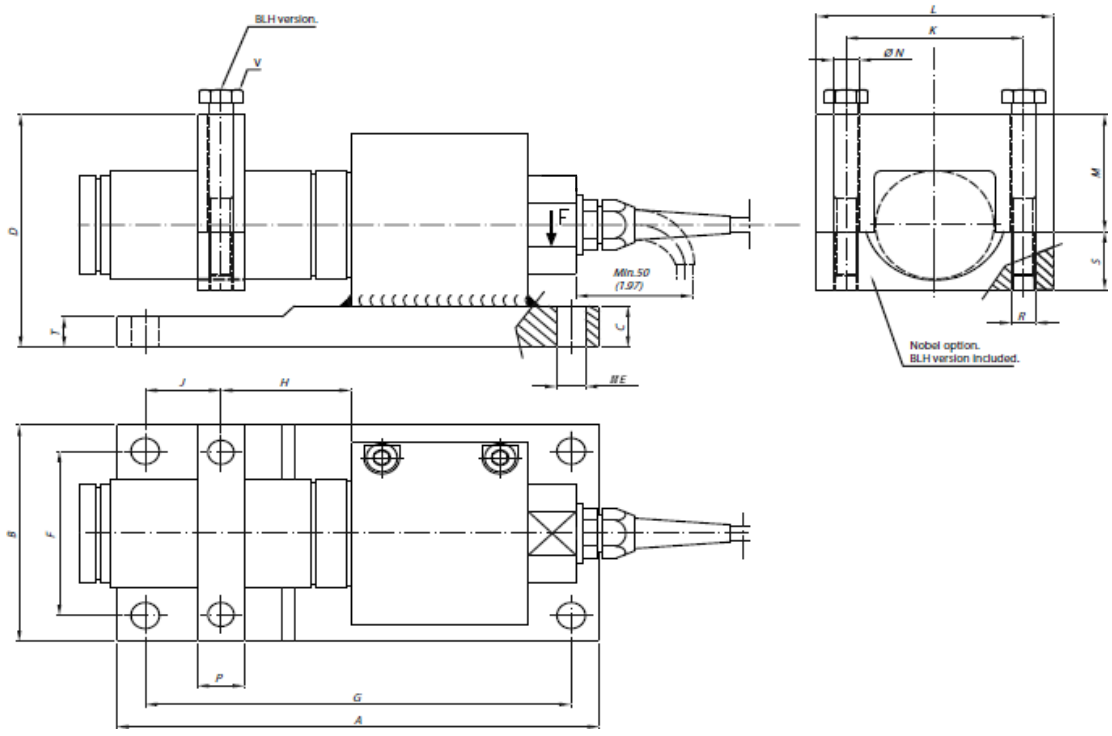
- Batch/blend/mix systems
- Reactor vessels
- Quality-critical process weighing
- Precision force measurement
- Conveyor belts




| RANGE kN | ØA | ØB | ØC | D | E | F | G | H | J | K | L | ØM | N | P | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.5-1-2-5 | 34 (1.34) | 33 (1.30) | 29 (1.14) | 169 (6.65) | 46 (1.81) | 35 (1.38) | - | 10 (.39) | 2.5 (.10) | 1.6 (.06) | - | 4.4 (.17) | 10 (.39) | 2.3 (.09) | 70 (2.75) | 15 (.59) | 30 (1.18) |
| 10-20-30 | 51 (2.00) | 50 (1.97) | 45 (1.77) | 213 (8.38) | 60 (2.36) | 55 (2.16) | 97.85 (3.85) | 13 (.51) | 4 (.16) | 1.85 (.07) | 2.15 (.08) | 7.5 (.29) | 12 (.47) | 5 (.20) | 75 (2.95) | 20 (.79) | 46 (1.81) |
| 50 | 77 (3.03) | 75 (2.95) | 70 (2.76) | 288 (11.34) | 93 (3.66) | 65 (2.56) | 141.3 (5.56) | 12 (.47) | 5 (.20) | 2.65 (.10) | 2.65 (.10) | 9.1 (.36) | 14 (.55) | 7 (.28) | 110 (4.33) | 20 (.79) | 60 (2.36) |

Dimension shown in MM (inch)

**Figure 8. Outline dimensions of KIS-2.**




| RANGE kN | A | B | C | D | ØE | F | G | H | J | K | L | M | ØN | P | T | R | S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.5-1-2-5 | 175 (6.89) | 75 (2.95) | 14 (.55) | 81 (3.19) | 12 (.47) | 51 (2.01) | 151 (5.94) | 35 (1.38) | 31 (1.22) | 55 (2.17) | 70 (2.76) | 41 (1.61) | 8.5 (.33) | 20 (.88) | 14 (.55) | M8 | 19 (.75) |
| 10-20-30 | 204 (8.03) | 100 (3.93) | 19 (.75) | 107.5 (4.23) | 12 (.47) | 76 (2.99) | 180 (7.08) | 55 (2.16) | 32 (1.26) | 75 (2.95) | 100 (3.93) | 54 (2.12) | 11 (.43) | 20 (.79) | 14 (.55) | M10 | 27 (1.06) |
| 50 | 280 (11.02) | 150 (5.90) | 30 (1.18) | 152 (5.98) | 16 (.63) | 115 (4.53) | 245 (9.64) | 65 (2.56) | 45.5 (1.79) | 115 (4.53) | 150 (5.90) | 72 (2.83) | 18 (.71) | 30 (1.18) | 30 (1.18) | M16 | 43 (1.69) |

| RANGE kN | V |
|---|---|
| 0.5-1-2-5 | M8-1.25X70 (2.755) LG |
| 10-20-50 | M10-1.5X90 (3.543) LG |
| 50 | M16-2X120(4.724) LG |

**Figure 8 con't. Outline Dimensions and Specifications for the KIS-2.**

| SPECIFICATIONS | |
|---|---|
| **PARAMETER** | |
| **PERFORMANCE** | |
| **Rated load (RL)** | 1, 2, 5, 10, 20, 30, 50 kN |
| **Combined error (terminal)** | ±0.05% RO |
| **Repeatability** | 0.01% RO |
| **Overload,* safe** | 200% RL, 150% RL for 30 kN and 50 kN |
| **Overload,* ultimate** | 300% RL, 200% RL for 30 kN and 50 kN** |
| **Uplift, safe** | 100% RL |
| **Uplift, ultimate** | 120% RL |
| **Side load,* safe** | 100% RL, 50% RL for 30 kN |
| **Side load,* ultimate** | 200% RL, 100% RL for 30 kN |
| **Input voltage, recommended** | 10 VDC or VAC |
| **Input voltage, maximum** | 18 VDC or VAC |
| **Input resistance** | 350 Ω ±3 Ω |
| **Output resistance** | 350 Ω ±3 Ω |
| **Rated output (RO)** | 2.040 mV/V |
| **Tolerance of RO** | ±0.25% RO |
| **Zero balance** | ±5% RO |
| **Tolerance of shunt calibration values** | ±0.25% of value |
| **Creep at RL after 30 minutes** | ±0.03% RL |
| **Temperature range (wider temperature range available upon request** | –40 to +105°C<br>–40 to +212°F |
| **Temperature effect, on output (–10°C to +50°C)** | ±0.0033% of output/°C<br>±0.00018% of output/°F |
| **Temperature effect, on zero balance (–10°C to +50°C)** | ±0.0014% of RO/°C<br>±0.0008% of RO/°F |
| **Insulation resistance at 200 VDC** | >4 GΩ |
| **Material: Load cell** | Stainless steel |
| **Material bracket, yoke and tilt guard** | Yellow chromate steel, stainless steel as an option |
| **Electrical connection** | 10 m shielded four conductor cable (BLH version) |
| | 5 m shielded four conductor cable (Nobel version) |
| **Degree of protection** | IP67 |
| **APPROVALS** | |
| ATEX, IECEx, FM, CSA certified versions are available upon request. For details contact blhnobel@vpgsensors.com. | |

* Referring to recommended loading point.

** 50 kN BLH version only.

### 1.4.3 KIS-3 Specifications

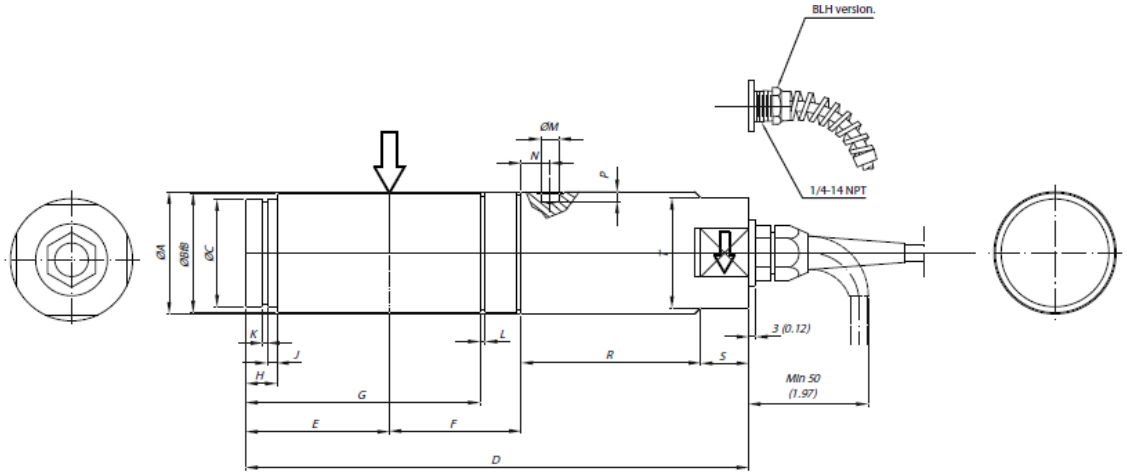
High-accuracy KIS-3 load cells have several features that clearly distinguish them from other load cells. They are easy to install and extremely accurate, even when subjected to dynamic process forces and severe environmental conditions.
All KIS load cells can be ATEX/IECEx/FM/CSA certified for use in explosive atmospheres. Outline dimensions are providedin Figure 9. Features of the KIS-3 include:

- Capacity range: 1, 2, 5, 10, and 20kN (225, 450, 1.12K, 2.25K, and 4.5Klb)
- Simple installation
- Moveable load point

- Withstands very high lateral forces Extremely accurate and rugged
- ATEX/IECEx/FM/CSA certified for hazardouslocations

- Quality-critical process weighing
- Batch/blend/mix systems
- Reactor vessels
- High-value ingredient weighing
- Precision force Measurement

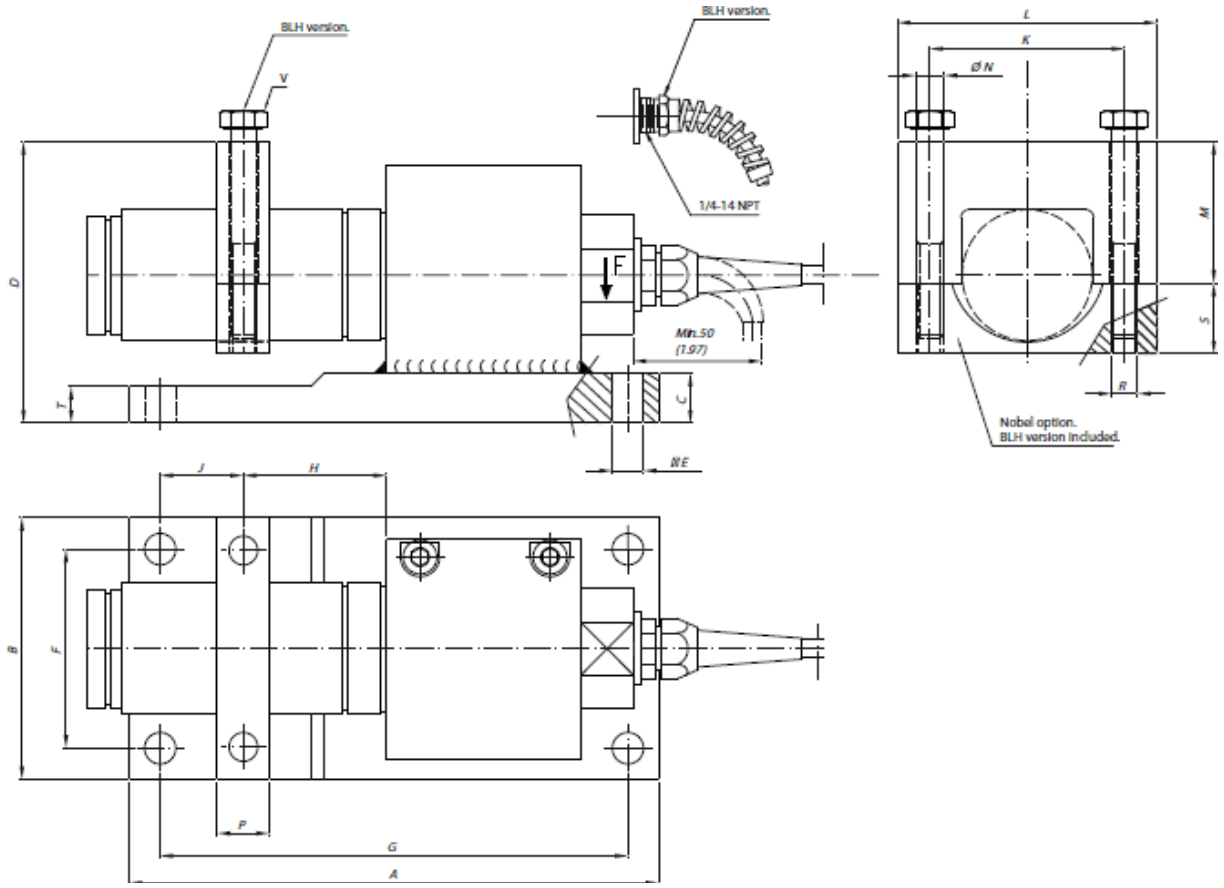
Applications of the KIS-3 include:




| RANGE kN | ØA | ØB | ØC | D | E | F | G | H | J | K | L | ØM | N | P | R | S | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-2-5 (225-450-1.2k) | 34 (1.34) | 33 (1.30) | 29 (1.14) | 169 (6.65) | 46 (1.81) | 35 (1.38) | - - | 10 (.39) | 2.5 (.10) | 1.6 (.06) | - - | 4.4 (.17) | 10 (.39) | 2.3 (.09) | 70 (2.76) | 15 (.59) | 30 (1.18) |
| 10-20 (2.25 – 4.5k) | 51 (2.01) | 50 (1.97) | 45 (1.77) | 213 (8.39) | 60 (2.36) | 55 (2.17) | 97.85 (3.85) | 13 (.51) | 4 (.16) | 1.85 (.07) | 2.15 (.08) | 7.5 (.30) | 12 (.47) | 5 (.20) | 75 (2.95) | 20 (.79) | 46 (1.81) |

- Dimension shown in MM (inch)

**Figure 9. Outline Dimensions for the KIS-3.**




| RANGE kN | A | B | C | D | ØE | F | G | H | J | K | L | M | ØN | P | T | R | S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-2-5 (225-450-1.2k) | 175 (6.89) | 75 (2.95) | 14 (.55) | 81 (3.19) | 12 (.47) | 51 (2.01) | 151 (5.94) | 35 (1.38) | 31 (1.22) | 55 (2.17) | 70 (2.74) | 41 (1.61) | 8.5 (.33) | 20 (.79) | 14 (.55) | M8 M8 | 19 (.75) |
| 10-20 (2.25 – 4.5k) | 204 (8.03) | 100 (3.94) | 19 (.75) | 107.5 (4.23) | 12 (.47) | 76 (2.99) | 180 (7.09) | 55 (2.47) | 32 (1.26) | 75 (2.95) | 100 (3.94) | 54 (2.13) | 11 (.93) | 20 (.79) | 14 (.55) | M10 M10 | 27 (1.06) |

| RANGE kN | V |
|---|---|
| 1-2-5 (225-450-1.2k) | M8-1.25X70 (2.755) LG |
| 10-20 (2.25-4.5k) | M10-1.5X90 (3.543) LG |

**Figure 9 con't. Outline Dimensions and Specifications for KIS-3.**

| SPECIFICATIONS | |
|---|---|
| **PARAMETER** | |
| **PERFORMANCE** | |
| **Rated load (RL)** | 1, 2, 5, 10, 20 kN |
| **Combined error (best fit through zero)** | ±0.02% RO |
| **Repeatability** | 0.01% RO |
| **Overload,* safe** | 200% RL |
| **Overload,* ultimate** | 300% RL |
| **Uplift, safe** | 100% RL |
| **Uplift, ultimate** | 120% RL |
| **Side load,* safe** | 100% RL |
| **Side load,* ultimate** | 200% RL |
| **Input voltage, recommended** | 5-10 VDC or VAC |
| **Input voltage, maximum** | 18 VDC or VAC |
| **Input resistance** | 350 Ω ±3 Ω |
| **Output resistance** | 350 Ω ±0.5 Ω |
| **Rated output (RO)** | 2.040 mV/V |
| **Tolerance of RO** | ±0.1% RO |
| **Zero balance** | ±1% RO |
| **Tolerance of shunt calibration values** | ±0.1% of value (actual output listed on unit calibration sheet) |
| **Creep at RL after 30 minutes** | ±0.01% RL |
| **Temperature range (wider temperature range available upon request** | –40 to +105°C<br>–40 to +220°F |
| **Temperature effect, on output [–10°C to +50°C (14 to 120°F)]** | ±0.001% of output/°C<br>±0.0008% of output/°F |
| **Temperature effect, on zero balance [–10°C to +50°C (14 to 120°F)]** | ±0.001% of RO/°C<br>±0.0008% of RO/°F |
| **Insulation resistance at 200 VDC** | >4 GΩ |
| **Material: load cell** | Stainless steel |
| **Material: bracket, yoke and tilt guard** | Yellow chromate steel, stainless steel upon request |
| **Electrical connection** | 10 m shielded four conductor cable (BLH version) |
| | 5 m shielded four conductor cable (Nobel version) |
| **Degree of protection** | IP67 |
| **APPROVALS** | |
| ATEX, IECEx, FM, CSA , NTEP and OIML certified versions are available upon request. For details contact blhnobel@vpgsensors.com. | |

* Referring to recommended loading point

## 1.5 WARRANTY POLICY

BLH Nobel warrants the products covered hereby to befree from defects in material and workmanship. BLH Nobel's liability under this guarantee shall be limited to repairing or furnishing parts to replace,
f.0.b. point of manufacture, any parts which, within three (3) years from date of shipment of said product(s) from BLH Nobel's plant, fail because ofdefective workmanship or material performed orfurnished by BLH Nobel. As a condition hereof, such defects must be brought to BLH Nobel's attention for verification when first discovered, and the material or parts alleged to be defective shall bereturned to BLH Nobel if requested. BLH Nobel shall not be liable for transportation or installation charges,

for expenses of Buyer for repairs or replacements or for any damages from delay or loss of use for other indirect or consequential damages of any kind. BLH Nobel may use improved designs of the parts to be replaced. This guarantee shall not apply to any material which shall have been repaired or altered outside of BLH Nobel's plant in any way, so as in BLH Nobel's judgment, to affect its strength, performance, or reliability, or to any defect due in any part to misuse, negligence, accident or any cause otherthan normal and reasonable use, nor shall it apply beyond their normal span of life to any materials whose normal span of life is shorter than the applicable period stated herein. In consideration of the forgoing guarantees, all implied warranties are waived by the Buyer, BLH Nobel does not guarantee quality of material or parts specified or furnished by Buyer, or by other parties designated by buyer, if not manufactured by BLH Nobel. If any modifications or repairs are madeto this equipment without prior factory approval, the above warranty can become null and void.

## 1.6 FIELD ENGINEERING

Authorized BLH Nobel Field Service Engineers are available around the world to install KIS Weigh Modules and/or train factory personnel to do so.The field service department at BLH Nobel is the mostimportant tool to assure the best performance from your application. Field service phone numbers are listed below.

# SECTION 2. Installation

## 2.1 GENERAL

Tips, techniques, and procedures for installing total weigh systems are presented in the BLH Nobel Electronic Weigh Systems Handbook (HDBK 002-1). This manual deals only with KIS WeighModules.

**IMPORTANT:** BLH Nobel strongly recommends that the user read this section completely prior to starting installation as each successive step depends upon satisfactory completion of all prior procedures.

## 2.2 KIS WEIGH MODULE INSTALLATION INSTRUCTIONS

This publication provides mechanical and electrical installation instructions for KIS Weigh Modules. KIS Weigh Modules are low profile weight transducer devices designed for simple mechanical installation. Each module contains a double cantilever type transducer and mounting hardware which typically allows installation under process and inventory vessels without stay and check rods. Four studs/bolts (customer supplied) secure the KIS module to a foundation or base, and two bolts* (BLH Nobel supplied) attach the retainer-yoke to the weigh vessel leg or gusset. Customer supplied bolts should be grade 8.8 or stronger.

### 2.2.1 Mechanical Installation

KIS installation instructions refer to specific parts of the KIS Weigh Module. Use the KIS module diagram shown in Figure 3 to identify parts and part locations.

### 2.2.2 Step by Step Installation Instructions

(1) **Positioning:** On vertical tanks, bins, or hoppers, KIS Weigh Modules should be oriented to face radially inward or outward. For horizontal vessels, modules mount parallel to the longitudinal axis in opposing directions. Orienting modules as described provides a safe, checkless installation while allowing thermal expansion and contraction of the vessel.

**(2) Mounting Base Surface Preparation:** The mounting base of the weigh module must be uniformly supported and level (Figure 10). On a structural steel support using through bolts, or a concrete pad using studs, the bolt spacing should be accurate to within 0.05 in. of the bolt pattern specified in the outline drawing dimensions (Figures 7, 8, or 9). Grade 8.8 (or stronger) studs or bolts must be used. Do not weld the weigh modules in place.

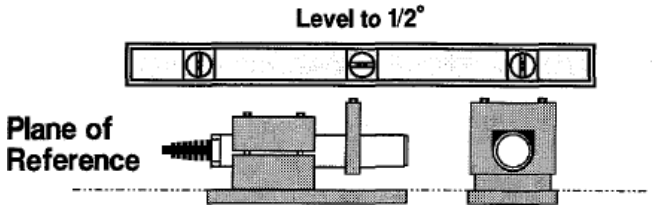



**Figure 10. KIS Module Level Considerations.**

**(3) Weigh Vessel Preparation:** Pre-drill holes in the leg or gusset of the vessel to match the retainer- yoke bolt pattern (see Figure 7, 8, or 9). Allow for normal bolt clearance and adjustment. Consult Figure 7, 8 or 9, specification 'Z' for vessel leg/gusset minimum thickness specifications. Although there is no maximum thickness specification, bolts should achieve four full threads of engagement in the retainer-yoke. Do not weld the retainer-yoke to the vessel leg or gusset.

**(4) Mechanical Installation (Figure 12):**

a). Raise the vessel and install the weigh module mounting bases in place on the prepared base mounting surfaces. Before bolting down, be sure KIS installation instructions refer to specific parts of that the base surface of the weigh module is uniformly supported and level.

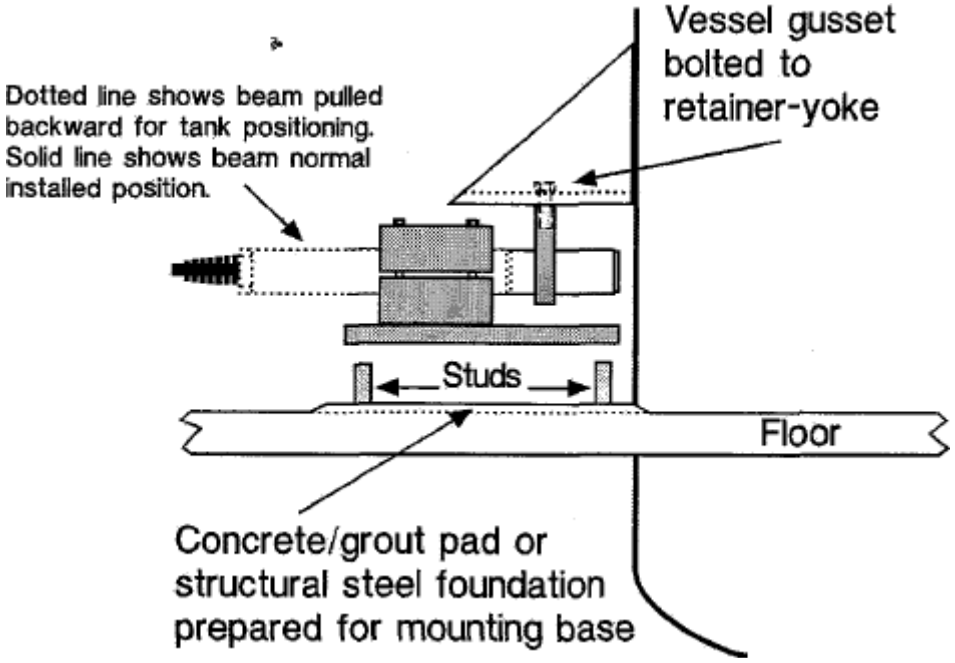



**Figure 12. KIS Installation Arrangements.**

b). Bolt retainer-yokes to the vessel legs/gussets (see Table 2-1 for torque specifications). Mounting bolts are inserted from the vessel side into the threaded retainer-yoke. When thermal pad kits are used, bolt the thermal plate to the retainer-yoke and then bolt the thermal pad/plate to the vessel leg/gusset.

c). Slide the KIS dummy beams backward into the split-block until the vessel is lowered.

d). Lower the vessel into position maintaining enough height for the KIS dummy beams to slide easily into the retainer-yokes.

e). Slide the KIS dummy beams forward into the retainer- yokes. Make certain that the distance from the split-block to the retainer-yoke coincides with specification 'P' in Figure 7, 8, or 9, on all modules.

f). Orient (rotate) the KIS Beam in the split block so that load is applied in the optimal force direction (typically in-line with the force arrow on the beam wrench flat). Tighten the integral split-block bolts to inhibit any further rotation or sliding of the KIS Beams (see Table 2-1 for torque specifications).

g). Lower the vessel fully onto the KIS dummy beams. Avoid dropping the vessel or applying an impact load to the beams. Tighten mounting bolts to the bolt manufacturer's recommended torque specifications. Following installation, do not perform arc welding on the vessel or any support structure electrically in contact with the weigh module.

(5) **Electrical Installation:** The standard ten meter KIS beam cable contains four conductors with integral shielding. The wiring color code is presented in the table below. Each conductor has tinned leads for easy connection to a BLH Nobel summing junction box or transmitter. Excess cable can be coiled up inside the summing unit or transmitter enclosure. If the cable length is cut, the rated output increases by approximately0.003% per foot at 70F. To achieve extra protection from lightning damage, BLH Nobel recommends a ground strap between the vesseland earth ground.

**Color Code:**

| | |
|---|---|
| + Excitation | Red Stripe on Green |
| - Excitation | Black |
| + Signal | Green Stripe on White |
| - Signal | White Stripe on Red |

These instructions are typical for KIS weigh system applications with weigh vessels, such as tanks, bins, or hoppers.

**NOTE:** When adding/removing conduit to KIS Beam, use a spanner wrench to keep the beam end fitting in contact with the weigh module stationary. Rotating the fitting may cause electrical damage.

**Table 2-1. Retainer & Split Block Bolt Torque Specifications**

| Capacity | 0.5 - 5 kN KIS-2/3 | 10 - 20 kN KIS-2/3 | 50 kN KIS-2/3 | 50 kN KIS-1 | 100 kN KIS-1 | 200 kN KIS-1 | 500 kN KIS-1 |
|---|---|---|---|---|---|---|---|
| **Split Block** | | | | | | | |
| Bolt Size | M6 | M8 | M10 | M10 | M12 | M16 | M20 |
| Recommended Torque | 5 ft/lb | 12 ft/lb | 18 ft/lb | 29 ft/lb | 52 ft/lb | 126 ft/lb | 172 ft/lb |
| **Yoke** | | | | | | | |
| Bolt Size | M8 | M10 | M16 | M16 | M20 | M24 | M24 |
| Torque | 12 ft/lb | 22 ft/lb | 60 ft/lb | 88 ft/lb | 172 ft/lb | 199 ft/lb | 199 ft/lb |

NOTE 1: All KIS-2/3 bolts are stainless steel
NOTE 2: All bolts are grade 8.8 or greater

### 2.2.3 Shimming for Load Distribution

With empty vessel weight resting on the modules and excitation voltage applied, measure output of each module with a DVM (digital volt meter). Each module must indicate some output representing weight of the empty vessel. Readings would normally be from 1-10 mV dc. No module should indicate less than 10% of empty vessel weight; ideally a proportionate share (vessel weight/number of modules) should be 'seen' by each module. Any module with output less than an equivalent 10% of vessel weight must be shimmed. If a gap exists between the KIS Beam and retainer-yoke, determine the gap size, raise the vessel, loosen the mounting bolts, and add shim material equal to the measured gap plus .015-.030 (Figure 2-4). Tighten the mounting bolts and lower vessel GENTLY onto the beams. Recheck the electrical output for proper distribution and continue inserting shims wherever needed. If no gap was measured as described above, but 1 or 2 modules had little or no output, insert a trial shim of .015-.030 thickness at module with lowest output and recheck all modules for proper weight distribution. Repeat shimming process until all modules have outputs within 20-30% of each other.

### 2.2.4 **Installation Examples**

Pages following figures provide examples of horizontal and vertical tank installations.

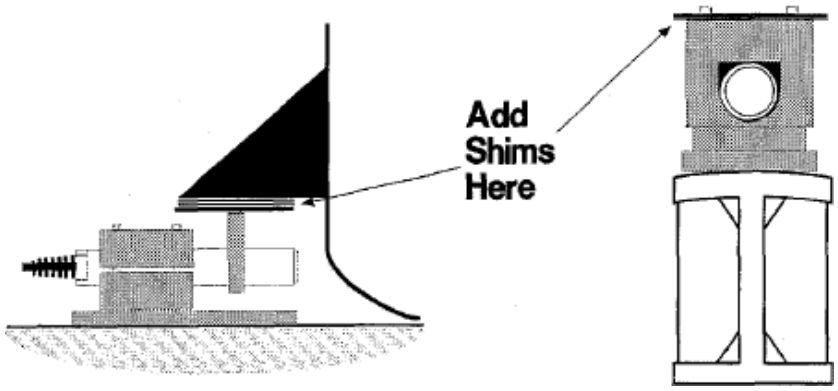



**Figure 13. KIS Weigh Module Shimming.**

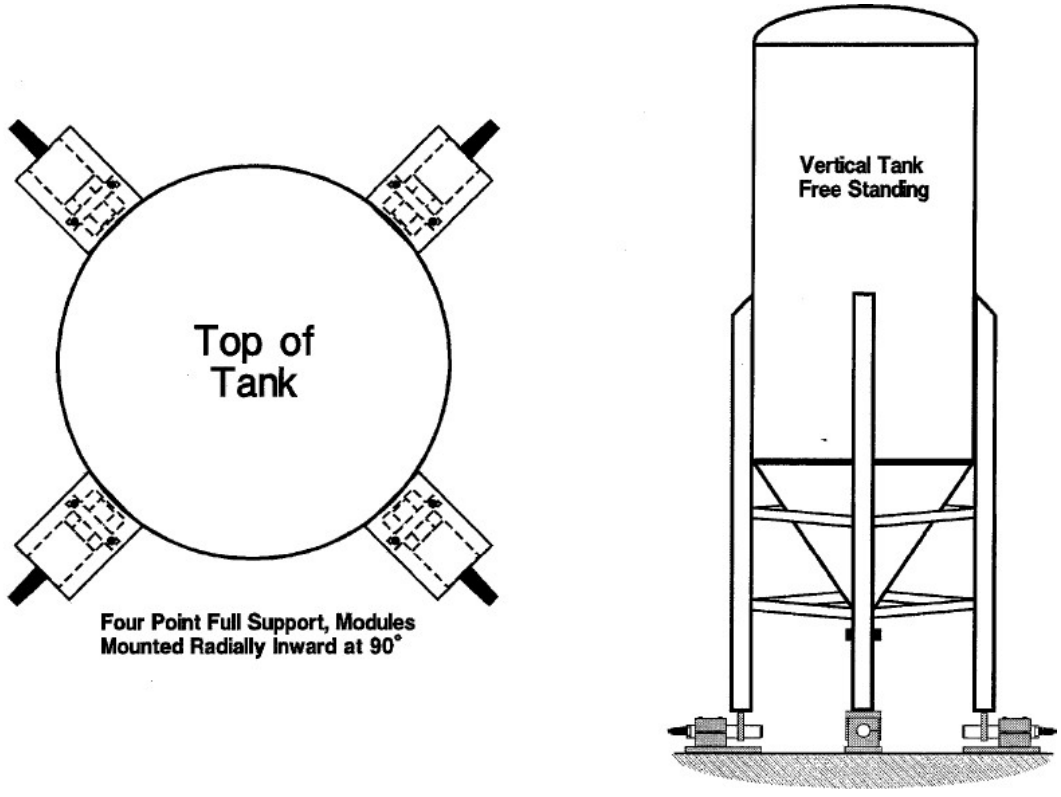



**Figure 14. Vertical Tank Installation.**

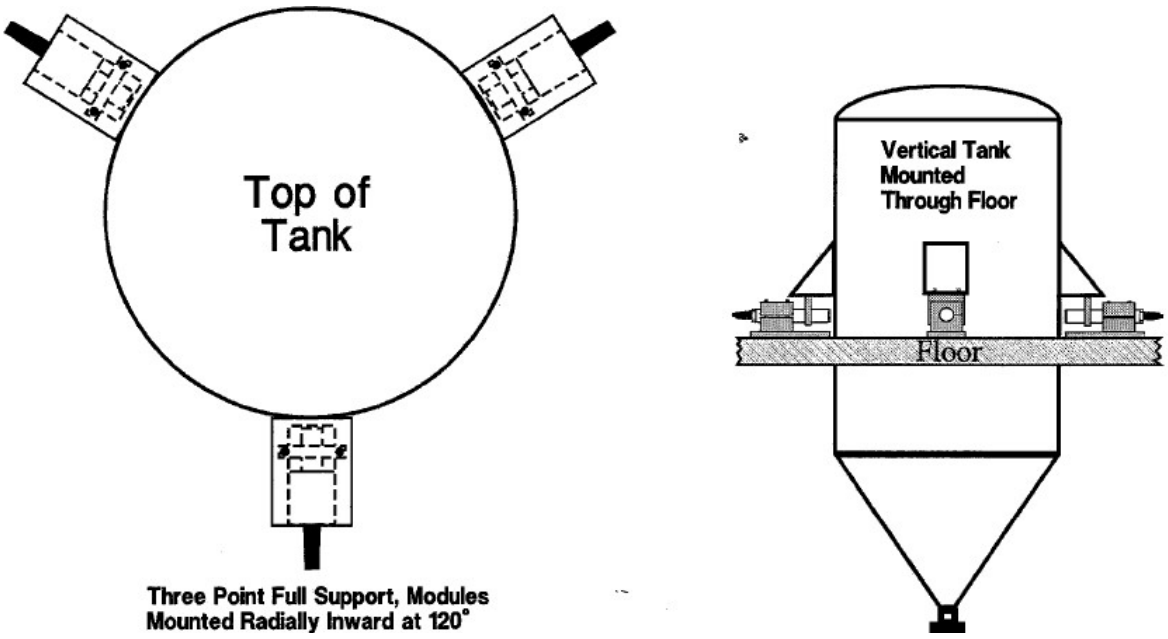



**Figure 15. High Accuracy, Full Support Configurations.**

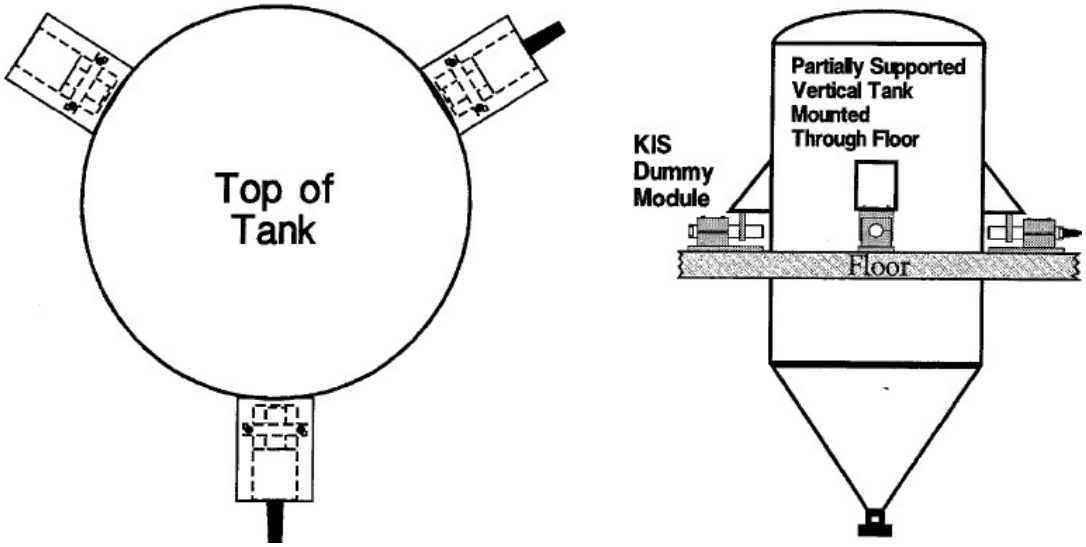



**Figure 16. Vertical Tank, Partially Supported.**

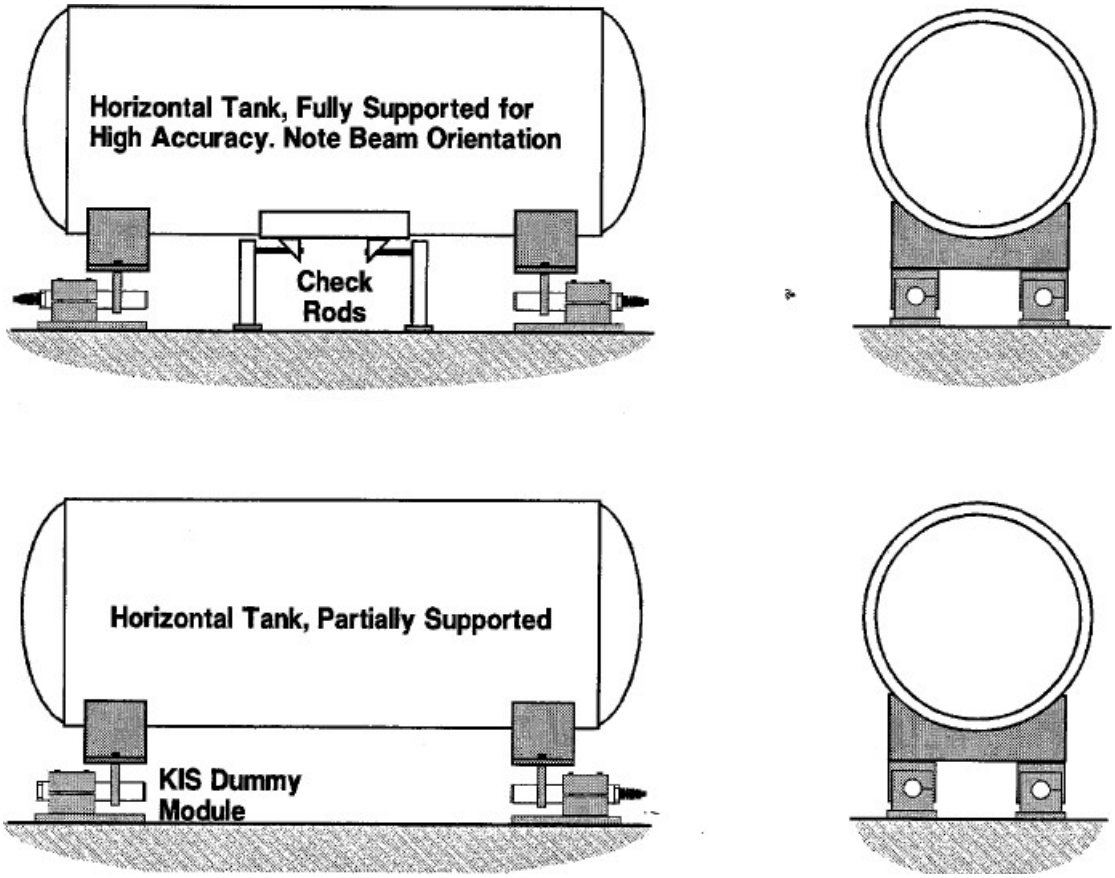



**Figure 17. Horizontal Tank Installation.**

# SECTION 3. Operation

## 3.1 TEMPERATURE CONSIDERATIONS

KIS Weigh Modules perform best when operated within their compensated temperature range of +15 to +120 degrees Fahrenheit. Maximum operating temperature range without damage is -40 to +220 degrees Fahrenheit. When ambient temperature exceeds the compensated temperature range, special precautions must be taken to ensure that actual module temperature is held within specified limits. These precautions are necessary whether or not the module is being operated. Thermal pads can be used to reduce conductive heating.

**CAUTION:** A static overload in excess of the specified overload rating may permanently affect the accuracy and performance of the module. Peak vibratory loadings should be limited to 100% of rated capacity to preclude premature fatigue failure of the module. Shock loads should be avoided or otherwise attenuated by means of resilient pads or mounts. Weigh systems designed without regard to significant shock loads may lose calibration or even damage the module(s) beyond repair.

# SECTION 4. Maintenance

## 4.1 CALIBRATION

KIS modules are carefully checked and calibrated at BLH Nobel before shipment. The accuracy of BLH Nobel instruments and standards used for calibration are traceable to the NationalInstitute of Standards Technology (NIST). A dataand calibration sheet is furnished with each module supplied by BLH Nobel. The data included on this sheet can be used as a reference where independent calibration checks are performed.

Calibration can be accurately checked by applying the rated load to the module and then comparing the output with the original data on the calibration certificate. Calibration should be checked whenever the beam is thought to have been overloaded beyond its safe overload rating (150%). Note that the module performance cannot be changed through external adjustments and any module displaying calibration error should be returned to BLH Nobel for service.

System calibration instructions are included in the digital indicator/transmitter operator's manual.

## 4.2 MAINTENANCE/ TROUBLESHOOTING

When it is necessary to determine if a KIS module circuit is operative, the vessel does not have to be lifted off the module in question. Simply read across the output leads (red & white) with a digital voltmeter with power applied to the module. The readings should be somewhat similar, normally in the 5-30 mV range. Any radical departure from these figures are usually indicative of a failure.

To determine the cause of incorrect operation of the measuring system, perform the following inspections:

a. Check instrument power and fuses.
b. Check that connections to the instrument are correct and tight.
c. Check instrument performance independently following recommended procedure.
d. Check continuity of interconnecting leads.
e. Check junction box connections (where used).
f. Check for proper excitation voltage.
g. Check output of each module for comparable output levels.
h. Insulation resistance checks: KIS Beams must be disconnected for leakage test (measured values should exceed 5000 m-ohms).
    a. Ground to a lead of the interconnecting cable.
    b. Module case to a lead of the cable.
    c. Module case to the shield of the cable.
i. Input/Output resistance check. Disconnect the module cable leads from the instrument or junction box. Measure the resistance between the input leads and between the output leads. Resistance should be as specified. OHMMETER USED SHOULD NOT APPLY MORE THAN 20 VOLTS TO THE BEAM BRIDGE.

Resistance readings other than those listed in the specifications indicate a failure within the unit. DO NOT attempt to repair; faulty modules require factory service. Contact the local sales office or BLH Nobel directly for RETURN AUTHORIZATION. Upon examination of the module at the factory, a full report on the condition with a quotation on repair cost and delivery will be submitted to the customer.

BLH NOBEL
A VPG Brand

Publication no. 35130

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