SENSiQ
Weigh Pin Structure

- **Compact measurement of masses and forces**
- **A single sensor geometry for all load ranges**
- **Maintenance-free**
- **Hermetically sealed, type of protection IP68**
- **Stainless steel for excellent corrosion protection**
- **Ideal for retrofitting existing silo systems**
- **Ex-protection (ATEX/IECEx)**

Application

The Weigh Pin Structure (WPS) is particularly suitable for use as a cost-effective level measurement device.
With minimal installation effort, a gravimetric fill-level analysing device can also be retrofitted.
Other applications include pre-assembled measuring supports or measurement shaft, as well as limit value monitoring for cranes.

Design

The WPS are made of stainless steel. The knurled press-fit surface applied around the circumference transmits the deformations of the supporting structure to the WPS, which is equipped with a strain gauge.
The measuring body and cable outlet are laser-welded, ensuring a hermetically sealed encapsulation.

Function

The WPS is press-fitted in a form-locking manner into the load-bearing structure of the construction to be weighed.
When the structure is subjected to a load, its deformation is converted into a change in electrical voltage.

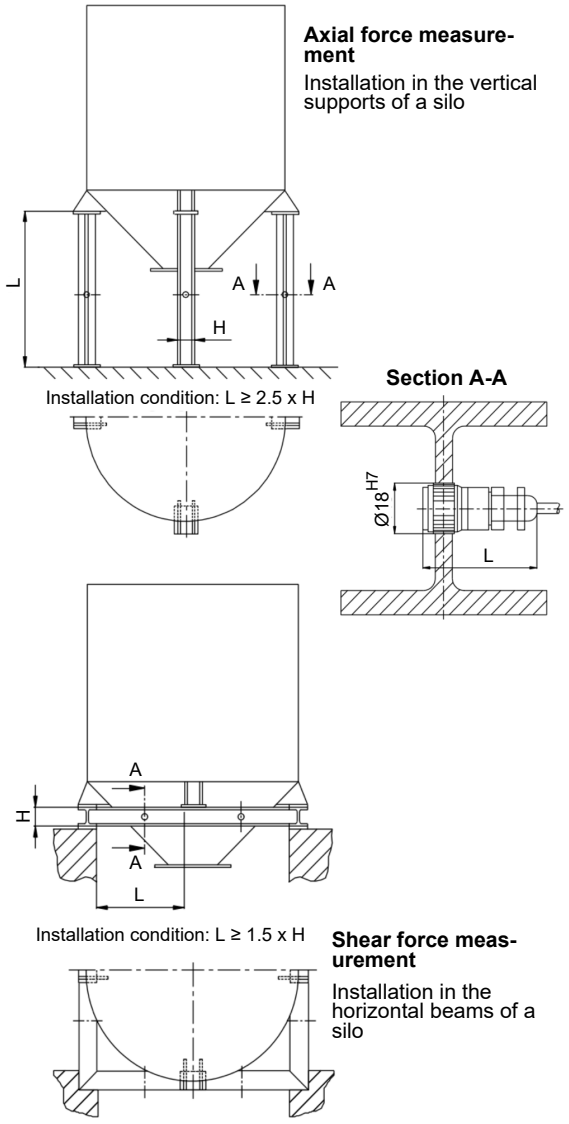
Variants

The following versions of Weigh Pin Structures are available:

- **WPS**
  WPS with a full DMS full bridge
- **WPS-OV**
  WPS with a complete full bridge and additional overvoltage protection, for example, for use in railway tracks
- WPS and WPS-OV are also available as **ATEX- and IECEx versions**.

Model	Length
WPS	46
WPS-OV	62
WPS-Ex	71

Typical installation applications for WPS applications



Axial force measurement
Installation in the vertical supports of a silo

Shear force measurement
Installation in the horizontal beams of a silo

Technical Data

Measuring principle		WPS		ATEX model
		Axial force measurement	Shear force measurement	
Required nominal stress in the measuring cross-section	σ, τ	σ ≥ 30 N/mm²	τ ≥ 15 N/mm²	σ, τ, see left
Sensitivity at the required nominal stress	Cn	≥ 0.3 mV/V		
Input resistance	R_e	380 Ω		1060 Ω
Output resistance	R_a	350 Ω		1000 Ω
Ref- supply voltage	U_{sref}	10 V		
Max. supply voltage	U_{smax}	12 V		
Nominal temperature	B_{tn}	-10 °C … +40 °C		
Operating temperature range	B_{tu}	-30 °C …+80 °C		-20 °C …+60 °C
Storage temperature range	B_{ts}	-40 °C …+85 °C		
Temperature coefficient of the zero signal	TK_o	< 1.5 µV / V / 10 K		
Material	-	Stainless steel		
Weight with cable	-	0.6 kg		
Type of protection	-	IP68 (laser welded)		
Cable - Standard	-	PVC cable Ø 5.4 x 15 m / -30 °C … +85 °C		
Cable - Ex	-	TPE cable Ø 6.5 x 15 m / -40 °C … +120 °C		
Terminal allocation	-	black: Input + 82; blue: Input - 81; red: Output + 28; white: Output - 27; black/yellow: Screen		

The system and switching accuracies depend on several factors, such as container geometry, installation location, and the type of measurement task. Typically, system accuracies of ±0.5% for shear force measurement or ±1.5% for normal force measurement can be achieved. The achievable switching accuracies for predefined fill levels (setpoints) are approximately ±0.2% (each relative to the full-scale value).
Achieving these accuracies requires qualified engineering and professional installation.

Notes on projection drafting

To determine whether an existing system is suitable for using Qlar-WPS, the occurring nominal stresses can be calculated as follows:

- Normal force measurement (required nominal stress σ ≥ 30 N/mm²):

$$\text{Nominal voltage } \sigma \text{ in [N/mm²]} = \frac{\text{(Mass of the maximum container contents in [kg])} \times 10}{\text{(Number of supports)} \times \text{(Cross-sectional area of the support in [mm²])}}$$

- Shear force measurement (required nominal stress τ ≥ 15 N/mm²):

$$\text{Nominal voltage } \tau \text{ in [N/mm²]} = \frac{\text{(Mass of the maximum container contents in [kg])} \times 10}{\text{(Number of horizontal beams)} \times 2 \times \text{(Web area of these beams in [mm²])}}$$

Order numbers

Model	Purchase Order number
WPS WPS with a DMS full bridge	D 705 336.01
WPS-Ex (intrinsically safe) **II 2G Ex ib IIC T6 Gb** WPS with a DMS full bridge for use in ATEX/IECEx	D 724 987.02
WPS-Ex (not intrinsically safe) **II 3G Ex ec IIC T6 Gc und II 2D Ex tb IIIC T85 °C Db** WPS with a DMS full bridge for use in ATEX/IECEx	D 724 987.03
WPS-OV WPS with a DMS full bridge for use in railway tracks	D 705 336.08
WPS-OV-Ex (intrinsically safe) **II 2G Ex ib IIC T6 Gb** WPS with a DMS full bridge for use in ATEX/IECEx and overvoltage protection	D 724 987.10
WPS-OV-Ex (not intrinsically safe) **II 3G Ex ec IIC T6 Gc und II 2D Ex tb IIIC T85 °C Db** WPS with a DMS full bridge for use in ATEX/IECEx and overvoltage protection	D 724 987.11
WPS, 0.1 mm oversize Spare part for replaced WPS	V030174.B01
WPS-OV for MULTIRAIL, 0.1 mm oversize Spare part for replaced WPS-OV	V030174.B03
WPS-Ex, 0.1 mm oversize (intrinsically safe) **II 2G Ex ib IIC T6 Gb** Spare part for replaced WPS-Ex	V030174.B04
WPS-Ex, 0.1 mm oversize (not intrinsically safe) **II 3G Ex ec IIC T6 Gc und II 2D Ex tb IIIC T85 °C Db** Spare part for replaced WPS-Ex	V030174.B05
Mounting tool for pressing in the WPS	D 705 046.01
Suitable current lead-through boxes, see data sheet BV-D2121	
Protection unit as mechanical protection of the WPS (not for WPS-OV)	D 705 968.01