

# Shear beam

## With thin-film technology up to 100 kN

### Models F3301 standard, F33C1 ATEX, F33S1 safety version

WIKA data sheet FO 51.42



For further approvals  
see page 4

#### Applications

- Industrial weighing technology
- Machine building and plant construction
- manufacturing automation
- Chemical and petrochemical industries
- Weighing in safety applications

#### Special features

- Measuring ranges 0 ... 2 kN to 0 ... 100 kN  
[0 ... 449.6 lbf to 0 ... 22,481 lbf]
- Corrosion-resistant stainless steel version
- Integrated amplifier
- High long-term stability, high shock and vibration resistance
- Good reproducibility, easy installation



Shear beam, model F3301

#### Description

Shear beams of models F33x1 are suitable for static and dynamic measuring requirements. They serve for determining shear forces in diverse fields of application.

The shear beams are very often used in industrial weighing technology as well as in the areas of special machinery construction and production automation. They are also used in laboratory technology and the process industry to determine torque.

The corresponding technical and regional approvals of these force transducers are, of course, available as options.

The shear beams are made of high-strength, corrosion resistant 1.4542 stainless steel, the properties of which are particularly well-suited to the areas of application of the shear beams.

As output signals, the common active current and voltage outputs are available (4 ... 20 mA, 0 ... 10 V). Redundant output signals and CANopen® protocols are possible.

The shear beams can be integrated into a certified WIKA overload protection with model ELMS1 (DIN EN ISO 13849-1 with PL d/Cat. 3).

## Specifications

Basic informations	Model F3301 and F33C1 with UL				Model F33S1		
<b>Standard</b>	In accordance with guideline VDI/VDE/DKD 2638						
<b>Rated force <math>F_{nom}</math> kN</b>	2	5	10	20	30	50	100
<b>Rated force <math>F_{nom}</math> lbf</b>	449.6	1,124	2,248	4,496	6,744	11,240	22,481
<b>Relative linearity error <math>d_{lin}^{1)}</math></b>	$\pm 1 \% F_{nom}$						
<b>Relative reversibility error <math>v</math></b>	$< 0.1 \% F_{nom}$						
<b>Relative creep</b>	$0.05 \% F_{nom}$						
<b>Temperature effect on</b>							
the characteristic value $TK_c$	$0.2 \% F_{nom} / 10 K$						
the zero signal $TK_0$	$0.2 \% F_{nom} / 10 K$						
<b>Force limit <math>F_L</math></b>	$150 \% F_{nom}$						
<b>Breaking force <math>F_B</math></b>							
2 kN / 20 kN ... 100 kN [449.6 lbf / 4,496 lbf ... 22,481 lbf]	$300 \% F_{nom}$						
10 kN [2,248 lbf]	$270 \% F_{nom}$						
<b>Permissible vibration loading <math>F_{rb}</math></b>	$\pm 50 \% F_{nom}$						
<b>Rated displacement (typical) <math>s_{nom}</math></b>							
$< 10 kN$ [2,248 lbf]	$< 0.02 mm$ [ $< 0.00079 in$ ]						
$< 100 kN$ [22,481 lbf]	$< 0.2 mm$ [ $< 0.0079 in$ ]						
<b>Material of the measuring body</b>	<ul style="list-style-type: none"> <li>■ Corrosion-resistant stainless steel, 1.4542, ultrasound-tested 3.1 material</li> <li>■ Version with 3.2 material available</li> </ul>						
<b>Rated temperature <math>B_{T, nom}</math></b>	$-20 \dots +80 \text{ }^\circ\text{C}$ [ $-4 \dots +176 \text{ }^\circ\text{F}$ ]						
<b>Operating temperature <math>B_{T, G}</math></b>	<ul style="list-style-type: none"> <li>■ <math>-30 \dots +80 \text{ }^\circ\text{C}</math> [<math>-22 \dots +176 \text{ }^\circ\text{F}</math>]</li> <li>■ <math>-40 \dots +80 \text{ }^\circ\text{C}</math> [<math>-40 \dots +176 \text{ }^\circ\text{F}</math>]</li> </ul>				$-30 \dots +80 \text{ }^\circ\text{C}$ [ $-22 \dots +176 \text{ }^\circ\text{F}$ ]		
<b>Storage temperature <math>B_{T, S}</math></b>	$-40 \dots +85 \text{ }^\circ\text{C}$ [ $-40 \dots +185 \text{ }^\circ\text{F}$ ]						
<b>Electrical connection</b>	<ul style="list-style-type: none"> <li>■ Circular connector M12 x 1, 4- or 5-pin</li> <li>■ CANopen<sup>®</sup>, Circular connector M12 x 1, 5-pin</li> <li>■ MIL-connector</li> </ul>				<ul style="list-style-type: none"> <li>■ 2-connector version M12 x 1, 4-pin</li> <li>■ MIL-connector</li> </ul>		
<b>Output signal (rated characteristic value) <math>C_{nom}</math></b>	<ul style="list-style-type: none"> <li>■ 4 ... 20 mA, 2-wire</li> <li>■ 4 ... 20 mA, 3-wire</li> <li>■ 2 x 4 ... 20 mA redundant</li> <li>■ DC 0 ... 10 V, 3-wire</li> <li>■ 2 x DC 0 ... 10 V redundant</li> <li>■ CANopen<sup>®</sup></li> </ul> <p>Protocol in accordance with CiA<sup>®</sup> 301, device profile CiA<sup>®</sup> 404, communication services LSS (CiA<sup>®</sup> 305), configuration of the instrument address and baud rate Sync/Async, Node/Lifeguarding, heartbeat; zero point and span adjustable by <math>\pm 10 \%</math> via entries in the object directory <sup>2)</sup></p>				<p>Redundant, opposing 4 ... 20 mA / 20 ... 4 mA</p> <p>Version in accordance with requirements for functional safety per machinery directive 2006/42/EC as WIKA overload protection with model ELMS1 (DIN EN ISO 13849-1 with PL d/cat. 3).</p>		
<b>Current/power consumption</b>	<ul style="list-style-type: none"> <li>■ Current output 4 ... 20 mA, 2-wire: Signal current</li> <li>■ Current output 4 ... 20 mA, 3-wire: <math>&lt; 8 mA</math></li> <li>■ Voltage output: <math>&lt; 8 mA</math></li> <li>■ CANopen<sup>®</sup>: <math>&lt; 1 W</math></li> </ul>				Current output 4 ... 20 mA: Signal current		
<b>Supply voltage <math>U_B</math></b>	<ul style="list-style-type: none"> <li>■ DC 9 ... 36 V for current output</li> <li>■ DC 13 ... 36 V for voltage output</li> <li>■ DC 9 ... 36 V for CANopen<sup>®</sup></li> </ul>				DC 10 ... 30 V for current output		
<b>Load</b>	<ul style="list-style-type: none"> <li>■ <math>\leq (U_B - 10 V) / 0.024 A</math> for current output</li> <li>■ <math>&gt; 10 k\Omega</math> for voltage output</li> </ul>				<ul style="list-style-type: none"> <li>■ <math>\leq (U_B - 10 V) / 0.020 A</math> (channel 1) for current output</li> <li>■ <math>\leq (U_B - 7 V) / 0.020 A</math> (channel 2) for current output</li> </ul>		
<b>Response time</b>	$\leq 2 ms$ (within 10 ... 90 % $F_{nom}$ ) <sup>3)</sup>						
<b>Ingress protection (per IEC/EN 60529)</b>							
Unplugged state	IP66, IP67				IP67		
Plugged-in state	IP68, IP69, IP69K						

Basic informations	Model F3301 and F33C1 with UL	Model F33S1
Electrical protection	Reverse polarity, overvoltage and short-circuit protection	
Vibration resistance	20 g, 100 h, 50 ... 150 Hz per DIN EN 60068-2-6	
Shock resistance	DIN EN 60068-2-27	
Immunity	<ul style="list-style-type: none"> <li>■ In accordance with DIN EN 61326-1/DIN EN 61326-2-3</li> <li>■ EMC-strengthened versions</li> </ul>	

- 1) Relative linearity error is specified in accordance with Directive VDI/VDE/DKD 2638 chapter 3.2.6.  
2) Protocol in accordance with CiA® 301, device profile CiA® 404, communication service LSS (CiA® 305).  
CANopen® and CiA® are registered community trademarks of CAN® in Automation e. V.  
3) Further response times possible on request.

Basic informations	Model F33C1 ATEX/IECEX EX ib 1)	Model F3301 Signal jump
Standard	In accordance with guideline VDI/VDE/DKD 2638	
Rated force $F_{nom}$ kN	2      5      10      20	30      50      100
Rated force $F_{nom}$ lbf	449.6      1,124      2,248      4,496	6,744      11,240      22,481
Relative linearity error $d_{lin}$ 2)	$\pm 1 \% F_{nom}$	
Relative reversibility error $v$	$< 0.1 \% F_{nom}$	
Relative creep	$0.05 \% F_{nom}$	
Temperature effect on		
the characteristic value $TK_C$	$0.2 \% F_{nom} / 10 K$	
the zero signal $TK_0$	$0.2 \% F_{nom} / 10 K$	
Force limit $F_L$	$150 \% F_{nom}$	
Breaking force $F_B$		
2 kN / 20 kN ... 100 kN [449.6 lbf / 4,496 lbf ... 22,481 lbf]	$300 \% F_{nom}$	
10 kN [2,248 lbf]	$270 \% F_{nom}$	
Permissible vibration loading $F_{rb}$	$\pm 50 \% F_{nom}$	
Rated displacement (typical) $s_{nom}$		
< 10 kN [2,248 lbf]	< 0.02 mm [< 0.00079 in]	
< 100 kN [22,481 lbf]	< 0.2 mm [< 0.0079 in]	
Material of the measuring body	<ul style="list-style-type: none"> <li>■ Corrosion-resistant stainless steel, 1.4542, ultrasound-tested 3.1 material</li> <li>■ Version with 3.2 material available</li> </ul>	
Rated temperature $B_{T, nom}$	-20 ... +80 °C [-4 ... +176 °F]	
Operating temperature $B_{T, G}$	Ex II 2G Ex ib IIC T4 Gb -25 °C < Tamb < +85 °C Ex II 2G Ex ib IIC T3 Gb -25 °C < Tamb < +100 °C Ex I M2 Ex ib I Mb -25 °C < Tamb < +85 °C Ex II 2G Ex ib IIC T4 Gb -40 °C < Tamb < +85 °C Ex I M2 Ex ib I Mb	-30 ... +80 °C [-22 ... +176 °F]
Storage temperature $B_{T, S}$	-40 ... +85 °C [-40 ... +185 °F]	
Electrical connection	<ul style="list-style-type: none"> <li>■ Circular connector M12 x 1, 4-pin</li> <li>■ MIL-connector</li> <li>■ Cable gland</li> </ul>	
Output signal (rated characteristic value) $C_{nom}$	4 ... 20 mA, 2-wire	<ul style="list-style-type: none"> <li>■ 4 ... 16 mA, 2-wire 3)</li> <li>■ DC 2 ... 8 V, 3-wire 3)</li> </ul>
Current/power consumption	Current output 4 ... 20 mA 2-wire: Signal current	<ul style="list-style-type: none"> <li>■ Current output 4 ... 20 mA 2-wire: signal current</li> <li>■ Current output 4 ... 20 mA 3-wire: &lt; 8 mA</li> <li>■ Voltage output: &lt; 8 mA</li> </ul>
Supply voltage $U_B$	DC 10 ... 30 V for current output	<ul style="list-style-type: none"> <li>■ DC 10 ... 30 V for current output</li> <li>■ DC 14 ... 30 V for voltage output</li> </ul>

Basic informations	Model F33C1 ATEX/IECEX EX ib <sup>1)</sup>	Model F3301 Signal jump
<b>Load</b>	<ul style="list-style-type: none"> <li>■ <math>\leq (UB - 10 V) / 0.024 A</math> for current output</li> <li>■ <math>&gt; 10 k\Omega</math> for voltage output</li> </ul>	
<b>Response time</b>	$\leq 2 ms$ (within 10 ... 90 % $F_{nom}$ ) <sup>4)</sup>	
<b>Ingress protection (per IEC/EN 60529)</b>	IP67	
<b>Electrical protection</b>	Reverse polarity, overvoltage and short-circuit protection	
<b>Vibration resistance</b>	20 g, 100 h, 50 ... 150 Hz per DIN EN 60068-2-6	
<b>Shock resistance</b>	DIN EN 60068-2-27	
<b>Immunity</b>	<ul style="list-style-type: none"> <li>■ In accordance with DIN EN 61326-1/DIN EN 61326-2-3</li> <li>■ EMC-strengthened versions</li> </ul>	


1) The shear beam with ignition protection type "ib" should only be powered using galvanically isolated repeater power supplies. Suitable repeater power supplies can be offered as an option, e.g. order number: 14255084.

2) Relative linearity error is specified in accordance with Directive VDI/VDE/DKD 2638 chapter 3.2.6






3) Further signal jumps are realisable on request.

4) Further response times possible on request.

## Approvals

Logo	Description	Region
	<b>EU declaration of conformity</b> EMC directive	European Union

## Optional approvals

Logo	Description	Country
	<b>EU declaration of conformity</b> <b>ATEX directive <sup>1)</sup></b> per EN 60079-0:2012 and EN 60079-11:2012 (Ex ib) Hazardous areas Ex ib Ex II 2G Ex ib IIC T4 Gb $-25\text{ }^{\circ}\text{C} < T_{amb} < +85\text{ }^{\circ}\text{C}$ Ex II 2G Ex ib IIC T3 Gb $-25\text{ }^{\circ}\text{C} < T_{amb} < +100\text{ }^{\circ}\text{C}$ Ex I M2 Ex ib I Mb <sup>3)</sup> $-25\text{ }^{\circ}\text{C} < T_{amb} < +85\text{ }^{\circ}\text{C}$ Ex II 2G Ex ib IIC T4 Gb $-40\text{ }^{\circ}\text{C} < T_{amb} < +85\text{ }^{\circ}\text{C}$ I M2 Ex ib I Mb <sup>3)</sup>	European Union
	<b>IECEX <sup>1)</sup></b> per IEC 60079-0:2011 (Ed. 6) and IEC 60079-11:2011 (Ed. 6) (Ex ib) Hazardous areas Ex ib Ex ib IIC T4/T3 Gb $-25\text{ }^{\circ}\text{C} < T_{amb} < +85\text{ }^{\circ}\text{C}$ Ex ib IIC T4 Gb $-25\text{ }^{\circ}\text{C} < T_{amb} < +100\text{ }^{\circ}\text{C}$ Ex ib I Mb <sup>3)</sup> $-25\text{ }^{\circ}\text{C} < T_{amb} < +85\text{ }^{\circ}\text{C}$ Ex ib IIC T4 Gb $-40\text{ }^{\circ}\text{C} < T_{amb} < +85\text{ }^{\circ}\text{C}$	International
	<b>UL <sup>2)</sup></b> per UL 61010-1 and CSA C22.2 NO. 61010-1 Component approval	USA and Canada
	<b>EAC</b> EMC directive	Eurasian Economic Community
	<b>EAC Ex <sup>1)</sup></b> Hazardous areas Ex ib Ex ib IIC T3 Gb $-40\text{ }^{\circ}\text{C} < T_{amb} < +100\text{ }^{\circ}\text{C}$ Ex ib IIC T3 Gb $-45\text{ }^{\circ}\text{C} < T_{amb} < +100\text{ }^{\circ}\text{C}$ Ex ib IIC T4 Gb $-40\text{ }^{\circ}\text{C} < T_{amb} < +85\text{ }^{\circ}\text{C}$ Ex ib IIC T4 Gb $-45\text{ }^{\circ}\text{C} < T_{amb} < +100\text{ }^{\circ}\text{C}$	Eurasian Economic Community

1) Only with models F33C1. ATEX equipment is labeled and certified under the brand tecsis.

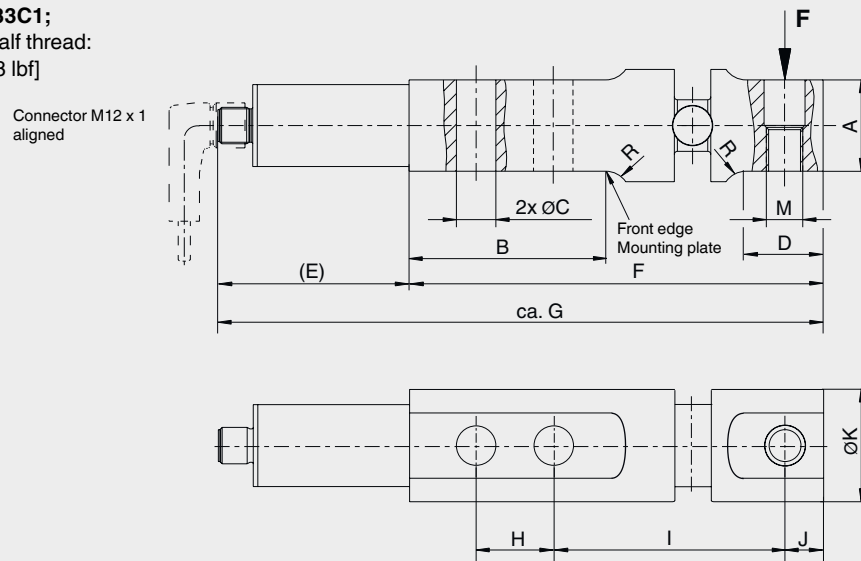
2) Only models F3301 and F33C1 with UL approval.

3) Only possible with cable gland.

→ For approvals and certificates, see website.

## Dimensions in mm [in]

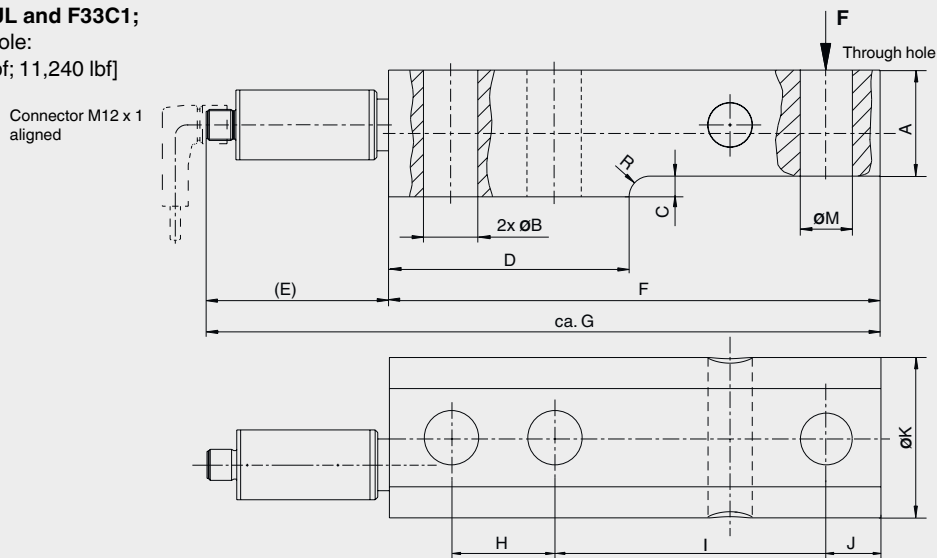
**F3301, F33C1 with UL and F33C1;**  
 Variant with through hole with half thread:  
 2 kN ... 20 kN [449.5 lbf ... 2,248 lbf]



Rated force in kN	Dimensions in mm												
	A <sub>-0.1</sub>	B	Ø C	D	E	F	approx. G	H	I	J	Ø K	M	R
<b>2; 5; 10; 20</b>	30.1	64.8	13	25.4	63	136.4	199	25.4	76.2	12.7	37	M12	8

Rated force in lbf	Dimensions in Inch												
	A <sub>-0.04</sub>	B	Ø C	D	E	F	approx. G	H	I	J	Ø K	M	R
<b>449.6; 1,124; 2,248; 4,496</b>	1.185	2.55	0.51	1	2.48	5.37	7.83	1	3	0.5	1.456	M12	0.315

**F3301, F33C1 with UL and F33C1;**  
 Variant with through hole:  
 30 kN; 50 kN [6,744 lbf; 11,240 lbf]

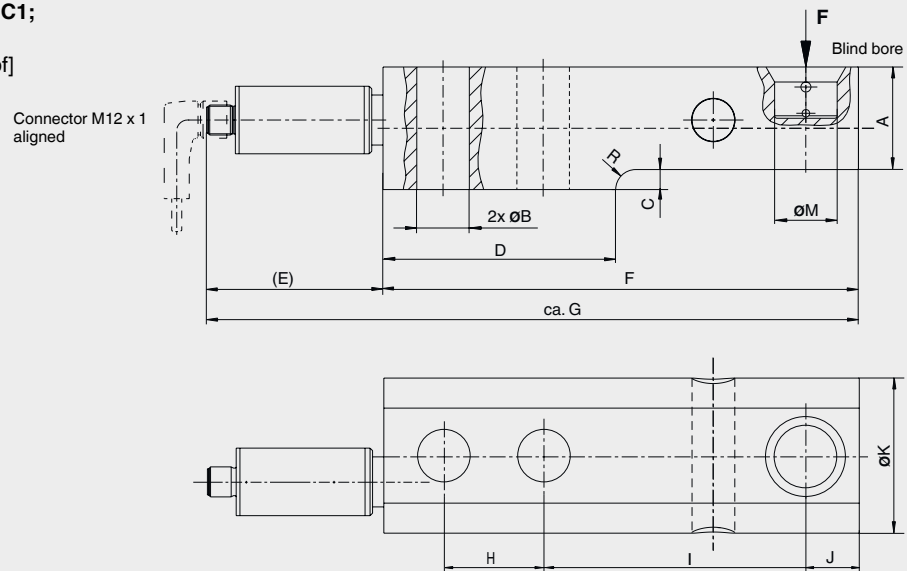


Rated force in kN	Dimensions in mm												
	A	Ø B	C	D	(E)	F	approx. G	H	I	J	Ø K	Ø M	R
<b>30; 50</b>	41	21	8	93	70.5	190	261	40	105	21	62	20	8

Rated force in lbf	Dimensions in Inch												
	A	Ø B	C	D	(E)	F	approx. G	H	I	J	Ø K	Ø M	R
<b>6,744; 11,240</b>	1.614	0.826	0.315	3.66	2.77	7.48	10.27	1.57	4.13	0.826	2.44	0.79	0.315

**Dimensions:** The customer-specific drawing of the respective order number has priority.

**F3301, F33C1 with UL and F33C1;**  
 Variant with blind bore:  
 30 kN; 50 kN [6,744 lbf; 11,240 lbf]

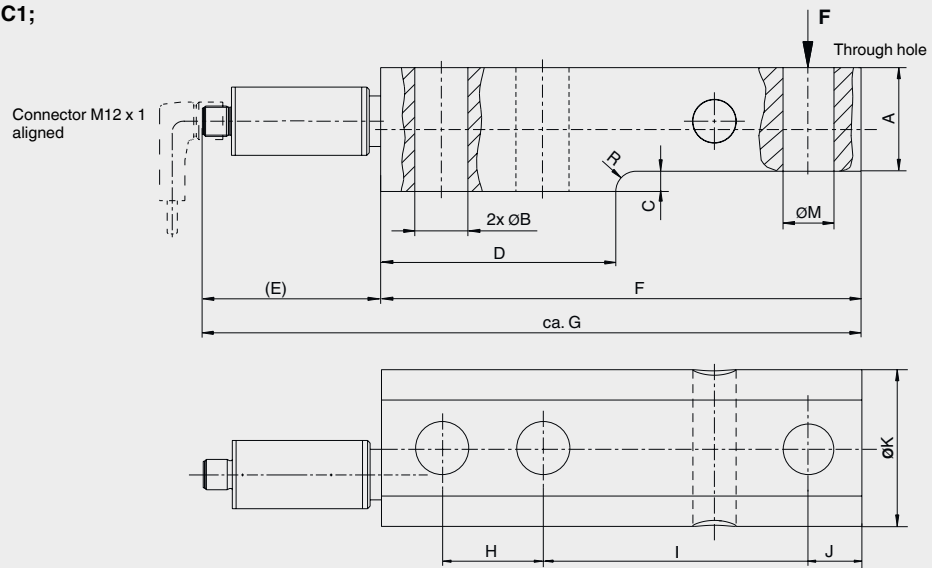


Rated force in kN	Dimensions in mm												
	A	Ø B	C	D	(E)	F	approx. G	H	I	J	Ø K	Ø M	R
<b>30; 50</b>	60.5	27	12.5	120	(70.5)	245	316	50	135	30	86	20	8

Rated force in lbf	Dimensions in Inch												
	A	Ø B	C	D	(E)	G	approx. H	H	I	J	Ø K	Ø M	R
<b>6,744; 11,240</b>	2.38	1.06	0.492	4.72	2.77	9.65	12.44	1.97	5.314	1.18	3.385	0.79	0.315

**F3301, F33C1 with UL and F33C1;**  
 Variant with through hole:  
 100 kN [22,481 lbf]



Rated force in kN	Dimensions in mm												
	A	Ø B	C	D	(E)	F	approx. G	H	I	J	Ø K	Ø M±0.1	R
<b>100</b>	41	21	8	93	70.5	190	261	40	105	21	62	25	8

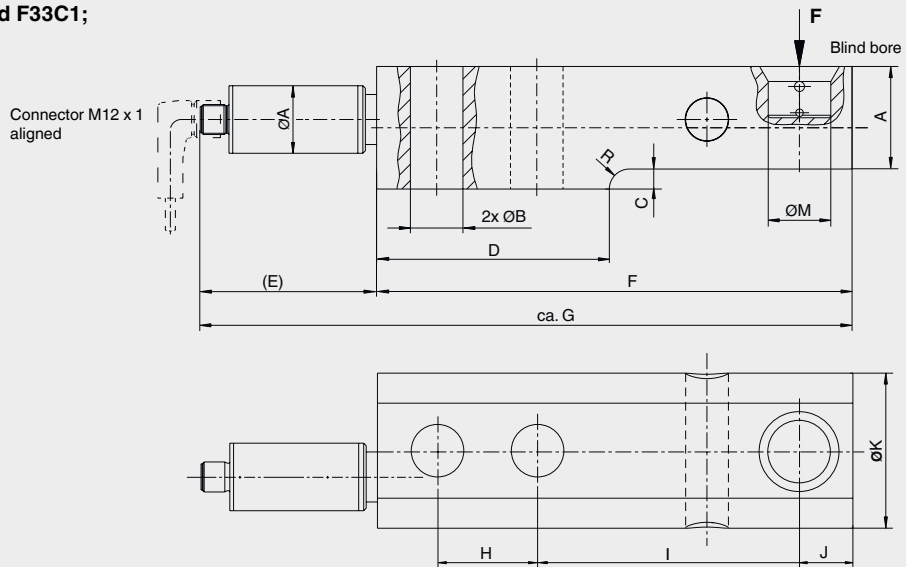
Rated force in lbf	Dimensions in Inch												
	A	Ø B	C	D	(E)	F	approx. G	H	I	J	Ø K	Ø M±0.04	R
<b>22,481</b>	1.614	0.826	0.315	3.66	2.77	7.48	10.27	1.57	4.13	0.826	2.44	0.79	0.315

**Dimensions:** The customer-specific drawing of the respective order number has priority.

**F3301, F33C1 with UL and F33C1;**

Variant with blind bore:

100 kN [22,481 lbf]



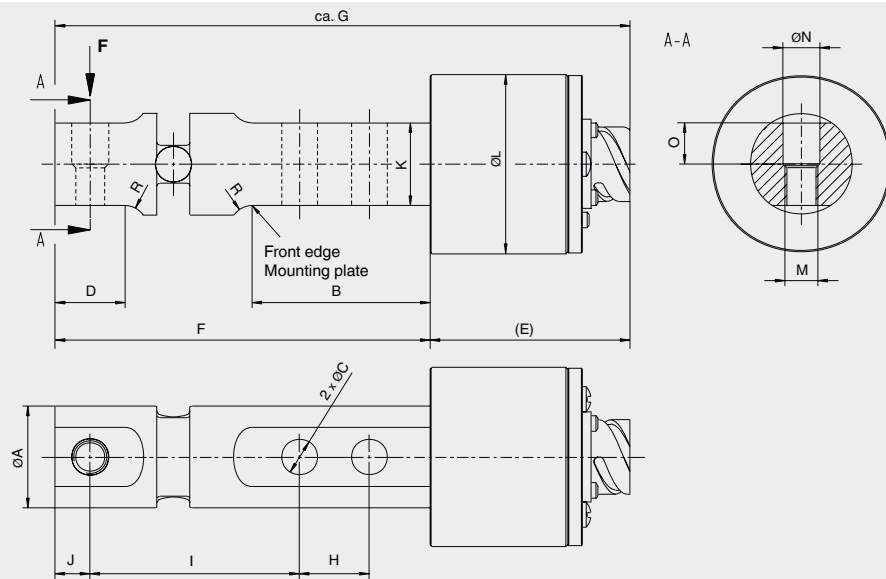
Rated force in kN	Dimensions in mm												
	A	Ø B	C	D	(E)	F	approx. G	H	I	J	Ø K	Ø M±0.1	R
100	60.5	27	12.5	120	(70.5)	245	316	50	135	30	86	30	8

Rated force in lbf	Dimensions in Inch												
	A	Ø B	C	D	(E)	F	approx. G	H	I	J	Ø K	Ø M±0.04	R
22,481	2.38	1.06	0.492	4.72	2.77	9.65	12.44	1.97	5.314	1.18	3.385	1.18	0.315

**F33S1;**

Safety variant



Dimensions in mm																
Ø A	B	Ø C	D	(E)	F	approx. G	H	I	J	K	Ø L	M	Ø N	O	R	
37	64.8	13	25.4	72.7	136.4	209	25.4	76.2	12.7	30.1	65	M12	13.5	15	8	

Dimensions in Inch																
Ø A	B	Ø C	D	(E)	F	approx. G	H	I	J	K	Ø L	M	Ø N	O	R	
1.456	2.55	0.512	1	2.86	5.37	8.23	1	3	0.5	1.185	2.56	M12	0.53	0.59	0.315	

**Dimensions:** The customer-specific drawing of the respective order number has priority.

## Mounting screws tightening torque in Nm






Rated force in kN	Mounting screws	Standard	Tightening torque [Nm]
2; 10	M12	8.8	90
20	M12	10.9	120
30; 50	M20	8.8	400
100	M24	8.8	700

Rated force in lbf	Mounting screws	Standard	Tightening torque [Nm]
449.6; 2,248	M12	8.8	90
4,496	M12	10.9	120
6,744; 11,240	M20	8.8	400
22,481	M24	8.8	700

## Pin assignment, analogue output

### Abbreviations, definitions

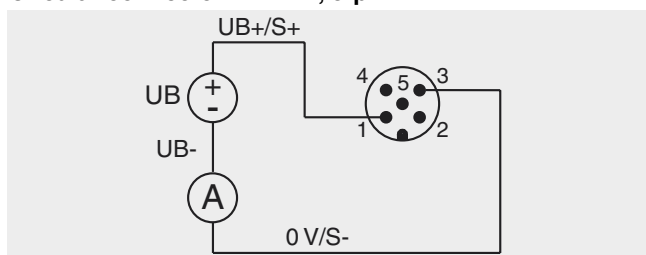
Signal	Description
UB	Voltage source for the sensor
UB+	Sensor voltage supply (+)
UB-	Sensor voltage supply (-)
S+	Output signal (+)
S-	Output signal (-)
0 V	0 V potential


Signal	Description
	Ammeter
	Voltmeter
	Voltage source
	Switch
	Shield (ground)

### For models F3301 and F33C1 with UL approval

#### Output 4 ... 20 mA, 2-wire

##### Circular connector M12 x 1, 5-pin

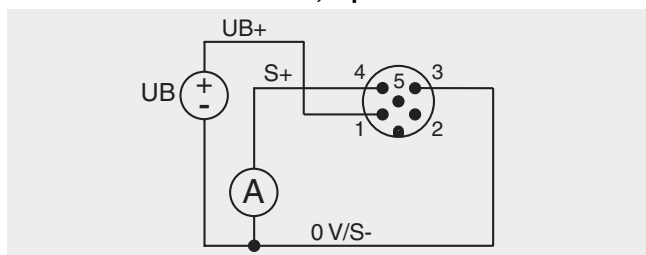



Signal	4 ... 20 mA, 2-wire	Cable colour
UB+/S+	1	Brown
0 V/S-	3	Black
Shield 	Case / Connector	--

Cable colours are only valid when using the standard WIKA cable, e.g. order number: 14259454

#### Output 4 ... 20 mA, 3-wire

##### Circular connector M12 x 1, 5-pin

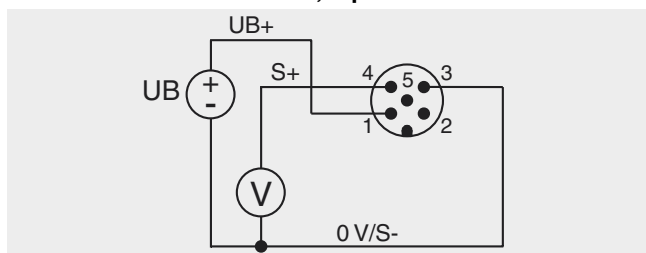



Signal	4 ... 20 mA, 3-wire	Cable colour
UB+	1	Brown
S+	4	Black
0 V/S-	3	Blue
Shield 	Case / Connector	--

Cable colours are only valid when using the standard WIKA cable, e.g. order number: 14259454

#### Output 0 ... 10 V, 3-wire

##### Circular connector M12 x 1, 5-pin



Signal	0 ... 10 V, 3-wire	Cable colour
UB+	1	Brown
S+	4	Black
0 V/S-	3	Blue
Shield 	Case / Connector	--

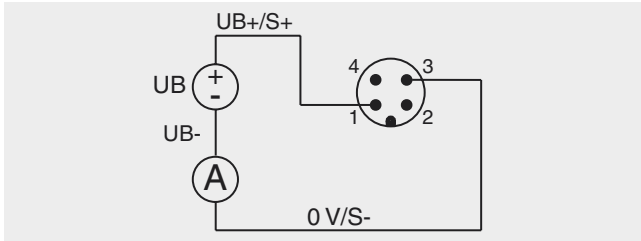
Cable colours are only valid when using the standard WIKA cable, e.g. order number: 14259454



## For model F33C1 for ATEX

Output 4 ... 20 mA, 2-wire

Circular connector M12 x 1, 4-pin



Signal	ATEX/IECEX Ex ib 4 ... 20 mA, 2-wire	Cable colour
UB+/S+	1	Brown
0 V/S-	3	Blue
Shield $\oplus$	Case / Connector	--

Cable colours are only valid when using the standard WIKA cable, e.g. order number: 14259454

## Pin assignment with signal jump

Abbreviations, definitions

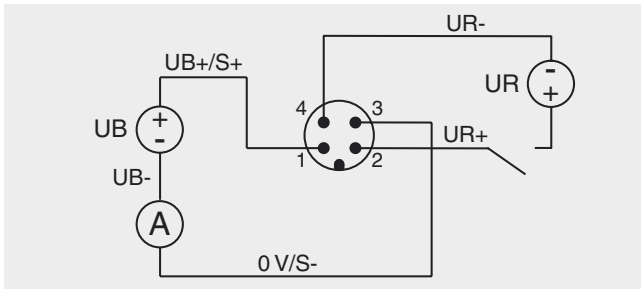
Signal	Description
UB	Voltage source for the sensor
UB+	Sensor voltage supply (+)
UB-	Sensor voltage supply (-)
UR	Voltage source for the signal jump
UR+	Signal jump supply voltage (+)
UR-	Signal jump supply voltage (-)
S+	Output signal (+)
S-	Output signal (-)
0 V	0 V potential

Signal	Description
$\text{A}$	Ammeter
$\text{V}$	Voltmeter
$\oplus$	Voltage source
$\sim$	Switch
$\oplus$	Shield (ground)

## For model F3301 with signal jump

Output 4 ... 20 mA, 2-wire

Circular connector M12 x 1, 4-pin

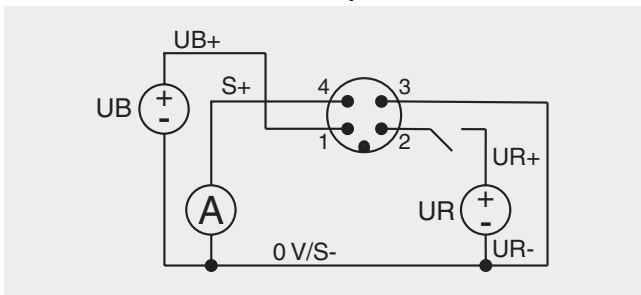


Signal	4 ... 20 mA, 2-wire	Cable colour
UB+/S+	1	Brown
0 V/S-	3	Blue
UR+	2	White
UR-	4	Black
Shield $\oplus$	Case / Connector	--

Cable colours are only valid when using the standard WIKA cable, e.g. order number: 14259454

Output 4 ... 20 mA, 3-wire

Circular connector M12 x 1, 4-pin



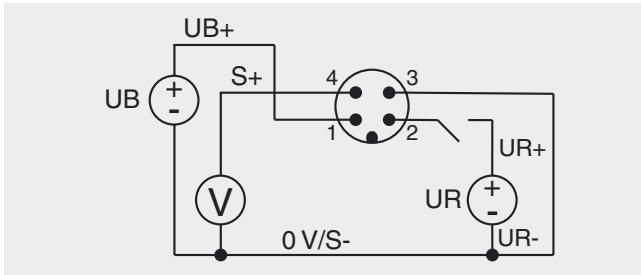
Signal	4 ... 20 mA, 3-wire	Cable colour
UB+	1	Brown
0 V/S-	3	Blue
UR+	2	White
UR-	3	Blue
S+	4	Black
Shield $\oplus$	Case / Connector	--

Cable colours are only valid when using the standard WIKA cable, e.g. order number: 14259454

## For model F3301 with signal jump

### Output 0 ... 10 V, 3-wire

Circular connector M12 x 1, 4-pin



Signal	0 ... 10 V, 3-wire	Cable colour
UB+	1	Brown
0 V/S-	3	Blue
UR+	2	White
UR-	3	Blue
S+	4	Black
Shield (⊕)	Case / Connector	--

Cable colours are only valid when using the standard WIKA cable, e.g. order number: 14259454

## Redundant pin assignment with 1 x connector

### Abbreviations, definitions

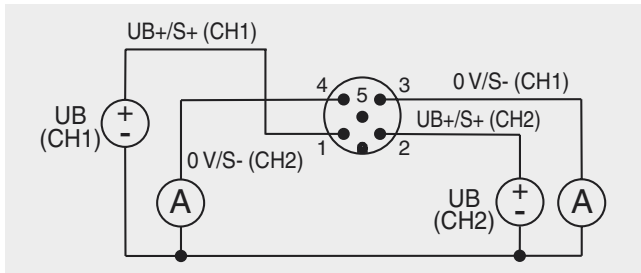
Signal	Description
UB	Voltage source for the sensor
UB+	Sensor voltage supply (+)
UB-	Sensor voltage supply (-)
S+	Output signal (+)
S-	Output signal (-)
CH1	Channel 1
CH2	Channel 2
CH1+2	Channel 1 and channel 2
0 V	0 V potential

Signal	Description
(A)	Ammeter
(V)	Voltmeter
(+/-)	Voltage source
⌵	Switch
(⊕)	Shield (ground)

## For models F3301 and F33C1 with UL approval

### Output 4 ... 20 mA, 2-wire

Circular connector M12 x 1, 5-pin

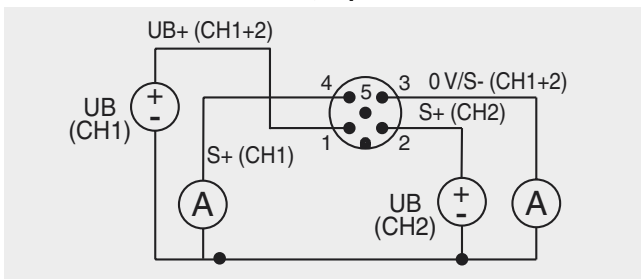


Signal	4 ... 20 mA, 2-wire	Cable colour
UB+/S+ (CH1)	1	Brown
UB+/S+ (CH2)	2	White
0 V/S- (CH1)	3	Blue
0 V/S- (CH2)	4	Black
Shield (⊕)	Case / Connector	--

Cable colours are only valid when using the standard WIKA cable, e.g. order number: 14259454

### Output 4 ... 20 mA, 3-wire

Circular connector M12 x 1, 5-pin

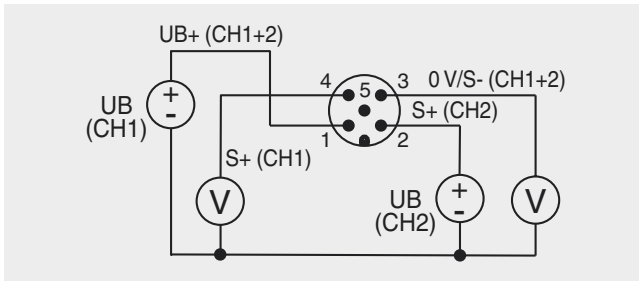


Signal	4 ... 20 mA, 3-wire	Cable colour
UB+ (CH1+2)	1	Brown
0 V/S- (CH1+2)	3	Blue
S+ (CH1)	4	Black
S+ (CH2)	2	White
Shield (⊕)	Case / Connector	--

Cable colours are only valid when using the standard WIKA cable, e.g. order number: 14259454

## For models F3301 and F33C1 with UL approval

Output 0 ... 10 V, 3-wire redundant with 1 x connector  
Circular connector M12 x 1, 5-pin



Signal	0 ... 10 V, 3-wire	Cable colour
UB+ (CH1+2)	1	Brown
0 V/S- (CH1+2)	3	Blue
S+ (CH1)	4	Black
S+ (CH2)	2	White
Shield (⊕)	Case / Connector	--

Cable colours are only valid when using the standard WIKA cable, e.g. order number: 14259454

## Diverse redundant pin assignment, opposing, with 2 x connector

### Abbreviations, definitions

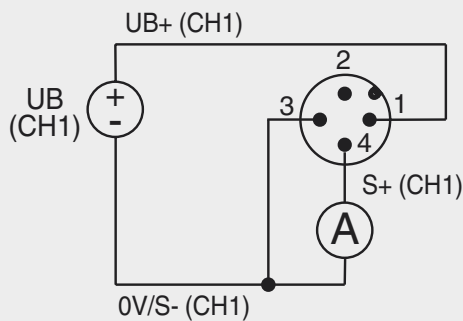
Signal	Description
UB	Voltage source for the sensor
UB+	Sensor voltage supply (+)
UB-	Sensor voltage supply (-)
S+	Output signal (+)
S-	Output signal (-)
CH1	Channel 1
CH2	Channel 2
CH1+2	Channel 1 and channel 2
0 V	0 V potential

Signal	Description
Ⓐ	Ammeter
Ⓥ	Voltmeter
⊕	Voltage source
⌞	Switch
⊕	Shield (ground)

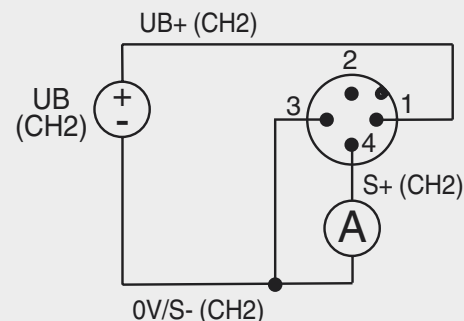
## For model F33S1

Output 4 ... 20 mA, 3-wire  
Circular connector M12 x 1, 4-pin

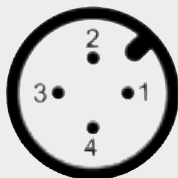
Connector channel 1



Connector channel 2



Circular connector M12 x 1, 4-pin



### 4 ... 20 mA, 3-wire diverse redundant, opposing

Signal	Connector channel 1	Connector channel 2	Cable colour
UB+	1	1	Brown
0 V/S-	3	3	Blue
S+	4	4	Black
Shield (⊕)	Case / Connector	Case / Connector	--

Cable colours are only valid when using the standard WIKA cable, e.g. order number: 14259454

2-connector variant, e.g. in combination with ELMS1 overload protection (F33S1).

Version in accordance with requirements for functional safety in accordance with the Machinery Directive 2006/42/EC.

## Pin assignment for MIL connector

### Abbreviations, definitions

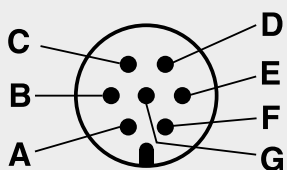
Signal	Description
UB	Voltage source for the sensor
UB+	Sensor voltage supply (+)
UB-	Sensor voltage supply (-)
S+	Output signal (+)
S-	Output signal (-)
CH1	Channel 1
CH2	Channel 2
CH1+2	Channel 1 and channel 2
0 V	0 V potential

Signal	Description
(A)	Ammeter
(V)	Voltmeter
(+)	Voltage source
⌵	Switch
(⊕)	Shield [ground]

### For the models F3301, F33C1 with UL approval, F33C1 Atex Ex ib and F33S1

#### MIL connector - 1-channel

MIL-CA3102E 16S-1P-B



#### 1-channel 4 ... 20 mA, 2-wire

Signal	Pin	Cable colour
UB+/S+	A	Brown
0 V/S-	C	Blue
Shield (⊕)	Cable gland	-

#### 1-channel 4 ... 20 mA, 3-wire

Signal	Pin	Cable colour
UB+	A	Brown
0 V/S-	C	Blue
S+	D	Black
Shield (⊕)	Cable gland	-

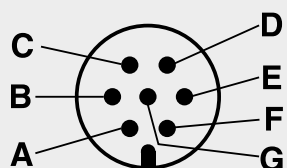
#### 1-channel 0 ... 10 V, 3-wire

Signal	Pin	Cable colour
UB+	A	Brown
0 V/S-	C	Blue
S+	D	Black
Shield (⊕)	Cable gland	-

Cable colours are only valid when using the standard WIKA cable, e.g. order number: 79100531

#### MIL connector - redundant, 2-channel

MIL-CA3102E 16S-1P-B



#### Redundant 4 ... 20 mA, 2-wire

Signal	Pin	Cable colour
UB+/S+ (CH1)	A	Brown
0 V/S- (CH1)	C	Blue
UB+/S+ (CH2)	D	White
0 V/S- (CH2)	F	Black
Shield (⊕)	Cable gland	-

#### Redundant 4 ... 20 mA, 3-wire

Signal	Pin	Cable colour
UB+ (CH1)	A	Brown
UB+ (CH2)	B	White
0 V/S- (CH1)	C	Green
S+ (CH1)	D	Yellow
0 V/S- (CH2)	E	Grey
S+ (CH2)	F	Pink
Shield (⊕)	Cable gland	-

#### Redundant 0 ... 10 V, 3-wire

Signal	Pin	Cable colour
UB+ (CH1)	A	Brown
UB+ (CH2)	B	White
0 V/S- (CH1)	C	Green
S+ (CH1)	D	Yellow
0 V/S- (CH2)	E	Grey
S+ (CH2)	F	Pink
Shield (⊕)	Cable gland	-

Cable colours are only valid when using the standard WIKA cable, e.g. order number: 79100531

## Pin assignment for CANopen® in accordance with CiA®303-1

### Abbreviations, definitions

Signal	Description
CAN-SHLD, shield $\oplus$	Shield
CAN-V+	External positive voltage supply for the supply of the sensor
CAN-GND	External 0 V potential for the supply of the sensor
CAN-High	CAN_H bus line (dominant high)
CAN-Low	CAN_L bus line (dominant low)

### For models F3301 and F33C1 with UL approval

#### CANopen® output

##### Circular connector M12 x 1, 5-pin

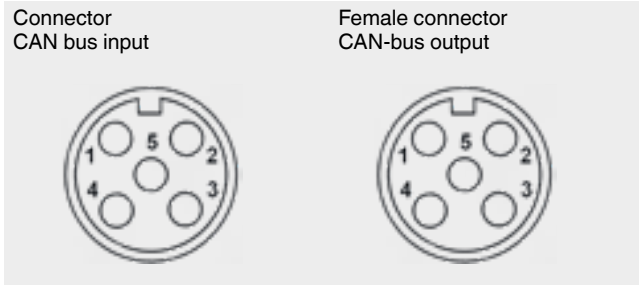


Signal	Pin	Cable colour
CAN-SHLD, shield $\oplus$	1 / case / connector	Brown
CAN-V+	2	Blue
CAN-GND	3	White
CAN-High	4	Blue
CAN-Low	5	Black

Cable colours are only valid when using the standard WIKA cable, e.g. order number: 14259454

#### CANopen® output with Y-connector

##### Socket M12 x 1, 5-pin / connector M12 x 1, 5-pin



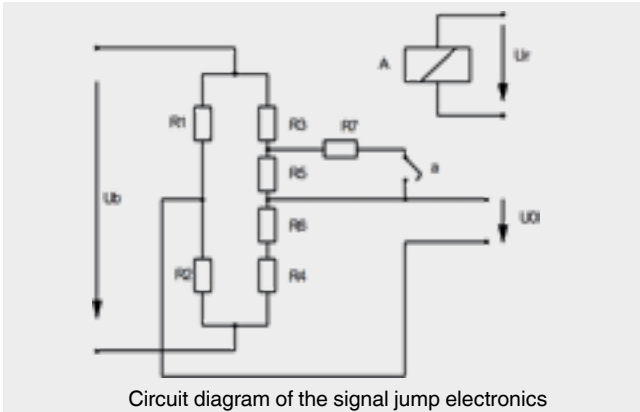
The socket and connector are connected internally.

Socket, M12 x 1, 5-pin / connector, M12 x 1, 5-pin		
Signal	Pin	Cable colour
CAN-SHLD, shield $\oplus$	1 / case / connector	Brown
CAN-V+	2	Blue
CAN-GND	3	White
CAN-High	4	Blue
CAN-Low	5	Black

Cable colours are only valid when using the standard WIKA cable, e.g. order number: 14259454

## Short description of the signal jump electronics

Amplifier 4 ... 20 mA or 0 ... 10 V for signal jump applications with 2-channel computer control.



With these force transducers, four variable resistors (R1 ... R4) are connected together to form a Wheatstone bridge. When the measuring body deforms, the opposing resistors are stretched or compressed in the same way. This leads to a detuning of the bridge and a diagonal voltage  $U_0$ .

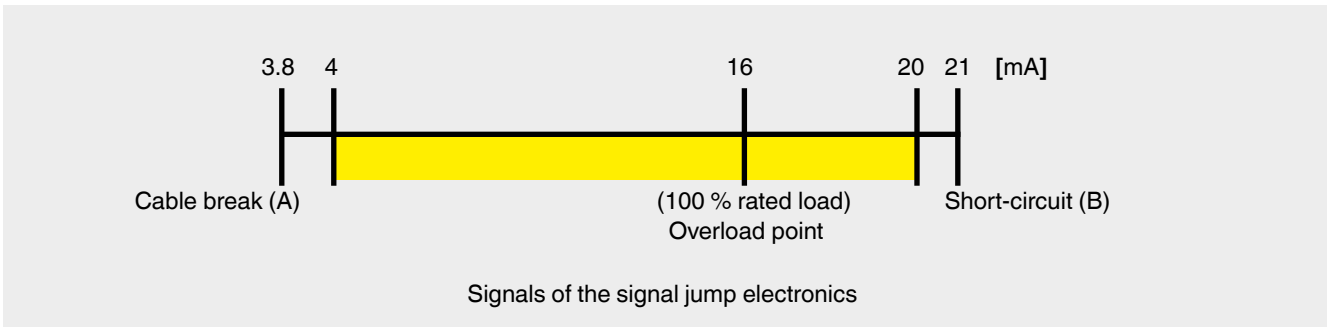
The test resistor R7 is now important in connection with checking the subsequent amplifier circuit and the subsequent signal paths. This is switched parallel to the resistor R5 via the relay contact (a) as soon as the excitation voltage  $U_r$  of the relay A is present. The connection of the resistor R7 causes a defined, always constant, detuning of the zero point (diagonal voltage) of the Wheatstone bridge.

An external controller that is independent of the force transducer must monitor the safe functioning of the force transducer. The functional test with a signal jump of 4 mA / 2 V is executed at an interval of 24 hours. The controller activates the relay A, thus changing the output signal of the force transducer in a defined manner.

If the expected change in the output signal occurs, it can be assumed that the entire signal path from the Wheatstone bridge per the amplifier through to the output is functioning correctly. If no signal change occurs, then it can be concluded that there is an error in the signal path.





Furthermore, the measuring signal should be checked by the controller for min. (A) and max. (B) signal values in order to detect any cable breaks or short circuits that may occur.

The default setting of the force transducers with a current output of 4 ... 20 mA for overload detection is, for example:



With a fixed signal jump of, for example, 4 mA, the test cycle can then be triggered, in any operating state, by activating the test relay. The upper measuring range limit of 20 mA will never be reached and thus the checking of the signal jump is enabled.

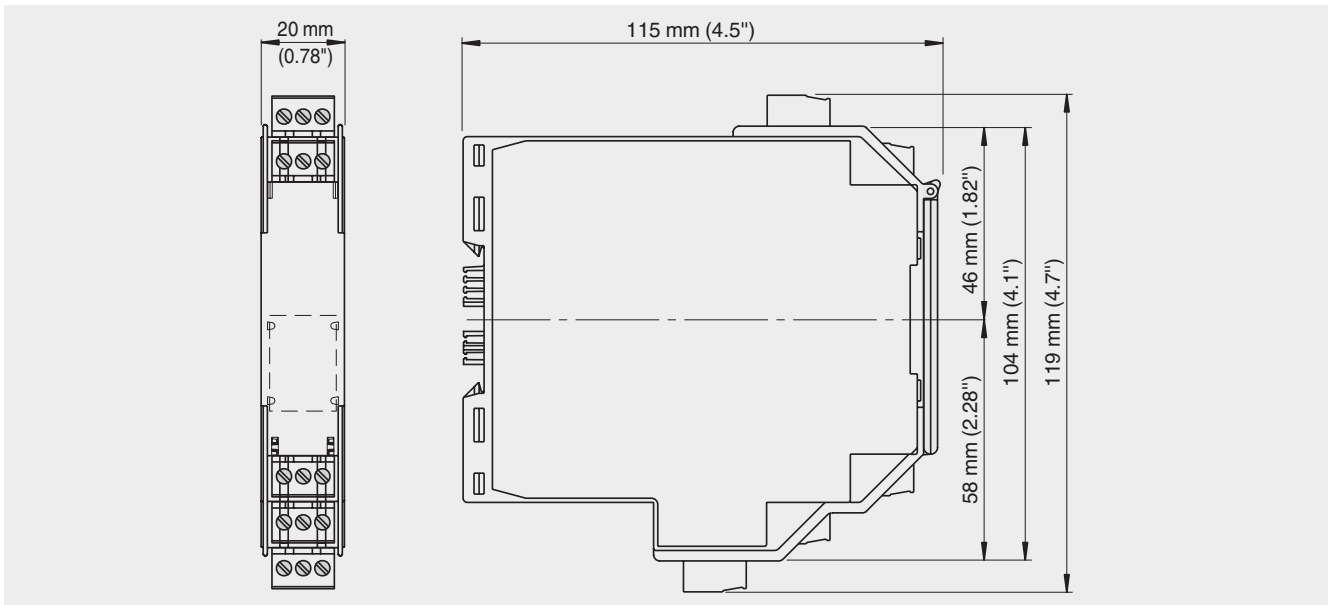
## Accessories

Connectors model EZE53 with moulded cable					
Model	Description	Temperature range	Cable diameter	Cable length	Order number
	Straight version, cut to length, 4-pin, PUR cable, UL listed, IP67	-20 ... +80 °C [-4 ... +176 °F]	4.75 mm ... 5.7 mm [0.18 in ... 0.22 in]	2 m [6.6 ft]	14259451
				5 m [16.4 ft]	14259453
				10 m [32.8 ft]	14259454
	Straight version, cut to length, 5-pin, PUR cable, UL listed, IP67	-20 ... +80 °C [-4 ... +176 °F]	4.75 mm ... 5.7 mm [0.18 in ... 0.22 in]	2 m [6.6 ft]	14259458
				5 m [16.4 ft]	79100672
				10 m [32.8 ft]	14259472
	Angled version, cut to length, 4-pin, PUR cable, UL listed, IP67	-20 ... +80 °C [-4 ... +176 °F]	5.05 mm ... 6 mm [0.2 in ... 0.24 in]	2 m [6.6 ft]	14259452
				5 m [16.4 ft]	14293481
				10 m [32.8 ft]	14259455
	Angled version, cut to length, 5-pin, PUR cable, UL listed, IP67	-20 ... +80 °C [-4 ... +176 °F]	5.05 mm ... 6 mm [0.2 in ... 0.24 in]	2 m [6.6 ft]	79101493
				5 m [16.4 ft]	79100686
				10 m [32.8 ft]	On request

Further cable lengths and cable types (e.g. for MIL connector) are available on request.

## Repeater power supply

The analogue input signal is transmitted to the non-hazardous area as galvanically isolated current value. The input signal can be overlaid on the Ex or non-Ex sides with binary signals transmitted bidirectionally.



Repeater power supply	Order number
1-channel with DC 24 V supply	14255084

## Possible measuring devices for load cell measuring systems

Model		Order number
<b>FE430</b>	Weighing indicator	14671552
<b>B6578</b>	Junction box als Summiereinheit foe load cells <ul style="list-style-type: none"> <li>■ 4-channel</li> <li>■ Material measuring body: stainless steel</li> <li>■ Ingress protection IP67</li> </ul>	64418893



→ WIKA accessories can be found online at [www.wika.com](http://www.wika.com).

### Ordering information

Model / Rated force / Relative linearity error / Temperature range / Output signal / Electrical connection / Approvals / Optional approvals, certificates / Pin assignment / Accessories

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