

DATA SHEET

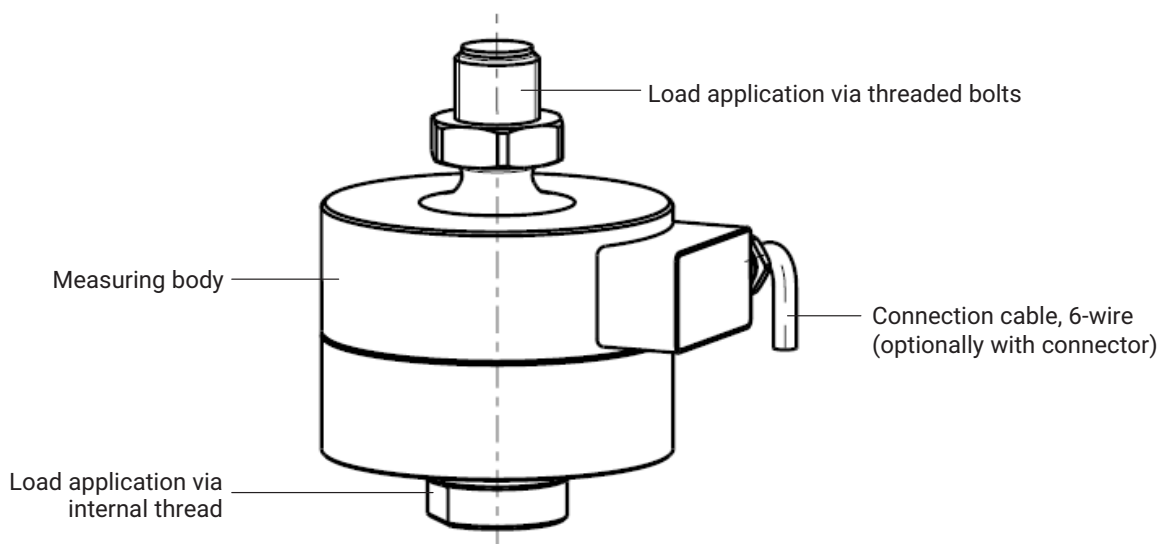
# U2B Force Transducer

## SPECIAL FEATURES

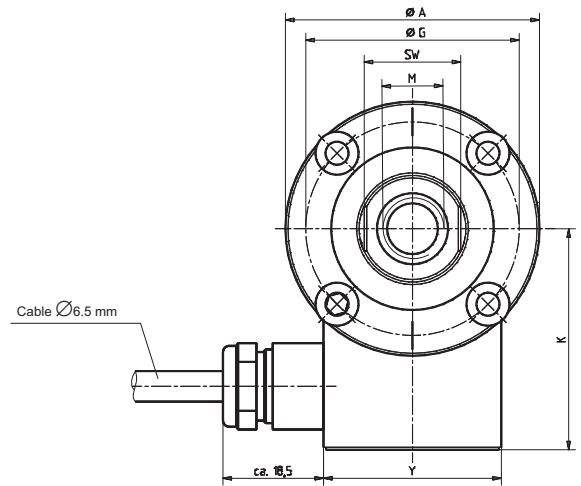
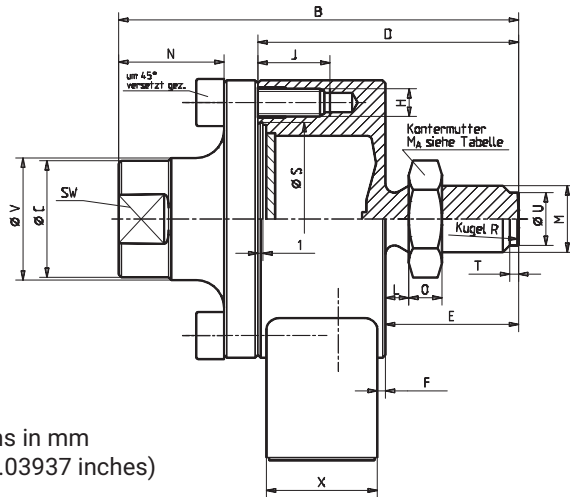
- Tensile/compressive force transducer
- Non-rusting, degree of protection IP67
- Can be configured with different cable lengths, plug assembly, integrated amplifier (0 ... 10 V, 4 ... 20 mA) and TEDS on request
- Nominal (rated) forces 500 N ... 200 kN
- Integrated lateral force compensation
- Low overall height



## SCHEMATIC DIAGRAM



# DIMENSIONS

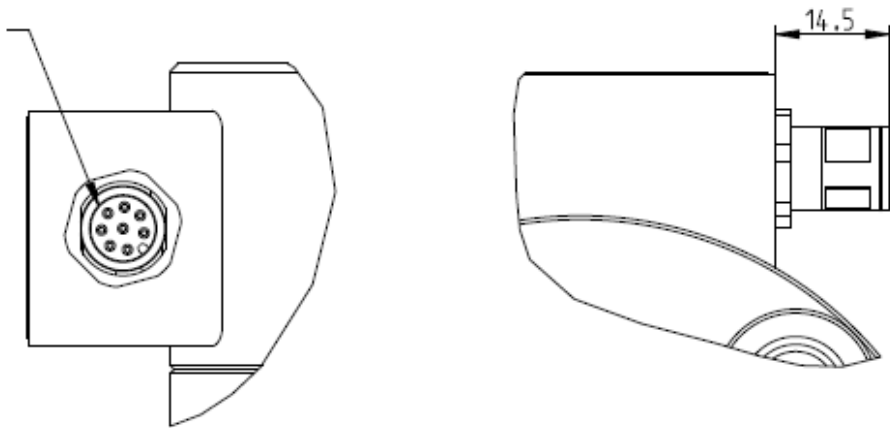


Dimensions in mm  
(1 mm = 0.03937 inches)

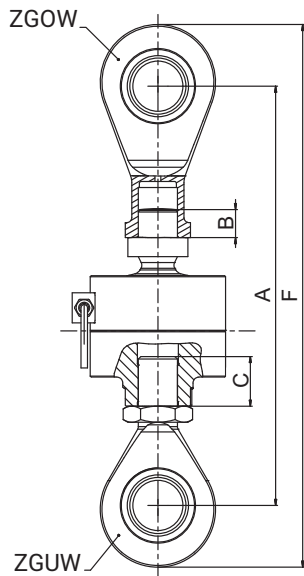
Nominal (rated) force	ØA <sub>0.2</sub>	B	ØC	D	E	F	ØG	H	J	K	L	M	N	O	ØS <sub>F8</sub> <sup>H8</sup>	AF	T	ØU	ØV	X	Y	M <sub>A</sub> (N·m)	Ball R
0.5-5 kN	50	72	21	47	24	1.5	42	4xM5	13	43.5	4.2	M12	19	6	34	19	1.6	9.5	22	20	35	60	60
10 kN											7.6												
20 kN	90	112	33	72	38	2	70	4xM10	20.5	63.5	10.6	M20x1.5	15	10	55	30	2	17	34	30	50	300	100
50 kN	100	141	40	86	47	6	78	4xM12	19	68	13.2	M24x2	20	12	61	36		20	42				
100 kN	135	197	68	122	67	17	105	8xM12	16	85.5	19	M39x2	29	19	79	60	2.2	36	70	30	50	-	160
200 kN	155	232	82	142	85	19	125	8xM16	26	95.5	24.2	M48x2	32	22	97	70		43	84			-	

## Option passive or active with M12, A-coded connector

M12 connector, 8-pin, A-coded

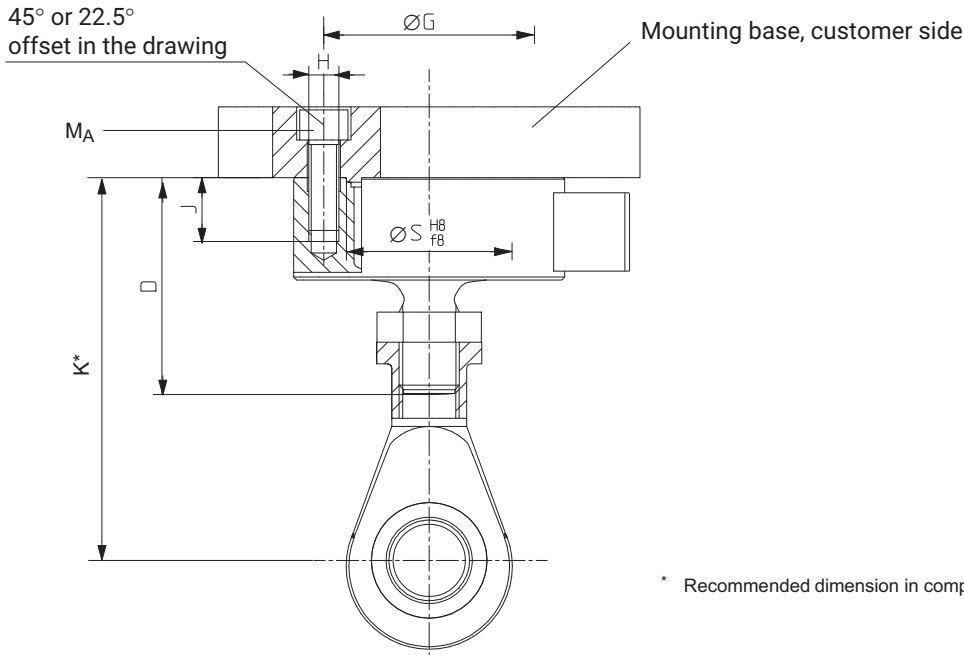


## U2B FORCE TRANSDUCER FITTED WITH KNUCKLE EYES ZGOW, ZGUW



Nominal (rated) force in [kN]	$A_{min}$	$A_{max}$	$F_{min}$	$F_{max}$	Minimum thread reach	
					b	c
0.5...10	139	156	171	188	9.6	9.6
20	212	234	262	284	16	16
50	260	288	320	348	19.2	19.2
100	418	436	541	559	27	31.2
200	466	489	602	625	36.6	38.4

## U2B WITH ZGOW, WITHOUT ADAPTER

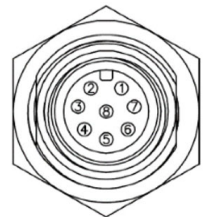


Nominal (rated) force in kN	D	ØG	H	J	K	ØS	MA <sup>1)</sup> [N·m]
0.5...10	47	42	4xM5	13	84...86.4	34	5
20	72	70	4xM10	20.5	131.6	55	35
50	86	78	4xM12	19	158.2	61	60
100	122	105	8xM12	16	244	79	60
200	142	125	8xM16	26	270.2	97	150

1) Recommended values when using a torque wrench on dry thread

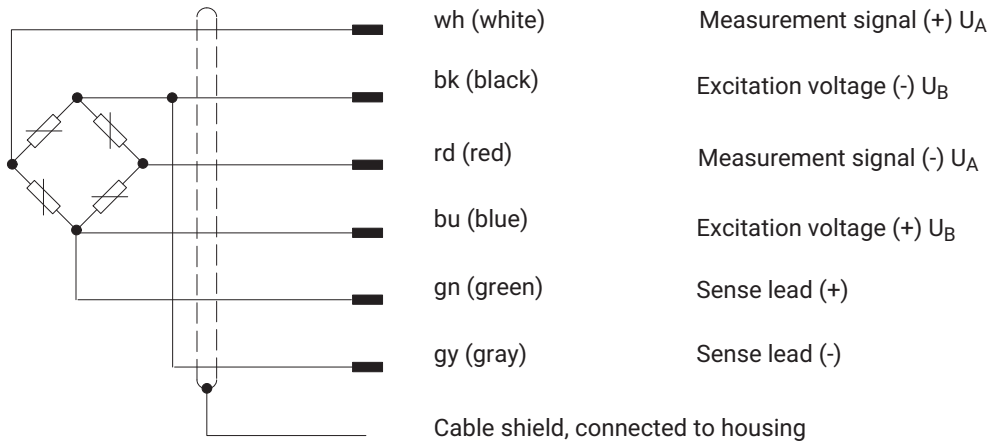
## CABLE WIRING ASSIGNMENT (M12 CONNECTOR)

Pin	Wire color	Version VA 1 (voltage output)	Version VA 2 (current output)	Connection cable wire assignments without integrated amplifier
1	white	Supply voltage 0 V (GND)		Measurement signal (+)
2	brown	Not in use		Bridge excitation voltage (-) (TEDS chip <sup>1)</sup> )
3	green	Zero control input		Bridge excitation voltage (+)
4	yellow	Not in use		Measurement signal (-)
5	gray	Output signal 0 ... 10 V	Output signal 4 ... 20 mA	Not in use
6	pink	Output signal 0 V	Not in use	Sense lead (+)
7	blue	Not in use		Sense lead (-) (TEDS chip <sup>1)</sup> )
8	red	Voltage supply +19 ... +30 V		Not in use
Cable shield, connected to the housing				



1) TEDS chip only if ordered

## CABLE WIRING ASSIGNMENT (6-WIRE CONFIGURATION WITHOUT PLUG)



## SPECIFICATIONS AS PER VDI/VDE 2638

Force transducer type			U2B							
Nominal (rated) force	$F_{nom}$	N	500							
		kN		1	2	5	10	20	50	100
<b>Accuracy</b>										
Accuracy class			0.2	0.1						
Relative reproducibility and repeatability errors without rotation	$b_{rg}$	%	0.1							
Rel. reversibility error ( $0.5 \cdot F_{nom}$ )	$V_{0.5}$	%	<0.2	0.15						
Non-linearity	$d_{lin}$	%	<0.2	0.1						
Creep upon loading (30 min)	$d_{cr, F+E}$	%	0.06							
Effect of the bending moment ( $10\% F_{nom} \cdot 10 \text{ mm}$ )	$d_{Mb}$	%	0.05							
Effect of lateral forces ( $10\% F_{nom}$ )	$d_Q$	%	0.1							
Temperature effect on sensitivity	$TC_S$	% / 10 K	0.1							
Temperature effect on zero point	$TC_0$	% / 10 K	0.1	0.05						
<b>Characteristic electrical values</b>										
Nominal (rated) sensitivity	$C_{nom}$	mV/V	2							
Relative zero signal error	$d_{s,0}$	%	1							
Sensitivity error, tension	$d_C$	%	0.2							
Sensitivity error, tension/compression	$d_{ZD}$	%	1.5	0.5						
Input resistance	$R_i$	$\Omega$	>345							
Output resistance	$R_o$	$\Omega$	300...400							
Insulation resistance	$R_{is}$	$\Omega$	$2 \cdot 10^9$							
Operating range of the excitation voltage	$B_{U,G}$	V	0.5...12							
Reference excitation voltage	$U_{ref}$	V	5							
<b>Temperature</b>										
Reference temperature	$T_{ref}$	$^{\circ}\text{C}$	+23							
Nominal (rated) temperature range	$B_{T,nom}$	$^{\circ}\text{C}$	-10 ... +70							
Operating temperature range	$B_{t,G}$	$^{\circ}\text{C}$	-30 ... +85							
Storage temperature range	$B_{T,S}$	$^{\circ}\text{C}$	-50 ... +85							

Force transducer type		U2B									
Nominal (rated) force	F <sub>nom</sub>	N	500								
		kN		1	2	5	10	20	50	100	200
<b>Characteristic mechanical quantities</b>											
Maximum operating force	F <sub>G</sub>	% of F <sub>nom</sub>	130	150							
Limit force	F <sub>L</sub>		>130	>150							
Breaking force	F <sub>B</sub>		>300								
Limit torque (when loading with nominal (rated) force)	M <sub>G</sub>	Nm	46.8	63.0	63.0	60.0	108.0	340.0	620.0	2430.0	5125.0
Limit bending moment (when loading with nominal (rated) force)	M <sub>b zul</sub>	Nm	2.9	12.8	19.0	24.0	49.0	223.0	380.0	1463.0	2880.0
Static lateral limit force (when loading with nominal (rated) force)	F <sub>Q</sub>	% of F <sub>nom</sub>	25.0	52.0	36.0	18.0	25.0	35.0	19.0	25.0	19.0
Nominal (rated) displacement ±15%	S <sub>nom</sub>	mm	0.058	0.056	0.048	0.047	0.047	0.065	0.082	0.09	0.12
Fundamental frequency	f <sub>G</sub>	kHz	4	6	8.7	14	17.5	8	8.5	6	5.6
Rel. permissible vibrational stress	F <sub>rb</sub>	% of F <sub>nom</sub>	100	160							
<b>General information</b>											
Degree of protection per DIN EN 60529 <sup>1)</sup>			IP67								
Spring element material			Stainless steel								
SG protection			Hermetically-welded measuring body								
Cable			6-wire, polyethylene insulated								
Cable length (standard version)	m		3			6			12		
Cable length (as requested by the customer)			See page 8 "Versions and ordering numbers"								
Weight	g		0.8			2.9			4.3, 10.7, 15.9		
<b>Mechanical shock; test severity level as per IEC 68-2-29-1987</b>											
Number	n		1000								
Duration	ms		3								
Acceleration	m/s <sup>2</sup>		637								
<b>Vibrational stress</b>											
<b>Test severity level as per DIN IEC 68, Part 2-6, IEC-2-6-1982</b>											
Frequency range	Hz		5 ... 65								
Duration	min		30								
Acceleration	m/s <sup>2</sup>		150								

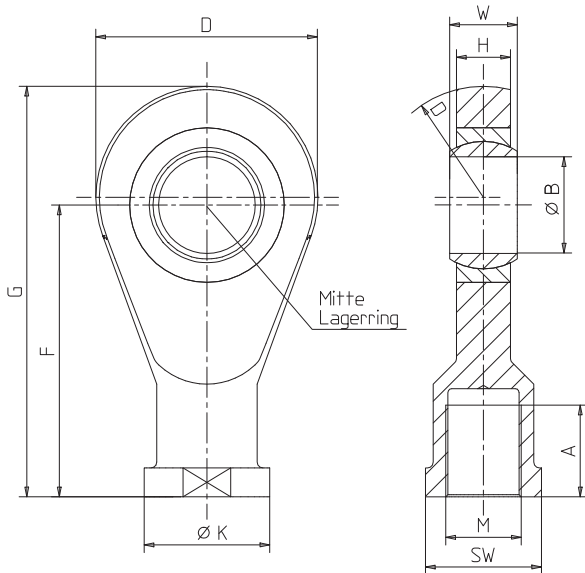
<sup>1)</sup> Water column; 0.5 h

Force transducer type		U2B active	
Module type		VA1	VA2
<b>Rated electrical output</b>			
Output signal		0... 10 V	4 ... 20 mA
Nominal sensitivity (span)		5 V	8mA
Rated output tolerance		±0.1 V	±0.16 mA
Zero signal		5 V	12 mA
Range of output signal		-0.3 ... 11 V	3 ... 21 mA
Cut-off frequency (-3 dB)	kHz	2	
Supply voltage	V	19 ... 30	
Nominal (rated) voltage	V	24	
Max. current consumption	mA	15	30
<b>Temperature</b>			
Nominal (rated) temperature range	°C	-10 ... +50	
Operating temperature range	°C	-20 ... +60	

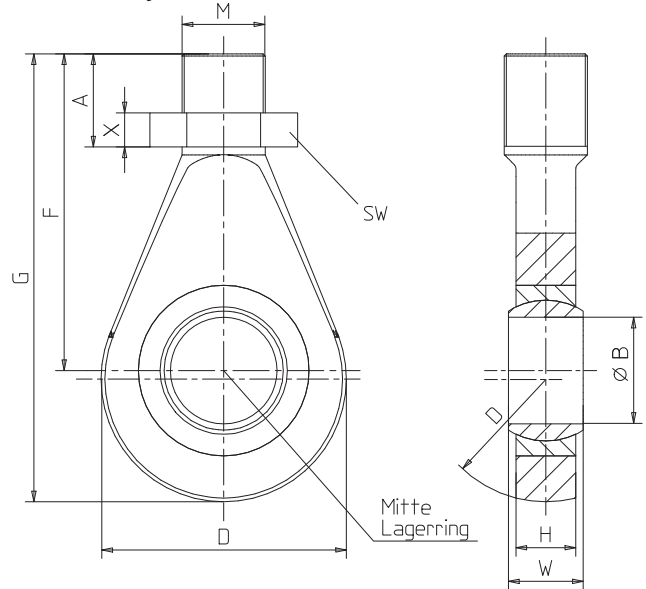
Force transducer type		U2B active	
Module type		VA1	VA2
Storage temperature range	°C	-25 ... +85	
Reference temperature	°C	+23	

## MOUNTING AIDS (DIMENSIONS IN MM (1 MM = 0.03937 INCHES))

**Knuckle eye ZGOW**



**Knuckle eye ZGUW**



Material: Tempered steel, galvanized; roller bearing steel and PTFE/bronze corrugated foil

Nominal (rated) force in kN	Ordering no. Knuckle eye ZGOW	Weight in kg	A	ØB	D	F	G	H	ØK	M	AF	W
0.5...10	1-U2A/1t/ZGOW	0.2	22	12 <sup>H7</sup>	32	50	66	12	22	M12	19	16
20	1-U2A/2t/ZGOW	0.5	33	20 <sup>H7</sup>	50	77	102	18	34	M20x1.5	32	25
50	1-U2A/5t/ZGOW	0.8	42	25 <sup>H7</sup>	60	94	124	22	42	M24x2	36	31
100	1-U2A/10t/ZGOW	3.2	50	50 <sup>+0.002 -0.014</sup>	115	151	212.5	28	65	M39x2	60	35
200	1-U2A/20t/ZGOW	4.8	60	60 <sup>+0.003 -0.018</sup>	126	167	235	36	82	M48x2	70	44

Nominal (rated) force in kN	Ordering no. Knuckle eye ZGUW	Weight in kg	A	ØB	D	F	G	H	M	AF	W	X
0.5...10	1-U2A/1t/ZGUW	0.1	33	12 <sup>H7</sup>	32	54	70	12	M12	19	16	7
20	1-U2A/2t/ZGUW	0.2	47	20 <sup>H7</sup>	50	78	103	18	M20x1.5	30	25	9
50	1-U2A/5t/ZGUW	0.4	57	25 <sup>H7</sup>	60	94	124	22	M24x2	36	31	10
100	1-U2A/10t/ZGUW	11	65.5	50 <sup>+0.002 -0.014</sup>	115	148.5	210	28	M39x2	60	35	16
200	1-U2A/20t/ZGUW	3.2	80	60 <sup>+0.003 -0.018</sup>	126	168	236	36	M48x2	75	44	18

## VERSIONS AND ORDERING NUMBERS

Code	Measuring range	Ordering number	
<b>500N</b>	500 N	1-U2B/500N	The ordering numbers shown in gray are preferred types and can be delivered rapidly. All preferred types come with free ends and without TEDS chip
<b>001K</b>	1 kN	1-U2B/1KN	
<b>002K</b>	2 kN	1-U2B/2KN	
<b>005K</b>	5 kN	1-U2B/5KN	
<b>010K</b>	10 kN	1-U2B/10KN	
<b>020K</b>	20 kN	1-U2B/20KN	
<b>050K</b>	50 kN	1-U2B/50KN	
<b>100K</b>	100 kN	1-U2B/100KN	
<b>200K</b>	200 kN	1-U2B/200KN	

Electrical connection to sensor	Plug version for the "permanently attached cable" option	Transducer identification	Amplifier
8-pin M12 connector, A-coded <b>00A8</b>	Free ends <b>Y</b>	With TEDS chip <b>T</b>	No amplifier <b>N</b>
1 m <b>01M0</b>	D-SUB, 15-pin <b>F</b>	Without TEDS chip <b>S</b>	VA1: 0... 10 V <b>VA1</b>
3 m <b>03M0</b>	D-SUB-HD15, 15-pin <b>Q</b>		VA2: 4 ... 20 mA <b>VA2</b>
6 m <b>06M0</b>	Male connector MS3106PEMV <b>N</b>		
12 m <b>12M0</b>	No cable available <b>X</b>		
20 m <b>20M0</b>			

Ordering example: U2B with a nominal (rated) force of 20 kN, M12 connector, no fixed cable on sensor, no TEDS chip, with integrated amplifier (current output)

<b>K-U2B-</b>	<b>020K-</b>	<b>00A8-</b>	<b>X-</b>	<b>S-</b>	<b>VA2</b>
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The TEDS chip cannot be ordered with an integrated amplifier. The integrated amplifier is only available with the M12 connector.



## ACCESSORIES (NOT INCLUDED IN THE SCOPE OF SUPPLY)

Description	Ordering number
Ground cable, 400 mm	1-EEK4
Ground cable, 600 mm	1-EEK6
Ground cable, 800 mm	1-EEK8
Knuckle eye with internal thread. Force range 500 N to 10 kN	1-U2A/1t/ZGOW
Knuckle eye with internal thread. Force range 20 kN	1-U2A/2t/ZGOW
Knuckle eye with internal thread. Force range 50 kN	1-U2A/5t/ZGOW
Knuckle eye with internal thread. Force range 100 kN	1-U2A/10t/ZGOW
Knuckle eye with internal thread. Force range 200 kN	1-U2A/20t/ZGOW
Knuckle eye with external thread. Force range 500 N to 10 kN	1-U2A/1t/ZGUW
Knuckle eye with external thread. Force range 20 kN	1-U2A/2t/ZGUW
Knuckle eye with external thread. Force range 50 kN	1-U2A/5t/ZGUW
Knuckle eye with external thread. Force range 100 kN	1-U2A/10t/ZGUW
Knuckle eye with external thread. Force range 200 kN	1-U2A/20t/ZGUW
Cable to connect M12 connector, 5 m long	1-KAB168-5
Cable to connect M12 connector, 20 m long	1-KAB168-20

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