

## Data Sheet | Force Transducer Series ZST

**Nominal Force**  
**100 kN - 10 MN**



### Key Facts

- ▶ For static tensile forces
- ▶ insensitive to disturbing forces and moments
- ▶ Nominal force: 100 kN·m to 10 MN
- ▶ Accuracy class: 0.5
- ▶ Standardized connection dimensions
- ▶ Non-rotating version
- ▶ configurable variants for maximum flexibility

### Options | Accessories

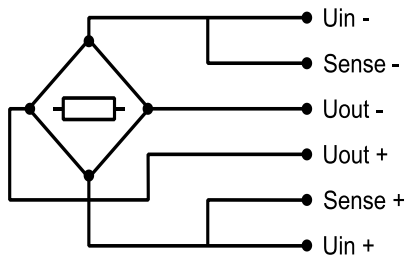
- ▶ Optional: second axial measuring circuit for redundancy
- ▶ Optional: bending moment measuring circuits  $M_x$ ,  $M_y$
- ▶ Extensive ISO 376 compliant mechanical accessories
- ▶ Extensive electrical connection options
- ▶ Special versions also in small quantities (on request)

# Technical Data | 100 – 10.000 kN

Nominal Force		$F_{nom}$	kN	100	200	500	600	1000	1200	2000	3000	4000	5000	6000	10000
Metrological Data	Classification			0.5 <sup>1)</sup>											
	Force measurement range		%	20 - 100											
	Interpolation error	$f_c$	%	0.045											
	Reversibility error	$v$	%	0.14											
	Repeatability error in unchanged mounting position	$b'$	%	0.045											
	Reproducibility error in different mounting positions	$b$	%	0.09											
	Zero error	$f_0$	%	0.02											
	Creep		%	0.03											
	Temperature effect on characteristic value per 10 K	$TK_C$	%/10 K	0.02											
	Temperature effect on zero signal per 10 K	$TK_0$	%/10 K	0.02											
Electrical Data	Rated characteristic value	$C_{nom}$	mV/V	2											
	Input resistance	$R_e$	$\Omega$	700 - 800											
	Output resistance	$R_a$	$\Omega$	600 - 750											
	Insulation resistance	$R_{is}$	$\Omega$	$>10^9$											
	Operating range of excitation voltage	$B_{U,G}$	V	5 - 12											
	Protection (DIN EN 60529)			54											
Limits	Weight without ball cup		kg	2	2.4	9	10	16.5	19	43	82	96	188	208	365
	Weight with ball cup		kg	3.1	3.5	12	13	25	27	66	146	160	212	232	550
	Force limit		%	110											
	Breaking force		%	300											
	Rated temperature range	$B_{T,nom}$	$^{\circ}C$	17 - 27											
	Operating temperature range	$B_{T,G}$	$^{\circ}C$	10 - 35											

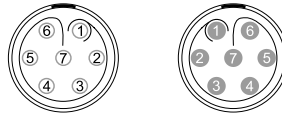
1) Classification according to ISO 376

# Cable connection | 100 – 10.000 kN



Connection  
pluggable<sup>1)2)</sup>

7-pin LEMO Series 0  
Female: - Male:



Connection		Pin
Supply voltage (+)	$U_{in+}$	3
Supply voltage (-)	$U_{in-}$	2
Measurement signal (+)	$U_{out+}$	1
Measurement signal (-)	$U_{out-}$	4
Sense (+)	Sense+	5
Sense (-)	Sense-	6
Shielding		Housing

1) View too weldingside

2) Female LEMO S.A. Typ: EGG.1B.307.CLL; Male: FGG.1B.307.CLA.D72

# Option: Double Bridge |second measuring circuit

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▶ In the version with a double measuring bridge, a second equivalent measurement signal is output via an additional connector. The technical data applies equally to both measuring circuits.

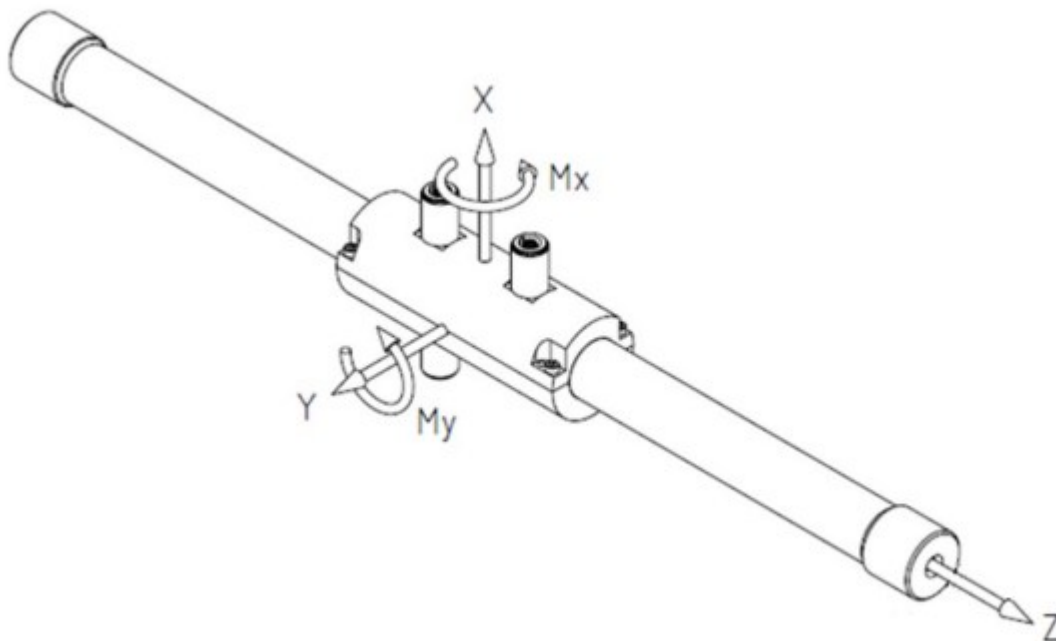
Note: Depending on the nominal force, the connection routing is optimally adapted to the mechanical integration: Up to 4 MN, the second connection is routed out to the side and arranged in series with the single measuring circuit. From 5 MN, both measuring circuits are routed out to the bottom – for clear cable routing and safe installation even in high load ranges.

# Option: Bending Moment Measurement Circuits

► When checking the force and torque input, the bending moments  $M_x$  and  $M_y$  are measured and output as separate channels.

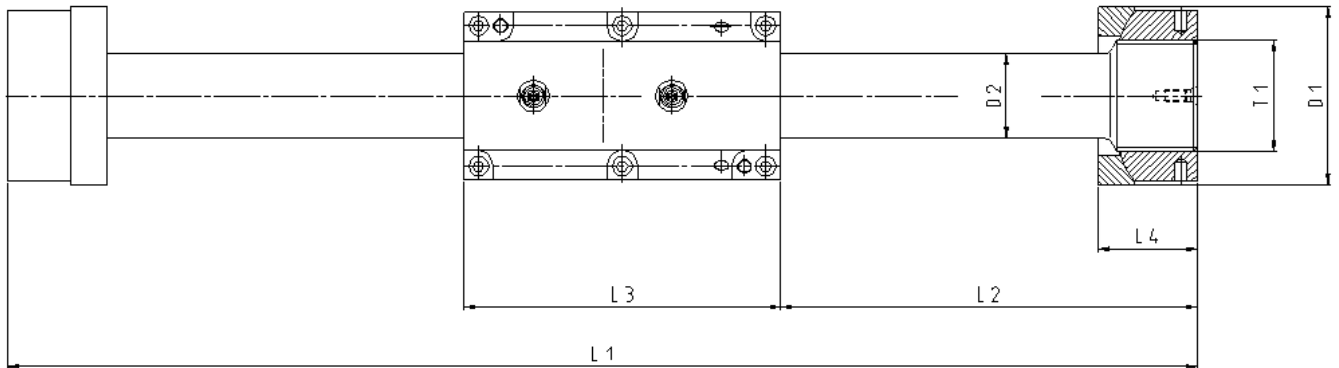
Nominal force	$F_{nom}$	kN	200 - 10000 (2mV/V)
Temperature effect on characteristic value per 10 K	$TK_C$	%/10 K	0.2
Temperature effect on zero signal per 10 K	$TK_0$	%/10 K	0.2
Rated characteristic value	$C_{nom}$	mV/V	1)
Input resistance	$R_e$	$\Omega$	400
Operating range of excitation voltage	$B_{U,G}$	V	5 - 12

1) Specification shown on the label



► Location of the coordinate system

# Mating dimensions



Nominal force compression/tension	$\pm F_{nom}$	kN	100	200	500	600	1000	1200	2000	3000	4000	5000 6000	10000
Diameter	$\varnothing D_1$	mm	50 <sub>c11</sub>	64 <sub>c11</sub>	90 <sub>c11</sub>		120 <sub>c11</sub>		165 <sub>c11</sub>	235 <sub>c11</sub>		270 <sub>c11</sub>	345
Diameter	$\varnothing D_2$	mm	26	26	42.5	46	58	63.5	83	102	118	148	191
Lenght	$L_1$	mm	500	500	600	650			900		1100	1400	1500
Lenght	$L_2$	mm	190	190	220	245			370		340	565	684
Lenght	$L_3$	mm	120	120	160							170	220
Lenght	$L_4$	mm	32	32	49.8		71.4		103.2	141		171	200
Thread	$T_1$		M24x2	M30x2	M56x4		M64x4		M90x4	M124x4		M160x6	M200x6

# Order numbers | configurable variants

## ► Force transducer series ZST | configurable variants

Item	Code	Description
Force Transducer Series ZST	C-ZST	Configurable Force Transducer Series ZST
Nominal Force	100K	100 kN
	200K	200 kN
	500K	500 kN
	600K	600 kN
	1M00	1 MN
	1M20	1,2 MN
	2M00	2 MN
	3M00	3 MN
	4M00	4 MN
	5M00	5 MN
6M00	6 MN	
10M0	10 MN	
Accuracy class	05	ISO 376   class 0.5
Measuring range of the accuracy class	20	ISO 376   20 - 100 %
Single or double measuring bridge	SB	Single bridge
	DB	Double bridge
Bending moment measuring circuits	NO	no bending moment measuring circuits Mx, My
	BM	Bending moment measuring circuits Mx, My
Temperature range	S	Standard temperature range   +17°C - +27°C
Electrical transducer connection (for all selected measuring circuits)	P	LEMO connection socket(s)
Cable connection type (for all selected measuring circuits)	P	LEMO connection socket(s)

### Order-Example

C	ZST	500K	05	20	SB	NO	P	P
		500 kN	ISO 376   class 0.5	ISO 376   20 - 100 %	Single measuring bridge	No bending moment circuits Mx, My	LEMO connection socket	LEMO connection socket

# Order numbers | Accessories

Description	Order number
<b>Measuring cables</b>	
Double-shielded measuring cable   yellow   5 m   double shielded and twisted in pairs   cable sheath Ø 6.5 mm   6-wire technology   transducer connection: straight plug (male) type LEMO 7-pole push-pull (male)   cable end amplifier: open	S-CAB-DMC-L-5M-F
Configurable measuring cable type DMC and others   in different lengths   with different connectors for amplifier connection	C-CAB-DMC-...
<b>Series KTN-ZD   cases</b>	
Case for series KTN-ZST   200 kN	S-TC-KTN_ZST-01
Case for series KTN-ZST   500 kN	S-TC-KTN_ZST-02
Case for series KTN-ZST   600 kN	S-TC-KTN_ZST-03
Case for series KTN-ZST   1 - 1.2 MN	S-TC-KTN_ZST-04
Flightcase for series KTN-ZST   2 MN	S-TC-KTN_ZST-05
Flightcase for series KTN-ZST   5 - 6 MN	S-TC-KTN_ZST-06
Flightcase for series KTN-ZST   10 MN	S-TC-KTN_ZST-07
<p>Notes:</p> <ul style="list-style-type: none"> <li>▶ GTM recommends in any case to use the series KTN-ZST with transport case.</li> <li>▶ More stable flight cases are used for nominal forces from 2 MN.</li> </ul>	

# Order numbers | Glossary

Item	Description
<b>Accuracy class acc. to ISO 376</b>	Force transducers calibrated according to ISO 376 are divided into accuracy classes. The highest accuracy class is class 00, followed by 0.5 and others. A smaller accuracy class represents a more precise sensor. GTM force transfer transducers that meet the requirements of an ISO 376 accuracy class are called reference force transducers or transfer standards. These transducers achieve defined accuracy classes in a specified measuring range, e.g. the force transducer KTN-ZST achieves accuracy class 0.5 according to ISO 376 in a measuring range between min. 20 % and 100 % of the nominal force.
<b>Measuring range accuracy class</b>	The measuring range indicates in which measuring range the transducer complies with the selected class. Through internal quality assurance processes, we always ensure that the specified accuracy class is maintained in the selected measuring range. We always recommend a GTM internal calibration of the transducer incl. standard compliant attachments. Every transducer calibrated according to ISO 376 receives a calibration certificate, which provides an evaluation of the characteristic values of the sensor and information about the calibration equipment used, the traceability and measurement uncertainty as well as the environmental conditions during the calibration process. In the calibration certificate, in addition to other technical information, you will find, for example, the measurement uncertainties of the calibrated force transducer for the respective load levels
<b>Single or double measuring bridge</b>	For redundancy reasons, it is necessary in safety-relevant applications, for example, to check the safety-relevant integrity of the measurement signal using a second measurement bridge (functional redundancy in the same torque transducer). Two torque transducer output signals are processed and analysed independently of each other via two separate measuring amplifier channels. This makes it possible to connect two measuring amplifiers with different characteristics (DC / TF). The second redundant measuring circuit is characterised by no crosstalk between the channels with different carrier frequencies. Notes: 1. The selection of a double measuring bridge has an effect on the number of connection sockets.
<b>Bending moment measuring circuits Mx, My</b>	The force transfer transducer series KTN-ZST can be equipped with bending moment measuring circuits optional. The additional bending moment measuring circuits can be measured to control the horizontal bending moments Mx and My and can be provided as separate channels. Notes: The selection of bending moment measuring circuits affects the number of connection sockets. A combination of double measuring bridges is possible on request.
<b>Temperature range</b>	The KTN-ZST series force transfer transducer can be used in a nominal temperature range of +17°C – +27 °C. S = Standard temperature range 17°C – 27°C Notes: Please observe the corresponding ambient conditions and ensure that there are no significant temperature fluctuations. These can possibly have an effect on the metrological performance.
<b>Electrical transducer connection</b>	The KTN-ZST series transducer can only be configured with pluggable connection sockets, without measuring cables. P = LEMO connection socket Notes: 1. The number of connection sockets depends on the number of measuring bridges selected.