

Operating manual

Force Transfer Standard Series KTN-D

Nominal Force
10 - 5000 kN





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The content of these manual is intended solely for information purposes and can be changed at any time without prior notification.

With regard to the warranty and liability, we refer expressly to our 'General commercial terms and conditions' (www.gtm-gmbh.com) and the instructions and regulations contained in these installation and operating instructions.

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1. Product description

1.1 Designated use

The force transducer of the KTN-D series is suitable for measuring uniaxial compressive forces and is used for calibration of static measuring machines, for example in accordance with ISO 376. For safe operation, original force introducing components must be used.

Any other use is not intended and is therefore prohibited. No claims may be made for damage resulting from inappropriate use.

The limit values for the total load and all other limits must be complied with.

1.2 Exempted use

The force transducer is not suitable for dynamic applications. The force transducer is not a safety component. You must not use it in a complete system in which its failure may lead to the life and well being of people being endangered.

The transducer is not suitable or approved for use in potentially explosive areas.

2. Safety instructions

Markings used

The following designations and symbols are used in the operating manual to identify hazards:



DANGER!

Denotes a possibly hazardous situation that can lead to physical injuries or death.



DANGER!

Denotes a hazardous situation due to electrical voltage that can lead to physical injuries or death.



NOTE!

Denotes usage tips, general information and other useful notes.



DANGER OF BURSTING!

Denotes a potentially hazardous situation that can cause physical injuries or death if ignored.

▶ Denotes handling instructions

● Denotes lists

Additional regulations

This operating manual contains the most important notes for safe operation of the transducer. Consideration must also be given to the legal and safety regulations applicable at the operating location, the accident prevention regulations applicable at the operating location and the technical data in connection with the safety regulations listed here.

Residual hazards

The transducer of series KTN-D is state-of-the-art technology and safe to operate.

Residual hazards can arise during operation if the devices are used and operated improperly by unqualified personnel.

The scope of delivery for the transducer only covers a partial area of mechatronic metrology. The safety-related criteria for using the transducer within a complete system must be taken into account by the system design engineer, the equipment manufacturer and/or the operator so that residual hazards are minimised. Reference must be made to the remaining residual hazards in the



DANGER!

In the case of a complete system, the safety-related criteria must be taken into account so that any failure of the transducer does not present a hazard to anyone.

Transducer condition and modifications

You may only operate the transducer in a perfect condition while complying with the instructions given in the operating manual.

The transducer must not be modified either in its design or safety-related features, without our express, written permission.

Overloading

All transducers of this series have already been subjected to an overload test at the manufacturer's. No additional overloads are permissible; always comply with the nominal loads of the transducer.



DANGER OF BURSTING!

Do not overload the transducer!

The attached parts must also be designed to bear the maximum load. Only use attached parts in an appropriate condition.

In case of new, untested designs, you must provide additional protective measures against bursting parts.

Personnel qualifications

The transducer and additional components must only be operated and assembled by qualified personnel. Qualified personnel are those persons who are acquainted with the assembly, commissioning and operation of the transducer and who have the appropriate qualifications for their job.



NOTE

GTM offers training courses to qualify personnel.

Ambient conditions

The transducer is intended for use in enclosed rooms while complying with the ambient conditions detailed in the technical specifications.

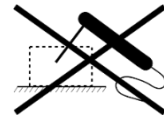
The transducer is not permitted for use in potentially explosive areas.



Protect the transducer against the influences of weather, such as rain and snow. Take appropriate measures on-site against power surges, e.g. from lightning strike.



No welding circuits may be introduced through the body of the transducer. If in doubt, you must dismantle the transducer.



DANGER!

The transducer is not suitable for:

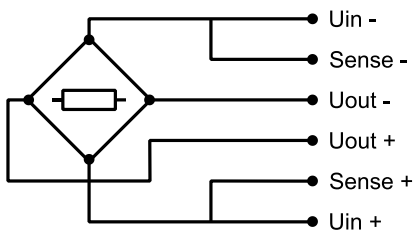
- Potentially explosive areas
- Power surges
- Welding circuits

3. Storage and transport instructions

The transducer series KTN-D is a precision measuring device and must be handled with appropriate caution.

- ▶ If the transducer is dropped or jolted it can become damaged prohibiting any further use.
- ▶ During storage, secure rotationally symmetrical transducers and attachment parts from rolling away.
- ▶ Only use the original transport packaging and other appropriate cut-to-size packaging for storage and transport.

4. Cable connection

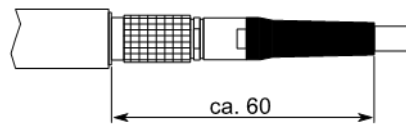
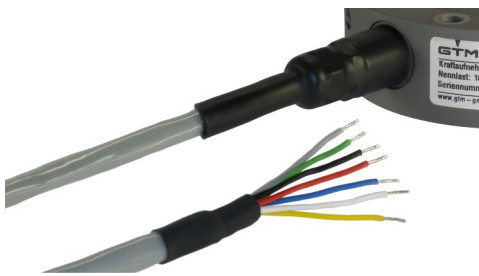


Connection pluggable ¹⁾²⁾	End not connected
7-pin LEMO Series 0 Female: - Male:	yellow cable Ø 6.5 mm twisted in pairs, 3 x 2 x 0.25 mm ² temperature range: -40 °C bis +90 °C

Connection		Pin	Wire colour
Supply voltage (+)	U _{in+}	3	blue
Supply voltage (-)	U _{in-}	2	black
Measurement signal (+)	U _{out+}	1	white
Measurement signal (-)	U _{out-}	4	red
Sense (+)	Sense+	5	green
Sense (-)	Sense-	6	grey
Shielding		Housing	yellow

1) View too weldingside

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



▶ permanent cable connection, end not connected

▶ pluggable cable connection

5. Double Bridge

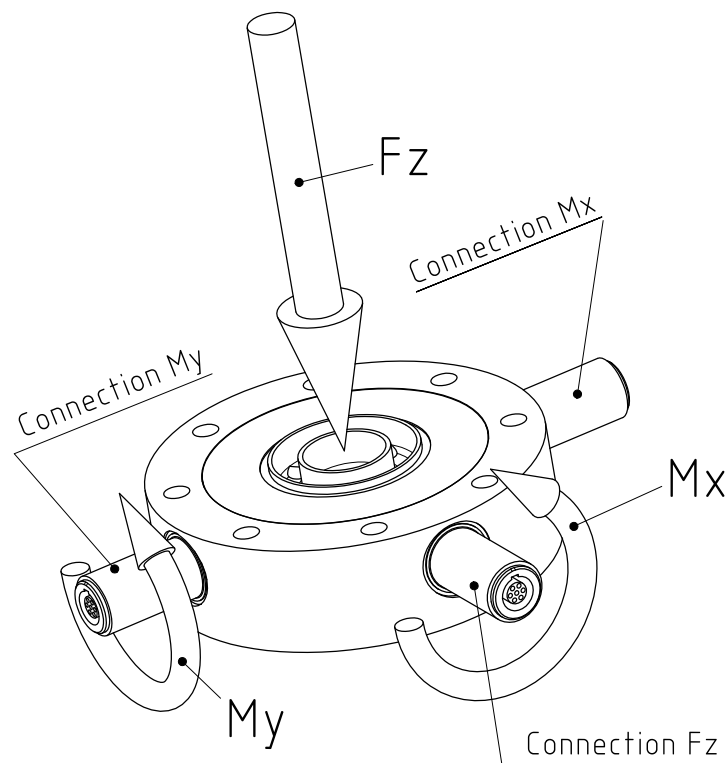
- ▶ For transducers with a double measuring bridge the second signal is measured by means of an additional plug. The respective electrical connections can be found in the chapter Technical Data.

6. Bending Moment Measuring Circuits

- ▶ During the test of force and torque introduction the bending moments M_x and M_y are measured and output as separate channels.

Nominal force	F_{nom}	kN	10 - 5000 (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
Nominal value	C_{nom}	mV/V	1)
Input resistance	R_e	Ω	400
Operating range of excitation voltage	$B_{U,G}$	V	5 - 12

1) Specification on type plate



▶ Position of the coordinate cross

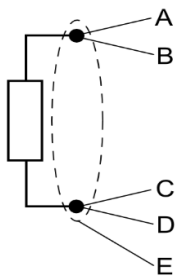
7. Temperature measurement

- ▶ For Type PT100 transducers with an integrated temperature sensor, observe the basic values of the resistors of the platinum measuring coils with a nominal resistance of 100 Ohms at 0°C. 3

These values and the permissible deviations correspond to DIN EN 60751.

Temperature range: see nominal temperature range in Technical Data

Connection type: 4 Conductor technology



		Permanent connection end not connected	Permanent connection ¹⁾	
		Black cable 4-wire Ø 2,2 mm 4 x 0,04 mm ² Temperature range: -50 °C bis +105 °C	6-pin LEMO Series 0 Female: - Male:	15-pin Sub-D male
Connection		Color	Pin	Pin
U (+)	A	White	1	5
Sense (+)	B	Red	3	12
U (-)	C	Black	4	6
Sense (-)	D	Green	6	13
Shielding	E	Housing	Housing	Housing

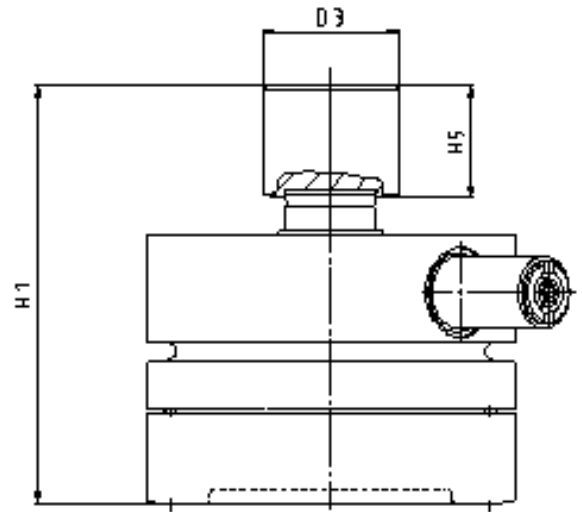
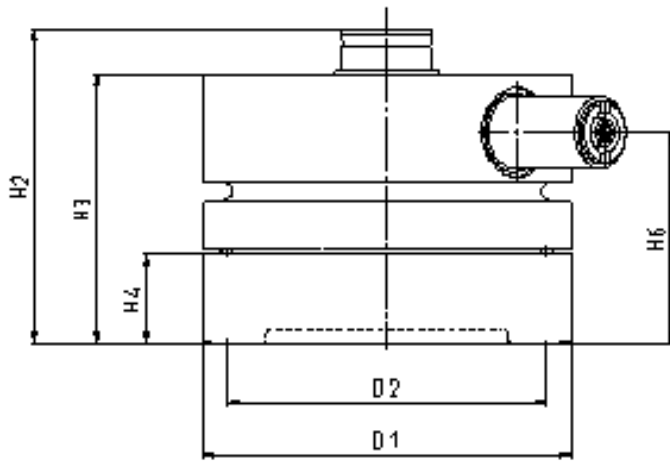
1) View to weldingside

8. Application instructions

8.1 Assembly instruction

- ▶ Avoid mechanical strain on the cable and the connector.
- ▶ Wear gloves if you wish to touch the transducer during a series of measurements.
- ▶ Avoid a deformation of the assembly surfaces. This could affect the measurement.
- ▶ Pay attention to the cleanliness of the mounting surfaces and connections. They should be cleaned from dust and dirt before mounting and measuring, otherwise the measuring would be influenced.

9. Mating dimensions



Nominal force	F_{nom}	kN	10	20	50	100	200	500	1000	2000	3000	5000	
Diameter	$\varnothing D_1$	mm	82	92	120	140	200	270	375				
Diameter	$\varnothing D_2$	mm	54	64	85	100	177	228	312.6				
Diameter	$\varnothing D_3$	mm	10 ^{H7}						150	215	25 ^{H8}		
Diameter	$\varnothing D_4$	mm	30	42	54	80	110	160	200				
Height	H_1	mm	93	107	124	149	195	267	360				
Height	H_2	mm	70		77	93	125	153	213				
Height	H_3	mm	60			66.75	82.35	103	140	197			
Height	H_4	mm	20						25		37		
Height	H_5	mm	25	39	49	58	75	119	153				
Height	H_6	mm	47	46			54.5	73.5	126	167			

10. Technical Data

10.1 Classification

Nominal force/kN	10	20	50	100	200	500	1000	2000	3000	5000
Class										
VN ¹⁾	✓	✓	✓	✓	✓	✓	✓			
00 ²⁾	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
0,5 ²⁾	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

1) GTM -Classification, better then class 00 according to ISO 376.

2) Class according to ISO 376

10.2 Class VN

	Nominal force	F_{nom}	kN	10	20	50	100	200	500	1000	
Metrological Data	Force measurement range		%	40 - 100							
	Interpolation error	f_c	%	0.002							
	Reversibility error	v	%	0.06							
	Repeatability error in unchanged mounting position	b, b_{rg}	%	0.002							
	Reproducibility error in different mounting positions	b', b_{rv}	%	0.005							
	Zero error	f_0	%	0.008							
	Creep		%	0.008							
	Temperature effect on characteristic value per 10 K	TK_C	%/10 K	0.01							
	Temperature effect on zero signal per 10 K	TK_0	%/10 K	0.01							
	Electrical Data	Rated characteristic value	C_{nom}	mV/V	2						
Input resistance		R_e	Ω	>1200	>1100					>1400	
Output resistance		R_a	Ω	>900							>1100
Insulation resistance		R_{is}	Ω	>10 ⁹							
Operating range of excitation voltage		$B_{U,G}$	V	5 - 12							
Protection (DIN EN 60529)				54							
Mechanical Data	Mass transducer	m	kg	1	2.3	2.4	4.5	7.7	15.6		
	Mass thrust piece	m	kg	0,2	0.5	0.5	0.9	2.3	5.5		
	Force limit		%	110							
	Breaking force		%	200							
	Permissible eccentricity	e_G	mm	5							10
	Rated temperature range	$B_{T,nom}$	°C	17 - 27							
	Operating temperature range	$B_{T,G}$	°C	10 - 35							

10.3 Class 00

Nominal force		F_{nom}	kN	10	20	50	100	200	500	1000	2000	3000	5000		
Metrological Data	Force measurement range		%	20 - 100											
	Interpolation error	f_c	%	0.02											
	Reversibility error	v	%	0.06											
	Repeatability error in unchanged mounting position	b, b_{rg}	%	0.023											
	Reproducibility error in different mounting positions	b', b_{rv}	%	0.045											
	Zero error	f_0	%	0.01											
	Creep		%	0.01											
	Temperature effect on characteristic value per 10 K	TK_C	%/10 K	0.01											
	Temperature effect on zero signal per 10 K	TK_0	%/10 K	0.01											
	Rated characteristic value	C_{nom}	mV/V	2											
Electrical Data	Input resistance	R_e	Ω	>1200	>1100				>1400	>1100	>900				
	Output resistance	R_a	Ω	>900					>1100	>900	>800				
	Insulation resistance	R_{is}	Ω	>10 ⁹											
	Operating range of excitation voltage	$B_{U,G}$	V	5 - 12											
	Protection (DIN EN 60529)			54											
Mechanical Data	Mass transducer	m	kg	1	2.3	2.4	4.5	7.7	15.6	39.4	124.3	133			
	Mass thrust piece	m	kg	0,2	0.5	0.5	0.9	2.3	5.5	18.6	36.7	36.7			
	Force limit		%	110											
	Breaking force		%	200											
	Permissible eccentricity	e_G	mm	5					10						
	Rated temperature range	$B_{T,nom}$	$^{\circ}\text{C}$	17 - 27											
	Operating temperature range	$B_{T,G}$	$^{\circ}\text{C}$	10 - 35											

10.4 Class 0.5

Nominal force		F_{nom}	kN	10	20	50	100	200	500	1000	2000	3000	5000		
Metrological Data	Force measurement range		%	20 - 100											
	Interpolation error	f_c	%	0.04											
	Reversibility error	v	%	0.14											
	Repeatability error in unchanged mounting position	b, b_{rg}	%	0.045											
	Reproducibility error in different mounting positions	b', b_{rv}	%	0.09											
	Zero error	f_0	%	0.02											
	Creep		%	0.02											
	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											
	Rated characteristic value	C_{nom}	mV/V	2											
Electrical Data	Input resistance	R_e	Ω	>1200	>1100				>1400	>1100	>900				
	Output resistance	R_a	Ω	>900					>1100	>900	>800				
	Insulation resistance	R_{is}	Ω	>10 ⁹											
	Operating range of excitation voltage	$B_{U,G}$	V	5 - 12											
	Protection (DIN EN 60529)			54											
Mechanical Data	Mass transducer	m	kg	1	2.3	2.4	4.5	7.7	15.6	39.4	124.3	133			
	Mass thrust piece	m	kg	0,2	0.5	0.5	0.9	2.3	5.5	18.6	36.7	36.7			
	Force limit		%	110											
	Breaking force		%	200											
	Permissible eccentricity	e_G	mm	5					10						
	Rated temperature range	$B_{T,nom}$	°C	17 - 27											
	Operating temperature range	$B_{T,G}$	°C	10 - 35											

11. Technical support

If problems arise while working with the product the following GTM services can be used:

E-mail support

contact@gtm-gmbh.com

Worldwide contact

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info@gtm.cz
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12. Declaration of incorporation

In accordance with EC Machinery Directive 2006/42/EC from May 17, 2006,
Appendix II B

We,

**GTM Testing and Metrology GmbH
Philipp-Reis-Straße 4-6
64404 Bickenbach
Deutschland**

hereby declare that the product

Force Transfer Standard Series KTN-D

complies with the following basic requirement:

- ▶ 2006/42/EG, Appendix II B EC Machinery Directive
- ▶ 2004/108/EC EMC Directive

The special technical documents were created in accordance with Appendix VII, Part B of the EC Machinery Directive 2006/42/EC. Upon reasoned request we shall undertake to submit them to the market supervision authority in electronic form within an appropriate period.

The product delivered by us may only be put into operation if it has been determined that the machine into which the product is to be incorporated likewise complies with the provisions of the Machinery Directive.



Daniel Schwind, Technical Manager

Bickenbach, 30.06.2022

13. Notes



#precision wins

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Illustrations may differ from originals.

