

## Operating manual

---

# Force Transfer Standard Series KTN-D

**Nominal Force**  
**10 - 5000 kN**





## **GTM Testing and Metrology GmbH**

Philipp-Reis-Straße 4-6

64404 Bickenbach

Deutschland

Tel: +49 6257 9720-0

Fax: +49 6257 9720-77

[contact@gtm-gmbh.com](mailto:contact@gtm-gmbh.com)

[www.gtm-gmbh.com](http://www.gtm-gmbh.com)

© GTM Testing and Metrology GmbH

All rights reserved. This document may not be photocopied, duplicated in any other form or translated into another language either in whole or in part without the prior written consent of GTM.

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](http://www.gtm-gmbh.com)) and the instructions and regulations contained in these installation and operating instructions.

# Table of contents

---

1. Product description .....	4
1.1 Designated use.....	4
1.2 Exempted use.....	4
2. Safety instructions.....	5
3. Storage and transport instructions .....	9
4. Cable connection .....	10
5. Double Bridge .....	11
6. Bending Moment Measuring Circuits .....	12
7. Temperature Measurement .....	13
8. Application instructions .....	14
8.1 Assembly instruction .....	14
9. Mating dimensions .....	15
10. Technical Data.....	16
10.1 Classification .....	16
10.2 Class VN .....	17
10.3 Class 00.....	18
10.4 Class 0.5.....	19
11. Technical support .....	20
12. Declaration of incorporation.....	21
13. Notes .....	22

# 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.

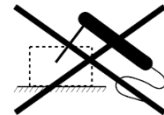
The transducer is not permitted for use in potentially explosive areas.



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



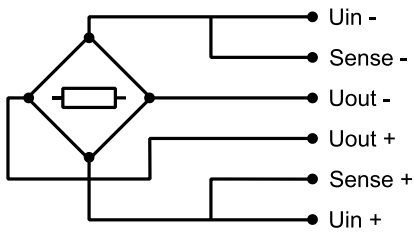
### 3. Storage and transport instructions

---

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



Pluggable connection <sup>1)2)3)</sup>	Open cable ends
7-pin LEMO Series 0 <b>female</b> <b>male</b> 	Double shielded measuring cable type DMC   yellow cable jacket   Ø 6.5 mm   twisted in pairs   3 x 2 x 0.25 mm <sup>2</sup>   temperature range: -40 °C ... +90 °C

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

1) View to o welding side

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

## ► Pluggable cable connection

All transducers of the KTN-D series can be equipped with a pluggable LEMO socket (on all measuring circuits selected). Suitable measuring cables S-CAB / C- CAB are available as accessories.

## ► Fixed measuring cable

All transducers of the KTN-D series can be equipped with permanently mounted measuring cables, e.g. with 5 / 10 m double-shielded measuring cable type DMC. The cable ends can be optionally open or equipped with various connectors for strain gauge amplifier connections.



► Plug-in cable connection with double-shielded measuring cable type DMC (S-CAB-DMC-L-5M-F)



► Fixed double-shielded measuring cable type DMC with open cable ends or with assembled plug for strain gauge amplifier connection

## 5. Double Bridge

---

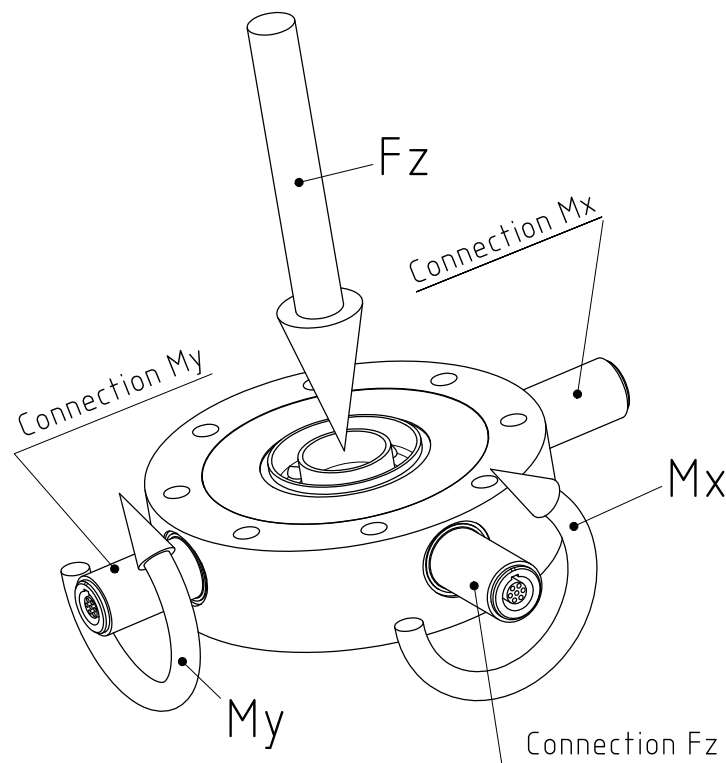
- ▶ For transducers with a double measuring bridge the second signal is measured by means of an additional plug. The respective electrical connections can be found in the chapter Technical Data.

## 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	$R_e$	$\Omega$	400
Operating range of excitation voltage	$B_{U,G}$	V	5 - 12

1) Specification on type plate



▶ Position of the coordinate cross

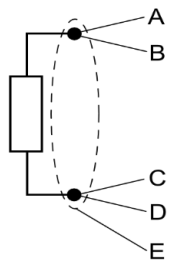
## 7. Temperature measurement

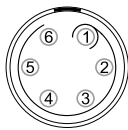
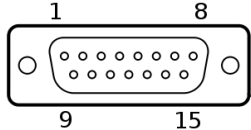
- ▶ For Type PT100 transducers with an integrated temperature sensor, observe the basic values of the resistors of the platinum measuring coils with a nominal resistance of 100 Ohms at 0°C. 3

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 <sup>1)</sup>	
		Black cable 4-wire Ø 2,2 mm 4 x 0,04 mm <sup>2</sup> 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

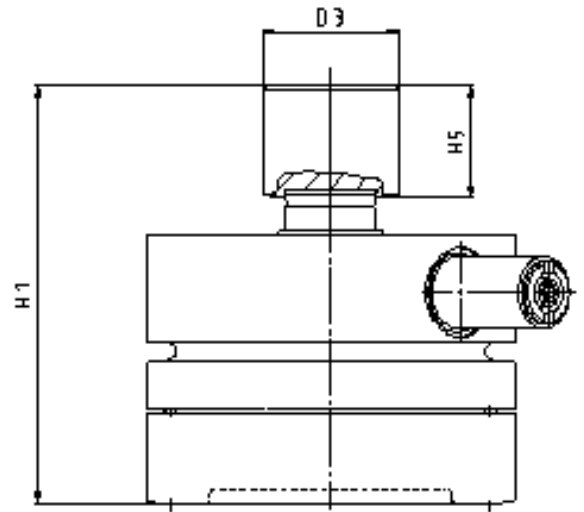
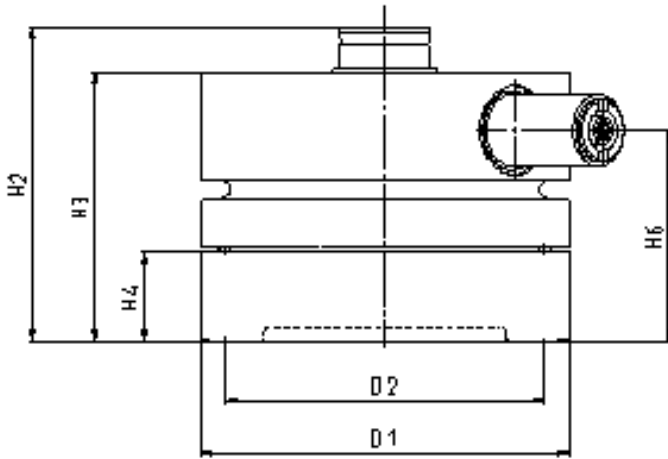
## 8. Application instructions

---

### 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	25	30	50	100	200	250	300	500	600	1000	1200	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	25	30	50	100	200	250	300	500	600	1000	1200	2000	3000	5000
Class																
VN <sup>1)</sup>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
00 <sup>2)</sup>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
0,5 <sup>2)</sup>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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

2) Class according to ISO 376 | measuring range selectable



## 10.2 Class VN

Nominal force		$F_{nom}$	kN	10	20	25	30	50	100	200	250	300	500	600	1000	1200			
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		$R_e$	$\Omega$	>1200				>1100					>1400						
Output resistance		$R_a$	$\Omega$	>900															
Insulation resistance		$R_{is}$	$\Omega$	$>10^9$															
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	4.8	7.7			15.6					
	Mass thrust piece	$m$	kg	0,2		0.5		0.5	0.9	0.9	2.3			5.5					
	Force limit		%	110															
	Breaking force		%	200															
	Permissible eccentricity	$e_G$	mm	5											10				
	Rated temperature range	$B_{T,nom}$	$^{\circ}C$	17 - 27															
	Operating temperature range	$B_{T,G}$	$^{\circ}C$	10 - 35															

## 10.3 Class 00

Nominal force		$F_{nom}$	kN	10	20	25	30	50	100	200	250	300	500	600	1000	1200	2000	3000	5000	
Metrological Data	Force measurement range		%	10 - 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	$R_e$	$\Omega$	>1200				>1100				>1400		>1100	>900					
	Output resistance	$R_a$	$\Omega$	>900												>1100	>900	>800		
	Insulation resistance	$R_{is}$	$\Omega$	>10 <sup>9</sup>																
	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	4.8	7.7			15.6	39.4	124.3	133				
	Mass thrust piece	$m$	kg	0.2	0.5		0.5	0.9	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																

## 10.4 Class 0.5

Nominal force		$F_{nom}$	kN	10	20	25	30	50	100	200	250	300	500	600	1000	1200	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															
	Electrical Data	Rated characteristic value	$C_{nom}$	mV/V	2														
Input resistance		$R_e$	$\Omega$	>1200	>1100						>1400			>1100	>900				
Output resistance		$R_a$	$\Omega$	>900											>1100	>900	>800		
Insulation resistance		$R_{is}$	$\Omega$	$>10^9$															
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	4.8	7.7			15.6	39.4	124.3	133			
	Mass thrust piece	$m$	kg	0,2	0.5		0.5	0.9	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	$B_{T,nom}$	$^{\circ}C$	17 - 27															
	Operating temperature range	$B_{T,G}$	$^{\circ}C$	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](mailto:contact@gtm-gmbh.com)

## **Worldwide contact**

GTM Testing and Metrology GmbH  
Philipp-Reis-Straße 4-6  
64404 Bickenbach  
Tel. +49 6257 9720-0  
Fax +49 6257 9720-77  
[www.gtm-gmbh.com](http://www.gtm-gmbh.com)

## **Local contact in Czech Republic**

GTM Praha s.r.o.  
Prosecká 811/76 a  
19000 Praha 9  
Czech Republic  
Tel. +420 286 891 392  
[info@gtm.cz](mailto:info@gtm.cz)  
[www.gtm.cz](http://www.gtm.cz)

## 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

## **GTM Testing and Metrology GmbH**

Tel: +49 6257 9720-0

Fax: +49 6257 9720-77

[contact@gtm-gmbh.com](mailto:contact@gtm-gmbh.com)

[www.gtm-gmbh.com](http://www.gtm-gmbh.com)

Subject to change without notice. All information describes our products in general terms. They do not represent agreed quality in the sense of § 434 Para. 1 of the BGB (German Civil Code).

Illustrations may differ from originals.

