GTM
DEFINING PRECISION

Operating manual

Force Transducer Series KL

Nominal Force
5 - 100 N

Variant with fixed measuring cable

Variante with connection socket

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
www.gtm-gmbh.com

Table of contents

1. Product description

1.1 Designated use

The force transducer of the UB series is to be used for measuring static and dynamic tensile forces and compressive forces.

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 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 KL 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 complete system.

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.

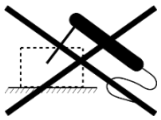
Ambient conditions

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

The tranducer 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.



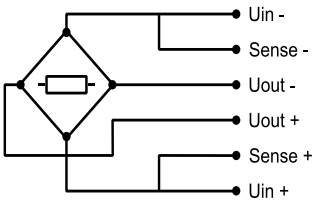
DANGER!
The transducer is not suitable for:
- Potentially explosive areas
- Power surges
- Welding circuits

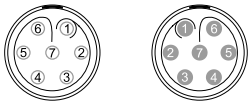
3. Storage and transport instructions

The transducer Series KL 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 | 20 - 500 kN



	Permanent connection end not connected	Connection pluggable[1)2)]
	SMC: grey | Ø 6.5 mm | twisted in pairs | 3 x 2 x 0.25 mm² | -35 °C to +90 °C	7-pin LEMO Series 0 Female: - Male: 

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

1) View to o weldingside
2) Female LEM O S.A. Typ: EGG.1B.307.CLL; M ale: FGG.1B.307.CLA.D72

▶ Fixed mounted measuring cables with open ends

▶ Pluggable cable connection

5. Application instructions | 5 - 100 N

5.1 Assembly instructions

- Tighten the screws evenly and crosswise.

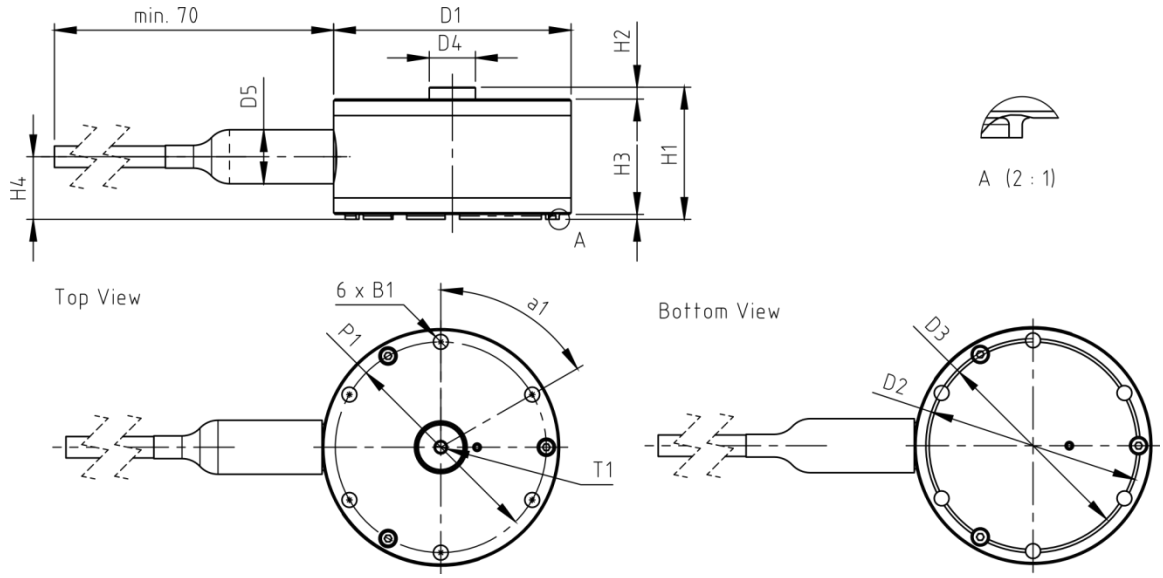
- Please note the maximum fastening torque of the central thread. A higher fastening torque or the release torque of the glued in screw will damage the transducer.

Connection	Nominal force	Screw size	Screw qualitiy	Fastening torque	Surface pressure [1)]
-	N	-	-	N·m	N/mm²
Thread	5 - 100	M4	A2-70	3	20
Flange	5 - 100	M4	A2-70	3	100

1) Surface pressure on the contact area as a result of the max. Fastening torque

NOTE!
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.

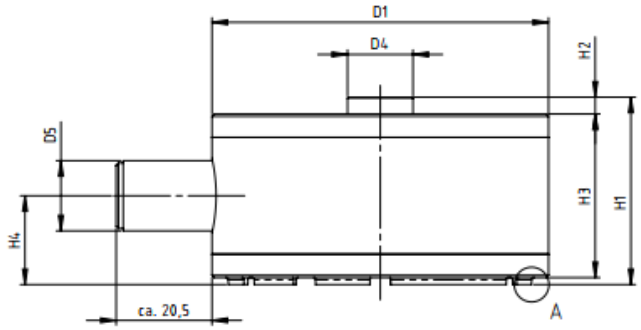
5.2 Mating dimensions *fixed measuring cable

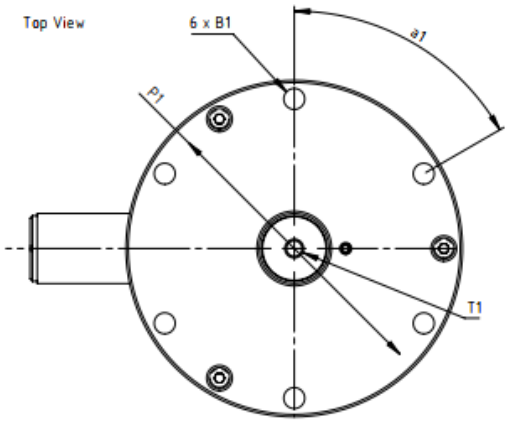


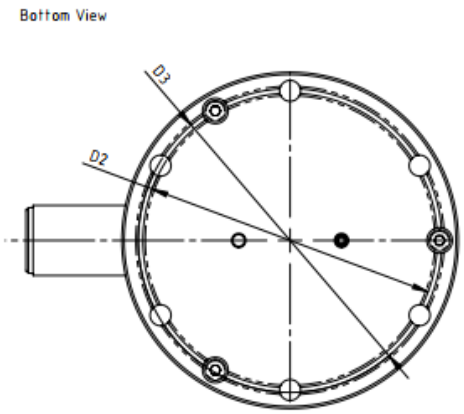
▶ Force transducer Series KL with fixed measuring cable

Nominal force compression/tension	$\pm F_{nom}$	kN	
Bore	$ØB_1$	mm	6 x 4.5
Diameter	$ØD_1$	mm	72
Diameter	$ØD_2$	mm	65
Diameter	$ØD_3$	mm	63
Diameter	$ØD_4$	mm	14
Diameter	$ØD_5$	mm	17
Pitch circle diameter	$ØP_1$	mm	64
Thread	T_1		M4, 8 mm
Height	H_1	mm	40.1
Height	H_2	mm	3.6
Height	H_3	mm	1.5
Height	H_4	mm	19
Angle	a_1		6 x 60°

5.3 Mating dimensions *pluggable connection



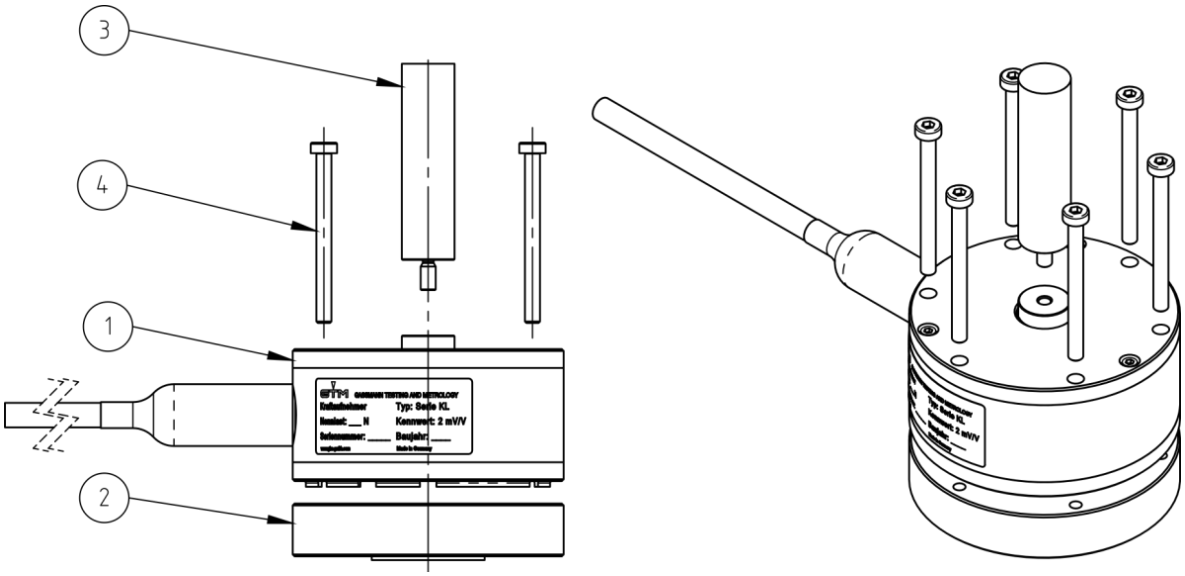




▶ Force transducer Series KL with pluggable connection

Nominal force compression/tension	$\pm F_{nom}$	kN	
Bore	$ØB_1$	mm	6 x 4.5
Diameter	$ØD_1$	mm	72
Diameter	$ØD_2$	mm	65
Diameter	$ØD_3$	mm	63
Diameter	$ØD_4$	mm	14
Diameter	$ØD_5$	mm	15
Pitch circle diameter	$ØP_1$	mm	64
Thread	T_1		M4, 8 mm
Height	H_1	mm	40.1
Height	H_2	mm	3.6
Height	H_3	mm	1.5
Height	H_4	mm	19
Angle	a_1		6 x 60°

5.4 Connection parts (example)



position	description
1	Spring element
2	Base plate
3	Tension member
4	Cylinder screw

6. Technical Data | 5 - 100 N

Nominal force compression/tension	$\pm F_{nom}$	N	5	10	20	50	100
Accuracy class			0.03				
Linearity error	d_{lin}	%	0.03				
Hysteresis	h	%	0.02				
Reproducibility		%	0.005				
Creep		%	0.025				
Temperature effect on characteristic value per 10 K	TK_C	%/10 K	0.04				
Temperature effect on zero signal per 10 K	TK_0	%/10 K	0.025				
Eccentricity effect		%/mm	0.015				
Bending moment effect		%/(0.1·N·m)	0.2	0.1	0.05	0.02	0.01
Lateral force effect		%/(0.1·F_{nom})	0.02				
Characteristic value difference, tension/compression force	d_{ZD}	%	0.1				
Rated characteristic value	C_{nom}	mV/V	2				
Characteristic value tolerance	d_c	%	0.2				
Zero signal deviation	$d_{S,0}$	%	0.5				
Input resistance	R_e	Ω	820				
Output resistance	R_a	Ω	600 - 700				
Insulation resistance	R_{is}	Ω	> 10^9				
Operating range of excitation voltage	$B_{U,G}$	V	5 - 12				
Protection (DIN EN 60529)			50				

Metrological Data

Electrical Data

Mechanical Data	Nominal force compression/tension	$\pm F_{nom}$	N	5	10	20	50	100
	Rated Displacement	s_{nom}	mm	0.54	0.45	0.31	0.22	0.18
	Spring rigidity	c_{ax}	N/mm	9	22	63	231	549
	Mass	m	kg	0.3				
	Proportionate moving mass	m_{mess}	kg	0.04				
	Fundamental resonant frequency	f_G	Hz	80	120	200	380	600
Limits	Force limit		%	150				
	Breaking force		%	300		275		250
	Lateral force limit		%	1900	1200	800	500	300
	Permissible eccentricity	e_G	mm	100	70	50	40	30
	Bending moment limit	$M_{b\,zul}$	N·m	0.5	0.7	1.1	1.9	2.8
	Rated temperature range	$B_{T,\,nom}$	°C	10 – 40				
	Operating temperature range	$B_{T,\,G}$	°C	- 10 – +50				

7. 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

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

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
www.gtm.cz

8. 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 Transducer Series KL

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

9. Notes

#precision wins

GTM Testing and Metrology GmbH
Tel: +49 6257 9720-0
Fax: +49 6257 9720-77
contact@gtm-gmbh.com
www.gtm-gmbh.com