

## Operating manual

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# Force Transducer Series UB

Nominal Force  
20 - 500 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](http://www.gtm-gmbh.com)) and the instructions and regulations contained in these installation and operating instructions.

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# 1. Product description

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## 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

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### 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 UB 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.

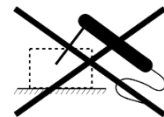
The transducer is not permitted for use in potentially explosive areas.



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



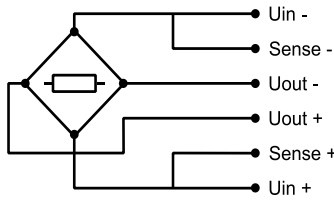
### 3. Storage and transport instructions

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The transducer Series UB 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 connected <sup>1)</sup>	Connection pluggable <sup>1)2)</sup>	Permanent connection end not connected
		7-pin LEMO Series 1 Male	7-pin LEMO Series 0 Female: - Male:	SMC: grey   Ø 6.5 mm   twisted in pairs   3 x 2 x 0.25 mm <sup>2</sup>   -35 °C to +90 °C
Connection		Pin	Pin	Wire Color
Supply voltage (+)	U <sub>in+</sub>	3	3	SMC: blue
Supply voltage (-)	U <sub>in-</sub>	2	2	SMC: black
Measurement signal (+)	U <sub>out+</sub>	1	1	SMC: white
Measurement signal (-)	U <sub>out-</sub>	4	4	SMC: red
Sense (+)	Sense+	5	5	SMC: green
Sense (-)	Sense-	6	6	SMC: grey
Shielding		Housing	Housing	SMC: yellow

1) View too weldingside

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



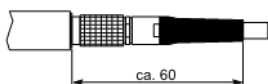
### ▶ Pluggable cable connection

All standard variants of the series UB are equipped with a pluggable LEMO socket. Suitable measuring cables S-CAB / C-CAB are available as accessories.



### ▶ Fixed measuring cable with open ends

For variants with fixed measuring cable type SMC 5 m and open cable ends, e.g. measuring amplifier plugs of type D-Sub 9; D-Sub 15; M-S 7pol can be additionally assembled on request.



## 5. Application instructions | 20 - 500 kN

### 5.1 Assembly instructions

- ▶ Avoid mechanical strain on the cable and the connector.
- ▶ Avoid a deformation of the assembly surfaces. This could affect the measurement.

Nominal force	Screw size	Screw quality	Min. screw depth	Max. screw depth	Suggested fastening torque
kN	-	-	mm	mm	N·m
20	M20x1.5	10.9	15	18	95
25	M20x1.5	10.9	15	18	115
50	M20x1.5	10.9	15	18	230
100	M24x2	10.9	17	21	550
200	M30x2	10.9	20	24	1400
500	M56x4	10.9	45	53	6700



#### ALTERNATIVE TO TIGHTEN THE THREAT:

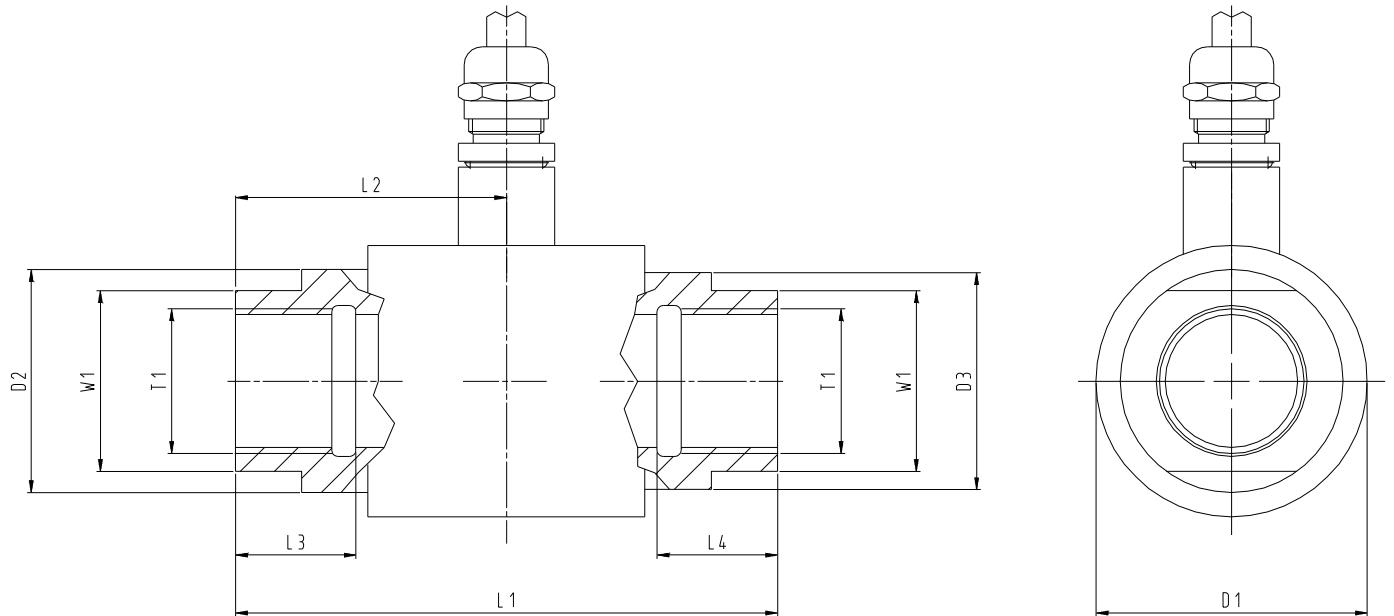
Put a strain of 130% of the nominal force on the force transducer  
Tighten the locknut by hand  
Unload the strain on the transducer



#### NOTE!

The fastening torque for tightening the locknuts should not be conducted over the transducer!

## 5.2 Mating dimensions



Nominal force compression/tension	$\pm F_{nom}$	kN	20	50	100	200	500
Diameter	$\varnothing D_1$	mm	40	55	65	120	
Diameter	$\varnothing D_2$	mm	30	45	55	110	
Diameter	$\varnothing D_3$	mm	29	44	54	109	
Lenght	$L_1$	mm	71	95	115	180	
Lenght	$L_2$	mm	35.5	47.5	57.5	92	
Lenght	$L_3$	mm	19	22	25	55	
Thread	$T_1$		M20x1.5	M24x2	M30x2	M56x4	
Width	$W_1$	mm	24	36	46	85	

## 6. Technical Data | 20 - 500 kN

Nominal force compression/tension		$\pm F_{nom}$	kN	20	50	100	200	500
Metrological Data	Accuracy class			0.2		0.3		
	Linearity error	$d_{lin}$	%	0.2		0.3		
	Hysteresis	$h$	%	0.05		0.07		
	Repeatability (f.s.)		%	0.01				
	Zero error	$f_0$	%	0.02				
	Creep		%	0.05				
	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				
	Eccentricity effect		%/mm	0.05				
	Lateral force effect		%/(0,1·F <sub>nom</sub> )	0.1				
	Torque effect		%/(mm·F <sub>nom</sub> )	0.1				
	Characteristic value difference, tension/compression force	$d_{ZD}$	%	max. 2				
	Rated characteristic value	$C_{nom}$	mV/V	2				
	Characteristic value tolerance	$dc$	%	0.25				
Electrical Data	Zero signal deviation	$d_{S,0}$	%	0.5				
	Input resistance	$R_e$	Ω	350 - 450				
	Output resistance	$R_a$	Ω	200 - 300		250 - 350	300 - 400	
	Insulation resistance	$R_{is}$	Ω	>10 <sup>9</sup>				
	Operating range of excitation voltage	$B_{U,G}$	V	5 - 12				
	Protection (DIN EN 60529)			54				

# Technical Data

Mechanical Data	Nominal force compression/tension	$\pm F_{nom}$	kN	20	50	100	200	500
	Rated Displacement	$s_{nom}$	mm	0.04	0.07	0.09	0.12	0.21
	Spring rigidity	$c_{ax}$	kN/mm	500	710	1100	1650	2350
	Mass	$m$	kg	0.3		1	1.5	8
	Proportionate moving mass	$m_{mess}$	kg	0.1		0.3	0.6	3.5
	Fundamental resonant frequency	$f_G$	kHz	7	8.5	6		3
	Permissible oscillation stress		%	100				
Limits	Force limit		%	150				
	Breaking force		%	300				
	Lateral force limit		%	80				
	Permissible eccentricity	$e_G$	mm	10				
	Rated temperature range	$B_{T,nom}$	°C	-10 - +60				
	Operating temperature range	$B_{T,G}$	°C	-10 - +80				

## 7. Technical support

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

### Local contact in Czech Republic

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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)

## 8. Declaration of incorporation

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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 UB**

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

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#precision wins

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