GTM
DEFINING PRECISION

Operating manual

Force Transducer
Series ZST

Nominal Force
200 kN - 10000 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
www.gtm-gmbh.com

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1. Product description

1.1 Designated use

The force transducer of the ZST series is is suitable for tensile forces and is used for static calibration of materials testing machines in accordance with ISO 7500. 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 ZST 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.

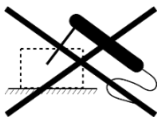
Ambient conditions

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.



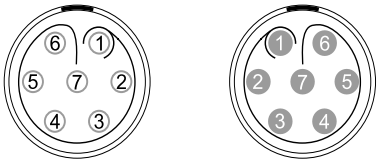
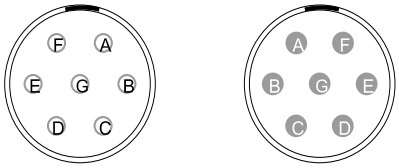
DANGER!
The transducer is not suitable for:
- Potentially explosive areas
- Power surges
- Welding circuits

3. Storage and transport instructions

The transducer series ZST 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)] 7-pin LEMO Series 0 Female: - Male:	Connection pluggable[1) 3) 4)] 7-pin Amphenol Female: - Male:
			
Connection		Pin	Pin
Supply voltage (+)	U_{in+}	3	C
Supply voltage (-)	U_{in-}	2	B
Measurement signal (+)	U_{out+}	1	A
Measurement signal (-)	U_{out-}	4	D
Sense (+)	Sense+	5	F
Sense (-)	Sense-	6	G
Shielding		Housing	Housing

1) View too weldingside
2) Female LEMO S.A. Typ: EGG.1B.307.CLL; Male: FGG.1B.307.CLA.D72
3) Amphenol Series 97, Female Typ: MS3102A-16S-1SF; Maler Typ: MS3106A-16S-1P
4) Only available from size 500 kN

5. Double Bridge

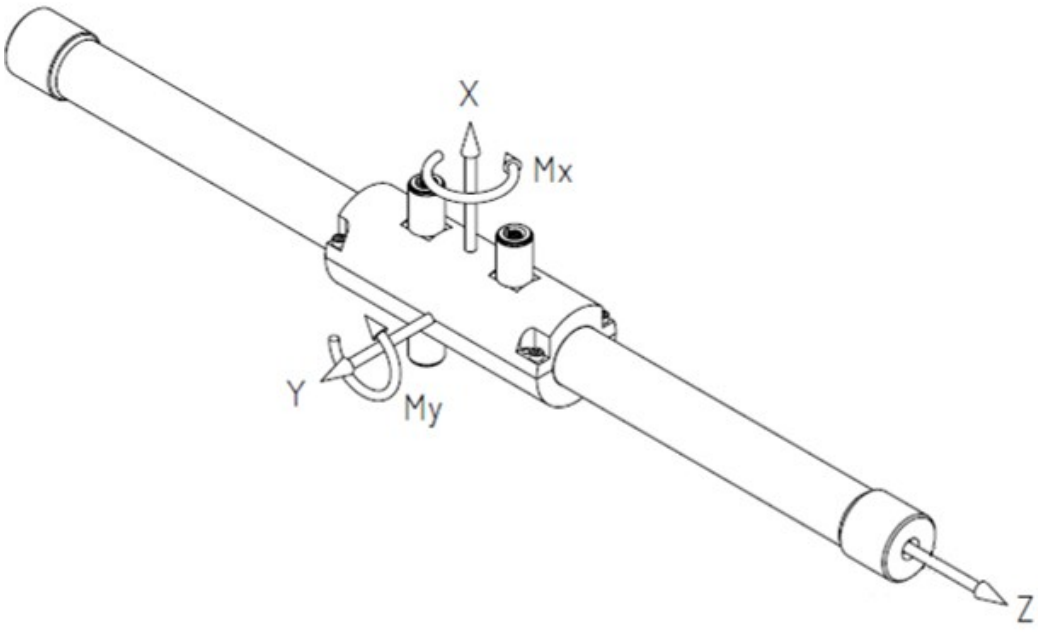
- For transducers with a double measuring bridge the second signal is measured by means of an additional plug. The respective electrical connections can be found in the chapter Technical Data.

6. Bending Moment Measuring Circuits

▶ During the test of force and torque introduction the bending moments Mx and My 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	Ω	400
Operating range of excitation voltage	$B_{U,G}$	V	5 - 12

1) Specification shown on the label



▶ **Position of the coordinate cross**

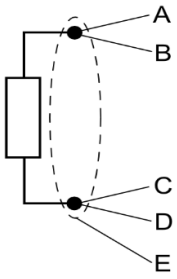
7. Temperature measurement

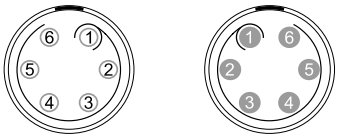
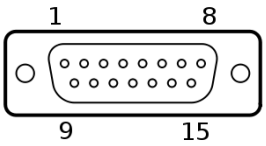
▶ For Type PT100 transducers with an integrated temperature sensor, observe the basic values of the resistors of the platinum measuring coils with a nominal resistance of 100 Ohms at 0°C.

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 mm² 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

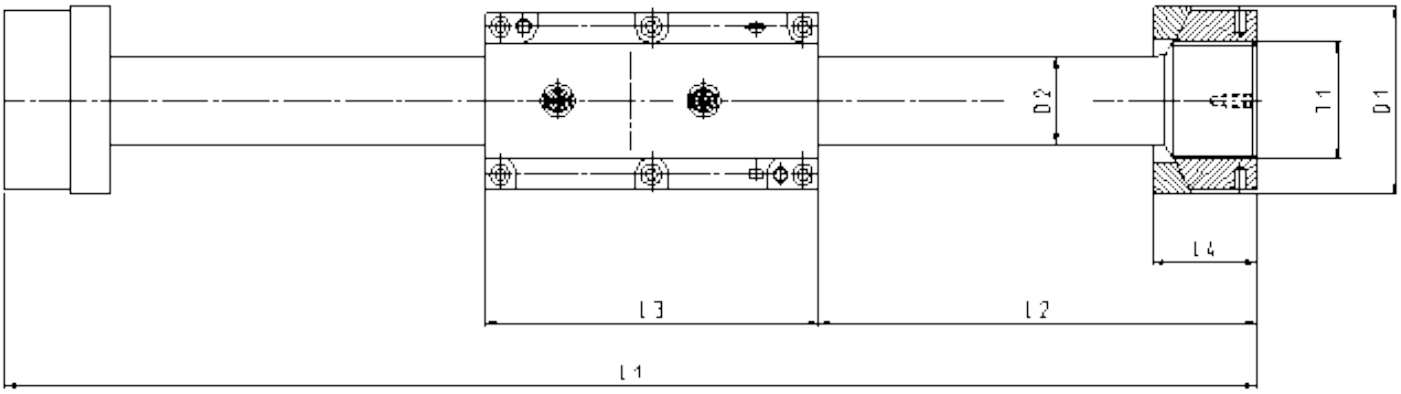
1) View to weldingside

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.
- In the use of hydraulic taper bush pay attention to the assembly instruction from the manufacturer.
- 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 compression/tension	$\pm F_{nom}$	kN	200	500	600	1000	1200	2000	5000 6000	10000
Diameter	$ØD_1$	mm	64_{c11}	90_{c11}		120_{c11}		165_{c11}	270_{c11}	345
Diameter	$ØD_2$	mm	26	42.5	46	58	63.5	83	148	191
Lenght	L_1	mm	500	600	650			900	1400	1500
Lenght	L_2	mm	190	220	245			370	565	684
Lenght	L_3	mm	120	160					170	220
Lenght	L_4	mm	32	49.8		71.4		103.2	171	200
Thread	T_1		M30x2	M56x4		M64x4		M90x4	M160x6	M200x6

10. Technical Data

Metrological Data	Rated Force	F_{nom}	kN	200	500	600	1000	1200	2000	5000 6000	10000
	Classification			0.5[1)]							
	Force measurment 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	Ω	700 - 800							
	Output resistance	R_a	Ω	600 - 750							
	Insulation resistance	R_{is}	Ω	> 10^9							
	Operating range of excitation voltage	$B_{U,G}$	V	5 - 12							
	Protection (DIN EN 60529)			54							
Limits	Weight without ball cup		kg	2.4	9	10	16.5	19	43	188	365
	Weight with ball cup		kg	3.5	12	13	25	27	66	212	550
	Force limit		%	110							
	Breaking force		%	300							
	Rated temperature range	$B_{T,nom}$	°C	17 - 27							
	Operating temperature range	$B_{T,G}$	°C	10 - 35							

1) Classification according to ISO 376

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

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

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 Transducer Series ZST

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
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contact@gtm-gmbh.com
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