GTM
DEFINING PRECISION

Operating manual

Torque Transfer Standard
Series Dm-TN

1 N·m - 20.000 N·m

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1. Product description

1.1 Designated use

The torque transducer of the Dm-TN series is suitable for static measurement of torques that are free of transverse forces and is used for calibration of static torque machines, for example in accordance with DIN 51309 or for static calibration of materials testing machines.

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 torque transducer is not suitable for rotating operation. The torque 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 Dm-TN 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.

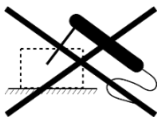
Ambient conditions

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.



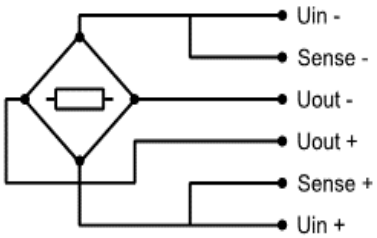
DANGER!
The transducer is not suitable for:
- Potentially explosive areas
- Power surges
- Welding circuits

3. Storage and transport instructions

The transducer series Dm-TN 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



		Permanent connection end connected[1) 3) 4)]	Connection pluggable[1) 2) 5)]
		7-pin LEMO Series 1 Female[3)]	7-pin LEMO Series 0 Female: - Male:
Connection		Pin	Pin
Supply voltage (+)	U_{in+}	3	3
Supply voltage (-)	U_{in-}	2	2
Measurement signal (+)	U_{out+}	1	1
Measurement signal (-)	U_{out-}	4	4
Sense (+)	Sense+	5	5
Sense (-)	Sense-	6	6
Shielding		Housing	Housing

1) View to welding side
2) Female LEMO S.A. Typ: EGG.1B.307.CLL; Male: FGG.1B.307.CLA.D72
3) Starting from size 10 N · m
4) Cable length: 0.5 m
5) Starting from size 20 N · m available

permanent cable connection, end connected (up to size 10 N·m)

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.

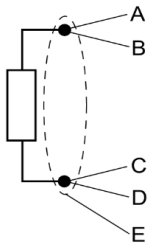
6. Temperature measurement

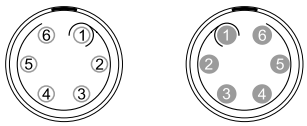
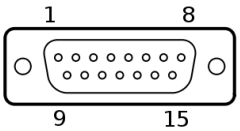
▶ For Type PT100 transducers with an integrated temperature sensor, observe the basic values of the resistors of the platinum measuring coils with a nominal resistance of 100 Ohms at 0°C.

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



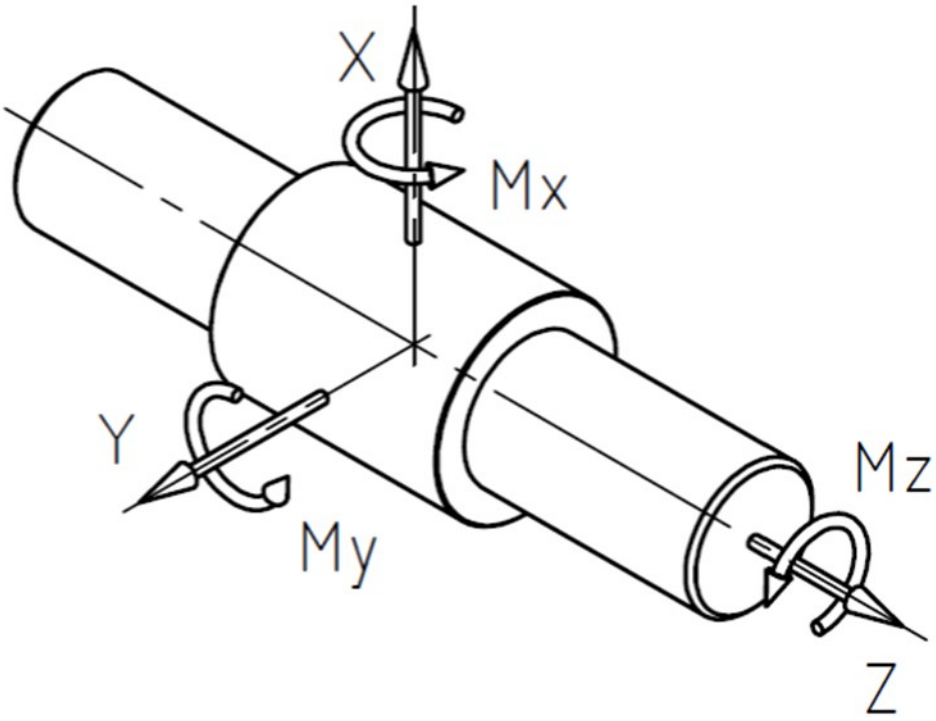
		Permanent connection end not connected	Permanent connection[1)]	
		Black cable 4-pin Ø 2,2 mm vibration-proof, 4 x 0,04 mm² Temperature range: -50 °C to +105 °C	6-pin LEMO Series 0 female: - male: 	D-Sub 15-pin 
Connection		Color		
U (+)	A	white	1	5
Sense (+)	B	red	3	12
U (-)	C	black	4	6
Sense (–)	D	green	6	13
Shielding	E	housing		

1) View to weldingside

7. 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.

Rated torque	M_{nom}	N·m	500 - 20000
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



▶ Position of the coordinate cross

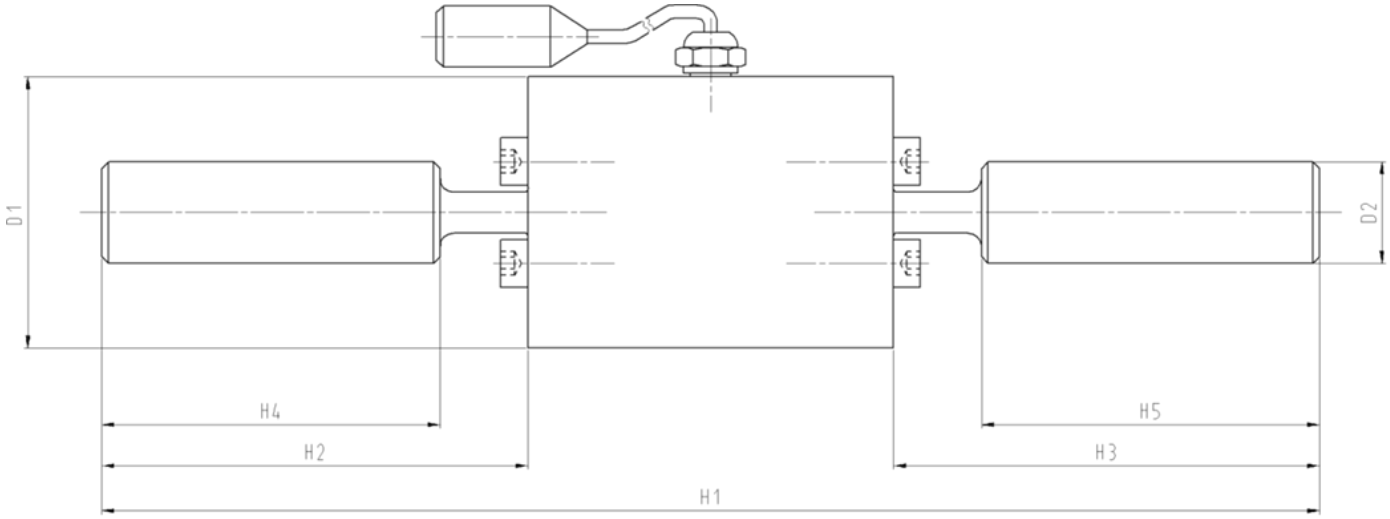
8. Application instructions

8.1 Assembly instruction

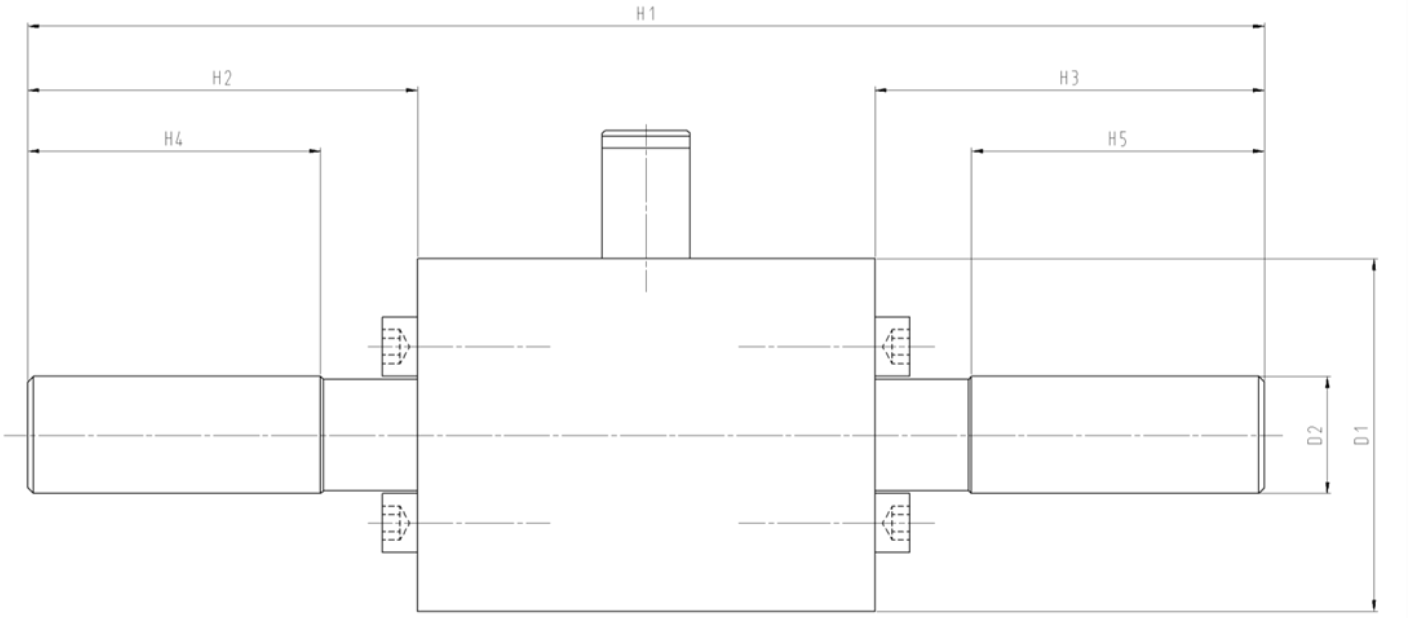
- Make sure that the transducer is installed in the correct direction. The measuring side is marked on the type plate.
- Avoid mechanical strain on the cable and the connector.
- "On the measuring side", the clamping bush must not rest against the housing, otherwise there is a risk of force shunt.
- Use compensating elements to compensate for unparallelism in the installation.
- 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

9.1 Construction size | 1 - 100 N·m



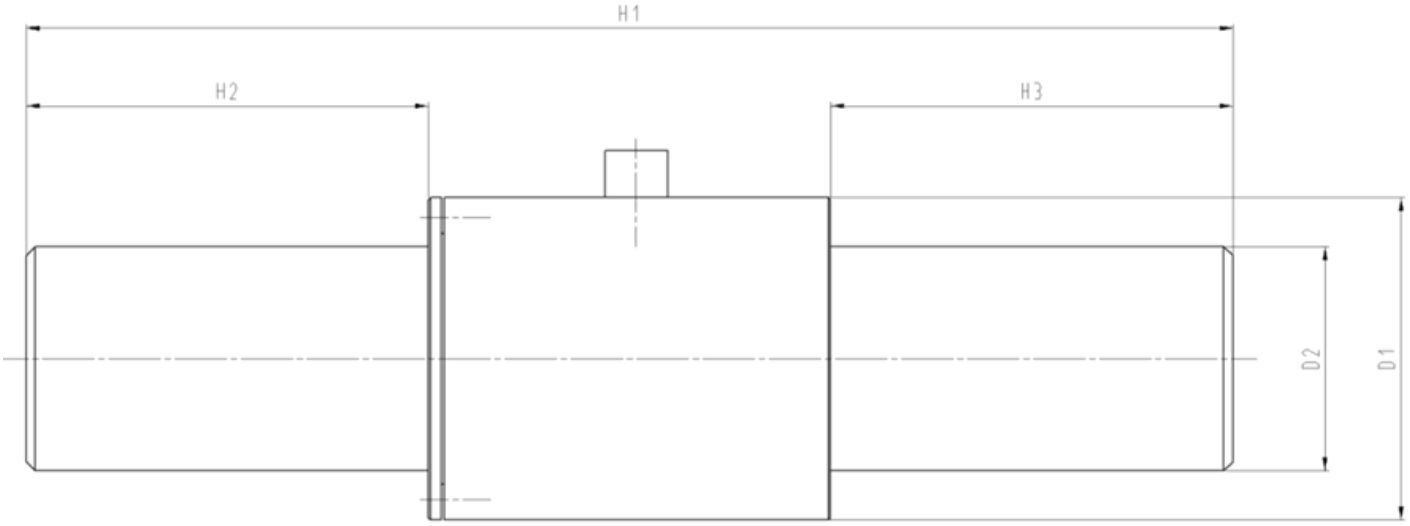
construction size | 1 - 10 N·m



construction size | 20 - 100 N·m

Rated Torque	M_{nom}	N·m	1 2 5 10	20 50 100
Diameter	$ØD_1$	mm	40	60
Diameter	$ØD_2$	mm	15_{h7}	20_{h7}
Height	H_1	mm	180	211
Height	H_2	mm	63	66.5
Height	H_3	mm	63	66.5
Height	H_4	mm	50	50
Height	H_5	mm	50	50

9.2 Construction size | 200 - 20.000 N·m



Rated Torque	M_{nom}	N·m	200	500 1000	2000 3000 5000	10000 20000
Diameter	$ØD_1$	mm	51	72	92	150
Diameter	$ØD_2$	mm	30h7	50h7	70h7	110h7
Height	H_1	mm	200	270	320	530
Height	H_2	mm	60	90	115	155
Height	H_3	mm	60	90	115	155

10. Technical Data

10.1 Class VN

Metrological Data	Rated Torque	M_{nom}	N·m	50 100	200	500	1000	2000	3000	5000	10000	20000
	Torque measurement range		%	40 - 100								
	Interpolation error	f_c	%	± 0.025								
	Reversibility error	v	%	0.063								
	Reproducibility error in different mounting positions	b, b_{rv}	%	0.01								
	Repeatability error in unchanged mounting position	b, b_{rg}	%	0.005								
	Zero error	f_0	%	0.006								
	Creep		%	0.004								
	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	0.008								
Electrical Data	Rated characteristic value	C_{nom}	mV/V	2								
	Input resistance	R_e	Ω	> 350								
	Output resistance	R_a	Ω	> 300								
	Insulation resistance	R_{is}	Ω	> 10^9								
	Operating range of excitation voltage	$B_{U,G}$	V	5 - 12 V								
	Protection (DIN EN 60529)			54								
Limits	Mass	m	kg	0.4	1.2	4.6		15.8			36.5	37
	Torque limit		%	110								
	Rated temperature range	$B_{T,nom}$	°C	17 - 27								
	Operating temperature range	$B_{T,G}$	°C	10 - 35								

10.2 Class 0.05

Rated Torque	M_{nom}	N·m	1 2 5 10	20 50 100	200	500	1000	2000	3000	5000	10000	20000
Torque measurement range		%	20 - 100									
Interpolation error	f_c	%	± 0.025									
Reversibility error	v	%	0.063									
Reproducibility error in different mounting positions	b', b_{rv}	%	0.05									
Repeatability error in unchanged mounting position	b, b_{rg}	%	0.025									
Zero error	f_0	%	0.0125									
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	0.008									
Rated characteristic value	C_{nom}	mV/V	1)	2								
Input resistance	R_e	Ω	> 350									
Output resistance	R_a	Ω	> 300									
Insulation resistance	R_{is}	Ω	> 10^9									
Operating range of excitation voltage	$B_{U,G}$	V	5 - 12 V									
Protection (DIN EN 60529)			54									
Mass	m	kg	0.3	0.4	1.2	4.6	15.8			36.5	37	
Torque limit		%	110									
Rated temperature range	$B_{T,nom}$	°C	17 - 27									
Operating temperature range	$B_{T,G}$	°C	10 - 35									

Metrological Data

Electrical Data

Limits

1) Size 1 … 5 N·m: ca. 1,8 mV/V ; nominal value is specified on the type label.
Size 10 N·m: 2 mV/V

10.3 Class 0.1

Metrological Data	Rated Torque	M_{nom}	N·m	1 2 5 10	20 50 100	200	500	1000	2000	3000	5000	10000	20000
	Torque measurement range		%	20 - 100									
	Interpolation error	f_c	%	± 0.05									
	Reversibility error	v	%	0.125									
	Reproducibility error in different mounting positions	b', b_{rv}	%	0.1									
	Repeatability error in unchanged mounting position	b, b_{rg}	%	0.05									
	Zero error	f_0	%	0.025									
	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									
Electrical Data	Rated characteristic value	C_{nom}	mV/V	1)	2								
	Input resistance	R_e	Ω	> 350									
	Output resistance	R_a	Ω	> 300									
	Insulation resistance	R_{is}	Ω	> 10^9									
	Operating range of excitation voltage	$B_{U,G}$	V	5 - 12 V									
	Protection (DIN EN 60529)			54									
Limits	Mass	m	kg	0.3	0.4	1.2	4.6		15.8		36.5	37	
	Torque limit		%	110									
	Rated temperature range	$B_{T,nom}$	°C	17 - 27									
	Operating temperature range	$B_{T,G}$	°C	10 - 35									

1) Size 1 … 5 N·m: ca. 1,8 mV/V; nominal value is specified on the type label.
Size 10 N·m: 2 mV/V

10.4 Class 0.2

Rated Torque	M_{nom}	N·m	1 2 5 10	20 50 100	200	500	1000	2000	3000	5000	10000	20000
Torque measurement range		%	20 - 100									
Interpolation error	f_c	%	± 0.1									
Reversibility error	v	%	0.25									
Reproducibility error in different mounting positions	b', b_{rv}	%	0.2									
Repeatability error in unchanged mounting position	b, b_{rg}	%	0.1									
Zero error	f_0	%	0.05									
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	1)	2								
Input resistance	R_e	Ω	> 350									
Output resistance	R_a	Ω	> 300									
Insulation resistance	R_{is}	Ω	> 10^9									
Operating range of excitation voltage	$B_{U,G}$	V	5 - 12 V									
Protection (DIN EN 60529)			54									
Mass	m	kg	0.3	0.4	1.2	4.6	15.8			36.5	37	
Torque limit		%	110									
Rated temperature range	$B_{T,nom}$	°C	17 - 27									
Operating temperature range	$B_{T,G}$	°C	10 - 35									

Metrological Data

Electrical Data

Limits

1) Size 1 … 5 N·m: ca. 1,8 mV/V ; nominal value is specified on the type label.
Size 10 N·m: 2 mV/V

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
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www.gtm-gmbh.com

Local contact in Czech Republic

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Prosecká 811/76 a
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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 Transfer Standard Series Dm-TN

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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