

## Operating manual

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# Torque Transfer Wrench Series Dm-TS

2 N·m - 3.000 N·m





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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 torque transfer wrench of the Dm-TS series is suitable for static measurement of torques produced under the effect of a transverse force. It is used for example for calibration of torque calibration stations for torque wrenches in accordance with DKD-R 3-8.

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 transfer wrench is not suitable for manual operation

It is not to be used for torque-controlled tightening of screws.

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 Dm-TS 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.

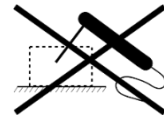
The transducer is not permitted for use in potentially explosive areas.



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



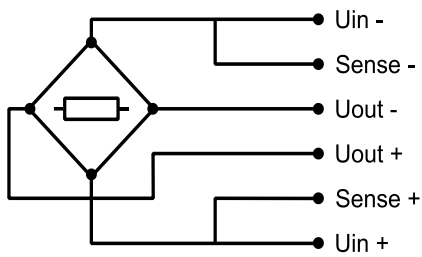
### 3. Storage and transport instructions



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The transducer series Dm-TS 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 <sup>1) 3) 4)</sup>	Connection pluggable <sup>1) 2) 5)</sup>
		7-pin LEMO Series 1 Female <sup>3)</sup>	7-pin LEMO Series 0 Female: - Male:
			
Connection		Pin	Pin
Supply voltage (+)	U <sub>in+</sub>	3	3
Supply voltage (-)	U <sub>in-</sub>	2	2
Measurement signal (+)	U <sub>out+</sub>	1	1
Measurement signal (-)	U <sub>out-</sub>	4	4
Sense (+)	Sense <sup>+</sup>	5	5
Sense (-)	Sense <sup>-</sup>	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) Available up to Size 25 N·m
- 4) Cable length 0,5 m
- 5) Available from Size 50 N·m

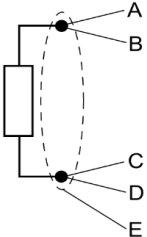
## 5. Temperature measurement

- 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



Connection		Color	Permanent connection <sup>1)</sup>	
			6-pin LEMO Series 0 female: - male:	D-Sub 15-pin
U (+)	A	white	1	5
Sense (+)	B	red	3	12
U (-)	C	black	4	6
Sense (-)	D	green	6	13
Shielding	E	housing		

Permanent connection end not connected

Black cable 4-pin  
Ø 2,2 mm  
vibration-proof, 4 x 0,04 mm<sup>2</sup>  
Temperature range: -50 °C to +105 °C

6-pin LEMO Series 0  
female: - male:

D-Sub 15-pin

1) View to weldingside

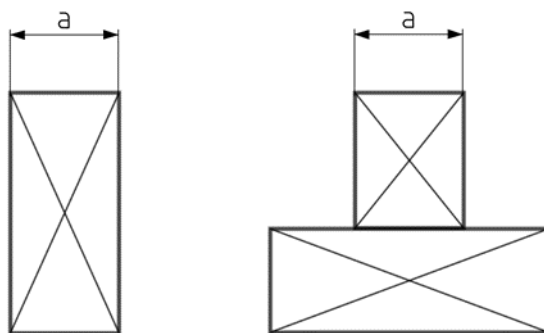
## 6. Application instructions

### 6.1 Square adaptor

The precision of the square adaptor is an essential influencing factor for the measuring properties of the transfer wrench. The square connection transfers the torque via force pairs which act on the square connection surfaces.

The square adaptors are assigned to the transfer wrenches and may not be switched amongst each other.

Square adaptors of different nominal sizes can optionally be used. At the same time, you must observe the maximum transferrable torque both for the transfer wrench and for its application. Information on the maximum transferrable torque of the square adaptor can be found in the technical specifications.

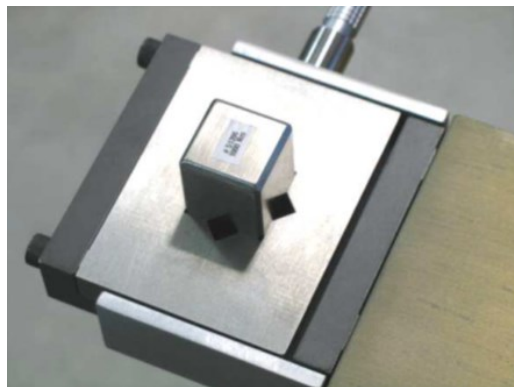


▶ standard- and reducing square adapter

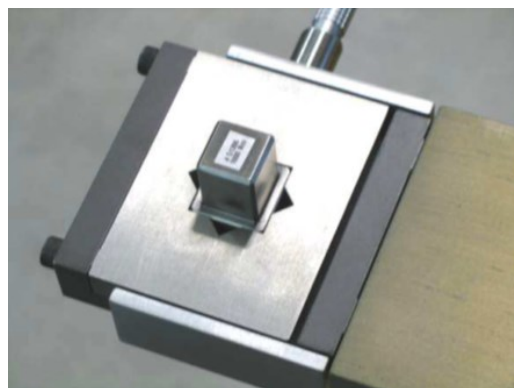
Nominal size "a"	Nominal size	Max. torque	Max. torque for reducing adapters
Zoll	mm	N·m	N·m
¼	6.3	30	20
⅜	10	135	100
½	12.5	340	200
¾	20	1000	500
1	25	2700	1500

Please observe the following instructions to ensure that the transfer wrench functions perfectly in its configuration:

- ▶ Only original square adapters from GTM may be used in the transfer wrench.
- ▶ Connect the transfer wrench with the calibration object as directly as possible, i.e. without any other adapters.
- ▶ Damaged adaptors may not be used and must be replaced as soon as possible!
- ▶ You must comply with the maximum transferable torque of the square adaptor. Information can be found about this in the technical specifications.



▶ Transfer wrench with square adaptor 1 inch



▶ Transfer wrench with  $\frac{3}{4}$ -inch square adaptor

## 6.2 Lever arm length

The effective lever arm length determines, at a defined moment, the size of the introduced transverse force, which can have a direct influence on the transfer wrench and on the object to be calibrated.

If you have a calibration certificate for the transfer wrench, the calibration values apply only in the range of the lever arm lengths used during calibration. A shortening of the lever arm necessarily follows a higher transverse force.

To avoid mechanical overloading of the lever due to impermissibly high transverse forces, the following minimum lever lengths must be observed:

$M_{\text{nom.}}$	$l_{\text{min.}}$
N·m	mm
2 – 20	100
25	125
50	200
100	275
200	380
500 – 2000	600
3000	1100

- ▶ Only introduce the shearing force in the range of the specified lever arm lengths.

## 6.3 Protective covering

The transfer wrench has a mechanical protective covering to protect the measuring application. This is connected elastically to the transfer wrench to minimise cross interference. The elasticity of the fastening has been deliberately designed and is not a defect in the transfer wrench.

An even, surrounding gap can be seen when the protective covering is seated correctly. Check this gap before each application and adjust the protective housing as necessary, however do not simultaneously loosen the protective housing screw connections!

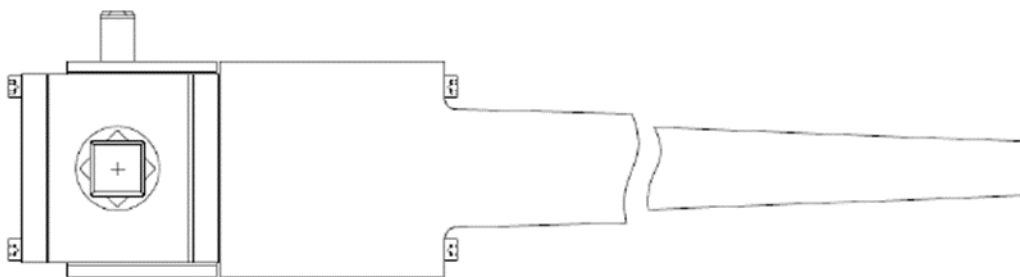


▶ Schutzabdeckung

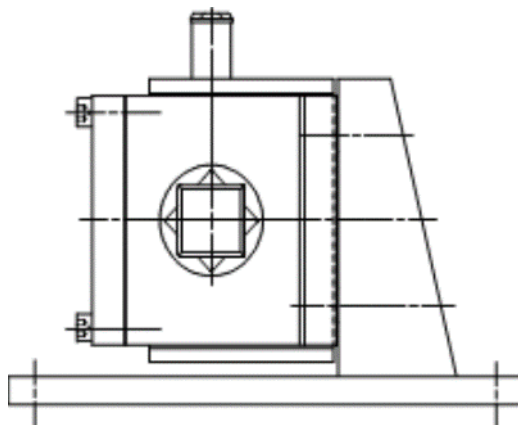
- ▶ Check that the protective covering is correctly seated before each application.

## 6.4 Design variations

The measuring elements of the torque transfer wrench can be optionally fitted with customer-specific holding devices. However, any changes to the measuring element fixture in this regard are only permitted by the manufacturer.

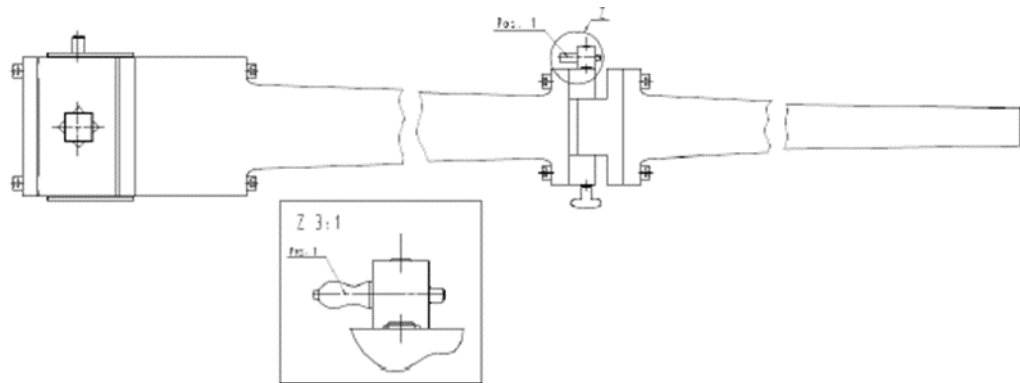


▶ Standard design of the Dm-TS series with a continuous lever arm



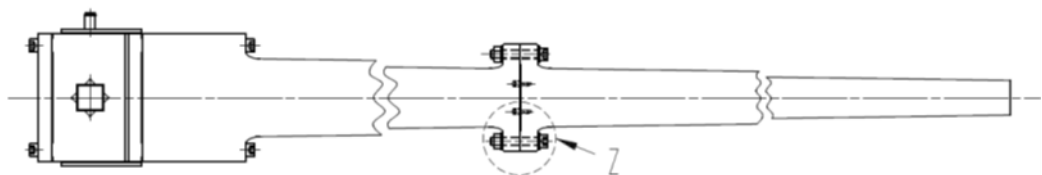
▶ Variation of the Dm-TS series as a table model





► Version of the Dm-TS series with a collapsible lever arm

- Make sure that the safety pin pos. 1 is correctly positioned when using a collapsible lever arm.

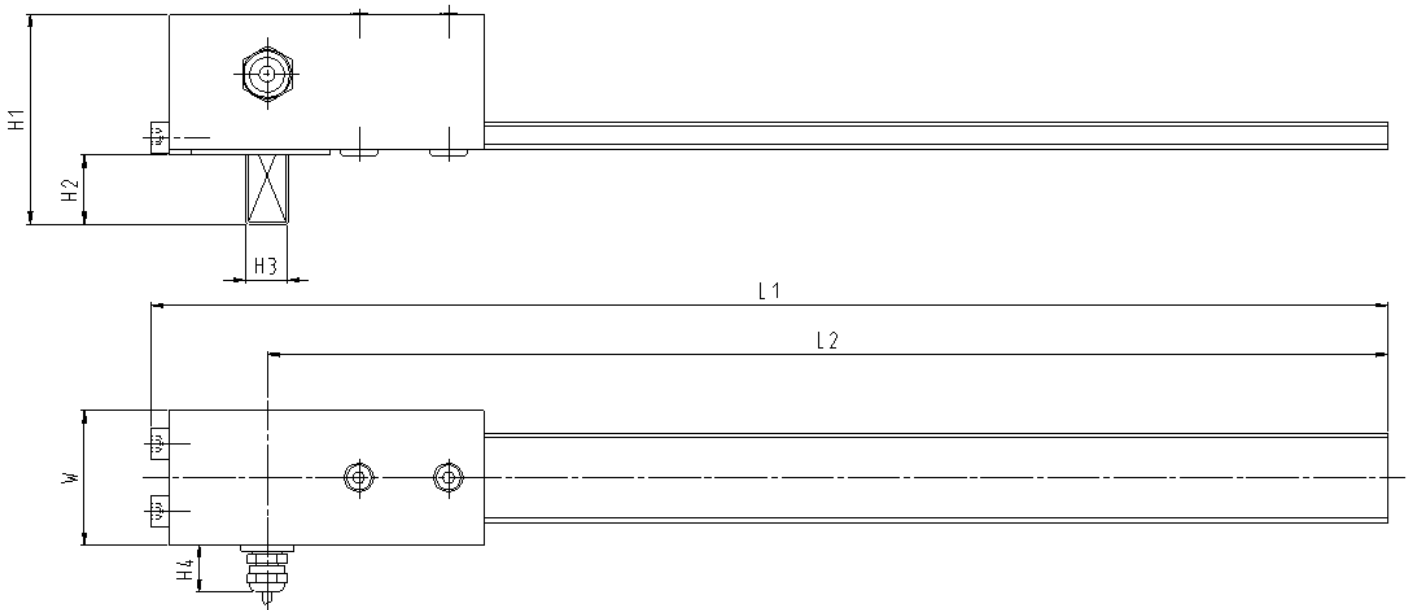


► Version of the Dm-TS series with a separable lever arm

- Before using a separable lever arm, the two parts must be screwed together (see detail Z). Tighten the screws (pos. 1: M12-10.9) to a tightening torque of 60 N · m.

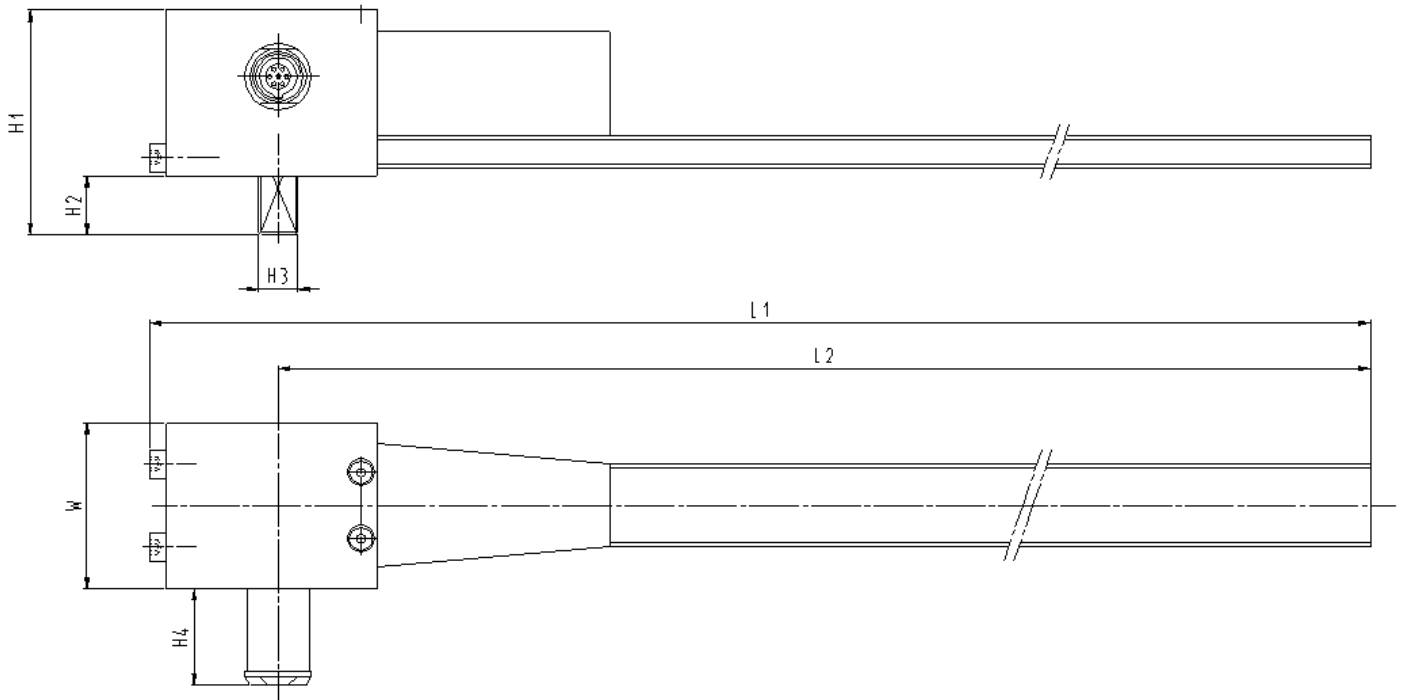
# 7. Mating dimensions

## 7.1 Construction size | 2 - 25 N·m



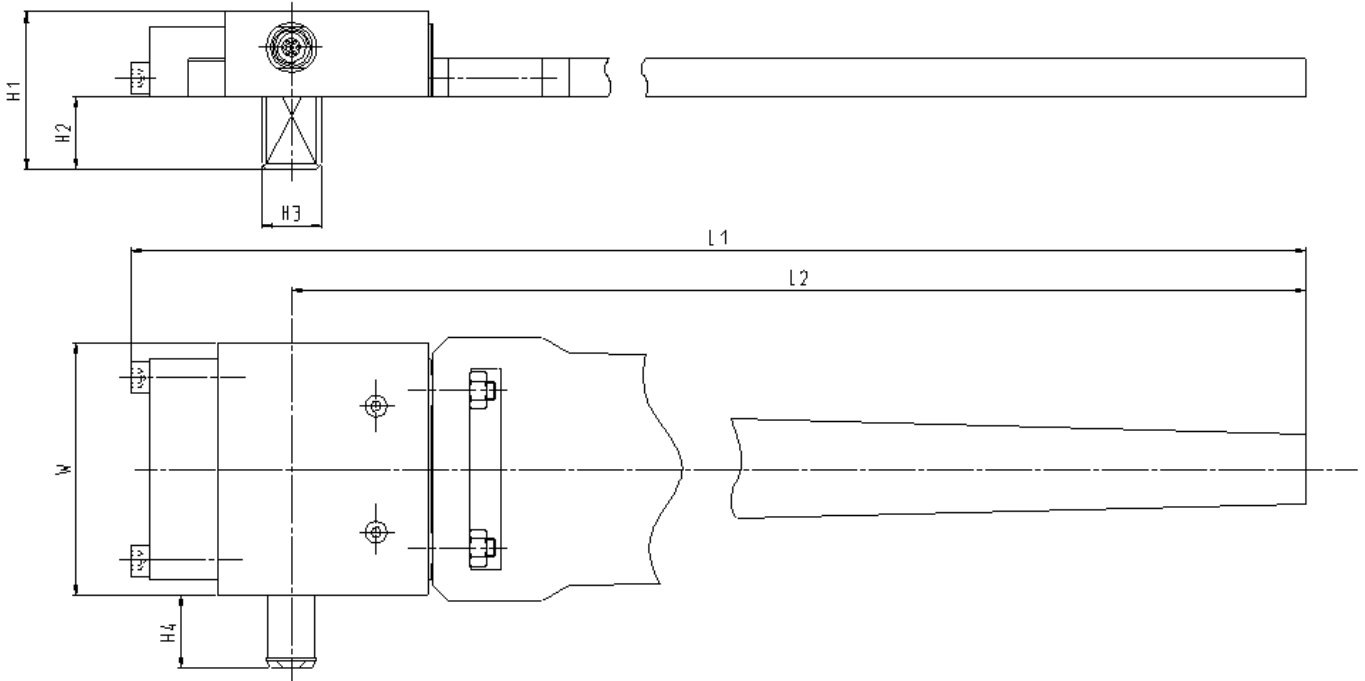
Rated Torque	$M_{nom}$	N·m	2	5	10	20	25
Height	$H_1$	mm			47		
Height	$H_2$	mm			15.5		
Height	$H_3$	mm			3/8"		
Height	$H_4$	mm			11		
Lenght	$L_1$	mm			276		
Lenght	$L_2$	mm			250		
Width	$W$	mm			30		

## 7.2 Construction size | 50 - 200 N·m

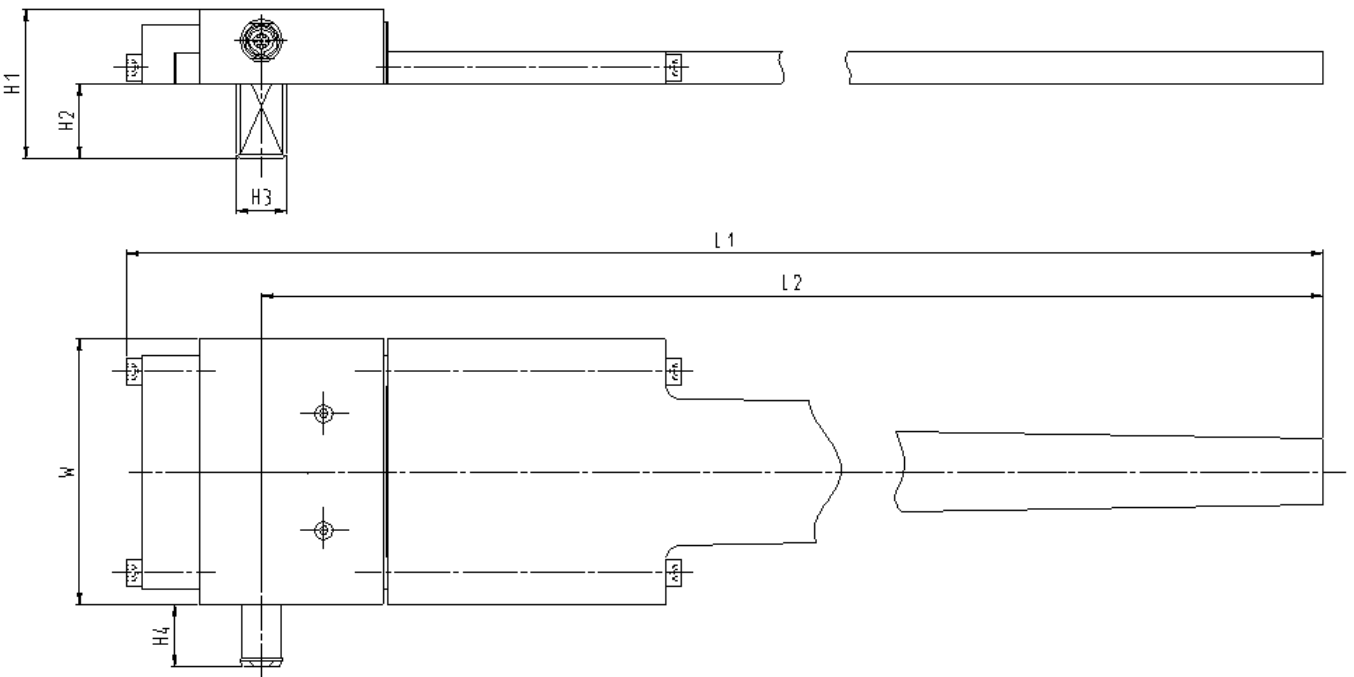


Rated Torque	$M_{nom}$	N·m	50	100	200
Height	$H_1$	mm	54	63.5	28
Height	$H_2$	mm	14	23.5	20
Height	$H_3$	mm	3/8"		1/2"
Height	$H_4$	mm	23		
Lenght	$L_1$	mm	481	582	799
Lenght	$L_2$	mm	450	550	756
Width	$W$	mm	40		60

## 7.3 Construction size | 500 - 3.000 N·m



► construction size 500 N·m



► construction size 1.000 - 3.000 N·m

## Mating dimensions

Rated Torque	$M_{nom}$	N·m	500	1000	1500 2000	3000 <sup>1)</sup>
Height	$H_1$	mm	50	56	62	83.5
Height	$H_2$	mm	23	28		33.5
Height	$H_3$	mm	3/4"	1"		1 1/2"
Height	$H_4$	mm	25			
Lenght	$L_1$	mm	1113	1115	1124	2587
Lenght	$L_2$	mm	1062	1064		2500
Width	$W$	mm	80	100	132	197

1) Lever arm is divided for transportation provided.

# 8. Technical Data

## 8.1 Class 0.1

Rated Torque		$M_{nom}$	N·m	2	5	10	20	25	50	100	200	500	1000	1500 2000	3000
Metrological Data	Torque measurement range		%	20 - 100											
	Interpolation error	$f_c$	%	0.05											
	Reversibility error	$v$	%	0.125											
	Repeatability error in unchanged mounting position	$b, b_{rg}$	%	0.05											
	Reproducibility error in different mounting positions	$b', b_{rv}$	%	0.1											
	Zero error	$f_0$	%	0.025											
	Creep		%	0.01											
	Temperature effect on characteristic value per 10 K	$TK_C$	%/10 K	0.05											
	Temperature effect on zero signal per 10 K	$TK_0$	%/10 K	0.05											
	Rated characteristic value	$C_{nom}$	mV/V	2											
Electrical Data	Input resistance	$R_e$	$\Omega$	1100								700-800			
	Output resistance	$R_a$	$\Omega$	850-1000								1700-2000			
	Insulation resistance	$R_{is}$	$\Omega$	$>2 \times 10^9$											
	Operating range of excitation voltage	$B_{U, G}$	V	5 - 12											
	Protection (DIN EN 60529)			IP 60											
Limits	Mass	$m$	kg	0.3			0.9		1.5	2.5	3.2	4	30		
	Torque limit		%	120											
	Breaking torque		%	200											
	Lateral force limit	$N$	%	24	60	120	240	300	480	690	1200	2400		2900	
	Rated temperature range	$B_{T, nom}$	$^{\circ}\text{C}$	-10 - +70											
	Operating temperature range	$B_{T, G}$	$^{\circ}\text{C}$	-20 - +85											

## 8.2 Class 0.2

Rated Torque		$M_{nom}$	N·m	2	5	10	20	25	50	100	200	500	1000	1500 2000	3000
Metrological Data	Torque measurement range		%	20 - 100											
	Interpolation error	$f_c$	%	0.1											
	Reversibility error	$v$	%	0.25											
	Repeatability error in unchanged mounting position	$b, b_{rg}$	%	0.1											
	Reproducibility error in different mounting positions	$b', b_{rv}$	%	0.2											
	Zero error	$f_0$	%	0.05											
	Creep		%	0.02											
	Temperature effect on characteristic value per 10 K	$TK_C$	%/10 K	0.05											
	Temperature effect on zero signal per 10 K	$TK_0$	%/10 K	0.05											
	Electrical Data	Rated characteristic value	$C_{nom}$	mV/V	2										
Input resistance		$R_e$	$\Omega$	1100						700-800					
Output resistance		$R_a$	$\Omega$	850-1000						1700-2000					
Insulation resistance		$R_{is}$	$\Omega$	$>2 \times 10^9$											
Operating range of excitation voltage		$B_{U,G}$	V	5 - 12											
Protection (DIN EN 60529)				IP 60											
Limits	Mass	$m$	kg	0.3			0.9			1.2	2.5	3.2	4	30	
	Torque limit		%	120											
	Breaking torque		%	200											
	Lateral force limit	$N$	%	24	60	120	240	300	480	690	1200	2400		2900	
	Rated temperature range	$B_{T,nom}$	$^{\circ}\text{C}$	-10 - +70											
	Operating temperature range	$B_{T,G}$	$^{\circ}\text{C}$	-20 - +85											

## 9. 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  
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)



## 10. 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

**Torque Transfer Key Series Dm-TS**

complies with the following basic requirement:

- ▶ 2006/42/EG, Appendix II B      EC Machinery Directive
- ▶ 2004/108/EC                      EMC Directive

as well as the other standards and specifications:

- ▶ DIN ISO 6789: 2003-10      Screwing tools - Hand-operated  
Torque tools
- ▶ DKD-R 3-7: 2003-10      Static calibration of indicating torque wrenches  
torque spanners

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

# 11. Notes

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#precision wins

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Illustrations may differ from originals.

