Screwdriving Technology
Automation
Air Motors
Air Tools

DEPRAG

Torque Transducers

Transducers, measurement platforms and measurement wrenches

- **highly accurate measurements**
- **wide measurement range**
- **in-process control with the torque transducer**

The selection of a suitable torque transdu-cer is a basic requirement for the adjust-ment, monitoring and inspection of screw-drivers, and also for the testing of screw joints and screw joint analysis.

Measuring Technology

D3020E 08.2019

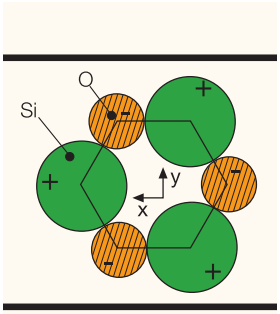
EXAMPLES for the use of the most suitable measurement device for processing reliability requirements

Example 1:
An operator always assembles the same type of screw using a DEPRAG pneumatic screwdriver. Through the driver shut-off when the preset torque is reached, the assembly is controlled and assured to be accurate. In certain intervals, the screwdrivers are cross-checked using torque-transducers and if deviations occur, re-adjustments can be made.
Measurement platforms which are intended for stationary use in a measurement laboratory or on a mobile measurement station are suitable for this test.

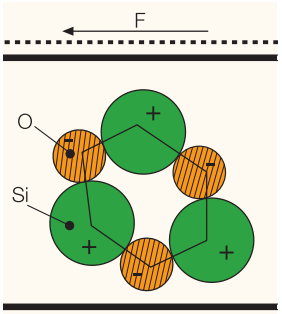
Example 2:
In a fully automatic assembly station, the regular testing of stationary screwdrivers is necessary. The DEPRAG torque wrenches in straight and angle-design, allow the mobile use when testing screwdriver-spindles without their removal from an assembly station.
The torque-wrenches can also be used for the re-tightening or loosening of already assembled fastener.

Example 3:
Transducers measure the torque directly on the component. When connected to a DEPRAG measuring instrument, this transducers are ideal for torque acquisition and screw joint analysis and are an important component for the optimum quality assurance.

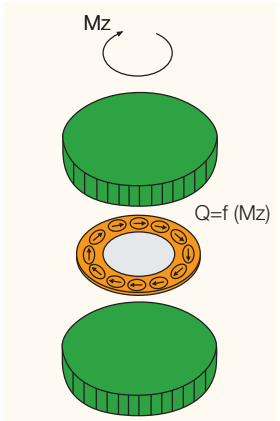
PHYSICAL PRINCIPLES



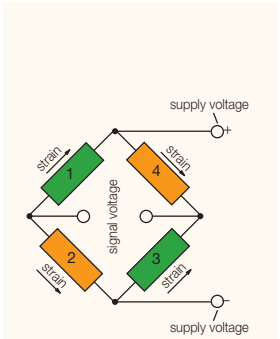
Arrangement of quartz crystal without load



under load

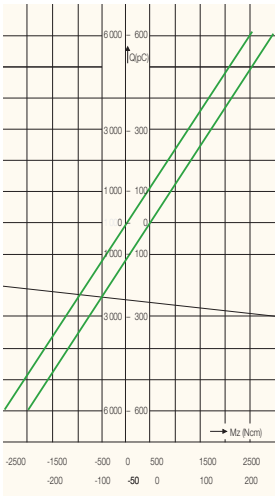


Function principle of the piezoelectric transducers



fully bridged with 4 active strain gages

standard design of a strain gage



Function principle of the strain gage transducers

Linearity diagram

Torque transducers vary widely in operation and appearance, and work on many different physical principles. The most common of these are:

a strain gage wrapped around a torsion bar, an eddy current transducer, a mechanical (spring or hydraulic) element, and a piezoelectric crystal.

To be effective, the torque transducer must have the following attributes. It must support a sampling rate that will allow the measurement of rapidly changing loads, it must be sufficiently stiff to withstand the peak load, it must have a high degree of linearity, it must be stable under varying environmental conditions, and it must have a good operating lifetime.

DEPRAG offers torque transducers that work on two different physical principles, both meeting these requirements.

– PE (Piezo Electric) Transducer
– DMS (Strain Gage) Transducer

When connected to the correct measuring instrument, each type of torque transducer has applications in the screwdriving technology. The familiar DEPRAG piezo-electric transducer offers a large measuring range and a robust design. For less demanding applications, the strain gage transducer offers an economical alternative.

Torque transducers are available either as a stationary measurement platform, or a mobile measuring wrench in straight and angle design to verify the measurement of screwdriving tools within screwdriving stations without dismantling the screwdriver. Depending on piezo-electric, strain gage or non-contact version the transducers are built to be connected to the relative electronic torquemeters (see brochure D3022E).

TECHNICAL DATA

Transducer (DMS, non-contact signal transmission)

	Type Part no.	**V002-E6.3/F6.3** 385481B	**V005-E6.3/F6.3** 385481C	**V010-E6.3/F6.3** 385481D	**V020-E6.3/F6.3** 385481E
Calibrated measuring range	Nm	0.2 - 2	0.5 - 5	1 - 10	2 - 20
	in.lbs	2 - 18	4 - 40	9 - 88	18 - 177
Permissible overload	%	100	100	100	30
Speed max.	rpm	10,000	10,000	10,000	10,000
Weight approx.	kg / lbs	0.3 / 0.66	0.3 / 0.66	0.3 / 0.66	0.3 / 0.66

Required Accessories

Measuring Instrument		Type ME5000, ME5400, ME5600, ME6000 or type ME6100 (see brochure D3022E)
Connector Cable (for transducer to measuring instrument ME 5…) Length 2 m / 4 m / 6 m 6.6' / 13' / 20'	Part no.	385486A/B/C
Power Supply for transducer connected to measuring instrument ME 5000	Part no.	800827
Power Supply Cable 220 V / 110 V	Part no.	812587 / 812295

When connected to a DEPRAG measuring instrument, this transducer is ideal for torque acquisition and documentation of all acquired results of screw joints and assembly requirements.

During the actual assembly process, performing torque acquisition and screw-joint analysis is possible. This feature fulfills most or all assembly-process requirements and assures even the highest quality demands.

V002-E6.3/F6.3
to
V020-E6.3/F6.3

TECHNICAL DATA

Piezoelectric (PE) transducers: measuring platforms

	Type Part no.	MP1PE 408000C		MP25PE 360850A	MP200PE 373205A	MP1000PE 408000A
Calibrated measuring range *)	Nm	0.1 - 1		2.5 - 25	20 - 200	50 - 500
	in.lbs	0.88 - 8.85		22.12 - 221.25	177-1770	442.5 - 4425
Permissible overload	%	20		20	20	20
Typical measurement uncertainty	%	<1		<1	<1	<1
Sensibility	pC / Ncm	21.7		2.4	1.7	1.0
Frequency response	kHz	> 53		approx. 15	approx. 3.5	approx. 11
Linearity	≤ %	± 0.2		± 1	± 1	± 0.5
Diameter D	mm / in.	109.5 / 4.3		105 / 4 1/8	140 / 5 1/2	200 / 7 7/8
Weight	kg / lbs	1.3 / 2.9		1.3 / 2.9	3.5 / 7.7	16 / 35.2
Connecting plug	type	BNC, neg.		BNC, neg.	BNC, neg.	10-32 UNF neg.

Strain gage (DMS) transducers: measuring platforms

	Type Part no.	MP2DMS 385200B	MP7DMS 385200A	MP25DMS 385200C	MP160DMS 385200D	MP500DMS 408088A
Calibrated measuring range *)	Nm	0.2 - 2	1.05 - 7	2.5 - 25	16 - 160	50 - 500
	in.lbs	1.77 - 17.7	9.29 - 61.95	22.12 - 221.25	141.6 - 1416	442.5 - 4425
Permissible overload	%	20	20	20	20	20
Typical measurement uncertainty	%	<1	<1	<1	<1	<1
Sensibility at nominal torque	mV/V	1.5	1.8	1.8	1.8	–
Operational temperature range	°C	10 to 40	10 to 40	10 to 40	10 to 40	10 to 40
	°F	50 to 104	50 to 104	50 to 104	50 to 104	50 to 104
Parameter temperature coefficient	% / K	0.01	0.01	0.01	0.01	0.01
Zero signal temperature coefficient	% / K	0.02	0.02	0.02	0.02	0.02
Supply voltage (DC)	V	5	5	5	5	12
Diameter D	mm / in.	105 / 4 1/8	105 / 4 1/8	105 / 4 1/8	140 / 5 1/8	229 / 9 1/64
Weight	kg / lbs	1 / 2.2	1 / 2.2	1 / 2.2	2 / 4.4	18 / 39.6
Connecting plug		4-pole	4-pole	4-pole	4-pole	12-pole

*) Calibrated measuring range (standard calibration - part no. 3855285 – included in delivery) according to VDI/VDE2646, optional calibration, see page 7.
Calibrations for other measuring ranges upon request!

Required Accessories:	**Measuring Instrument** (see brochure D3022E). **Connection Cable** and **Screwplates** see page 6.

The **measuring platforms** are well suited for the installation into a calibration laboratory, as well as for the construction of a mobile measuring waggon. The robust and sturdy platform design guarantees permanent high measuring accuracies. As an optional accessory, we offer a clamping plate, which allows the temporary fastening of the platform into a vice. For specially high accuracy demands, or for the obtaining of extremely small torque values, we recommend to mount the platform with its polished lower surface to a table top, which has been treated in a similar fashion.

Because of such an extreme high grade installation, even the smallest measuring-errors, created by lateral force, deflection, vibration, or misalignment, can be completely avoided.
To ensure optimal measurement conditions we offer screwdriver adapters in combination with linear stands or parallelogram arms (see brochure D3345E).

MP1PE

MP25PE

MP200PE

MP2DMS - MP25DMS

MP160DMS

MP1000PE

MP500DMS

Piezoelectric (PE) transducer: E-torque wrench

	Type Part no.			**MS25PE-W** 346217A	**MS25PE-WS** 346217C
Calibrated measuring range *)	Nm			2.5 - 25	2.5 - 25
	in.lbs			22.12 - 221.25	22.12 - 221.25
Permissible overload	%			20	20
Typical measurement uncertainty	%			<1	<1
Sensibility	pC / Ncm			2.4	2.4
Frequency response	kHz			approx. 15	approx. 15
Linearity	≤ %			± 1	± 1
Length L	mm / in.			442 / 17 13/32	297 / 11 11/16
Weight	kg / lbs			1.1 / 2.4	0.9 / 1.98
Connecting plug	type			BNC, neg.	BNC, neg.

Strain gage (DMS) transducers: E-torque wrench

	Type Part no.	**MS2DMS** 387798B	**MS7DMS** 387798A	**MS7DMS-W** 388050A	**MS25DMS-W** 388050C
Calibrated measuring range *)	Nm	0.2 - 2	1.05 - 7	1.05 - 7	2.5 - 25
	in.lbs	1.77 - 17.7	9.29 - 61.95	9.29 - 61.95	22.12- 221.25
Permissible overload	%	20	20	20	20
Typical measurement uncertainty	%	<1	<1	<1	<1
Sensibility at nominal torque	mV/V	1.5	1.8	1.8	1.8
Operational temperature range	°C	0 to + 60	0 to + 60	0 to + 60	0 to + 60
	°F	32 to 140	32 to 140	32 to 140	32 to 140
Parameter temperature coefficient	% / K	0.01	0.01	0.01	0.01
Zero signal temperature coefficient	% / K	0.02	0.02	0.02	0.02
Supply voltage (DC)	V	5	5	5	5
Length L	mm / in.	186 / 7 5/16	186 / 7 5/16	268 / 10 9/16	423 / 16 5/8
Weight	kg / lbs	0.5 / 1.1	0.5 / 1.1	0.5 / 1.1	0.7 / 1.5
Connecting plug		4-pole	4-pole	4-pole	4-pole

*) Calibrated measuring range (standard calibration - part no. 3855285 – included in delivery) according to VDI/VDE2646, optional calibration, see page 7.
Calibrations for other measuring ranges upon request!

Required Accessories:	**Measuring Instrument** (see brochure D3022E). **Connection Cable** and **Screwplates** see page 6.

The **E-torque wrenches** allow the testing of screwdriver spindles without their removal from an assembly station.

MS25PE-W

MS2DMS
MS7DMS

MS7DMS-W
MS25DMS-W

ACCESSORIES

Required Accessories on special request

For Piezoelectric (PE) transducers: measuring platforms		Type	MP1PE			MP25PE	MP200PE	MP1000PE
For Piezoelectric (PE) transducer: E-torque wrench		**Type**				**MS25PE-W(S)**		
Connection cable to measuring instrument	5 m/16.4 ft.	Part no.	810675			810675	810675	
Connection cable to measuring instrument	1 m/3.3 ft.	Part no.						810629
For Strain gage (DMS) transducers: measuring platforms		**Type**		**MP2DMS**	**MP7DMS**	**MP25DMS**	**MP160DMS**	**MP500DMS**
For Strain gage (DMS) transducers: E-torque wrenches, angle head design		**Type**			**MS7DMS-W**	**MS25DMS-W**		
For Strain gage (DMS) transducers: E-torque wrenches, straight design		**Type**		**MS2DMS**	**MS7DMS**			
Connection cable to measuring instrument	2 m/ 6.6 ft.	Part no.		385493A	385493A	385493A	385493A	385486A
Connection cable to measuring instrument	4 m/13.2 ft.	Part no.		385493B	385493B	385493B	385493B	385486B
Connection cable to measuring instrument	6 m/19.8 ft.	Part no.		385493C	385493C	385493C	385493C	385486C
Screwplate M1.6: 0.8-2 Ncm (for above allen bit AF1.5)	right left	Part no. Part no.	120422A					
Screwplate M1.6: 2-6 Ncm (for above allen bit AF1.5)	right left	Part no. Part no.	120422B					
Screwplate M2.5: 6-16 Ncm (for above allen bit AF2)	right left	Part no. Part no.	120424A					
Screwplate M2.5: 16-40 Ncm (for above allen bit AF2)	right left	Part no. Part no.	120424B					
Screwplate M4: 40-100 Ncm (for above allen bit AF3)	right left	Part no. Part no.	120426E					
Screwplate M1.6: 0.06-0.12 Nm (for above allen bit AF1.5)	right left	Part no. Part no.		120571A	120571A	120571A		
Screwplate M2: 0.12-0.25 Nm (for above allen bit AF1.5)	right left	Part no. Part no.		120572A 120572B	120572A 120572B	120572A 120572B		
Screwplate M2.5: 0.25-0.5 Nm (for above allen bit AF2)	right left	Part no. Part no.		120573A 120573B	120573A 120573B	120573A 120573B		
Screwplate M3: 0.5-0.9 Nm (for above allen bit AF2.5)	right left	Part no. Part no.		120574A 120574B	120574A 120574B	120574A 120574B	120574A 120574B	
Screwplate M4: 0.9-2.2 Nm (for above allen bit AF3)	right left	Part no. Part no.		120575A 120575B	120575A 120575B	120575A 120575B	120575A 120575B	
Screwplate M5: 2.2-5 Nm (for above allen bit AF4)	right left	Part no. Part no.			120576A 120576B	120576A 120576B	120576A 120576B	
Screwplate M6: 5-8 Nm (for above allen bit AF5)	right left	Part no. Part no.			120577A 120577B	120577A 120577B	120577A 120577B	
Screwplate M8: 8-25 Nm (for above allen bit AF6)	right left	Part no. Part no.				120578A 120578B	120578A 120578B	
Screwplate M10: 17-35 Nm (for above socket AF17)	right left	Part no. Part no.					120579A 120579B	
Screwplate M12: 35-60 Nm (for above socket AF19)	right left	Part no. Part no.					120580A	
Screwplate M14: 60-100 Nm (for above socket AF22)	right left	Part no. Part no.					120446C	
Screwplate M16: 100-200 Nm (for above socket AF24)	right left	Part no. Part no.					120446D	

More Accessories on special request

Bit adapter, hex. drive female DIN ISO 1173 F6.3 (1/4")	Part no.		120489A	120489A	120489A	120489A	
Socket adapter, square drive male DIN 3121 E12.5 (1/2")	Part no.		120488A	120488A	120488A	120488A	
Clamping plate for clamping the torque dynamometer into a vice	Part no.	120436A	120436A	120436A	120436A	120436A	

Screwplate

Bit adapter

Socket adapter

Clamping plate

CALIBRATION

Calibration of DEPRAG measurement transducer or factory calibration of a measurement device or measurement electronic - for special order

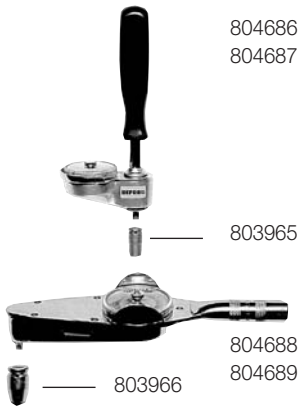
DAkkS-calibration in accordance with DIN 51309 Strain gauge measurement transducer Load right/left 3 mounting positions 8 measurement points DAkkS-calibration certificate Part no. 3855281	**Factory calibration in accordance with DIN 51309** Strain gauge or piezo measurement transducer Load right/left 3 mounting positions 8 measurement points Factory calibration certificate Part no. 3855282
Factory calibration in accordance with DIN 51309 Strain gauge or piezo measurement transducer Load right 3 mounting positions 8 measurement points Factory calibration certificate Part no. 3855283	**Factory calibration in accordance with VDI/VDE 2646** Strain gauge or piezo measurement transducer Load right/left 2 mounting positions 8 measurement points Factory calibration certificate Part no. 3855284
Factory calibration (Standard) in accordance with VDI/VDE 2646 Strain gauge or piezo measurement transducer Load right 2 mounting positions 8 measurement points Factory calibration certificate Used for first calibration Standard for recalibration Part no. 3855285	**Factory calibration of measurement device or measurement electronic** Inspection and calibration of a torque measurement device or measurement electronic in accordance with DIN ISO 9001, as well as the creation of a corresponding measurement protocol with proof of traceability to national standards. Part no. 000768
Factory calibration of torque transducers DMS non-contact Documentation by factory certificate Part no. 000769	

TECHNICAL DATA

Mechanical torque wrenches

	Part no.	804686	804687	804688	804689
Measuring range	Nm/in.lbs	0 - 3.4 / 30	0 - 8.4 / 74	0 - 17 / 150	0 - 60 / 531
Increment	Nm/in.lbs	0.1 / 0.89	0.2 / 1.77	0.5 / 4.43	1 / 8.85
Drive (square male)		1/4"	1/4"	3/8"	3/8"
Optional equipment					
Bit adapter *)	Part no.	803965	803965	803966	803966

*) Inserting tools see leaflet D 3320 E



The mechanical torque wrenches (manual indicator design) can be used for simple adjustment or control tasks. To obtain the torque of a screw connection, simply retighten the fastener. The use of a mechanical torque wrench allows the fast appraisal of tightening torque values.

Possible Combinations

Measuring principle: PIEZO-ELECTRIC

Measuring Instrument
type ME5000, ME5400,
ME5600, ME6000 or ME6100

Connection Cable:
Length 5 m Part no. 810675

Torque Transducer
Measuring Platforms: type MP1PE, type MP25PE, type MP200PE
E-Torque-Wrenches: type MS25PE-W, type MS25PE-WS

Measuring Instrument
type ME5000, ME5400,
ME5600, ME6000 or ME6100

Connection Cable:
Length 1 m Part no. 810629

Torque Transducer
Measuring Platform: type MP1000PE

Measuring principle: STRAIN GAGE

Measuring Instrument
type ME5000, ME5400,
ME5600, ME6000 or ME6100

Connection Cable:
Connection Measuring Instrument ME… to Measuring Platforms or Torque Wrenches
Length 2 m Part no. 385493A
Length 4 m Part no. 385493B
Length 6 m Part no. 385493C

Torque Transducer
Measuring Platforms: type MP2DMS, type MP7DMS, type MP25DMS, type MP160DMS
E-Torque Wrenches: type MS2DMS, type MS7DMS, type MS7DMS-W, type MS25DMS-W

Measuring principle: STRAIN GAGE OR DMS NON-CONTACT

Connection Cable, Length 2 m / 4 m / 6 m

Measuring Instrument
type ME5000, ME5400,
ME5600, ME6000 or ME6100

Connection Cable:
Connection Measuring Instrument ME… to Non-contact Transducer or Measuring Platforms
Length 2 m Part no. 385486A
Length 4 m Part no. 385486B
Length 6 m Part no. 385486C

Additionally required when connected with ME5000:
Power Supply Part no. 800827 and
Power Supply Cable 230 V Part no. 812587
115 V Part no. 812295

Torque Transducer
Non-contact Transducer
type V002-E6.3/F6.3
type V005-E6.3/F6.3
type V010-E6.3/F6.3
type V020-E6.3/F6.3

Measuring Platform
type MP500DMS

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