

## 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 transducer is a basic requirement for the adjustment, monitoring and inspection of screw-drivers, and also for the testing of screw joints and screw joint analysis.

### Measuring Technology



## 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, readjustments 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.

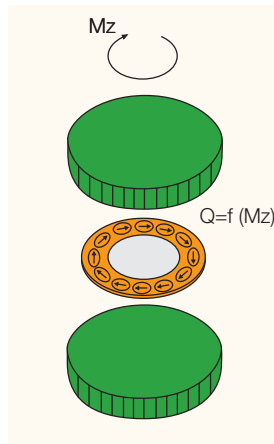
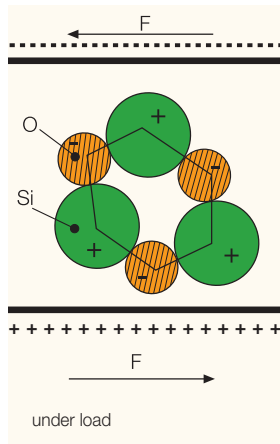
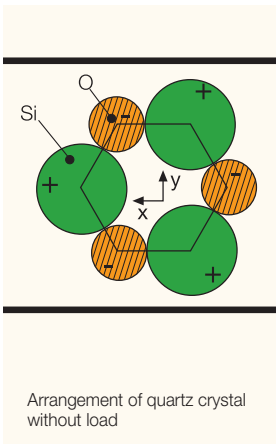
### Example 2:

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.

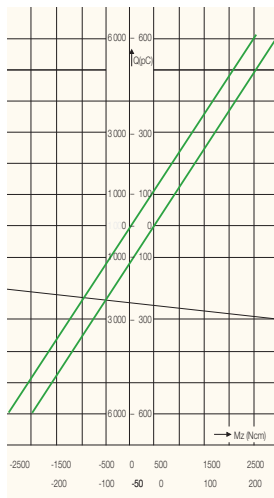
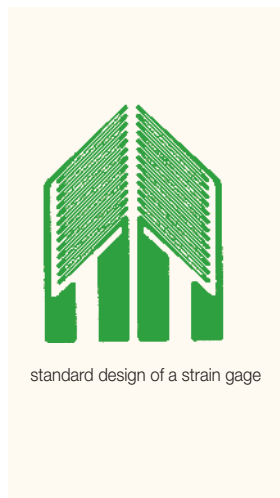
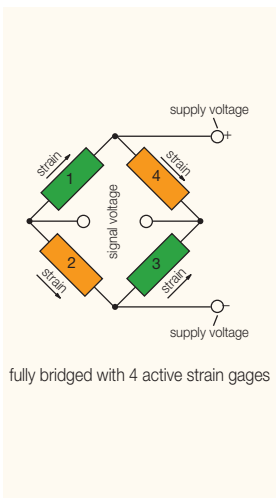
### Example 3:

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



Function principle of the piezoelectric transducers



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 piezoelectric 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 torque-meters (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

<b>Measuring Instrument</b>	Type ME5000, ME5500, ME5600, ME6000 or type ME6100 (see brochure D3022E )	
<b>Connector Cable</b> (for transducer to measuring instrument ME 5...) Length 2 m / 4 m / 6 m 6.6' / 13' / 20'	Part no.	385486A/B/C
<b>Power Supply</b> for transducer connected to measuring instrument ME 5000	Part no.	800827
<b>Power Supply Cable</b> 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

**Piezoelectric (PE) transducers: measuring platforms**

	Type	MP1PE	MP25PE	MP200PE	MP1000PE
	Part no.	408000C	360850A	373205A	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	MP2DMS	MP7DMS	MP25DMS	MP160DMS	MP500DMS
	Part no.	385200B	385200A	385200C	385200D	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!

<b>Required Accessories:</b>	<b>Measuring Instrument</b> (see brochure D3022E). <b>Connection Cable</b> and <b>Screwplates</b> see page 6.
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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 fasten-

ing 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



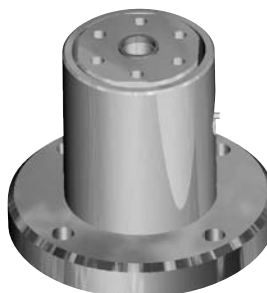
MP200PE



MP2DMS - MP25DMS



MP160DMS



MP1000PE



MP500DMS

**Piezoelectric (PE) transducer: E-torque wrench**

	Type			MS25PE-W	MS25PE-WS
	Part no.			346217A	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 <sup>13</sup> / <sub>32</sub>	297 / 11 <sup>11</sup> / <sub>16</sub>
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	MS2DMS	MS7DMS	MS7DMS-W	MS25DMS-W
	Part no.	387798B	387798A	388050A	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 <sup>5</sup> / <sub>16</sub>	186 / 7 <sup>5</sup> / <sub>16</sub>	268 / 10 <sup>9</sup> / <sub>16</sub>	423 / 16 <sup>5</sup> / <sub>8</sub>
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!

<b>Required Accessories:</b>	<b>Measuring Instrument</b> (see brochure D3022E). <b>Connection Cable</b> and <b>Screwplates</b> see page 6.
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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	Part no.	120422A						
	left	Part no.							
Screwplate M1.6: 2-6 Ncm (for above allen bit AF1.5)	right	Part no.	120422B						
	left	Part no.							
Screwplate M2.5: 6-16 Ncm (for above allen bit AF2)	right	Part no.	120424A						
	left	Part no.							
Screwplate M2.5: 16-40 Ncm (for above allen bit AF2)	right	Part no.	120424B						
	left	Part no.							
Screwplate M4: 40-100 Ncm (for above allen bit AF3)	right	Part no.	120426E						
	left	Part no.							
Screwplate M1.6: 0.06-0.12 Nm (for above allen bit AF1.5)	right	Part no.		120571A	120571A		120571A		
	left	Part no.							
Screwplate M2: 0.12-0.25 Nm (for above allen bit AF1.5)	right	Part no.		120572A	120572A		120572A		
	left	Part no.		120572B	120572B		120572B		
Screwplate M2.5: 0.25-0.5 Nm (for above allen bit AF2)	right	Part no.		120573A	120573A		120573A		
	left	Part no.		120573B	120573B		120573B		
Screwplate M3: 0.5-0.9 Nm (for above allen bit AF2.5)	right	Part no.		120574A	120574A		120574A	120574A	
	left	Part no.		120574B	120574B		120574B	120574B	
Screwplate M4: 0.9-2.2 Nm (for above allen bit AF3)	right	Part no.		120575A	120575A		120575A	120575A	
	left	Part no.		120575B	120575B		120575B	120575B	
Screwplate M5: 2.2-5 Nm (for above allen bit AF4)	right	Part no.			120576A		120576A	120576A	
	left	Part no.			120576B		120576B	120576B	
Screwplate M6: 5-8 Nm (for above allen bit AF5)	right	Part no.			120577A		120577A	120577A	
	left	Part no.			120577B		120577B	120577B	
Screwplate M8: 8-25 Nm (for above allen bit AF6)	right	Part no.					120578A	120578A	
	left	Part no.					120578B	120578B	
Screwplate M10: 17-35 Nm (for above socket AF17)	right	Part no.						120579A	
	left	Part no.						120579B	
Screwplate M12: 35-60 Nm (for above socket AF19)	right	Part no.						120580A	
	left	Part no.							
Screwplate M14: 60-100 Nm (for above socket AF22)	right	Part no.						120446C	
	left	Part no.							
Screwplate M16: 100-200 Nm (for above socket AF24)	right	Part no.						120446D	
	left	Part no.							

### 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	



Screw  
plate



Bit adapter



Socket adapter



Clamping  
plate



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

<p><b>DAkKS-calibration in accordance with DIN 51309</b>                  Strain gauge measurement transducer                  Load right/left                  3 mounting positions                  8 measurement points                  DAkKS-calibration certificate                  Part no. 3855281</p>	<p><b>Factory calibration in accordance with DIN 51309</b>                  Strain gauge or piezo measurement transducer                  Load right/left                  3 mounting positions                  8 measurement points                  Factory calibration certificate                  Part no. 3855282</p>
<p><b>Factory calibration in accordance with DIN 51309</b>                  Strain gauge or piezo measurement transducer                  Load right                  3 mounting positions                  8 measurement points                  Factory calibration certificate                  Part no. 3855283</p>	<p><b>Factory calibration in accordance with VDI/VDE 2646</b>                  Strain gauge or piezo measurement transducer                  Load right/left                  2 mounting positions                  8 measurement points                  Factory calibration certificate                  Part no. 3855284</p>
<p><b>Factory calibration (Standard) in accordance with VDI/VDE 2646</b>                  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</p>	<p><b>Factory calibration of measurement device or measurement electronic</b>                  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</p>
<p><b>Factory calibration of torque transducers</b>                  DMS non-contact                  Documentation by factory certificate                  Part no. 000769</p>	

**TECHNICAL DATA**

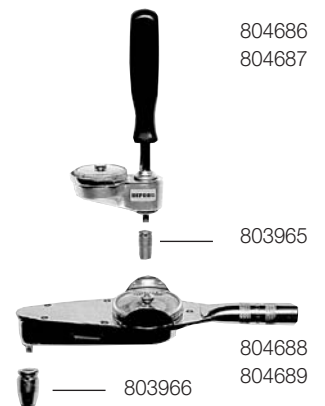
**Mechanical torque wrenches**

	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"
<b>Optional equipment</b>					
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 re-

tighten the fastener. The use of a mechanical torque wrench allows the fast appraisal of tightening torque values.



804686  
804687

803965

804688  
804689

803966

## Possible Combinations

### Measuring principle: PIEZO-ELECTRIC

#### Measuring Instrument

Type ME5000, ME5500,  
ME5600, ME6000 or ME6100

#### Connection Cable:

Length 5 m Part no. 810675

#### Torque Transducer

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

#### Measuring Instrument

Type ME5000, ME5500,  
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, ME5500,  
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, ME5500,  
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

#### 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

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

# DEPRAG

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