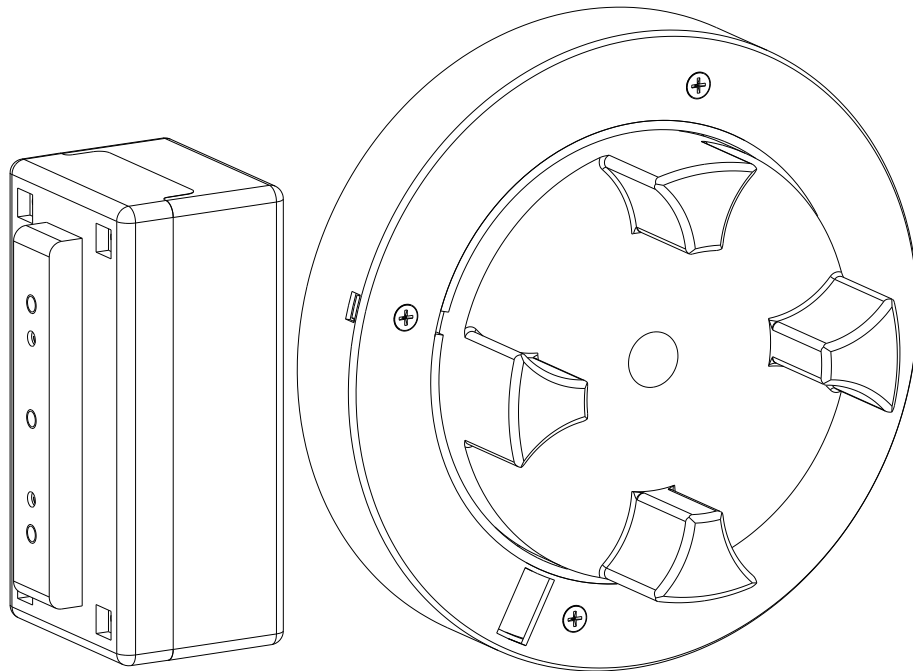




MONITEX® BT

Flexible jaw coupling with integrated measurement of torque and speed



MONITEX® BT is a flexible jaw coupling with integrated torque and speed measurement. It is composed of a coupling hub with integrated measurement electronics and an inductive energy transducer (inductive head). The measuring data are contactlessly transmitted to a mobile device or PC and can be additionally read via a display on the coupling with rotation. A digital- to-analog-converter is optionally available providing the data as analog output values.



- KTR PC software ¹⁾
- KTR mobile apps
- Display
- Analog output
- IoT Edge Device ¹⁾

1) Please contact KTR for further details about „IoT Edge Device“.

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1 Technical data

MONITEX® BT measuring hub

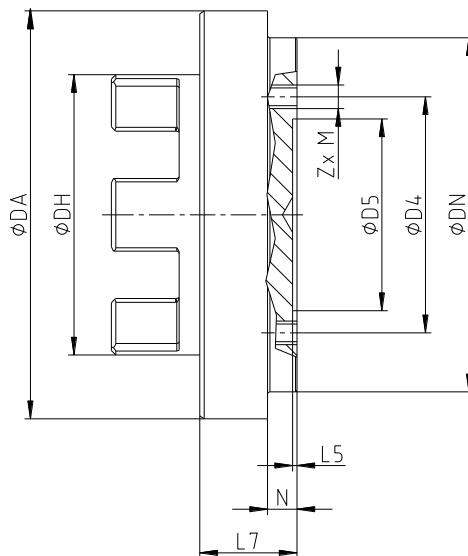


Illustration 1: MONITEX® BT measuring hub

Table 1: Dimensions

MONITEX® BT size	Dimensions in mm								
	DA	DH	DN	D4	D5	L5	L7	N	Z x M
28/200	112.4	65	90	54	44	1.5	28	10	8x M6
42/800	138.4	95	120	80	65	1.5	33	10	12x M8

Table 2: Technical data

Coupling size of MONITEX® BT	28/200	42/800
Electrical data		
Supply voltage DC in V	24 ±4	
Max. current consumption in mA	200	
Torque measurement		
Measuring range - rated torque T_{KN} in Nm	-200 ... +200	-800 ... +800
Measuring frequency of PC software in Hz	500	
Measuring frequency of mobile device (Android, iOS) in Hz	60	
Error in linearity in % ¹⁾	±0.25 ¹⁾	
Influence of temperature in %/10K	0.05 ¹⁾	
Nominal temperature range in °C	0 - 55	
Speed measurement		
Measuring range in rpm	30 - 3500	
Inaccuracy in rpm	1	
Measuring frequency of PC software in Hz	5	
Measuring frequency of mobile device (Android, iOS) in Hz	3	
Display		
Number of digits of torque	3 + 1 decimal places + sign	
Number of digits of speed	4	
Turn-on threshold in rpm	300	
Mechanical data		
Static load limit T_{Kmax} in % ¹⁾	150	150
Breaking load T_{Kbreak} in % ¹⁾	300	300
Max. bending torque in Nm	22.0	86.0
Max. radial force in N	250	700
Max. axial force in kN	8.0	20.0
Weight in kg	0.84	1.72
Torsion spring stiffness C_T in Nm/rad	46000	194000
Torsion angle with T_{KN} in degrees	0.25	0.24
Mass moment of inertia in kgmm ²	765.0	2690.0
Max. speed in rpm	3500	

1) Referring to rated torque T_{KN} (different T_{KN} figures of spider, see table 3)

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1 Technical data

MONITEX® BT measuring coupling in combination with a coupling flange

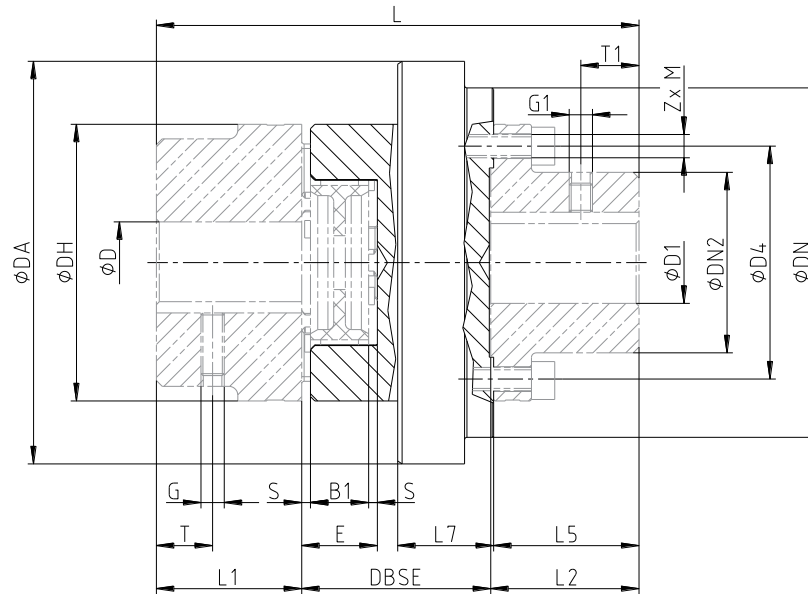


Illustration 2: MONITEX® BT measuring coupling with coupling flange

Table 3: Dimensions and technical data

MONITEX® BT size	ROTEX® GS			Dimensions ²⁾ in mm						
	Size	Spider GS shore hardness	Rated torque T _{KN} in Nm	Max. finish bore		DA	DH	DBSE	DN	DN2
				D	D1					
28/200	28	92 ShA	95	35	30	112.4	65	54.5	90	42
		98 ShA	160							
		57 ShD	178							
		64 ShD	200							
42/800	42	72 ShD	260	55	45	138.4	95	65.0	120	62
		98 ShA	450							
		57 ShD	495							
		64 ShD	560							
		72 ShD ¹⁾	728							

MONITEX® BT size	Dimensions ²⁾ in mm										Cap screws DIN EN ISO 4762		
	D4	L	L1	L2	L5	L7	E	B1	S	Number Z	M	T _A in Nm	
28/200	54	125	35	35.5	35	28	20	15	2.5	8	M6	17	
42/800	80	166	50	51.0	50	33	26	20	3.0	12	M8	41	

- 1) When using the spider 72 ShD, we recommend to use hubs made of steel.
- 2) For dimensions G, G1, T and T1 see table 4



Please note that with the use of the 72 ShD spider of ROTEX® GS size 28 the max. permissible torque of MONITEX® BT (see table 2) must not be exceeded.

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	Verified:	2023-06-21 Pz	Replaced by:	

**2 Advice****2.1 General advice**

Read carefully through these operating/assembly instructions before you start up the measuring coupling. Pay special attention to the safety instructions!

The operating/assembly instructions are part of your product. Please store them carefully and close to the measuring coupling. The copyright for these operating/assembly instructions remains with KTR.

2.2 Safety and advice symbols

Warning of potentially explosive atmospheres

This symbol indicates notes which may contribute to preventing bodily injuries or serious bodily injuries that may result in death caused by explosion.



Warning of personal injury

This symbol indicates notes which may contribute to preventing bodily injuries or serious bodily injuries that may result in death.



Warning of product damages

This symbol indicates notes which may contribute to preventing material or machine damage.



Warning of electromagnetic field

This symbol indicates notes which may contribute to preventing injuries resulting from electromagnetic radiation.



General advice

This symbol indicates notes which may contribute to preventing adverse results or conditions.

2.3 General hazard warnings

With assembly, operation and maintenance of the measuring coupling it has to be made sure that the entire drive train is secured against accidental switch-on. You may be seriously hurt by rotating parts. Make absolutely sure to read through and observe the following safety indications.

- All operations on and with the measuring coupling have to be performed taking into account "safety first".
- Make sure to switch off the power pack before you perform your work on the measuring coupling.
- Secure the power pack against accidental switch-on, e. g. by providing warning signs at the place of switch-on or removing the fuse for current supply.
- The front side of the MONITEX® BT inductive head must not have any contact with metallic surfaces when switched on. Metallic surfaces reduce the transmission performance and may damage the electronics assembly with lasting contact. The minimum distance to metallic surfaces should not fall below 10 mm.
- Do not reach into the operating area of the measuring coupling as long as it is in operation.
- Secure the rotating components of the measuring coupling against accidental contact. Provide for the necessary protection devices and covers.



The device must not be used by persons with a pacemaker, since the energy needed for the operation is transmitted by an inductive head. We cannot rule out that the emerging electromagnetic radiation may generate malfunctions or damages on vital medical devices.

**2 Advice****2.4 Proper use**

You may only assemble, operate and maintain the measuring coupling if you

- have carefully read through the operating/assembly instructions and understood them
- are technically qualified and specifically trained (e. g. safety, environment, logistics)
- are authorized by your company

The measuring coupling may only be used in accordance with the technical data (see chapter 1). Unauthorized modifications on the measuring coupling design are not admissible. We will not assume liability for any damage that may arise. In the interest of further development we reserve the right for technical modifications.

The **MONITEX® BT** measuring hub described in here corresponds to the state of the art at the time of printing of these operating/assembly instructions.

2.5 Reference to EC Machinery Directive 2006/42/EC

The measuring equipment supplied by KTR should be considered as components, not machines or partly completed machines according to EC Machinery Directive 2006/42/EC. Consequently KTR does not have to issue a declaration of incorporation. For details about safe assembly, start-up and safe operation refer to the present operating/assembly instructions considering the warnings.

3 Storage, transport and packaging**3.1 Storage**

Humid storage rooms are not suitable.

Make sure that condensation is not generated. The best relative air humidity is less than 65 %.

3.2 Transport and packaging

In order to avoid any injuries and any kind of damage always make use of proper transport and lifting equipment.

The measuring couplings are packed differently each depending on size, number and kind of transport. Unless otherwise contractually agreed, packaging will follow the in-house packaging specifications of KTR.

**4 Assembly****4.1 Mounting instructions of the MONITEX® BT measuring hub**

Opening the housing is not required and may cause damage to the measuring shaft.

- **Protection class**

The MONITEX® BT measuring hub complies with protection class IP51 acc. to DIN EN 60529.

- **Maintenance**

The MONITEX® BT measuring hub is maintenance-free. Lubrication or cleaning is not necessary.

- **Calibration**

The transducer is calibrated when supplied. We recommend an annual inspection of the calibration.

The mounting position of **MONITEX® BT** is variable. The measurement system can be mounted both horizontally and vertically. Vertical assembly may require a support in the bottom coupling hub.

4.2 Components of the MONITEX® BT measuring coupling**Components of the MONITEX® BT measuring coupling**

Component	Quantity	Subassembly
1	1	MONITEX® BT measuring hub
2	1	MONITEX® BT inductive head (inductive current transmission)
3 ¹⁾	1	MONITEX® BT connection cable
4 ²⁾	1	ROTEX®/ROTEX® GS hub
5 ²⁾	1	ROTEX® GS spider
6 ²⁾	1	ROTEX® coupling flange N
7 ²⁾	see table 3	Cap screws DIN EN ISO 4762 - 12.9
8 ²⁾	2	Setscrew DIN EN ISO 4029

1) not graphically displayed in illustration 3

2) Optionally available

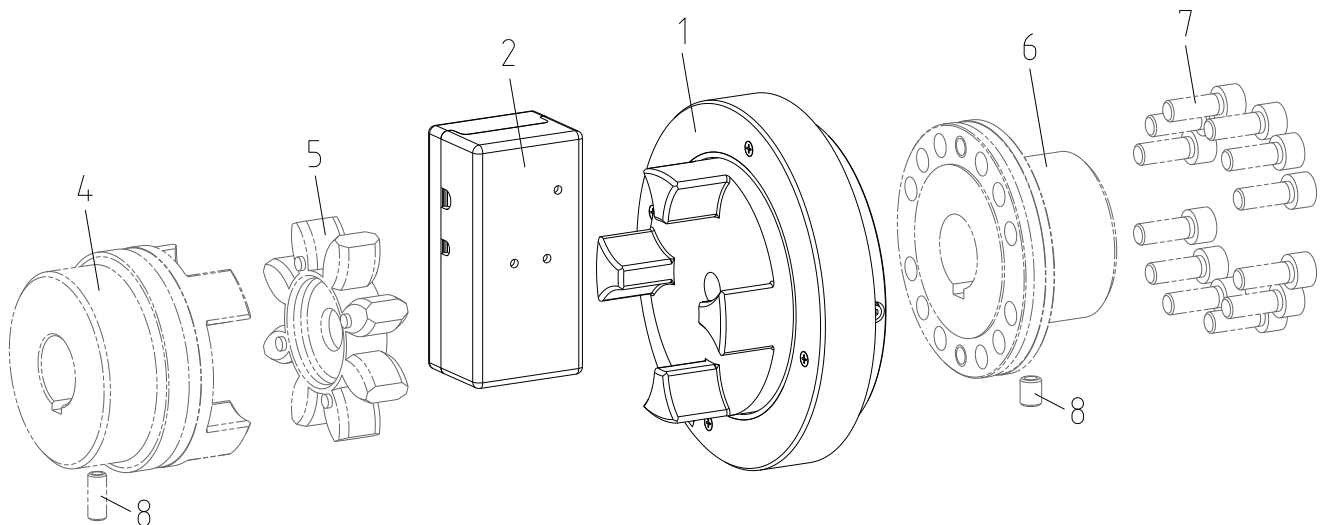


Illustration 3: MONITEX® BT measuring coupling



4 Assembly

4.3 Technical description

1. General description

The MONITEX® BT measuring hub has an integrated measuring system for measuring the current torque and speed. These data can be directly received by bluetooth compatible devices, e. g. mobile phones or tablets. Free apps for Android and iOS are available in the app stores. Those PCs that are able to receive data via bluetooth are also supported. The PC software can be downloaded via the KTR homepage.



Please consider the respective system requirements of your device (see chapter 9.1).

4.4 Advice for finish bore of ROTEX®/ROTEX® GS hub resp. coupling flange N



The maximum permissible bore diameters D (see chapter 1 - technical data) must not be exceeded. If these figures are disregarded, the coupling may tear. Rotating particles may cause danger to life.

- Bores machined or remachined by the customer have to observe concentricity respectively axial runout (see illustration 4).
- Make absolutely sure to observe the figures for ØD.
- Carefully align the hubs when the finish bores are drilled.
- Provide for a setscrew according to DIN EN ISO 4029 with a cup point or an end plate to fasten the hubs axially.

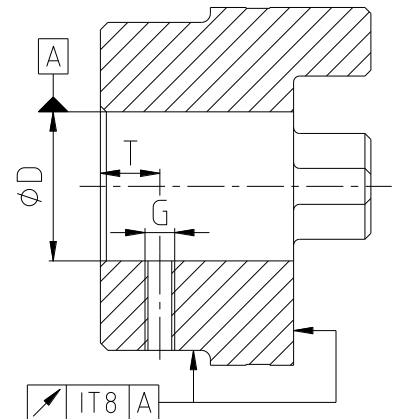


Illustration 4: Concentricity and axial runout



The customer bears the sole responsibility for all machining processes performed subsequently on unbored or pilot bored as well as finish machined coupling components and spare parts. KTR does not assume any warranty claims resulting from insufficient remachining.

Table 4: Setscrew DIN EN ISO 4029

Size	28	42
Dimension G, G1 in mm	M8	M8
Dimension T, T1 in mm	15	20
Tightening torque T _A in Nm	10	10

**4 Assembly****4.5 Assembly of the coupling (general)**

We recommend to inspect bores, shaft, keyway and feather key for dimensional accuracy before assembly.



Heating the hub or coupling flange lightly (approx. 80 °C) allows for an easier mounting on the shaft.



Touching the heated components causes burns. Please wear safety gloves.



With the assembly make sure that the distance dimension E or DBSE (see table 3) is observed to allow for axial clearance of the spider when in operation. Disregarding this advice may cause damage to the coupling.

4.6 Assembly of the hub resp. coupling flange N and the MONITEX® BT measuring hub

- Mount the coupling flange N on the shaft of the driving side and the hub on the shaft of the driven side (see illustration 5).
- The internal sides of the components must be flush with the front sides of the shafts.
- Fasten the hub and coupling flange by tightening the setscrews DIN EN ISO 4029 with a cup point (tightening torques see table 4).

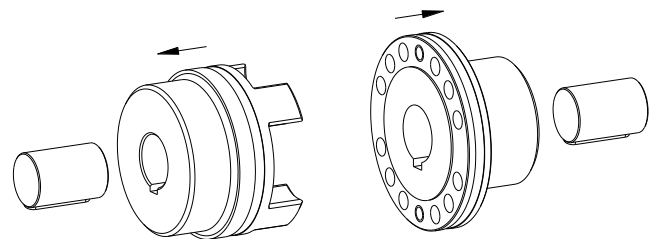


Illustration 5: Assembly of hub resp. coupling flange N

- Insert the MONITEX® BT measuring hub in front of the coupling flange (see illustration 6).
- Hand-tighten the components first.
- Tighten the screws at the tightening torques T_A specified in table 3 by means of a suitable torque key.

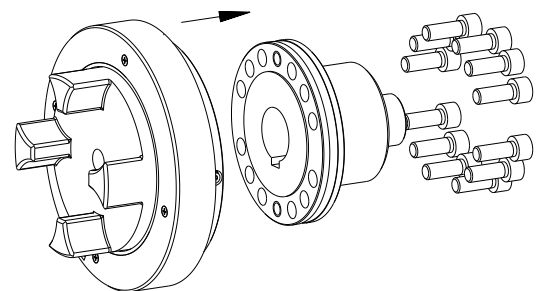


Illustration 6: Assembly of the MONITEX® BT measuring hub

- Insert the spider in the cam section of the hub (see illustration 7).
- Shift the power packs in axial direction until the distance dimension E or DBSE is achieved (see illustration 2 and table 3).
- Centre the spider between the hub and the coupling flange N and check the dimension E and S (see illustration 2 and table 3).

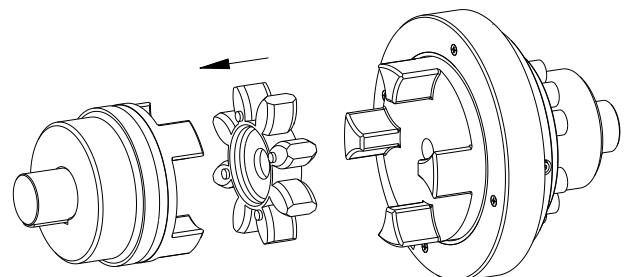


Illustration 7: Assembly of spider



Having started up the measuring coupling, the wear of the spider has to be inspected at regular maintenance intervals and the spider has to be replaced, if necessary.

4 Assembly

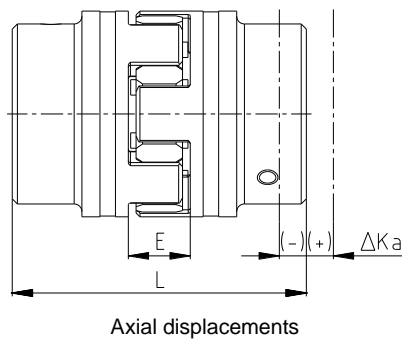
4.7 Displacements - alignment of the ROTEX® GS couplings



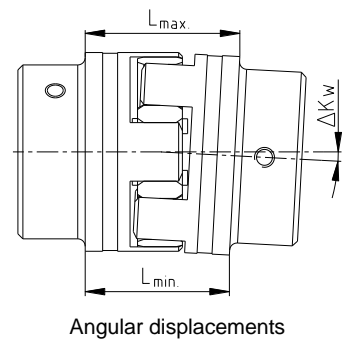
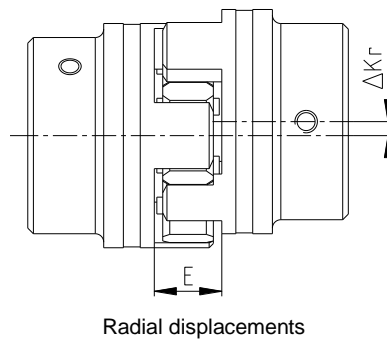
In order to ensure a long service life of the components, the shaft ends have to be accurately aligned. Please absolutely observe the displacement figures specified (see table 5). If the figures are exceeded, the measuring coupling will be damaged. The more accurate the alignment of the coupling, the longer is its service life.

Please note:

- The displacement figures specified in table 5 are maximum figures which must not arise in parallel. If axial, radial and angular displacement arises at the same time, these values must be reduced (see illustration 9). Inspect with a dial gauge, ruler or feeler gauge whether the permissible displacement figures specified in table 5 can be observed.



$$L_{\max} = L \pm \Delta K_a$$



$$\Delta K_w \text{ in mm} = L_{1\max} - L_{1\min}$$

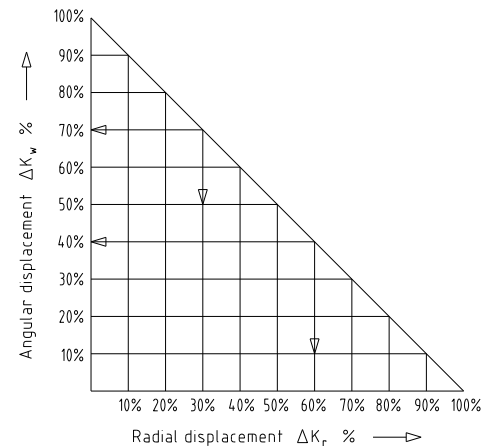
Illustration 8: Displacements

Examples of the displacement combinations specified in illustration 9:

Example 1:
 $\Delta K_r = 30 \%$
 $\Delta K_w = 70 \%$

Example 2:
 $\Delta K_r = 60 \%$
 $\Delta K_w = 40 \%$

Illustration 9: Combinations of displacement



$$\Delta K_{\text{total}} = \Delta K_r + \Delta K_w \leq 100 \%$$

Table 5: Displacement figures

MONITEX® BT size	ROTEX® GS size	Spider GS shore hardness	Max. axial displacement ΔK_a in mm	Max. radial displacement ΔK_r in mm	Max. angular displacement ΔK_w in degree
28/200	28	92 ShA	+1.5 / -0.7	0.15	1.0
		98 ShA		0.11	0.9
		57 ShD		0.09	0.85
		64 ShD		0.08	0.8
		72 ShD		0.05	0.7
42/800	42	98 ShA	+2.0 / -1.0	0.14	0.9
		57 ShD		0.12	0.85
		64 ShD		0.10	0.8
		72 ShD		0.07	0.7

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4 Assembly

4.8 Assembly of the MONITEX® BT inductive head (energy transducer)

a) Fastening of inductive head

Mounting of the inductive head is made by fastening the mounting profile fitted on the back side to a suitable fixture.

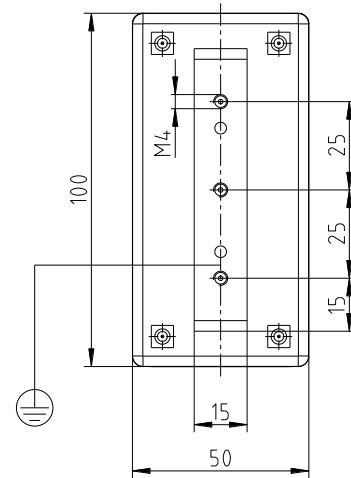


Illustration 10: Dimensions of inductive head

b) Arrangement of inductive head

The inductive head (energy transducer) is mounted radially beside the measuring hub inductively providing the rotating unit with energy. The following items should be observed:

- The maximum distance is 10 mm, the maximum axial displacement from the centre is ± 2.5 mm.
- The orientation is directed vertically to the axis of rotation.
- The front side of the transducer is directed to the external surface of the rotor.

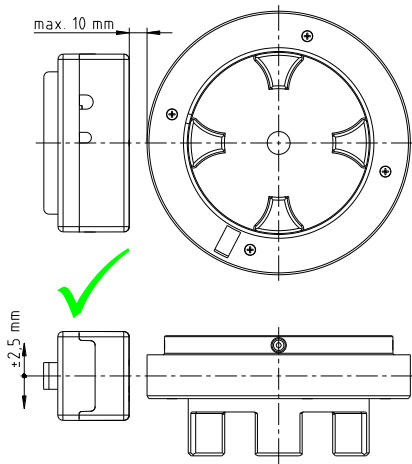


Illustration 11: Correct positioning of the inductive head

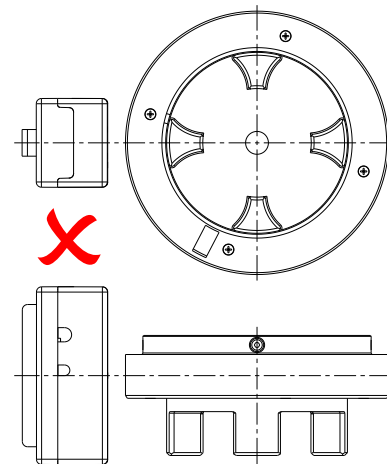


Illustration 12: Incorrect positioning of the inductive head



5 Start-up

5.1 Electrical connections

a) Connection cable

The connection cable has a four-pole M8 circular connector that can be screwed together with the mating connector of the inductive head (see illustration 13). Table 6 shows the pin assignment.

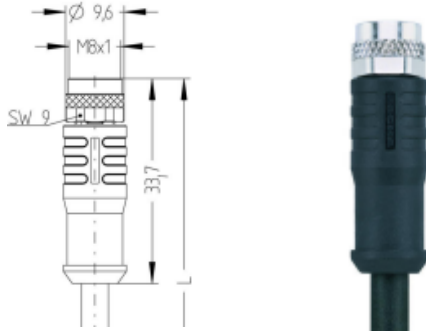


Illustration 13: Connector plug

Table 6: Pin assignment

Colour	Connection
White	Operating voltage +24 V
Black	Operating voltage GND
Blue	Not assigned
Brown	Not assigned

b) Operating voltage 24 V

The supply voltage is 24 V ±4 V direct current voltage (DC). The current consumption is 200 mA at the maximum.

c) Ground connection

To avoid interferences, the mounting aid resp. the mounting bracket of the inductive head should be grounded (see illustration 14).

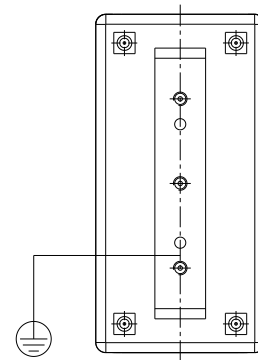


Illustration 14: Grounding of inductive head

5.2 Operation

a) Switching on

Having positioned and connected the inductive head, the system can be switched on via the on/off switch. The orange function LED on the inductive head lights up. The LEDs integrated in the rotor light up one after another from inside to outside and indicate starting of the measurement.

b) Bluetooth signal

Having switched on the measuring hub the bluetooth signal is available for a mobile device or a PC. The bluetooth device resp. the PC can now be coupled with MONITEX® BT. Having opened the app resp. the PC software, the torque and speed signals are available.

c) Display

With speeds exceeding 300 rpm the rotating display switches on. The measurement values for torque and speed can be read out directly on the sensor. If the distance of the inductive head to the rotor is too big, the display shows the hint "distance" alerting about a termination of energy supply. In this case the distance between the inductive head and the rotor must be investigated and the alignment must be inspected. The centre of the display is 90 degrees at the right of the position of the inductive head.

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6 Disposal

In respect of environmental protection we would ask you to dispose of the packaging resp. products on termination of their service life in accordance with the legal regulations resp. standards that apply.

7 Maintenance and service

The **MONITEX® BT** is a low-maintenance torque measuring hub. We recommend to perform a visual inspection on the coupling **at least once a year**. Pay special condition to the condition of the spiders of the **ROTEX® GS** coupling.

- Since the flexible machine bearings of the driving and driven side settle during the course of load, inspect the alignment of the measuring coupling and re-align, if necessary.
- The components have to be inspected for damages.
- The screw connections have to be visually inspected.



Please consider our operating/assembly instructions KTR-N 45510 additionally when using the ROTEX® GS coupling.

8 Services, customer service addresses

If requested, we are pleased to perform the calibration of your measuring hub and other services.

Contact addresses of the KTR partners for spare parts and orders can be obtained from the KTR homepage at www.ktr.com.



KTR does not assume any liability or warranty for the use of spare parts and accessories which are not provided by KTR and for the damages which may incur as a result.

KTR Systems GmbH
Carl-Zeiss-Str. 25
D-48432 Rheine
Phone: +49 5971 798-0
E-mail: mail@ktr.com

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9 Description of the MONITEX® BT app

9.1 System requirements



MONITEX® BT

The KTR-MONITEX® BT App is available for Android and IOS in the app stores free of charge. Both versions have the same functionality. The versions of the operating systems from Android 6 and iOS 15.5 ¹⁾ are supported.

1) On old devices with low processing power the performance may be affected with long measurements.



Switch-on animation

Position the inductive head acc. to chapter 4.8 and switch on the power supply. An animation of the rotor display informs about the proper function.

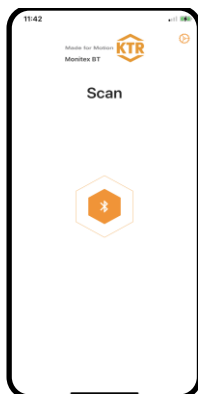


Bluetooth menu

Please switch to the system settings and activate the bluetooth mode.

- With Apple devices you have to activate the function "allow new connections". The sensor is usually not displayed in the system menu, since coupling is made by the app.
- Even if the name of the sensor appears in the system menu, do not couple it at this point, but only with the app. If the sensor is coupled in the system menu, it is no longer visible for the app.

9.2 Coupling of hardware



Start screen.

Please start the app.
Now the app is in the starting mode.



9 Description of the MONITEX® BT app

9.2 Coupling of hardware



Scan function

Having activated the scan button a new window is opened listing all MONITEX® BT sensors that are available. The number displayed corresponds to the last digits of the ident number of the sensor. The ident number can be found as a label on the outer edge of the coupling and in the calibration record.



Please note that a sensor is not listed if it is already in connection with another device. If the sensor shall be used, its coupling must be disconnected first. The maximum range may vary depending on the mounting situation.



9.3 Measuring mode



Measuring mode

Please select a sensor. The display switches into the measuring mode. Measuring is started via the button "play". The measuring data is automatically saved and can be processed later. Below the diagram a timer informs about the expired test duration.



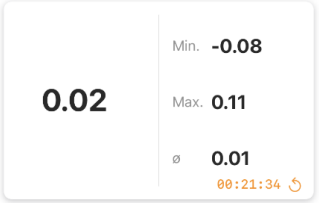
The display of the smartphone/tablet can be switched off during measuring. The Measuring is continued in the background.

 Reset zoom	<p>The display limits comply with the measuring range of the connected sensor. The diagram can be shifted and zoomed in x and y direction. The button "reset zoom" allows to set back the display range to standard values.</p>
 Go Live	<p>The curves can be shifted to the beginning of the measurement, so that incidents in the past can be analysed during the ongoing measurement as well. For that purpose simply shift the curve right as far as necessary. The button "go live" directs you to the end of the diagram again. The landscape view enlarges the respective diagram tapping the diagramme surface once.</p>

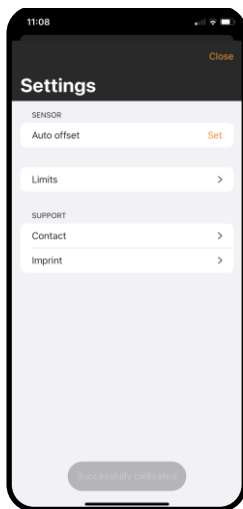


9 Description of the MONITEX® BT app

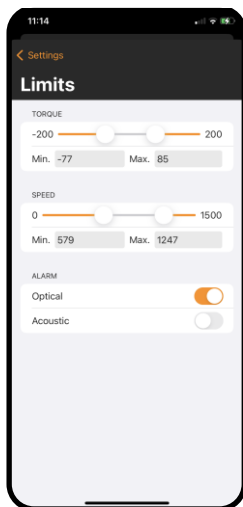
9.3 Measuring mode

 	<p>Using the number and curve icon the current view can be switched between "number display" and "curve display".</p>
	<p>On the left side of the numerical display the current values are shown. On the right side maximum values, minimum values and average values of the ongoing measurement are continuously calculated. The period of calculation is displayed in a timer. The calculation of the extreme values starts again once the timer is reset.</p>

9.4 Settings



The gear wheel icon refers to the menu "settings". The function "Auto offset" allows to set the torque output to 0 Nm.



Limits serve for producing an alert in case if a defined range is exceeded or fallen below. The alert can be signaled visually by discolouration of the diagram background or acoustically by a warning signal. The volume can be set via the media volume in the system menu. The limits of the selected ranges are displayed in the diagram by dotted lines.




9 Description of the MONITEX® BT app

9.5 Saving of measuring data



The measuring data is automatically saved as soon as the measurement is started via the button "play".

	<p>If a measurement is finished by the stop button, the button "share" is displayed, it opens a window with possibilities to send or save the measured data.</p>																					
<table border="1" data-bbox="240 667 544 801"> <thead> <tr> <th>Time (in n*1/60s)</th> <th>Torque (in Nm)</th> <th>Speed (in rpm)</th> </tr> </thead> <tbody> <tr><td>84.833</td><td>4.111</td><td>1050</td></tr> <tr><td>85.000</td><td>4.158</td><td>1050</td></tr> <tr><td>85.167</td><td>4.129</td><td>1050</td></tr> <tr><td>85.333</td><td>4.146</td><td>1050</td></tr> <tr><td>85.500</td><td>4.103</td><td>1050</td></tr> <tr><td>85.667</td><td>4.208</td><td>1050</td></tr> </tbody> </table>	Time (in n*1/60s)	Torque (in Nm)	Speed (in rpm)	84.833	4.111	1050	85.000	4.158	1050	85.167	4.129	1050	85.333	4.146	1050	85.500	4.103	1050	85.667	4.208	1050	<p>The data format comprises a table in CSV format indicating the measuring time in s, the torque in Nm and the speed in rpm. The semicolon is used as a separator. The sampling frequency of the torque is 60 Hz. The sampling frequency of the speed signal is 3 Hz.</p>
Time (in n*1/60s)	Torque (in Nm)	Speed (in rpm)																				
84.833	4.111	1050																				
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10 Declaration of conformity

10.1 EU Declaration of conformity

EU Declaration of conformity

The manufacturer - KTR Systems GmbH, Carl-Zeiss-Str. 25, D-48432 Rheine - states that the

MONITEX® BT measuring hub

described in the present operating/assembly instructions is in accordance with the following directive:


2014/30/EU Directive of the European Parliament and European Council dated February 26. 2014 for harmonizing the legal provisions of the member states regarding electromagnetic compatibility

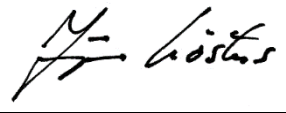
Standards applied:

- EN IEC 61000-6-2: Immunity standard for industrial environments
- EN 61000-4-2: Electrostatic discharge immunity test (ESD)
- EN IEC 61000-4-3: Radiated, radio-frequency, electromagnetic field immunity test
- EN 61000-4-4: Electrical fast transient/burst immunity test
- EN 61000-4-6: Immunity to conducted disturbances, induced by radio-frequency fields
- EN IEC 61000-6-4: Emission standard for industrial environments
- EN 55011: Intensity of radio interference area (class B)

Rheine,
Place

2022-07-18
Date

i. V. 
Reinhard Wibbeling
Engineering/R&D

i. A. 
Jürgen Kösters
Product Manager



10 Declaration of conformity

10.2 UK Declaration of conformity

UK Declaration of conformity

The manufacturer - KTR Systems GmbH, Carl-Zeiss-Str. 25, D-48432 Rheine - states that the

MONITEX® BT measuring hub

described in the present operating/assembly instructions is in accordance with the following directive:

SI 2016/1091 Electromagnetic Compatibility Regulations 2016

Standards applied:

- EN IEC 61000-6-2: Immunity standard for industrial environments
- EN 61000-4-2: Electrostatic discharge immunity test (ESD)
- EN IEC 61000-4-3: Radiated, radio-frequency, electromagnetic field immunity test
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- EN 61000-4-6: Immunity to conducted disturbances, induced by radio-frequency fields
- EN IEC 61000-6-4: Emission standard for industrial environments
- EN 55011: Intensity of radio interference area (class B)

Authorised representative:

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Year of UKCA marking: 2022

Rheine, 2022-07-18
Place Date

i. V.
Reinhard Wibbeling
Engineering/R&D

i. A.
Jürgen Kösters
Product Manager