DDU SENSOR SYSTEM

Properties

- Sensor system for contact-free monitoring of rotating and rigid tools
- DMS technology in rotor
- 3 measuring ranges each, for torque and feed force
- Rotor standard types and individual designs available
- Inductive transmission of measuring data and energy supply
- Different cable variants available for stator

DDU Sensor System

DDU-rotor and DDU-stator constitute the sensor system for contact-free monitoring of rotating and rigid tools. In combination with the relevant measuring transducers, the system is employed with all ARTIS tool and process monitoring systems. The figure shows an example for use in the CTM system.

Mode of Operation

The DDU-rotor continuously measures the torque-values acting on the tool as well as the feed forces. The transmission of the energy supply and the measurement data to the attached measuring transducer is carried out inductively via an air gap located between the rotor and the permanently installed stator.

The page **Measuring and Application Ranges** contains the technical data of the available 6 standard rotor types.

Concerning the individual design of rotors for other application conditions, exact data about the relevant machining task are required as per the checklist **Machining task of tool holder**.

Two different cable variants are available for the DDU-stator: PUR- and ROB PUR-cable, both either with axial or sideways cable outlet.

Compatibility

- TF-01 Genior Modular Torque and Axial Force
- Measuring Transducer for contact-free tool monitoring
- DDU-4 measuring transducer for stand-alone-operation
- or use with the CTM Tool and Process Monitoring system (see figure on the left)

DDU ROTOR
COMPONENT OF THE DDU SENSOR SYSTEM

Summary

The ARTIS tool monitoring systems Genior Modular and CTM may be equipped with devices for contact-free tool monitoring. This monitoring solution is individually tailored to the customer's requirements.

The sensor, which is designed as a cylindrical rotor, is attached to the customer's tool holder and firmly connected to it.

The monitoring system can be used for breakage monitoring of threading operations, drilling or as a quality insurance instrument for tapping. It is also suitable for monitoring rigid tools.

Restrictions:
Hydraulic chucks and shrink chucks cannot be equipped with the rotor.

Note: Upon applying the strain gauges the tool holder needs to endure temperatures up to 150 °C! Balancing of the tool holder must be carried out by the customer.

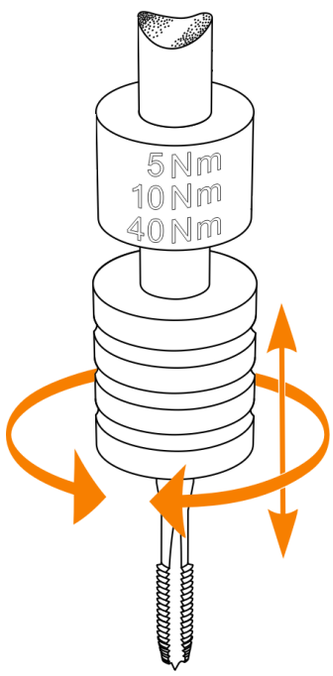


Illustration similar

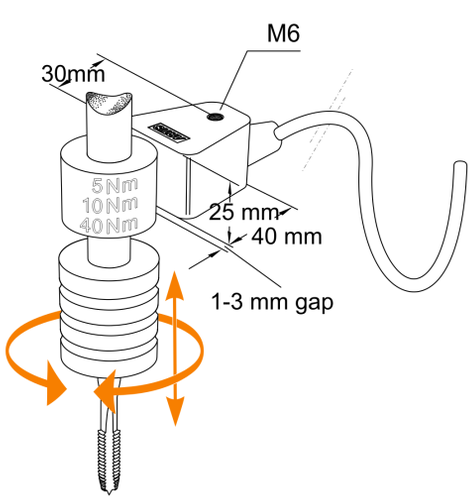


Illustration similar - Assembly sketch

CODE	O3PZ1021011
DIMENSIONS	depending on the tool-holder, the DDU Rotor is applied to the tool holder
DEGREE OF PROTECTION	IP66/IPx7, resistant to cooling lubricants
SURFACE	High tenacity, protected against abrasion by chips
OPERATING TEMPERATURE	15 °C – 50 °C
MEASURING RANGE **(ALSO SEE PAGE 3)**	Depending on the tool holder, 3 measuring ranges each for torque and feed force, technical clarification required!
MEASURING PRINCIPLE	Strain gauge technology in full-bridge circuit
RESOLUTION	9 bit, 8 bit data, 1 bit sign
ACCURACY	±5 % of measuring end value
REPETITIVE ACCURACY	±2 % of measuring end value
DATA TRANSMISSION RATE	10 ms (100 Hz)
SAMPLING RATE	2 ms (500 Hz)
MAX. ROTATIONAL SPEED	max. rotational speed = 5500 rpm
CONFORMITY	CE

DDU ROTOR
COMPONENT OF THE DDU SENSOR SYSTEM

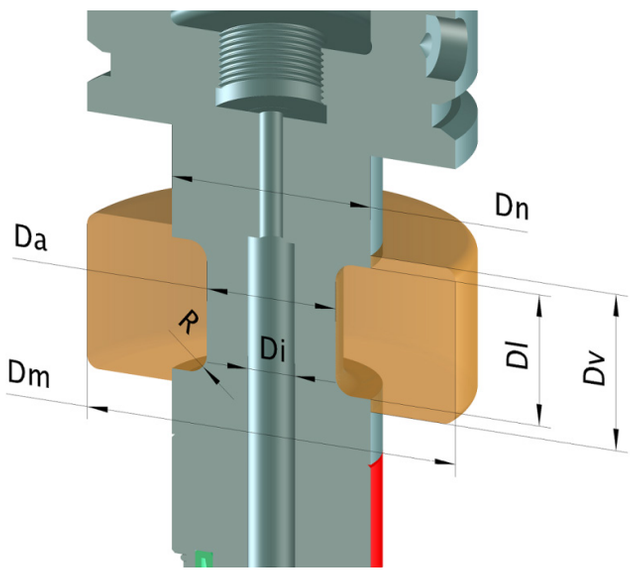
Summary

The DDU-rotor is designed uniquely to the customer‘s machining task.

All relevant information for technical clarification of the required measuring range and a list of available measuring ranges can be found on this sheet.

The data of the available standard types are listed below. If none of the standard types can be employed, exact data about the relevant machining task are required as per the checklist: Machining task of tool holder.

***Note:** Within the area Dl no internal, mobile components or lockings screws for tool stop are admitted!



	Measuring ranges and application data						
DIMENSIONS	**Da**	**Di**	**Dl***	**Dm**	**Dn**	**Dv**	**R**
MIN. IN MM	20	0	21	42	20	25	2
MAX. IN MM	80	40	21	125	100	25	3

STANDARD TYPES	**Da (mm)**	**Di (mm)**	**Measuring range torque (Nm)**	**Measuring range feed force (kN)**	**min. Dm (mm)**
TYPE 1	18	< 12	2/10/30	1/2/5	> 42 mm
TYPE 2	20	< 15	5/10/40	1/2/5	> 42 mm
TYPE 3	25	< 16	10/30/60	2/5/10	> 50 mm
TYPE 4	30	< 14	15/40/60	3/6/10	> 52 mm
TYPE 5	33	< 21	20/40/100	3/6/10	> 63 mm
TYPE 6	36	< 16	30/80/200	5/10/20	> 63 mm

AVAILABLE MEASURING RANGES	**Identification no. – torque (Nm)**				**Identification no. – feed force (kN)**		
	A – 2/10/30	E – 10/20/40	I – 15/40/60	M – 30/80/200	A – 1/2/5	E – 3/8/15	
	B – 5/10/20	F – 10/30/50	J – 20/40/80		B – 1,5/3/6	F – 5/10/20	
	C – 5/10/30	G – 10/30/60	K – 20/50/80		C – 2/5/10	G– 0,5/1/2	
	D – 5/10/40	H – 15/30/60	L – 20/40/100		D – 3/6/10	H– 10/30/50	

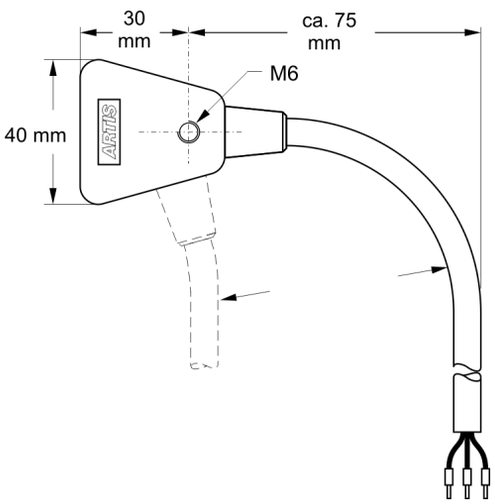
CHECKLIST MACHINING TASK OF TOOL HOLDER	**Monitoring of threading tasks**				**Monitoring of drilling tasks**		
	Thread cutting ☐		Thread forming ☐		**Process data**	min.	max.
	Process data				Outer drill hole Ø (mm)		
THREAD Ø, e.g. M6	min.	max.		**Material**	Inner Ø (counterbore only) (mm)		
			mm	Tensile strength of material	No. of cutting edges (pcs.)		
PITCH			mm	N/mm²	Spindle rotational speed (rpm)		
SPINDLE ROT. SPEED			rpm		Feed force (mm/U)		

DDU STATOR
COMPONENT OF THE DDU SENSOR SYSTEM

Summary

Together with the DDU-rotor, the DDU-stator forms the sensor system for contact-free monitoring of rotating and rigid tools. It can be used in combination with the ARTIS tool and process monitoring systems GENIOR MODULAR and CTM. The stator is installed solidly and centrically to the DDU-rotor in a distance of 1 - 3 mm. Via this air gap, the transmission of measurement data from rotor to stator is carried out contact-free (inductively). Subsequently, the stator submits the data to the connected measuring transducer (GEM TF-01 or DDU-4).

Note: Thoroughly follow the instructions in the installation manual when mounting rotor and stator!



GENERAL DATA		
ARTICLE NUMBER **with PUR cable, gray**	Stator-G 5 m	O3PZ1021005
	Stator-G 10 m	O3PZ1021006
	Stator-S 5 m	O3PZ1021003
	Stator-S 10 m	O3PZ1021004
DIMENSION	see drawing	
DEGREE OF PROTECTION	IP67, resistant to cooling lubricants	
TEMPERATURE RANGE	15 °C – 50 °C	
INSTALLATION	Screw mounting, M6	
PROPERTIES PUR CABLE, GRAY	• Low adhesion, oil resistant and flame retardant (IEC 60332-1-2). • Designed for up to 5 million swaying cycles in cable carriers (in dry, damp or wet surrounding at normal mechanical stress).	
CONDUCTOR LAYOUT	Extra fine wired acc. to VDE 0295, class 6/ IEC 60228 Cl.6	
MIN. BENDNG RADIUS	For flexible use 7.5 x outer Ø, if permanently installed 4 x outer Ø	
DIAMETER	8.5 mm	
CONFORMITY	CE	

GENERAL DATA		
ARTICLE NUMBER **with ROB PUR cable, black**	Stator-G 10 m	O3PZ1021013
	Stator-S 10 m	O3PZ1021014
DIMENSION	see drawing	
DEGREE OF PROTECTION	IP67, resistant to cooling lubricants	
TEMPERATURE RANGE	15 °C – 50 °C	
INSTALLATION	Screw mounting, M6	
PROPERTIES ROB PUR CABLE, BLACK	• Low adhesion, flame retardant (IEC 60332-1-2) • Mostly resistant to oil and grease • Resistant to vibration, solvents, acids, lye as well as to hydraulic fluids • High flexibility in cold surrounding, abrasion and cut-resistant • Performs well under torsional stress ± 360 degrees/meter	
CONDUCTOR LAYOUT	Extra fine wired acc. to VDE 0295, class 6/ IEC 60228 Cl.6	
MIN. BENDING RADIUS	For flexible use 7.5 x outer Ø, if permanently installed 4 x outer Ø	
DIAMETER	8.5 mm	
CONFORMITY	CE, UKCA	

For a full list of address locations, please consult the Marposs official website

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