

KiTorq Stator

Type 4542A...

Torque Evaluation Unit (Stator) for a Torque Measuring Flange

KiTorq Stator Type 4542A... for supplying power to and capturing measurement data from torque measuring units in the KiTorq System, such as the Type 4550A... rotor.

- Combinations of various rotors and stators
- High precision
- Low installation height
- Fieldbus or Industrial Ethernet interface
- Freely scalable voltage and frequency output
- Cut-off frequency ≤ 4 kHz and IRT-capable for PROFIBET Interface

Description

The KiTorq Stator Type 4542A... and KiTorq Rotor Type 455xA... make up the torque measuring flange KiTorq System. The stator supplies power to the rotor, receives and processes the measurement data, and provides different output signals. The outputs can be tared via the digital interface or by pressing a button. The outputs can be configured via the digital interface. This makes it possible, for instance, to use the output for measuring the torque with a different low-pass filter than a second torque output used for control purposes. It is also possible to convert the speed into a voltage signal. Different scaling factors can also be applied to different plugs.

The KiTorq Stator Type 4542A... can be used together with a rotor from the KiTorq system. Using the ordering key, the stator can be purchased individually or as a calibrated torque measurement chain, together with a Type 455xA... rotor.

The standard torque evaluation unit (stator) is shipped calibrated.

Calibration of the entire measurement chain, consisting of the KiTorq Rotor and a KiTorq Stator, can be ordered using the rotor ordering key (such as the Type 4550A...).

Application

Applications for the KiTorq Stator are found in test bench engineering, such as electric motor, gear, pump, and combustion engine test stands. Special applications for the individual components of the KiTorq System can be found on their corresponding data sheets.



Image Stator with PROFIBUS interface

General Technical Data

The accuracy class is determined by the KiTorq Rotor 455xA...

Linearity error	% FSO	0,01
Temperature influence on the zero point TK0	% FSO/10 K	0,01
Temperature influence on the nominal value TKC	% FSO/10 K	0,01
Rel. standard deviation of repeatability	% FSO	0,003
Zero point stability (48 h)	% FSO	0,003
Limit frequency -3 dB	kHz	10
Operating temperature range (Rated temperature range)	°C	10 ... 60
Service temperature range	°C	0 ... 70
Storage temperature range	°C	-25 ... 80
Protection class		IP54

Technical Data

Noise Immunity (EN 61326-1, Table 2)

Electromagnetic field (AM)	V/m	10
Magnetic field	A/m	100
Electrostatic discharge (ESD)		
Contact discharge	kV	8
Air discharge	kV	4
Fast transients (burst)	kV	1
Impulse voltage (surge)	kV	1
Conducted emissions (AM)	V	10

Mechanical Shock (EN 60068-2-27)

Quantity	n	1 000
Duration	ms	3
Acceleration	m/s ²	650

Vibrational Loads in 3 Directions (EN 60068-2-6)

Frequency range	Hz	10 ... 2 000
Duration	h	2,5
Acceleration (amplitude)	m/s ²	200

Speed Measuring

Pulses/revolution		1x60
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Industrial Ethernet-Interface PROFINET

Sampling rate (values/s)	s	max. 4 000
Baud rate	Mbit/s	100
Connector		4 pin M12
Encoding		D
Max. cable length (X1, X2)	m	100

Dimensions

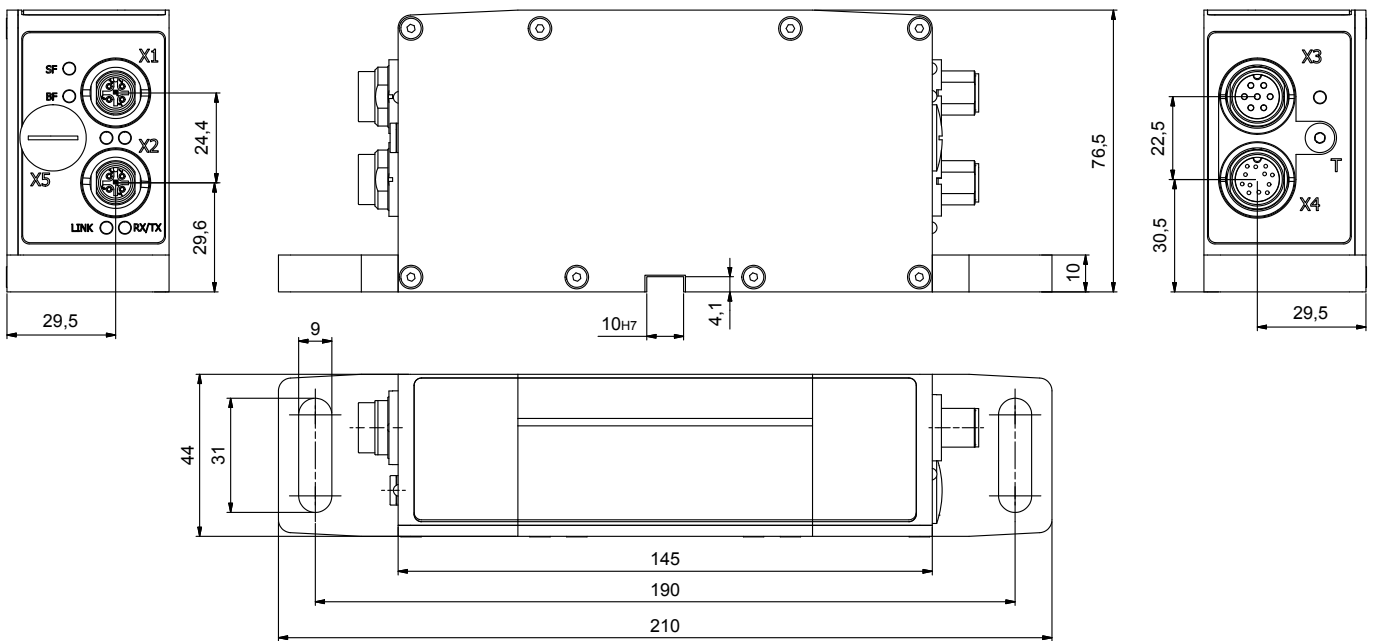
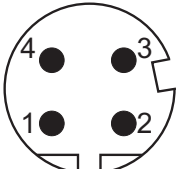


Fig. 1: Dimensions of Type 4542A... KiTorq Stator torque evaluation unit (stator) (dimensions in mm) with version PROFINET

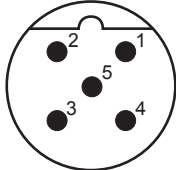
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Electrical Connections

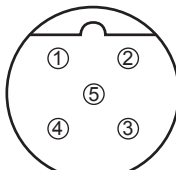
Pin Allocation of the 4 Pin Built-in Connector X1, X2 PROFINET, EtherCAT, EtherNet/IP (M12, D-Encoding)

	Function	PIN	Description		
	Digital Interface PROFINET, EtherCAT, EtherNet/IP	1	TX+	Transmission cable	
		2	RX+	Reception cable	
		3	TX-	Transmission cable	
4		RX-	Reception cable		

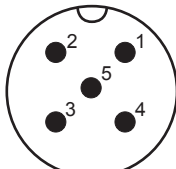
Pin Allocation of the 5 Pin Built-in Connector X1 PROFIBUS

	Function	PIN	Description		
	Connector 5 pin M12 B-Encoding	1	+5 V_BUS	+5 V for bus termination	
		2	RX/TX-	Sending/reception cable	
		3	GND_BUS	Mass	
		4	RX/TX+	Sending /reception cable	
5		n.c.	Not connected		

Pin Allocation of the 5 Pin Flange bushing X2 PROFIBUS

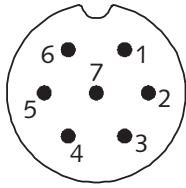
	Function	PIN	Description		
	Flange bushing 5 pin M12 B-Encoding	1	+5 V_BUS	+5 V for bus termination	
		2	RX/TX-	Sending /reception cable	
		3	GND_BUS	Mass	
		4	RX/TX+	Sending/reception cable	
5		n.c.	Not connected		

Pin Allocation of the 5 Pin Built-in Connector X1 and X2 CANopen

	Function	PIN	Description		
	Connector 5 pin M12 A-Encoding	1	SHIELD	In the sensor, on the housing	
		2	n.c.	Not connected	
		3	GND_BUS	Mass	
		4	CAN_H	Sending/reception cable	
5		CAN_L	Sending/reception cable		

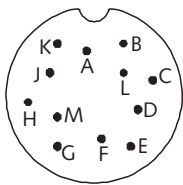
Pin Allocation of the 7 Pin Built-in Connector X3

Function	PIN	Description	
		PIN	Description
Power supply	3	+U _B	18 ... 30 VDC, power consumption <20 W
	2	GND	Ground for +U _B
Torque output	4	U _A	Voltage output ±10 VDC at ±M _{Nom} at >2 kΩ 10 VDC at control signal activation R _{i,c} = 10 Ω, output short circuit proof
	1	AGND	Ground for U _A
	5		Not connected
	6	Control	Off: 0 ... 2 VDC On: 3,5 ... 30 VDC
100 % control (Floating input)	7	GND	Opto isolated ground for control



Pin Allocation of the 12 Pin Built-in Connector X4

Function	PIN	Description	
		PIN	Description
Supply	F	+U _B	18 ... 30 VDC, power consumption <20 W
	A	GND	Ground for +U _B
Shield	M		In the sensor, on the housing
Torque output	C	U _A	Voltage output ±10 VDC at ±M _{Nom} at >2 kΩ 10 VDC at control signal activation R _{i,c} = 10 Ω, Output short circuit proof
	D	AGND	Ground for U _A
Speed pulses	H	Track A	Active, TTL level
	G	Track B	Active, TTL level (at speed option N3)
	J	Track Z	Active, TTL level (at speed option N2, N3)
Input 100 % control	K	Control	Off: 0 ... 2 VDC On: 3,5 ... 30 VDC
	B	TXD	Serial transmission cable
RS-232C interface to the CoMo Torque	L	RXD	Serial receiving cable
	E	DGND	Ground for speed impulses, calibration/control input and RS-232C interface



Application Examples

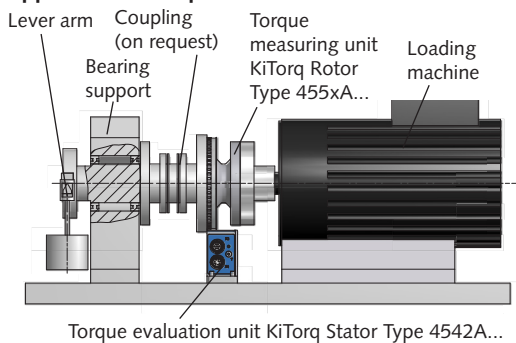


Fig. 2: Possibility for calibration

Metal-Free Room

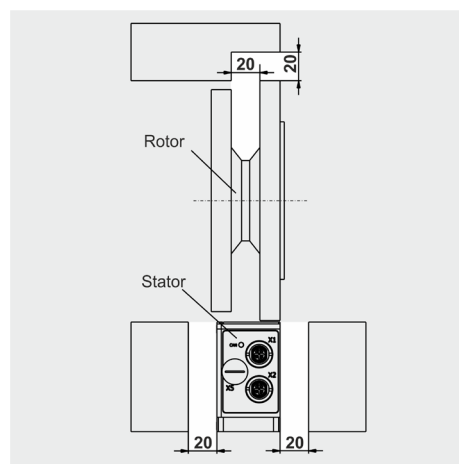


Fig. 3: Metal-free room for nonconstraining energy transmission

Please note that there should be no piece of metal inside the „metal-free room“. Any metal could disturb the energy transmission between rotor and stator and could lead into signal disturbance.

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Calibration

Standard Calibration: The stator is calibrated as a standard. When a torque measurement chain with a KiTorq Rotor, the rotor and stator are calibrated to WKS 1 as a measurement chain. The measurement chain calibration is specified solely by the ordering key of the KiTorq Rotor.

The following signals are set as standard:

- Frequency: 240 kHz \pm 120 kHz
- Analog: \pm 10 V

The following signals are calibrated as standard:

- Analog \pm 10 V at output X4

When a second scaling factor is selected (1:5 or 1:10), both ranges are calibrated at output X4 and can be selected there.

Special Calibration: Upon request, additional calibrations can be ordered (e.g. second scaling factor, another frequency, ...).

The torque measurement chain, consisting of the KiTorq Rotor and KiTorq Stator, has its own separate calibration certificate and a serial number.

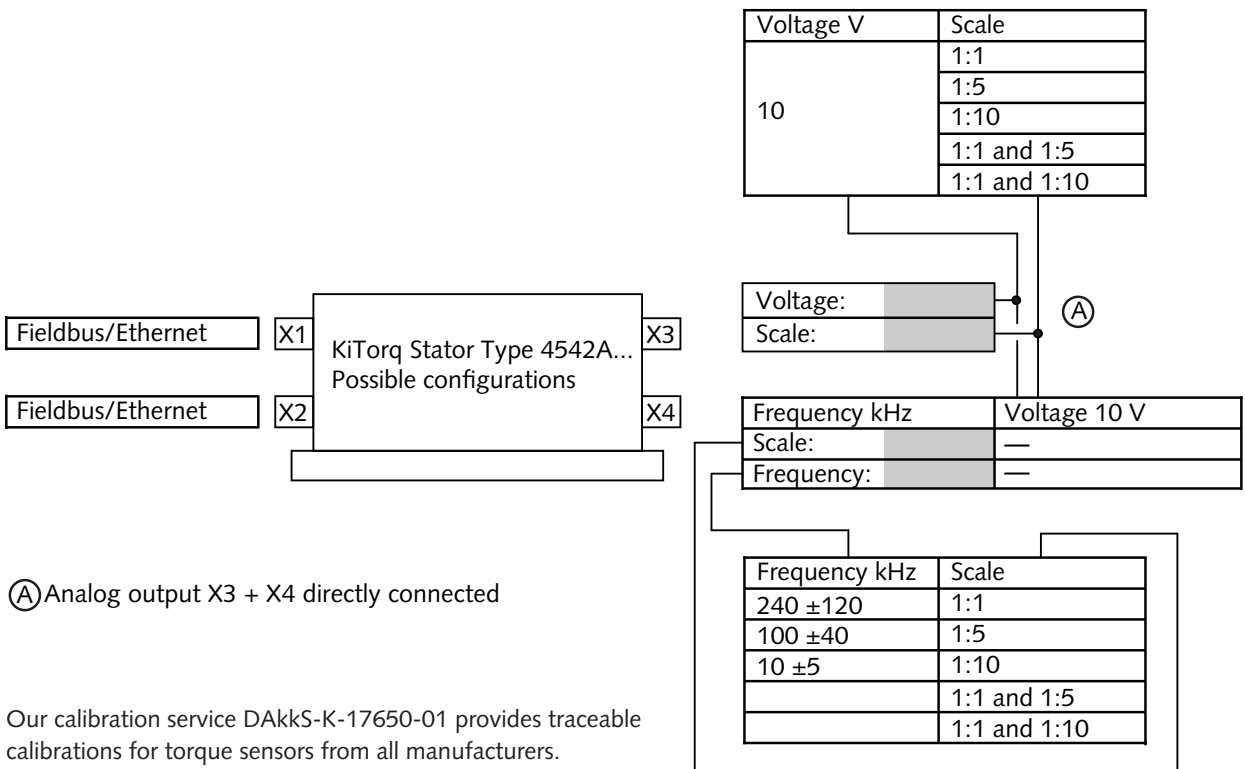
If one of the components is replaced (e.g. with a KiTorq Rotor with a different nominal torque), then the virtual calibration values for the new measurement chain can be calculated from the individual calibration certificate for the rotor and stator.

All output settings can be changed afterward by the customer. The calibration certificates apply only to the settings at delivery, according to the order.

Definition of Calibration Terms:

- **WKS 1:** Works calibration at 5 points right, 3 points left
- **WKS 2:** Works calibration at 5 points right and left, and repeat series
- **DakKS:** Calibration per DIN 51309

Available Customer-Specific Special Settings/Calibrations



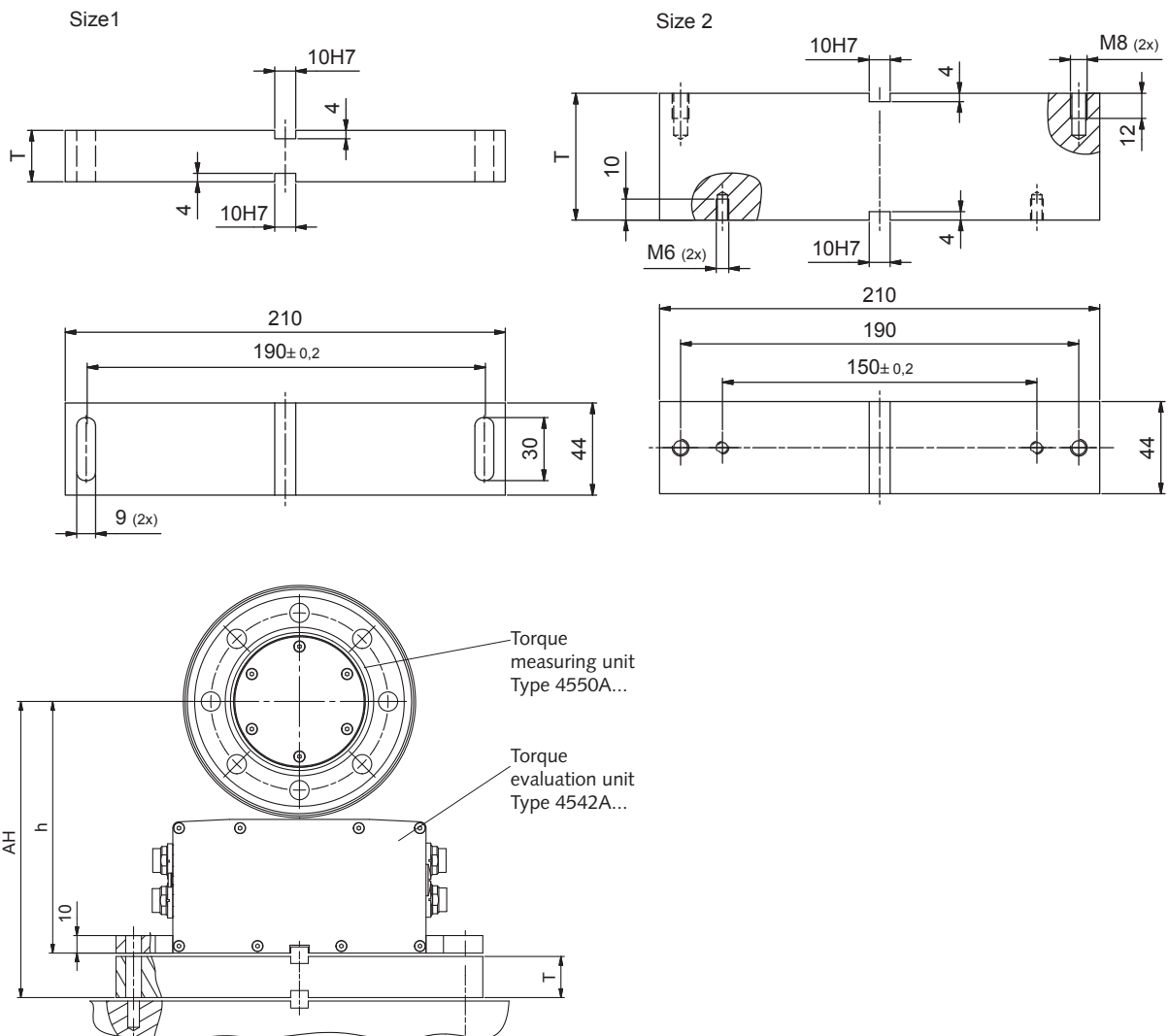
ⓐ Analog output X3 + X4 directly connected

Our calibration service DAKKS-K-17650-01 provides traceable calibrations for torque sensors from all manufacturers.

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Dimensions of the Spacer Plate

Spacer Axis height	100 N·m/ 200 N·m h= 133 mm			500 N·m/ 1 000 N·m h= 144 mm			2 000 N·m/ 3 000 N·m h= 161 mm			5 000 N·m h= 175,5 mm		
	Mat. No.	T [mm]	Size	Mat. No.	T [mm]	Size	Mat. No.	T [mm]	Size	Mat. No.	T [mm]	Size
157,5	18024999	24,5	1									
167,5				55114700	23,5	1						
185,5				55114702	41,5	1	18024999	24,5	1			
194,5	18024998	61,5	2									
202,5							55114702	41,5	1	55116668	27	1
204,5				55114704	60,5	2						
222,5							18024998	61,5	2			
226,5												
239,5										55116667	64	2
263,5												



Dimensions of Type 4542A... with spacer plate (total axis height AH)

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Included Accessories **Type/Art. No.**

- Calibration certificate 55117425
- Ferrule resistor PROFIBUS M12 for Type 4542A... with PROFIBUS (4542AN1B) 55117425
- Ferrule resistor CANopen M12 for Type 4542A... with CANopen (4542AN1C) 5511742

Optional Accessories **Type/Art. No.**

- Connection cable, length 5 m, 7 pin – open ends 18008996
- Connection cable, length 5 m, 12 pin – open ends 18008943
- Connection cable, length 2,5 m, 12 pin – to CoMo Torque 18008967
- Connection cable Ethernet, length 2 m, water blue, M12 D-encoding of RJ45 55117503
- Connection cable Ethernet, length 5 m, water blue, M12 D-encoding of RJ45 55117504
- Connection cable Ethernet, length 10 m, water blue, M12 D-encoding of RJ45 18026867
- Extension cable PROFIBUS, length 2 m, violet, M12 B-encoding, female connector to connector 1:1 55117321
- Extension cable PROFIBUS, length 5 m, violet, M12 B-encoding, female connector to connector 1:1 55117500
- Connection cable PROFIBUS, length 2 m, violet, M12 B-encoding, female connector to open ends 18029811
- Connection cable PROFIBUS, length 5 m, violett, M12 B-encoding female connector to open ends 55117502
- Extension cable CANopen, length 2 m, M12 A-encoding, female connector to connector 1:1 18029812
- Extension cable CANopen, length 5 m, M12 A-encoding, female connector to connector 1:1 55117501
- Connection cable CANopen, length 2 m, M12 A-encoding, female connector to open ends 55117499
- Connection cable CANopen, length 5 m, M12 A-encoding female connector to open ends 55117388
- Cable socket 7 pin (plug X3) 18008363
- Cable socket 12 pin (plug X4) 18008371

Optional Accessories **Type/Art. No.**

- Spacer plate 24,5 mm, AH 157,5/185,5 18024999
- Spacer plate 61,5 mm, AH 194,5/222,5 18024998
- Spacer plate 23,5 mm, AH 167,5 55114700
- Spacer plate 60,5 mm, AH 204,5 55114704
- Spacer plate 41,5 mm, AH 185,5/202,5 55114702
- Spacer plate 27 mm, AH 202,5 55116668
- Spacer plate 64 mm, AH 239,5 55116667
- ControlMonitor CoMo Torque Evaluation instrument for torque sensors 4700B...
- Adapter flanges (on request) 2305A...
- Couplings (on request) 2305A...
- SensorTool 4706...

Ordering Key

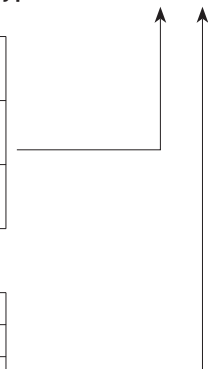
Speed

Speed measuring with 1x60 Imp./Rev.	N1¹⁾
Speed measuring with 1x60 Imp./Rev. and Z-pulse	N2
Speed/angle measurement with 2x 8 192 Imp./Rev. and Z-pulse	N3

Interface

PROFINET (RT / IRT)	A
PROFIBUS	B
CANopen	C
EtherCAT	D
EtherNet/IP	E

Type 4542A



¹⁾ Option N1 only with KiTorq Rotor Type 4550A... possible.

Please note: Only use rotors and stators with the same speed option.

Order Example: **Type 4542AN1A**

Torque evaluation unit Type **4542A**, speed measuring 60 impulses/revolution: **N1**, Interface PROFINET: **A**

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