Interface description

Torque senso model 8661
USB interface

Valid from 01.10.2021

Manufacturer:
burster
praezisionsmesstechnik gmbh & co kg
Talstr. 1 - 5
76593 Gernsbach
Germany

Talstr. 1 - 5
76593 Gernsbach
Germany

Tel.: +49-7224-645-0
Fax.: +49-7224-645-88
Email: info@burster.com
www.burster.com

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The measurement solution.

EU-Konformitätserklärung (nach EN ISO/IEC 17050-1:2010)

EU-Declaration of conformity (in accordance with EN ISO/IEC 17050-1:2010)

Name des Ausstellers: burster präzisionsmesstechnik gmbh & co kg
Issuer's name:

Anschrift des Ausstellers: Talstr. 1-5
Issuer's address: 76593 Gernsbach, Germany

Gegenstand der Erklärung: Präzisions-Drehmomentsensor + Steckernetzteil
Object of the declaration: *Precision Torque Sensor + power pack*

Modellnummer(n) (Typ): 8661 + 8600-Z010
Model number / type:

Diese Erklärung beinhaltet obengenannte Produkte mit allen Optionen
This declaration covers all options of the above product(s)

Das oben beschriebene Produkt ist konform mit den Anforderungen der folgenden Dokumente:
The object of the declaration described above is in conformity with the requirements of the following documents:

Dokument-Nr. *Documents No.*	**Titel** *Title*	**Ausgabe** *Edition*
2011/65/EU	Richtlinie zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten *Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment*	2011
2014/35/EU	Richtlinie zur Harmonisierung der Rechtsvorschriften der Mitgliedsstaaten über die Bereitstellung elektrischer Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen auf dem Markt *Directive on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits*	2014
2014/30/EU	Richtlinie zur Harmonisierung der Rechtsvorschriften der Mitgliedsstaaten über die Elektromagnetische Verträglichkeit *Directive on the harmonization of the laws of the Member States relating to electromagnetic compatibility*	2014
EN 61010-1	Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte – Teil 1: Allgemeine Anforderungen *Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements*	2010 + Cor.:2011
EN 61326-2-3	Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV-Anforderungen – Teil 2-3: Besondere Anforderungen *Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 2-3: Particular requirements*	2006
EN 55011	Industrielle, wissenschaftliche und medizinische Geräte – Funkstörungen – Grenzwerte und Messverfahren *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*	2009

Gernsbach	20.04.2016	i.V. Christian Karius
Ort / *place*	Datum / *date*	*Quality Manager*

Dieses Dokument ist entsprechend EN ISO/IEC 17050-1:2010 Abs. 6.1g **ohne Unterschrift** gültig
According EN ISO/IEC 17050 this document ***is valid without a signature.***

burster präzisionsmesstechnik gmbh & co kg · Talstr. 1-5 DE-76593 Gernsbach (P.O.Box 1432 DE-76587 Gernsbach) · Tel. +49-7224-6450 · Fax 645-88
www.burster.com · info@burster.com · burster is ISO 9001:2008 certified

Contents

1. For your safety

The following symbols on the torque sensor model 8656 and in this operation manual warn of hazards. This document is a supplement to the operation manual for the torque sensor model 8661.

IMPORTANT: In any case, heed the information in the operation manual for the torque sensor model 8661. This document is only a supplement.

1.1 Symbol used in this manual

1.1.1 Signal words

The following signal words are used in the operation manual according to the specified hazard classification.

 **DANGER**	
High degree of risk: indicates a hazardous situation which, if not avoided, will result in death or serious injury	
 **WARNING**	
Moderate degree of risk: indicates a hazardous situation which, if not avoided, may result in death or serious injury.	
 **CAUTION**	
Low degree of risk: indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.	
NOTICE	
Property damage to the equipment or the surroundings will result if the hazard is not avoided.	

Note: It is important to heed these safety notices in order to ensure you handle the torque sensor model 8661 correctly.

IMPORTANT: Follow the information given in the operation manual.

1.1.2 Pictograms

	**Electric shock hazard.**
	Observe the advice for protecting the torque sensor model 8656.

1.2 General safety instructions

The torque sensor model 8661 uses state-of-the-art engineering and is safe to operate. However, if the torque sensor model 8661 is not used or operated as intended, it may present a hazard.

DANGER

Danger of electric shock!
The following instructions must be followed to prevent electric shock and injuries:

- In order to achieve high measuring characteristic value, the torque sensor model 8661 is not designed with the usual safety factors (2…20) for machine designs. For applicable overload factors, see the technical data (data sheet).
- Observe accident prevention regulations, including for accessories used.
- Use torque sensor model 8661 only in **non-safety-critical applications**.
- Only use torque sensor model 8661 **outside** of **potentially explosive areas** (Ex protected areas).

NOTICE

The following points must be observed to prevent injuries and damage to property:

- The limits for permissible mechanical, thermal and electrical loads are shown in the data sheet. These limits must not be exceeded. Take these limits into account when planning the measuring arrangement, and during installation (preferably with the display for the torque connected) and operation.
- Impacts and shocks may damage the torque sensor model 8661 (e.g. if it is dropped). Exercise the necessary care when transporting and fitting the torque sensor model 8661.
- Torque peaks in excess of the permissible overload may destroy the torsion shaft. Make sure that such peaks do not occur, or ensure that they are absorbed.

2. Introduction

IMPORTANT: Read the operation manual carefully before using the equipment, and keep for future reference.

2.1 Intended use

The torque sensor model 8661 measures static and dynamic torques on rotating or stationary machine parts in either direction of rotation. You have the option of measuring rotational speed or angular displacement. The respective upper range value is shown on the type plate. The USB version of the 8661 torque sensor model 8661 transmits all measurement signals via USB.

Both the low mass of the torque sensor model 8661 and its high torsional rigidity are an advantage when measuring dynamic torques. However, you need to pay attention to the torsion spring constant and the sensor's cut-off frequency with such measurements. You can find both of these in the data sheet.

The torque sensor model 8661 is maintenance-free thanks to its contactless transmission of the measurement signal. The electrical measurement signals can be transmitted to remote measuring stations where they can be displayed, recorded, processed and used for control and regulation tasks.

Use the torque sensor model 8661 only for measuring torque and rotational speed or angular displacement.

Do **not** use the torque sensor model 8661 in safety-critical applications.

The torque sensor model 8661 is not intended for use as a safety device.

2.2 Electromagnetic compatibility

2.2.1 Interference immunity

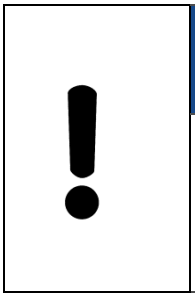
Interference immunity to EN 61326-2-3:2006

Industrial locations

2.2.2 Emitted interference

Emitted interference to EN 61326-2-3:2006

3. Serial Communication



NOTICE

- Only the commands described in this interface specification should be used. Use of undocumented commands can cause incorrect operation.
- A point '.' is used in floating-point numbers
- The number of parameters must always be adhered to

3.1 Interface parameters

A serial data stream is tunneled through the USB interface. This data stream has the following parameters:

Baud rate:	921600 baud
Data bits:	8
Stop bits:	1
Parity:	none

no hardware handshake

3.2 Communications protocol

Control characters:	<STX>	0x02	=> Start of Text
	<ETX>	0x03	=> End of Text
	<ENQ>	0x05	=> Enquiry
	<ACK>	0x06	=> Acknowledge
	<S>or ` `	0x20	=> Space
	<NAK>	0x15	=> Not Acknowledge
	<LF>	0x0A	=> Line Feed
	<EOT>	0x04	=> End Of Transmission
	<NUL>	0x00	=> NULL character

ANSII standard X3.28-1976 Subcategory 2.5, A3 is used as the communications protocol. This standard is used in systems where a master communicates with a slave via a point-to-point connection. There is no addressing.

3.2.1 Command structure

3.2.2 Commands without parameters

aaaaB<LF>

with

aaaa	Command name, 4 ASCII characters
B	Command type, ´?´ for queries, ´!´ for commands to be executed
<LF>	Line Feed, 0x0A

3.2.3 Commands with parameters

aaaaB<S>P1,P2,...,Px<LF>

with

aaaa	Command name, 4 ASCII characters
B	Command type, ´?´ for queries, ´!´ for commands to be executed
<S>	Space, 0x20
P1, P2, ..., Px	Parameter 1 to x, separated by commas
<LF>	Line Feed, 0x0A

3.2.4 Structure of a response to a question form

The question was asked

aaaa?<LF>

<>

aaaa	Command name, 4 ASCII characters
?	The character '?' identifies the question form
<LF>	Line Feed, 0x0A

A response with, for instance, 3 parameters follows

P1<NUL>,P2<NUL>,P3<NUL><LF>

<>

Px	Parameter x
<NUL>	NULL character, 0x0
<LF>	Line Feed, 0x00x0A

3.2.5 Example of the communication sequence

The following sequence shows how the 8661 communicates with a host controller using a command with the question form

Controller sends: <STX>info?<LF><ETX>

Command sequence: The 8661USB should execute the info? command

8661 replies with: <ACK>

The 8661 reports that it recognizes and understands the info? command; otherwise, it would respond with <NAK>.

Controller sends: <EOT>

The host controller starts querying the response

8661 replies with: <STX>burster 8661 info-antwortstring<LF><ETX>

This is the correct response to the info? command

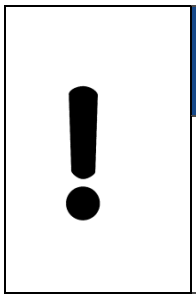
Controller sends: <ACK>

The controller has received the response and accepted it. Does the 8661 have any other answers stored that can be provided now?

8661 replies with: <EOT>

No. This ends the communication sequence.

3.3 General information



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3.3.1 Interface watchdog timer

3.3.1.1 Timer A (response timer)

Timer A is used by the 8661 to protect itself from an invalid response or no response.

- Start: Timer A is started after data transfer has been terminated with <ETX>. The instrument waits for an acknowledgement by the master.
- Stop: Timer A is stopped if a valid response <ACK> has been received.
- Timeout: If a timeout occurs, the 8661 sends an <EOT>
- and returns to its initial state (ready for a new command).

The timeout for Timer A is set to 5 seconds.

3.3.1.2 Timer B (receive timer)

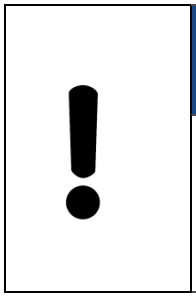
Timer B is used by the receive station, to protect itself against

non-recognition of the <ETX> character.

- Start: Timer B is started after receiving the <STX>
- Restart: Timer B is restarted as long as data is being received in order to allow variable data block lengths to be received.
- Stop: Timer B is stopped when the <ETX> character has been received.
- Timeout: If a timeout occurs, the received data (command) is discarded. The instrument enters the initial state and waits for new commands.

The timeout for Timer B is set to 5 seconds.

3.3.2 Information about the command descriptions



NOTICE

- Only the commands described in this interface specification should be used. Use of undocumented commands can cause incorrect operation.
- A point '.' is used in floating-point numbers
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4. Interface commands

NOTICE

- Only the commands described in this interface specification should be used. Use of undocumented commands can cause incorrect operation.
- A point '.' is used in floating-point numbers
- The number of parameters must always be adhered to

4.1 General settings

4.1.1 INFO Querying an info string

Entering a new value

There is no write form for this command.

Read out the current value

The INFO? command can be used to read out the info string.

The host sends:	<STX>INFO?<LF><ETX>
8661 replies with:	<ACK>
The host sends:	<EOT>
8661 replies with:	<STX>P1,P2,P3,P4,P5,P6,P7,P8<ETX>
The host sends:	<ACK>
8661 replies with:	<EOT>

Meaning of parameter Pn

Parameter	Assignment	Value
P1	Device type	e.g. "8661-0000-V0000"
P2	Serial number	"SN_123456"
P3	Calibration date	"AbglDat_12.01.2020"
P4	Calibration counter	Integer value
P5	Full-scale value	Floating-point number

P6	Factor 1:x (only relevant for dual-range sensor)	Floating-point number For single-range sensor, always 1.0
P7	Number of lines on the encoder disk	0…10000
P8	Stator software version	“STAT_V200400“
P9	Rotor software version	“ROT_V200400“

4.1.2 FEHL Reading out the error status

4.1.2.1 Entering a new value

Any errors present are deleted with the FEHL! command

The host sends: <STX>FEHL!<LF><ETX>

8661 replies with: <ACK>

4.1.2.2 Reading out the current value

The FEHL? command can be used to read out the error status. The errors that have occurred are cleared by switching back on or by FEHL! write access. The individual errors are transmitted bit-coded

The host sends: <STX>FEHL?<LF><ETX>

8661 replies with: <ACK>

The host sends: <EOT>

8661 replies with: <STX>P1<ETX>

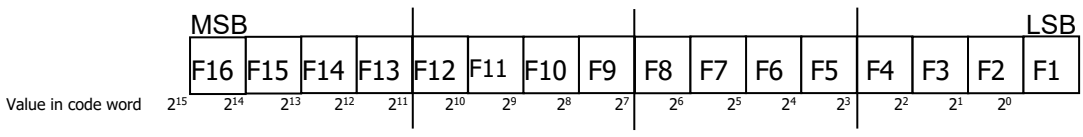
The host sends: <ACK>

8661 replies with: <EOT>

Meaning of parameter Pn

Parameter	Assignment	Value
P1	Error status	16-bit integer (hexadecimal)

Code table for the error bits



Error number	Error description

F1	Gain > 100%
F2	Illegal access to password-protected command
F3	EPROM read error
F4	Parameter error: incorrect number of bytes
F5	Parameter error: incorrect range
F6	Error during internal transmission
F7	Command not executed
F8	Undefined
F9	Undefined
F10	Undefined
F11	Undefined
F12	Undefined
F13	Undefined
F14	Undefined
F15	Undefined
F16	Undefined

4.1.3 Querying the DIGI version info for PC software

4.1.3.1 Entering a new value

There is no write form for this command.

4.1.3.2 Reading out the current value

The DIGI? command can be used to read out the version info string for the PC software.

This documents special properties of the device software version or special version.

Parameters P4 and P5 are bit-coded and relevant for a special version of the device software. These parameters are used to inform the PC software which functions are disabled for the PC software in the case of special device software. A 1 in the corresponding position means that the function is disabled. A 0 means no restriction of the function. Bit0 is always the LSB and BIT7 the LSB.

Note: In the current state of development, different versions do not yet exist. Accordingly, all parameters are set to zero

The host sends: <STX>DIGI?<LF><ETX>
8661 replies with: <ACK>
The host sends: <EOT>
8661 replies with: <STX>P1,P2,P3,P4,P5<ETX>
The host sends: <ACK>
8661 replies with: <EOT>

Meaning of parameter Pn

Parameter	Assignment	Value
P1	Version of the device's sensor technology	0...255: bit-coded, reserved
P2	Version of the device's communication technology	0...255: bit-coded, reserved
P3	Communication counter	Is incremented with every software change that has an effect on the RS232 communication. This counter starts with 0 for version V201100
P4	First byte for recognizing special properties of special software (bit-coded)	Bit0: reserved Bit1: reserved Bit2: reserved Bit3: reserved Bit4: reserved Bit5: reserved Bit6: reserved Bit7: reserved
P5	Second byte for recognizing special properties of special software (bit-coded)	Bit0: reserved Bit1: reserved Bit2: reserved Bit3: reserved Bit4: reserved Bit5: reserved Bit6: reserved Bit7: reserved

4.1.4 DEFU Loading default user settings

4.1.4.1 Entering a new value

The DEFU! command resets the user settings to the default values and saves them.

The host sends: <STX>DEFU!<LF><ETX>
8661 replies with: <ACK>

4.1.4.2 Reading out the current value

There is no question form for this command.

4.1.5 MIWE Setting the number of averages N / gate time

4.1.5.1 Entering a new value

The MIWE! command is used to set the number of averages formed for output of each measured value. This also established the gate time for the speed measurement if IMOD is set accordingly. Base is 0.5 ms, so maximum gate time is 50 s (gate time [s] = number_averages * 0.5 [ms]).

- With MIWE! = 0, the sensor is automatically set to angle measurement for compatibility reasons, with MIWE! >= 1 to speed measurement. If this is not desired, this measuring mode can be corrected afterwards with IMOD!

The host sends: <STX>MIWE! P1<LF><ETX>

8661 replies with: <ACK>

Meaning of parameter Pn

Parameter	Assignment	Value
P1	Number of averages	0 or 100000

4.1.5.2 Reading out the current value

The MIWE? command can be used to read out the currently set number of averages.

The host sends: <STX>MIWE?<LF><ETX>

8661 replies with: <ACK>

The host sends: <EOT>

8661 replies with: <STX>P1<ETX>

The host sends: <ACK>

8661 replies with: <EOT>

Meaning of parameter Pn

Parameter	Assignment	Value
P1	Number of averages	0 or 100000

4.1.6 IMOD Setting the incremental counter mode

4.1.6.1 Entering a new value

The IMOD! command sets the operating mode of the incremental counter. If the sensor is operating in the angle mode, the current rotation angle is always returned. This angle of rotation can be zeroed with WINU. If the sensor is operating in the speed mode, the measured speed is returned. The gate time for measuring the speed is set by the measuring time specified in the MIWE command.

The host sends: <STX>IMOD! P1<LF><ETX>

8661 replies with: <ACK>

Meaning of parameter Pn

Parameter	Assignment	Value
P1	Incremental counter mode	0: Angle mode 1: Speed mode

4.1.6.2 Reading out the current value

The IMOD? command can be used to read out the current operating mode of the incremental counter.

The host sends:	<STX>IMOD?<LF><ETX>
8661 replies with:	<ACK>
The host sends:	<EOT>
8661 replies with:	<STX>P1<ETX>
The host sends:	<ACK>
8661 replies with:	<EOT>

Meaning of parameter Pn

Parameter	Assignment	Value
P1	Incremental counter mode	0: Angle mode 1: Speed mode

4.1.7 WINU Zeroing the angle

4.1.7.1 Entering a new value

The momentary measured value of the angle is zeroed with the command WINU! in the angle mode (MIWE = 0). In the speed mode (MIWE >0) this command has no effect.

The host sends:	<STX>WINU!<LF><ETX>
8661 replies with:	<ACK>

4.1.7.2 Reading out the current value

There is no question form for this command.

4.1.8 MBER Selecting the measuring range (only for dual-range sensor)

4.1.8.1 Entering a new value

The measuring range of a dual range sensor is selected and stored in the EEPROM with the command MBER!.

- This command is only possible with the dual-range sensor and is answered with NAK in the case of the single-range sensor!

The host sends:	<STX>MBER! P1<LF><ETX>
8661 replies with:	<ACK>

Meaning of parameter Pn

Parameter	Assignment	Value
P1	Measurement range	0: Large measuring range 1: Small measuring range

4.1.8.2 Reading out the current value

The command MBER? can be used to read out the currently set measuring range.

The host sends:	<STX>MBER?<LF><ETX>
8661 replies with:	<ACK>
The host sends:	<EOT>
8661 replies with:	<STX>P1<ETX>
The host sends:	<ACK>
8661 replies with:	<EOT>

Meaning of parameter Pn

Parameter	Assignment	Value
P1	Measurement range	0: Large measuring range 1: Small measuring range

4.1.9 TEST Sensor test

4.1.9.1 Entering a new value

There is no write form for this command.

4.1.9.2 Reading out the current value

The command TEST? reads out the current ADC-LSB measured value and the value measured during adjustment of the sensor for the zero value. If the sensor is mechanically unloaded and the adjustment was also calibrated while unloaded, a statement about the quality of the sensor zero point can be made by means of these two values.

The host sends:	<STX>TEST?<LF><ETX>
8661 replies with:	<ACK>
The host sends:	<EOT>
8661 replies with:	<STX>P1,P2,P3<ETX>
The host sends:	<ACK>
8661 replies with:	<EOT>

Meaning of parameter Pn

Parameter	Assignment	Value
P1	Current uncalibrated measured value in ADC LSBs	16-bit integer
P2	ADC zero value measured at the time of adjustment	16-bit integer
P3	Deviation of the actual value from the adjustment zero point in percent based on the measuring range	Floating-point number

4.2 Reading measured values

4.2.1 VALUE Querying the calibrated measured value of the torque

4.2.1.1 Entering a new value

There is no write form for this command.

4.2.1.2 Reading out the current value

The command VALUE? can be used to query the current calibrated measured value

The host sends:	<STX>WERT?<LF><ETX>
8661 replies with:	<ACK>
The host sends:	<EOT>
8661 replies with:	<STX>P1<ETX>
The host sends:	<ACK>
8661 replies with:	<EOT>

Meaning of parameter Pn

Parameter	Assignment	Value
P1	Calibrated measured value without unit	Floating-point number

4.2.2 INKR Speed / angle of rotation as increments

4.2.2.1 Entering a new value

There is no write form for this command.

4.2.2.2 Reading out the current value

The command INKR? can be used to query the current "speed" in increments or the current "angle of rotation" in increments, depending on the setting for averages

The speed/angle of rotation must still be calculated, and for this you need to know how many increments make up a full rotation. The encoder disk can be read with the command SEIB? .

If MIWE is set == 0, the lines counted since last zeroing (transmission of MIWE! 0) is output

If MIWE > 0, i.e. if a gate time has been defined, the lines counted in the last gate time period are output here.

The host sends:	<STX>INKR?<LF><ETX>
8661 replies with:	<ACK>
The host sends:	<EOT>
8661 replies with:	<STX>P1<ETX>
The host sends:	<ACK>
8661 replies with:	<EOT>

Meaning of parameter Pn

Parameter	Assignment	Value
P1	Speed or angle of rotation in increments	Signed long

4.2.3 DREH Querying the speed / angle of rotation

4.2.3.1 Entering a new value

There is no write form for this command.

4.2.3.2 Reading out the current value

The command SPEED? can be used to query the current speed in [rpm] or the current angle of rotation in [degrees], depending on the setting for averages

If the incremental operating mode has been set to "Angle" with IMOD == 0, the absolute angle of rotation since last zeroing (transmission of WINU!) is output here

In the "Speed" operating mode, the speed is output here based on the gate time defined with MIWE and transmitted in [rpm].

The host sends:	<STX>DREH?<LF><ETX>
8661 replies with:	<ACK>
The host sends:	<EOT>
8661 replies with:	<STX>P1<ETX>
The host sends:	<ACK>
8661 replies with:	<EOT>

Meaning of parameter Pn

Parameter	Assignment	Value
P1	Speed in [rpm] or angle of rotation in degrees	Floating-point number

4.2.4 RADI Querying the speed n in [rad/s] / angle of rotation in [rad]

4.2.4.1 Entering a new value

There is no write form for this command.

4.2.4.2 Reading out the current value

The command RADI? can be used to query the current speed in [rad/s] or the current angle of rotation in [rad], depending on the setting for averages

If the incremental operating mode has been set to "Angle" with IMOD == 0, the absolute angle of rotation since last zeroing (transmission of WINU!) is output here

In the "Speed" operating mode, the speed is output here based on the gate time defined with MIWE and transmitted in [rpm].

The host sends:	<STX>RADI?<LF><ETX>
8661 replies with:	<ACK>
The host sends:	<EOT>
8661 replies with:	<STX>P1<ETX>
The host sends:	<ACK>
8661 replies with:	<EOT>

Meaning of parameter Pn

Parameter	Assignment	Value
P1	Speed in [rad/s] or angle of rotation in [rad]	Floating-point number

4.2.5 SPOM Speed-optimized query mode

With the speed-optimized query mode, measured values can be read out from the device in quick succession.

IMPORTANT: This query mode is a violation of the otherwise usual protocol!!

The command SPOM? Is used to start the query sequence. Each data item received must be acknowledged with a certain control character (0x0e), the next data item is then requested immediately. If the acknowledgment is made with different control character defined for this purpose, this query mode is terminated and normal interface communication is possible again.

For speed reasons there is no timeout monitoring in this query mode

Sensors without the option of angle of rotation/speed:

In each telegram 50 measured values of torque are transmitted. At maximum speed (MIWE=1 or MIWE =0) you get 40 telegrams/s = 2000 values per second.

Sensors with the option of angle of rotation/speed:

In each telegram 25 value pairs each of torque and rotation angle/speed (depending on MIWE) are transmitted. Due to limitation by the transmission bandwidth, every second value is transmitted. At maximum speed (MIWE=1 or MIWE =0) you get 40 telegrams/s = 1000 values of torque and 1000 values of angle of rotation/speed per second.

- The SPOM mode only makes sense if a number of averages (MIWE) <=20 is set! Otherwise, value acquisition takes so long that this transmission mode makes no sense. For slower data rates, simply use VALUE?

4.2.5.1 Entering a new value

There is no write form for this command

4.2.5.2 Reading out the current value

The host sends:	<STX>SPOM?<LF><ETX>
8661 replies with:	<ACK>
The host sends:	<EOT>
8661 replies with:	<STX>SPOM-START-NOW<ETX>
The host sends:	<0x0E>
8661 replies with:	P1
The host sends:	<0x0E>
8661 replies with:	P1
The host sends:	<0x0E>
8661 replies with:	P1
The host sends:	<0x0E>
8661 replies with:	P1
(…)	
The host sends:	<0x0E>
8661 replies with:	P1
The host sends:	<0x0F>
8661 replies with:	<EOT>

Meaning of parameter Pn

Parameter	Assignment	Value
P1 For sensor without the option of angle of rotation/speed	50 measured values of torque	250 bytes of binary data in each 5 bytes of encoded floating point values (see comment below)
P1 For sensor with the option of angle of rotation/speed	2 x 25 measured values of torque and speed/angle of rotation, every second value is transmitted. (always alternating: A1 B1 A2 B2 A3 B3 A4 B4 …)	250 bytes of binary data in each 5 bytes of encoded floating point values (see comment below)

4.3 Binary data “5-byte float”

A floating point number is stored in the sensor in 4 bytes. However, this is pure binary data that can take any hex value. This data cannot be transmitted in this way because certain values (control characters) are reserved in the interface protocol and these values must not be taken by the useful data.

To avoid this problem, the leading bit (MSB) must be set for all transmitted data. This eliminates possible confusion with control characters (0x0...0x31). The leading bits are transmitted separately in a fifth byte (where, of course, the leading bit is also set).

Example:

Floating-point value: 0x03 0x1f 0xfe 0x11

(1) Set all leading bits

(a)0x83 (b)0x9f (c)0xfe (d)0x91

(2) Assemble fifth byte

at byte (a) the MSB was not set, bit 0 remains 0

at byte (b) the MSB was not set, bit 1 remains 0

at byte (c) the MSB was set, bit 2 becomes 1

at byte (d) the MSB was not set, bit 3 remains 0

Bit 7 is also set so that the byte cannot be a control character. The rest is don’t care. And is set to 1

Thus binary: 0b1000 0100 o with the don’t cares set to 1 0b1111 0100 Hex 0xF4

What is now transmitted:

0x83

0x9f

0xfe

0x91

0xF4

4.3.1 WEDR combination command - Querying VALUE and SPEED (binary)

4.3.1.1 Entering a new value

There is no write form for this command.

4.3.1.2 Reading out the current value

With the command WEDR? the torque value (see command VALUE) and the speed/angle of rotation (see command DERH) can be queried simultaneously The data are transmitted as encoded 5-byte floats in binary form (see comment Binary data "5-byte float" at command SPOM)

If the sensor is one without the option of speed/angle of rotation, the value 0.0 is encoded for the second 5 bytes.

The host sends: <STX>WEDR?<LF><ETX>

8661 replies with: <ACK>

The host sends: <EOT>

8661 replies with: <STX>P1<ETX>

The host sends: <ACK>

8661 replies with: <EOT>

Meaning of parameter Pn

Parameter	Assignment	Value
P1	Torque value and speed in [rpm] or angle of rotation in degrees as 5-bytes floats without separators	10 bytes of binary data, see comment "Binary data "5-byte float" at command SPOM

4.3.2 ADAC Reading out the min. value/max. value

4.3.2.1 Entering a new value

The ADAC! command resets storage of the minimum/maximum values (LSB)

The host sends: <STX>ADAC!<LF><ETX>

8661 replies with: <ACK>

4.3.2.2 Reading out the current value

The ADAC? command can be used to read the currently stored min/max values (LSB and the current measured value in LSBs in hexadecimal representation.

The host sends: <STX>ADAC?<LF><ETX>

8661 replies with: <ACK>

The host sends: <EOT>

8661 replies with: <STX>P1<ETX>

The host sends: <ACK>

8661 replies with: <EOT>

Meaning of parameter Pn

Parameter	Assignment	Value
P1	Response string, values in hex	„ADC_0xAktWert MAX_0xMaxWert MIN_0xMinWert“

4.3.3 NUMO transmission mode - Setting “Only torque”

4.3.3.1 Entering a new value

The NUMO! command is used to specify for a sensor with the angle option whether it should also transmit this angle information in the SPOM mode. If the angle information is not transmitted in the SPOM mode, this doubles the maximum data transmission rate for the torque signal.

The host sends: <STX>NUMO! P1<LF><ETX>

8661 replies with: <ACK>

Meaning of parameter Pn

Parameter	Assignment	Value
P1	Transmission mode (Only relevant for SPOM transmission for sensors with angle disk)	0: Torque and angle (or speed) are transmitted 1: Only the torque info is transmitted

4.3.3.2 Reading out the current value

The command NUMO? can be used to read out the currently set transmission mode.

The host sends: <STX>NUMO?<LF><ETX>

8661 replies with: <ACK>

The host sends: <EOT>

8661 replies with: <STX>P1<ETX>

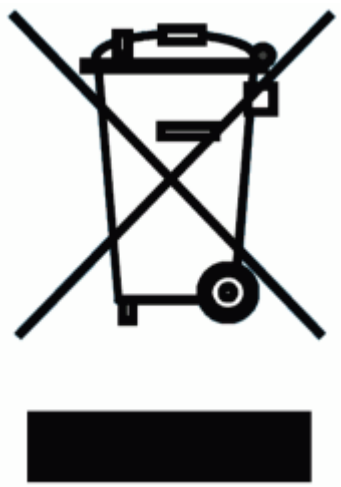
The host sends: <ACK>

8661 replies with: <EOT>

Meaning of parameter Pn

Parameter	Assignment	Value
P1	Transmission mode (Only relevant for SPOM transmission for sensors with angle disk)	0: Torque and angle (or speed) are transmitted 1: Only the torque info is transmitted

5. Disposal



Equipment disposal

Please fulfill your legal obligations and dispose of unserviceable equipment in accordance with applicable legal requirements. Thus you contribute to environmental protection.