

M40079.V13 torque measuring unit
for Right and Left running measuring

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The torque measuring unit M40079.V13 stores the torque values average = $((MAX+MIN)/2)$ which occur in succession during the right and left rotation of the radial joint. The sum of both values will be classified. Additional an automatic Zero-point correction will be done during the rotation without any piece, when an AUTOZERO-Cycle is running. During this cycle, the torque average value of the measuring contrivance will be taken as offset correction for all following measuring cycles. In a special mode, only the left rotation will be measured and classified. The calibration values for up to 32 different models may be stored in the unit. The selection of the actual model will be done by the machine control when starting the measuring.

Additional function: Automatic control of torque set value (> V409A):

For special use like torque measuring during assembly, this process will be controlled in dependence of the latest 4 measured torque values.

1. Displays and control elements

front view



- 1 - Display
- 2 - Lamp: Upper class limit
- 3 - Lamp: Measuring value inside class limits
- 4 - Lamp: Lower class limit
- 5 - Pushbutton UP
- 6 - Pushbutton ENTER
- 7 - Pushbutton DOWN
- 8 - Keyswitch SETUP – Operating Mode (AUTO)

Back view parallel interface



- T1 - Input torque sensor
- T2...T3 - not used
- T4 - DC-voltage output torque sensor
- X312 - Input from external control unit
- X412 - DC-voltage output measuring value torque (MAX+MIN)/2
- X401 - Input power supply
- X402 - Output printer
- S1 - Power supply switch
- F1- Power supply fuse
- 12V - Indicator -12V supply
- +12V - Indicator +12V supply
- + 5V - Indicator + 5V supply

Back view PROFIBUS interface



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Display modes

XavR+L (Nm)	summary of the last measured values of the torque average (MAX+MIN)/2 from right- and left running measuring cycle
model-nr. 000....031	last selected model. The individual class limits and the zero-offset for the actual torque signal are read out from the memory for this number when leaving this display mode.
Max R L	last measured maximum values from right and left running measuring cycle.
Min R L	last measured minimum values from right and left running measuring cycle.
Autozero L	value of the autozero-cycle left.
Autozero R	value of the autozero-cycle right.
Act.val. Nm	actual torque value from the sensor
XavR+L UL	upper class limit for Xav. R+L = (XavR + XavL)*0.5
XavR+L LL rLL	lower class limit for Xav. R+L = (XavR + XavL)*0.5 rLL: actual limit for automatic control of torque set value
Xav set value	set value for automatic control

Attention: The pushbuttons UP and DOWN are locked in the Operating-Mode (AUTO), so that the calibration values can only be changed in the SETUP-Mode

2. Power Supply

Connect the measuring equipment at X401 via the power cable (europ. Standard) to a power supply of 230 V, 50-60 Hz and turn the power switch S1 at the back into ON position. To avoid influence of temperature the measuring equipment should be turned on ten minutes before the first measurement.

3. Setup: Keyswitch at the front in position SETUP

3.1 Model-Nr.

First step is to select the model-nr. you wish to work with.

Select the display mode „model-nr.“ with repeated pushing of pushbutton ENTER. Select the necessary value (000...031) by pushing the pushbutton UP or DOWN. The calibration values for 3.4, 3.5, 3.6 and 3.7 will be read out from the memory when leaving the display mode "model-Nr."

3.2 Torque sensor connection

The sensor has to be connected with connector T1 at the backside.

3.3 Checking the Gain adjustment

The calibration may be done only by special educated persons. The calibration is possible at the backside with the hidden adjuster T1. The unit has been calibrated in our factory.

Gain adjustment with lever-arm and gauge weight:

approximate formular: $\text{torque (Nm)} = \text{lever-arm (cm)} * \text{weight (kg)} * 0,1$

for example lever-arm 20cm, gauge weight 5kg -> torque 10Nm

- a) Exonerate the torque sensor and set display value to zero (see 3.4)
- b) Put the gauge weight to the lever-arm and read the display value.
- c) If the display does not show the correct value, the calibration has to be corrected with the hidden adjuster T1 at the backside so that the display value is correct.
After that, this check and correction has to be repeated beginning at a) until the display shows the correct value.

3.4 Zero Point adjustment

Select the display mode „act.val. Nm“ with repeated pushing of pushbutton ENTER.

With exonerated torque sensor the adjustment will be done by positioning the online value display to Zero (Push pushbutton UP or DOWN).

This adjustment will be stored for the actual model-nr. when the keyswitch is turned into position AUTO. Then the value will be preserved even when the power supply is switched off.

3.5 Upper class limit adjustment

Select the display mode „XavR+L UL“ with repeated pushing of pushbutton ENTER.

Adjust the necessary value by pushing the pushbutton UP or DOWN.

This adjustment will be stored for the actual model-nr. when the keyswitch is turned into position AUTO. Then the value will be preserved even when the power supply is switched off.

3.6 Lower class limit adjustment

Select the display mode „XavR+L LL“ with repeated pushing of pushbutton ENTER.

Adjust the necessary value by pushing the pushbutton UP or DOWN.

This adjustment will be stored for the actual model-nr. when the keyswitch is turned into position AUTO. Then the value will be preserved even when the power supply is switched off.

The value rLL is not adjustable by the user.

3.7 Xav Set value adjustment

Select the display mode „Xav set value“ with repeated pushing of Pushbutton ENTER.

Adjust the necessary value by pushing the pushbutton UP or DOWN.

This adjustment will be stored for the actual model-nr. when the keyswitch is turned into position AUTO. Then the value will be preserved even when the power supply is switched off.

3.8 Choice of language version

(from program version > 40079V13 400)

Select the display mode " XavR+L (Nm)". Push the pushbuttons arrow UP and DOWN at the same time. The chosen language is shown: DEUTSCH, FRANCAIS, ESPANOL or ENGLISH. Select the language by pushing the pushbutton arrow UP or arrow DOWN. Then push pushbutton arrow RIGHT. The display mode" XavR+L (Nm)" is shown again and the chosen options are stored durably.

4. Operating Mode: Keyswitch at the front in position AUTO

The unit is ready for measuring independent of the display mode.

In operating mode only the display mode may be selected. The changing of any adjusted values is locked.

ATTENTION:

After POWER ON an AUTOZERO-Cycle has to be done first, because the autozero-memory does not store its values without power supply.

5. Programming

5.1 Measuring range

By adding different connections in the connector X312, the measuring ranges 2, 5, 10, 20, 50, 100 Nm are programmable (look at 5. schematics).

Without any additional connections the range 5 Nm is selected.

5.2 Measuring program

The result of the average value is fixed with the formular:

Torque average Xav. R+L = 1/2 * (XavR + XavL)

XavR = (1/2 * (MaxR + MinR)) - Autozero R

XavL = (1/2 * (MaxL + MinL)) - Autozero L

Autozero R=1/2 *(MaxR+MinR) will be measured and stored in the Autozero-cycle

Autozero L=1/2 *(MaxL+ MinL) will be measured and stored in the Autozero-cycle

MaxR = The highest torque value during "Measuring Right"

MinR = The lowest torque value during "Measuring Right"

Because changing the direction the left running measuring is calculated:

MaxL = The highest torque value of the inverted signal during "Measuring Left"

MinL = The lowest torque value of the inverted signal during "Measuring Left"

When the special mode "Only left rotation measuring" is selected, all the

right running values will be set to the corresponding left running values.
So the summary of Xav will be the left running value.
Look for the connector pinning 4_7913b1 to get detailed information,
how to select this mode.

6. Connection schematics

4_7913b1/2	Connector pinning and signal flow to the external control unit
T4: DC-Output torque sensor	5pol. female, Series 680 Pin 4: Output +/-10V; Pin2: Signal Ground
X412: DC-Output Xq R+L	6pol. female, Series 680 Pin 5: Output +/-5V; Pin6: Signal Ground
X402: Output printer	9pol. female Sub D Pin3: Output ; Pin7: Signal Ground RS-232: 9600 Baud, 8 Bit, 1 Stopbit, no parity

Eingänge von der SPS		Ausgänge zur SPS	
Bit-Nr.	Wort 0	Bit-Nr.	Wort 1
0	Messen Linkslauf	0	Meßeinheit BEREIT
1	AUTOZERO Zyklus	1	Meßzyklus Links läuft
2	Messen Rechtslauf	2	Meßzyklus Rechts läuft
3	Typkennung Bit 0	3	Drehmoment Xq > obere Toleranz
4	Typkennung Bit 1	4	Drehmoment Xq ist GUT
5	Typkennung Bit 2	5	Drehmoment Xq < untere Toleranz
6	Typkennung Bit 3	6	Drehmoment MAX > obere Toleranz
7	Typkennung Bit 4	7	Drehmoment ist > Sollwerttoleranz - V409A
8	Nur Linksmessung	8	Start Meßwertspeicher
9	Meßbereich 9,99	9	
10	Dezimalpunkt XX , X	10	
11	Meßbereich 1,99	11	
12	Meßbereich 10Nm, Anzeige x,xx ab V403	12	
13	Sollwertregelung AKTIV ab V409	13	
14		14	Vorzeichen: 0=+
15		15	MeßwertBEREIT

Meßwertübertragung Nur M40079.V13 (ab Version 406)

MeßwertVorzeichen 11 Bit
Meßwert BEREIT
Meßwert ANFORDERN

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Meßstab:	CAD-Nr. 4_7913b2	Seite 2	von 2

Security comments according to VDE 0411

General technical

time for warming up	20 minutes
temperature	0...+40 Grd C
atmospheric humidity	on to 75% rel.
frequency	50/60 Hz
power supply voltage	230V +/-10%
security	according to VDE 0411, protection class 1

This unit is built and checked under DIN 57411 part 1/VDE 0411 part 1 and left the factory in a safe and perfect condition. To preserve this condition and to guarantee a safe working the user has to follow the comments and warnings which are given in this instructions.

Before turning on the power you have to make sure, that the voltage of operation and the mains voltage correspond.

The mains plug may only be inserted into a socket with ground contact. The safety effect may not be abolished by an extension lead without ground connection.

The opening of covers or removing of components, except if it is possible to do by hand, might uncover parts or connections under dangerous voltage.

Racks may only be used inside a cover.

If an adjustment, a maintenance or a repair at the opened unit under voltage is unavoidable, it may be done only by a qualified employee, who is well acquainted with the dangers involved.

ATTENTION:

After the end of those works, the unit has to be checked according to VDE 0411, part 1.

You have to make sure, that only fuses of the given type and values are taken for replacement. The use of mended fuses or short-circuiting them is inadmissible.

If it is presumed, that a safe work is not possible, you have to take this unit out of work. A safe work may not be possible, if

- there are visible damages at the unit.
- the unit doesn't work.
- after longer storage under unfavourable circumstances.
- after heavy stress of transport.