

## M40097.V11 Torque Measuring Unit

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Please note that some functions and adjustments described in this manual may not be available for every model or in all program releases.

## 1. Functions

### 1.1 Measuring task

Examination of the torque of axial joints.

The following parameters are monitored in detail for compliance with their tolerances:

- start-torque
- torque MAX;  $X_{avg}=(MAX+MIN)/2$ ; MAX-MIN
- angular rotation

### 1.2 Display of measuring results

The measured value of each tested characteristic is displayed as numeric value. In addition, the result of the classification, i.e. GOOD / NO GOOD, is displayed.

Furthermore, the signal sequence is displayed as curve torque over angle:

- diagram for the course of the start torque
- diagram for the course of the torque

In order to evaluate the settings, the measuring windows in which the measurement takes place are shown as vertical marks in the diagrams.

## 2. Construction

- 1x strain gauge measuring amplifier torque
- 1x profibus interface to PLC with 32Bit input, 32Bit output
- analysis software

The following variations are available:

Compact Measuring Computer A&V 8861 for control cabinet installation on top hat rail

**without monitor**, with VGA output, **webserver function (see below)**:

in top hat rail case WxHxD approximately 335x133x200,

weight 3kg, power supply 24VDC

Measuring computer A&V 8817.653.0 or A&V 8817.655 in table case

**with 10,4" colour monitor with touchscreen**, ext. VGA output

in table case WxHxD 335x200x220,

weight 5kg, power supply 115/230VAC 50/60Hz

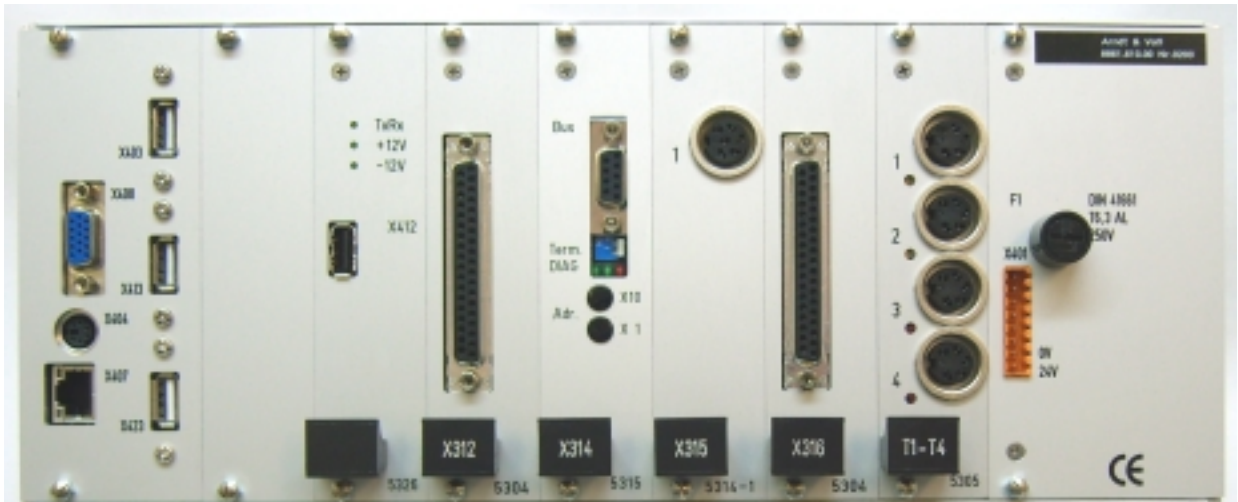
### Webserver function for remote control:

The unit has got a human-machine interface and acts as an internet server with an individual address. Status information as well as inputs and outputs are not carried out on the device, but via an external computer via ETHERNET interface and a browser program, e.g. Internet Explorer. The measuring device may be displayed through the PC browser program by entering its address. The measuring units contain their own firewall in order to repel unauthorized access via the ETHERNET interface.

### 3. Connection elements

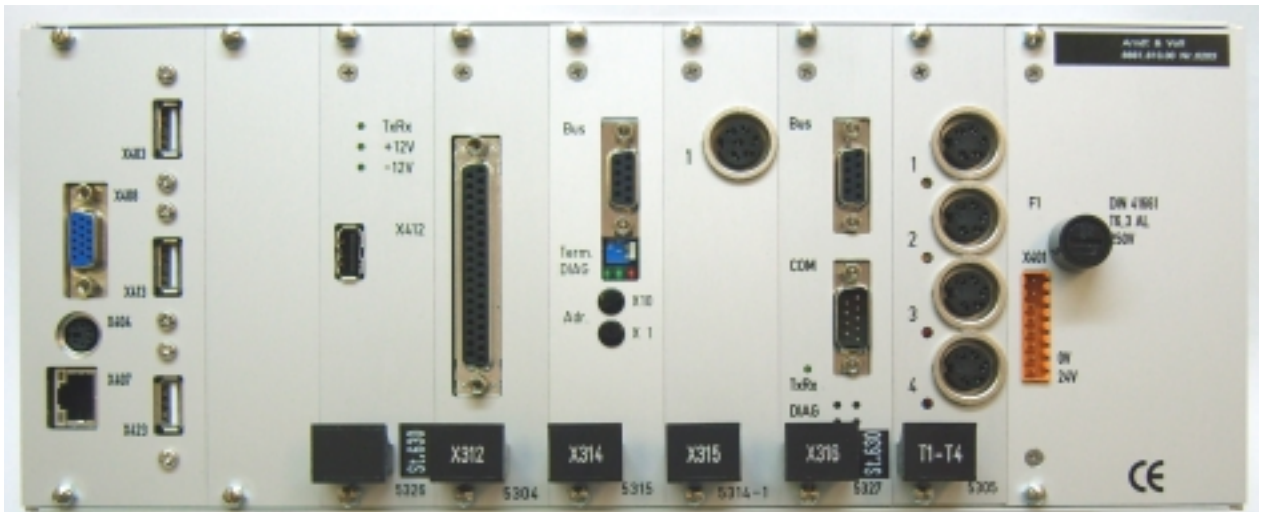
Back of case:

#### Type 1 (Parallel input angular transmitter):



X408	15-pole plug MIN D	Output VGA monitor
X404	PS-2 socket	Keyboard/mouse input
X407	RJ45 socket	Ethernet interface
X403	USB socket	USB connection
X413	USB socket	USB connection
X423	USB socket	USB connection
X412	Internal USB	Test socket (DO NOT USE)
X312	37-pole socket MIN D	Rotation Right/Left to transverter
X314	9-pole socket MIN D	Profibus interface
X315	6-pole socket 680	+/-10V output to transverter
X316	37-pole socket MIN D	Parallel input angular transmitter
T1-4/1	5-pole socket 680	Input torque gauge bar
X401	8-pole plug	Power supply 24V DC

Type 2 (Profibus input angular transmitter):



X408	15-pole plug MIN D	Output VGA monitor
X404	PS-2 socket	Keyboard/mouse input
X407	RJ45 socket	Ethernet interface
X403	USB socket	USB connection
X413	USB socket	USB connection
X423	USB socket	USB connection
X412	Internal USB	Test socket (DO NOT USE)
X312	37-pole socket MIN D	Rotation Right/Left to transverter
X314	9-pole socket MIN D	Profibus interface
X315	6-pole socket 680	+/- 10V output to transverter
X316	9-pole socket MIN D	profibus input angular transmitter
T1-4/1	5-pole socket 680	test plug
X401	8-pole plug	Input torque gauge bar
		Power supply 24V DC

#### 4. Programming

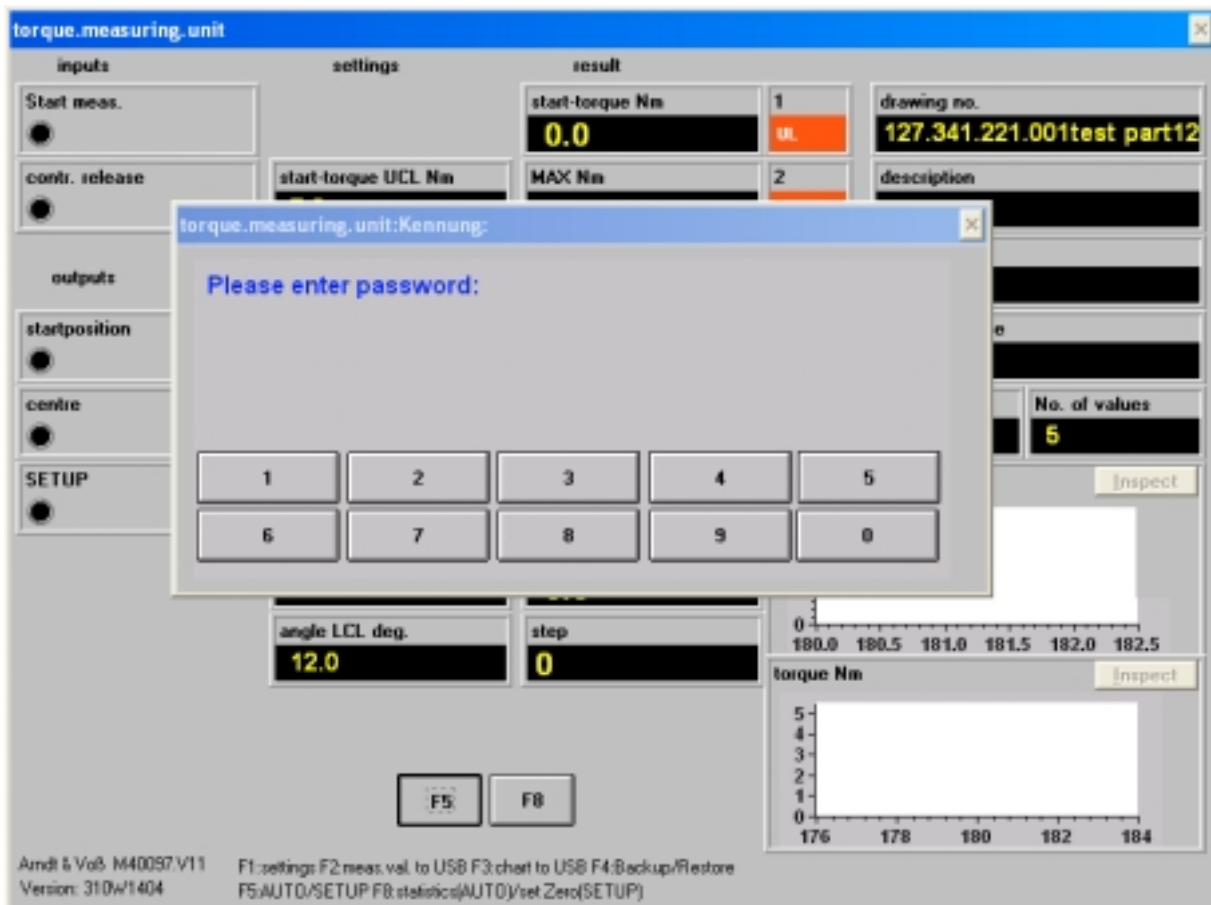
Switch on unit. After loading the program, the unit is in the operation mode AUTOMATIC and ready to operate. In order to make entries, the operation mode needs to be switched to SETUP by entering the password.

The sub-operating modes appear in the menu bar:

- F1 Settings
- F2 Measuring values to disk
- F3 Chart to disk
- F4 Backup/restore settings
- F5 AUTO/SETUP
- F8 Set zero

#### F5 AUTO/SETUP Selection of operation modes SETUP or AUTOMATIC

The password window opens. The unit will only switch into the SETUP mode after entering the correct password. Switching back to AUTOMATIC may be done without entering any password.



If F5 is selected by touchscreen or mouse, an enhanced password query opens.

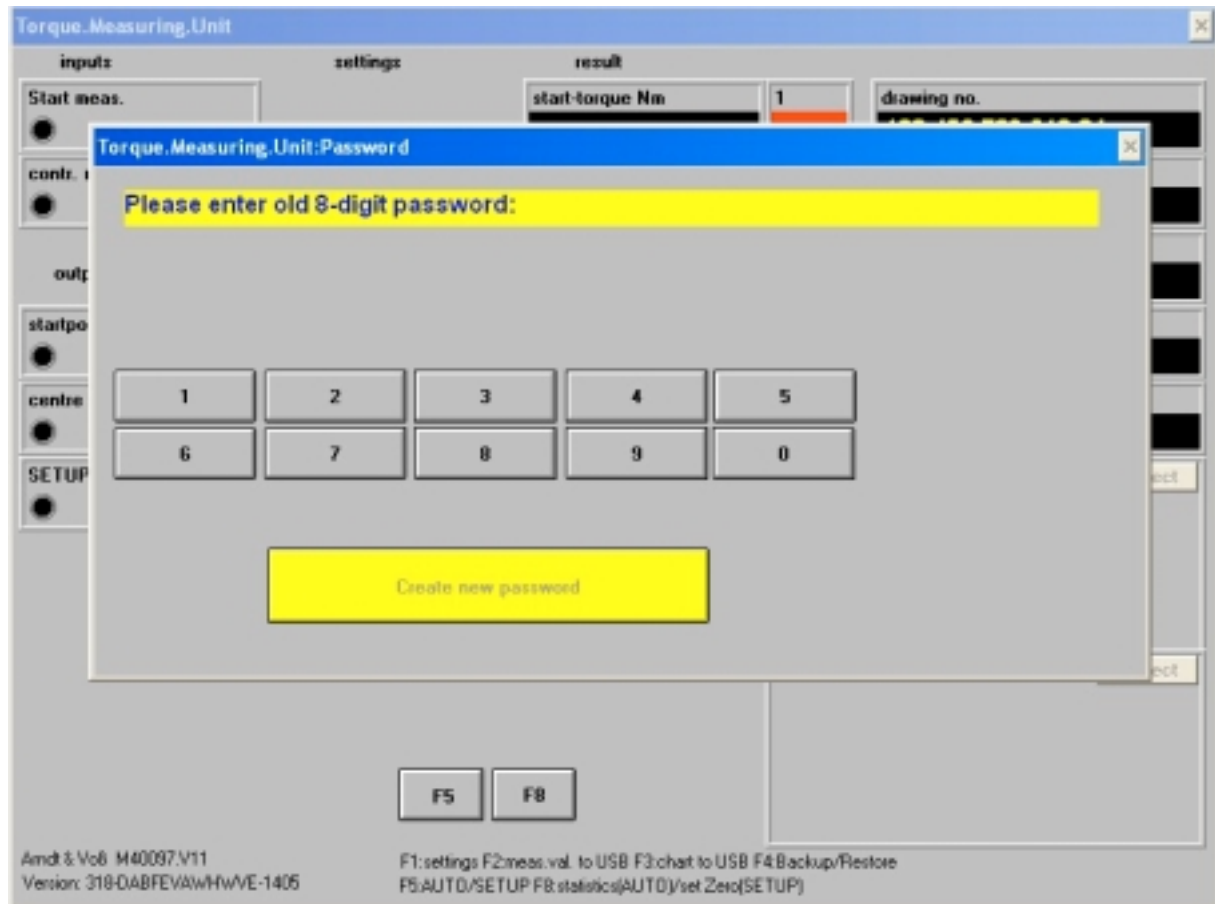


In order to define a new password, please activate "Create new password" before entering the current password.

By entering the 8-digit password, the unit switches into SETUP mode.

It is possible to change the password after activating the option "Create new password". It is, however, necessary to enter the new password by mouse or touchscreen. The option button "Create new password" is marked in yellow, indicating that this option has been activated.

First of all, the old password must be entered (password prompt marked in yellow).



Then, a new 8-digit password may be defined (password prompt marked in white).



The new password must be repeated (password prompt marked in green).



The new password is saved and the unit switches into SETUP mode.

In case the password is lost, please contact our technical support.



4.1 F1 Settings

The parameters are entered into the input fields one after the other. By pressing the TAB key, the next field is selected.

If the respective value is darkly marked, it may be overwritten by entering the new value. The old value may be kept by pressing ENTER. After all fields have been edited, the input menu is closed by pressing ACCEPT.

Meaning of the individual fields:

**Model No.:** Number of the part model whose nominal values are selected. A maximum of 32 models can be administered. In the automatic mode, the model number is pre-selected by the round table control.

#### Tolerance limits:

Start-torque UCL: upper control limit for the start-torque  
MAX UCL: upper tolerance limit for maximum torque value  
MAX UL: upper tolerance limit for maximum torque value VERY HIGH  
**(OPTION)**  
MIN LCL: lower tolerance limit for maximum torque value. If the evaluation mode Xav was selected in the step control, the following values appear instead:  
Xav LCL: lower tolerance limit for torque  $X_{av}=(MAX+MIN)/2$   
MAX-MIN UCL: upper tolerance limit for torque difference MAX-MIN  
Angle UCL: upper tolerance limit for tilting angle  
Angle LCL: lower tolerance limit for tilting angle

The following fields may only be changed if the control process is changed as well!

#### Step control:

Zero-angle: Nominal value of angular transmitter for the zero position of the measuring mechanics  
Max. torque R/L: The engine control is compulsorily switched off if this value is exceeded.  
Stop angle centre: Preset for the brake control of the engine **(OPTION)**  
Return angle left: Direction change LEFT  
Return angle right: Direction change RIGHT  
**ATTENTION:** The return angles must be set as deviation from the zero-angle. Normally, this is half the value of the upper tolerance limit of the angle.  
Stop angle left/right: Preset for the brake control of the engine  
Classification: Selection between Xav and MIN  
Process: Selection between short or long cycle  
Short: centre-right-left-centre  
Long: centre-right-left-right-centre

#### Measuring window torque:

Angle beginning: Beginning of torque measurement during left-right measuring cycle (cf. also 5. AUTOMATIC)  
This value must also be set as difference to the max. torque left!  
Angle ending: End of torque measurement during left-right measuring cycle (cf. also 5. AUTOMATIC)  
This value must also be set as difference to the max. torque left!

#### Zeropoint:

Offset angle: Correction value for the measured angle value  
This value is deducted from the measured value.  
Offset start-torque: Correction value for the measured value of the start-torque.  
This value is deducted from the measured value.

- Workstation:** In the measuring unit, 10 characters are defined as designation for the workstation in a parameter file c:\daten\arbeitsplatz.dat. It is not possible for the user to change this file in the measuring program. If this file exists in the unit, it is not possible to change the settings (F1) for the workstation.
- Job number:** 12 digits are mandatory for this field. A plausibility check for numerical input is carried out.
- Drawing number:** Input for the selected model No. The material or drawing number is formatted according to the formula xxx.xxx.xxx-xx. The 14 digits (in this example "x") are mandatory fields and the 3 dots as well as the dash are predefined. A plausibility check for numerical input is carried out.
- Designation:** Designation of the selected model number.

#### 4.2 F2 Measuring values to disk

Selection only possible in SETUP mode!

The measuring values will be stored onto the external USB storage medium in PPQ5 format.

#### 4.3 F3 Chart to disk

Selection only possible in SETUP mode!

In case of technical problems, the measuring value courses may be stored onto the external USB storage medium for analysis purposes.

### 4.4 F4 Backup/restore settings

Selection only possible in SETUP mode! The sub-menu opens:



### F4 Backup settings

The parameters are stored onto the external USB storage medium.

### F5 Restore settings

The parameters are restored from the external USB storage medium.

### F9 Cancel

Close sub-menu.

### 4.5 F8 Set zeros

Selection only possible in SETUP mode!

The actual torque value is set to zero.

### 4.6 Gain adjustment

Discharge torque gauge bar and set actual torque value to zero with key F8 (cf. 4.5). Set defined torque e.g. via weight with lever arm. If the actual value displayed deviates from the nominal value, it may be fine-tuned with the hidden adjuster at the input plug T1-4/1 (cf. 3. Connection elements). If a measuring amplifier A&V 5305 (T1-T4) is exchanged, the gain adjustment needs to be checked and corrected if necessary.

### 4.7 IN-Test

The function key IN-Test opens an IN-test panel for diagnosis purposes. The max. 8 measuring inputs, 0...7 input bits as well as the currently used program release and the name of the measuring computer are displayed.



### 4.8 OPTION: Import of job number and drawing/material number via barcode scanner

This program option makes it possible to import job numbers and drawing/material numbers from barcodes via barcode scanner. The barcode scanner is attached to the measuring unit via USB interface. The barcode information is read and imported by the measuring program.

Example of the drawing number structure: 027.060.030.203-02 or 027.060.030.203

Example of the job number structure: 42136391

The length of the job number with 8, 12 or 16 digits may be parametrized. A plausibility check of the scanned data for numerical input and number of digits is carried out. Scanning of barcodes is possible in SETUP as well as in AUTOMATIC mode.

## 5. Automatic



The measuring computer awaits the starting signal from the PLC.  
The following parameters are displayed:

Measuring value and classification of all characteristics

The measuring value course of start-torque and torque of the previous measurement  
Status: 0: ready for measuring

Display torque N (actual):

Current value of the torque gauge bar

Display angle degree (actual):

Current value of the angular transmitter (absolute value)

Display angle degree:

Value of the range - 3 - in the torque diagram:

angle of left to right stop of the joint

Diagram start-torque:

- 1 - is the range of the measuring window in which the maximum value of the torque is recorded and stored as start-torque.

Starting point: centre position (zero position) of the joint

Ending point: pre-programmed angle (min. 5 degrees)

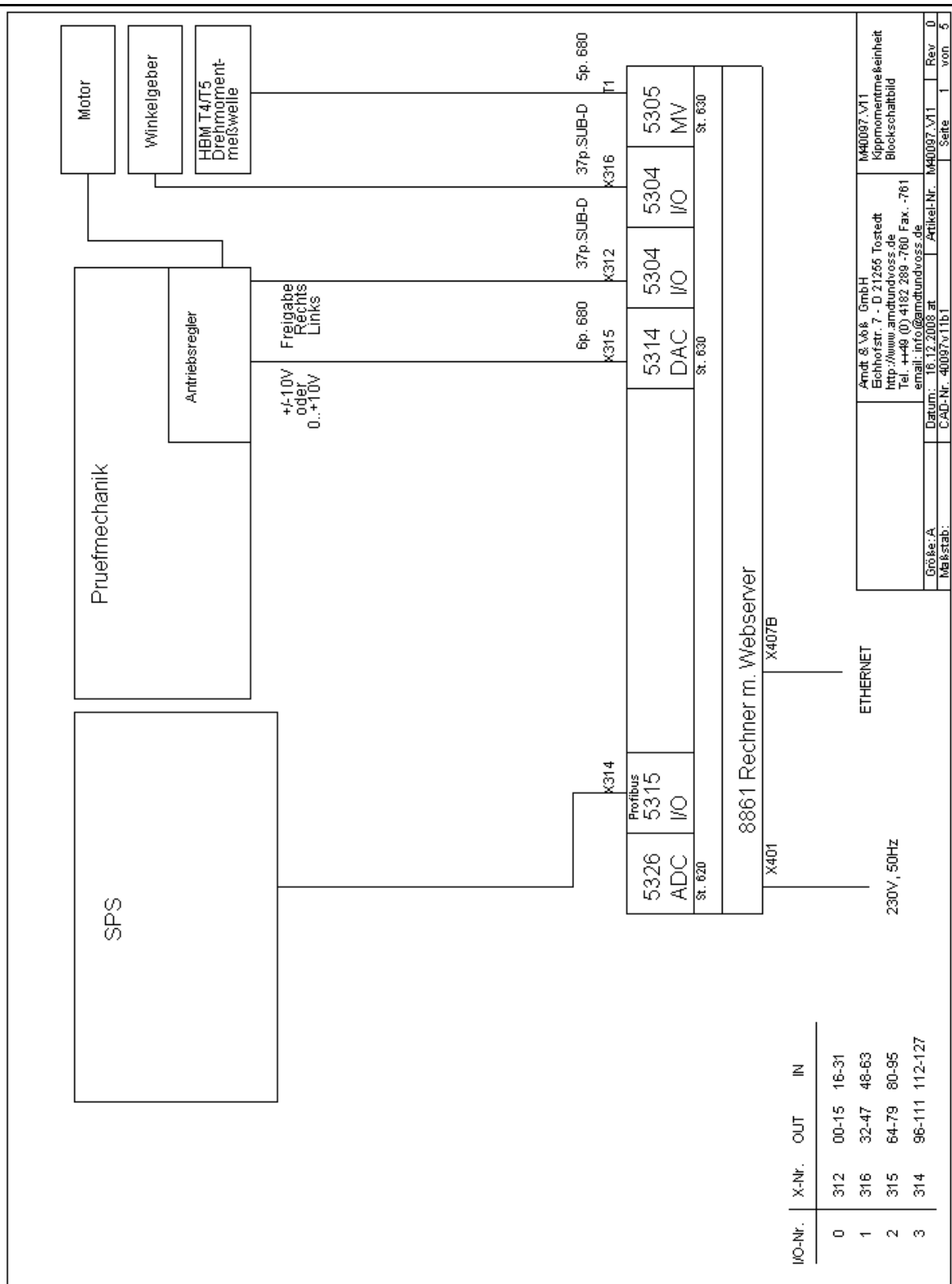
Diagram torque:

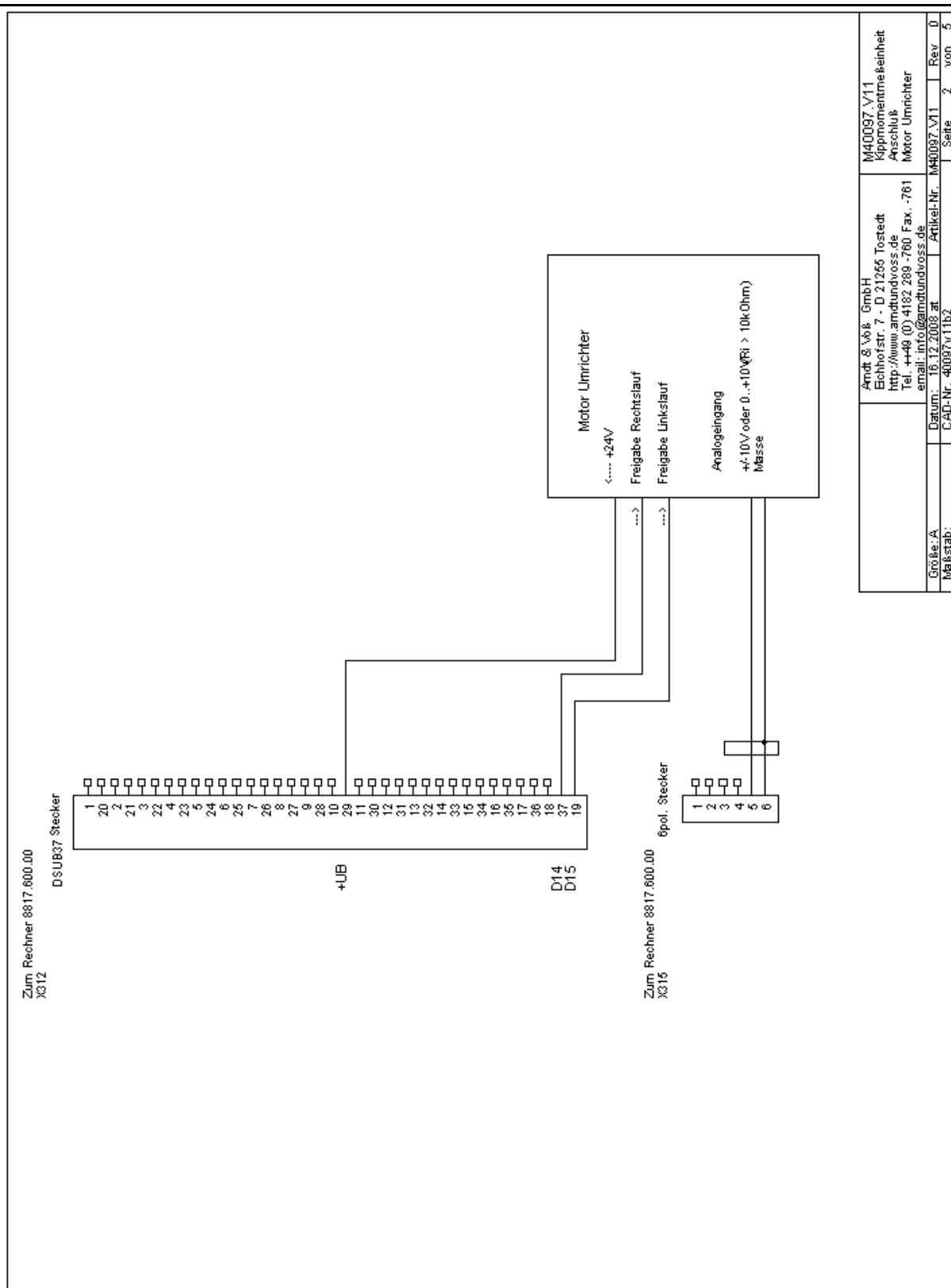
- 2 - is the range of the measuring window in which the maximum and minimum value of the torque are recorded and stored.

Starting point: cf. 4.1 measuring window torque - angle beginning

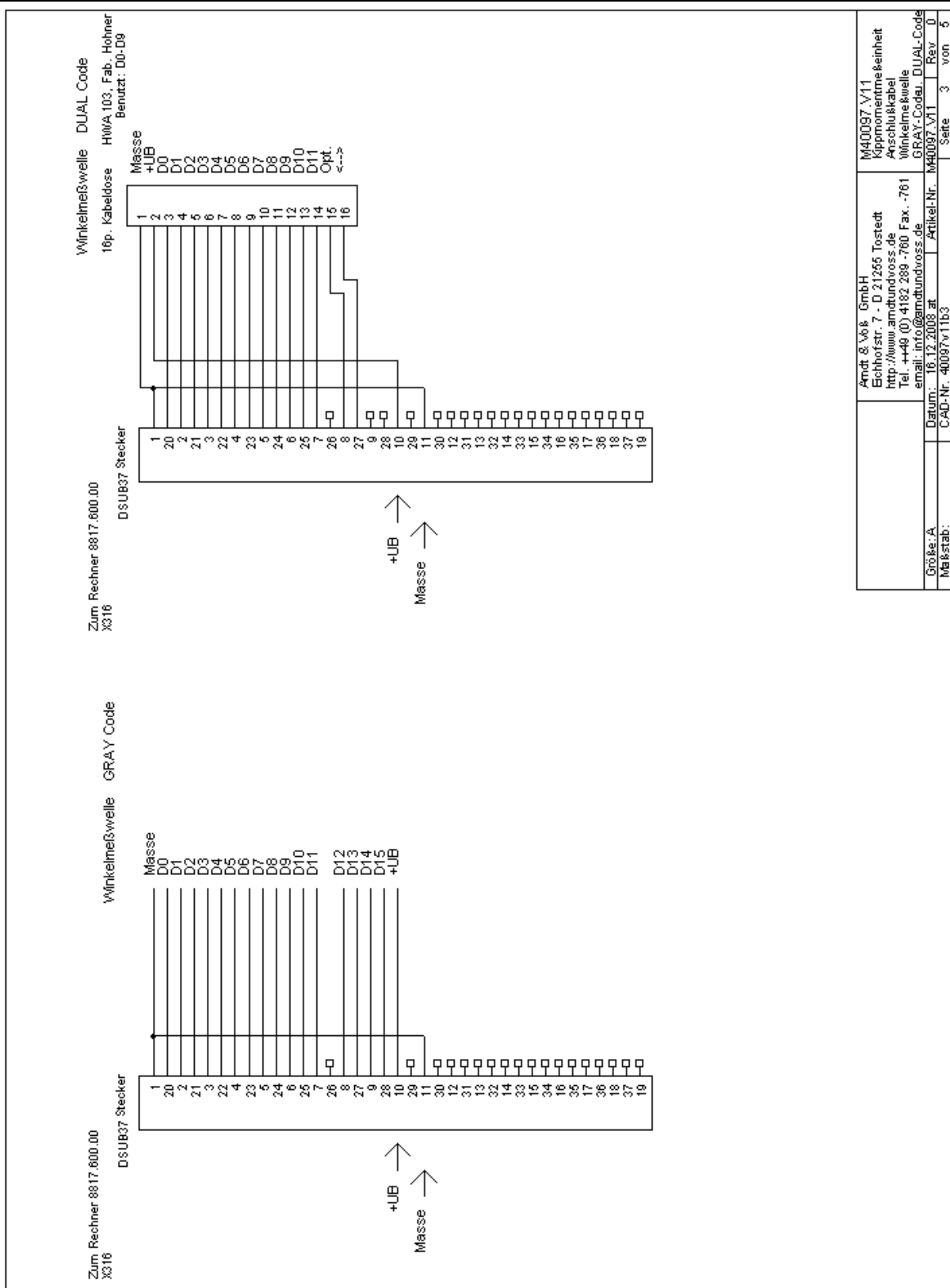
Ending point: cf. 4.1 measuring window torque - angle ending

## 6. Connection schematics

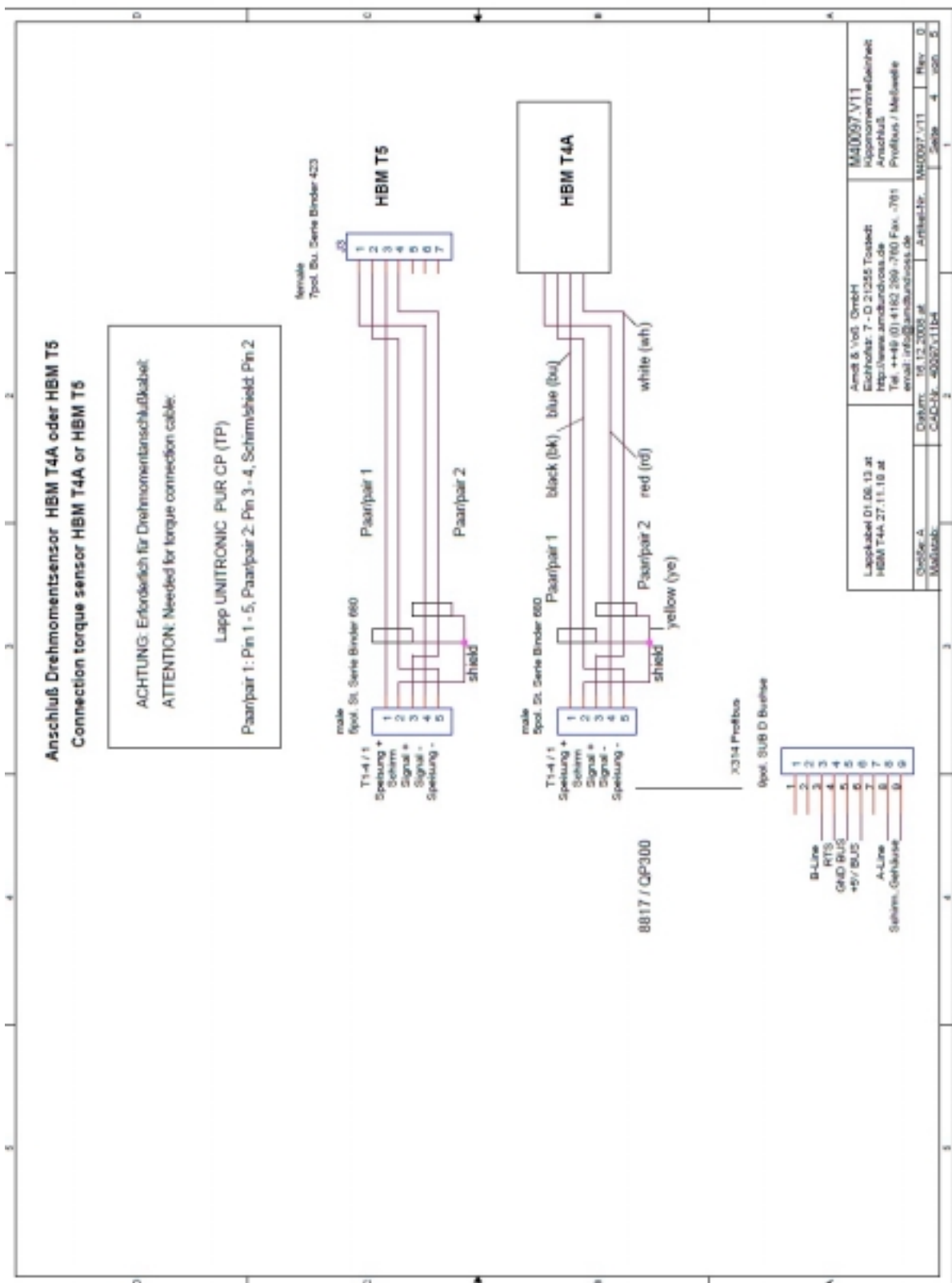








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Größe: A	Datum: 16.12.2008 at	Artikel-Nr. M40097.V11	Rev. 0
Maßstab:	CAD-Nr. 40097v11b3	Seite 3	von 6



Von der SPS übergebene Daten (ASCII-String)		Eingänge von der SPS			Ausgänge zur SPS		
Code/nr. Bedeutung	Stellenzahl (max. Positionsnr.:31)	Bit-Nr.	Wort 0	Wort 1	Bit-Nr.	Wort 0	Wort 1
0		0	Start Messung		0	Grundstellung	
1	Zeichnungs-nr.	1	Freigabe	1	1	Messung läuft (Meißstellennr.)	1
2	Bezeichnung	2	Typnr. Bit 0	2	2	Ergebnis GUT	2
3	Auftragsnr.	3	Typnr. Bit 1	3	3	Losbrech > OT	3
4	Arbeitsplatz	4	Typnr. Bit 2	4	4	Kipp MAX > OT	4
5	Datum	5	Typnr. Bit 3	5	5	Kipp Xq < UT	5
	8 (Format 20070424) (JJJJMMTT)	6	Typnr. Bit 4	6	6	Kipp (MAX-MIN) > UT	6
		7		7	7	Winkel n.i.O.	7
<b>An die SPS übergebene Daten (Binärzahl)</b>							
Meißstellennr.	Bedeutung						
1	Losbrechmoment MAX						
2	Kippmoment MAX						
3	Kippmoment Xquer						
4	Kippmoment MAX-MIN						
5	Winkel						
6	Losbrechmoment MAX OT						
7	Kippmoment MAX OT						
8	Kippmoment Xquer UT						
9	Kippmoment MAX-MIN OT						
10	Winkel OT						
11	Winkel UT						

Datenübertragung von der SPS (in Betriebsart EINRICHTEN)		Meßwertübertragung zur SPS (in Betriebsart AUTOMATIK)	
Zeichennummer	n	Meißstellen Nr.	5 Bit
Typnr. 5 Bit	n+1	Meißwert/Vorzeichen	12 Bit
Code/nr. 3 Bit	n+2	Meißwert	BEREIT
Zeichenposition 5 Bit	n+3	Meißwert ANFORDERN	(Codennummer)
ASCII-Zeichen 8 Bit			
Einlesewert von SPS Bereit			
Einlesen FERTIG			

Speichern in Datei erfolgt bei:  
 1.) Wechsel der Typnr.  
 2.) Umschalten von EINRICHTEN auf AUTOMATIK

09.06.07 EINRICHTEN, Messwert anford./Parameter Bereit Bit 03.08.11 Toleranzausgabe

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Größe: A  
 Meißstab: Datum: 25.04.07 at Artikel-Nr. M40097.V11 CAD-Nr. 40097.V11b5

Kippmoment/messseinhl. Signalverlauf Datenübertragung

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## 7. Settings of function modules

The following pages give an overview of the function modules which are contained in the torque measuring unit M40097.V11 as well as of their specific settings.

### 7.1 USB Interface module 5326.620/630

The torque measuring unit contains a USB interface module 5326, either of version 620 or 630.

#### Version 5326.620



Version 5326.630



Connection cable PC - measuring device: Pin1 of the cable on Pin1 of the USB interface  
USB socket X412: Internal USB, test socket (DO NOT USE)

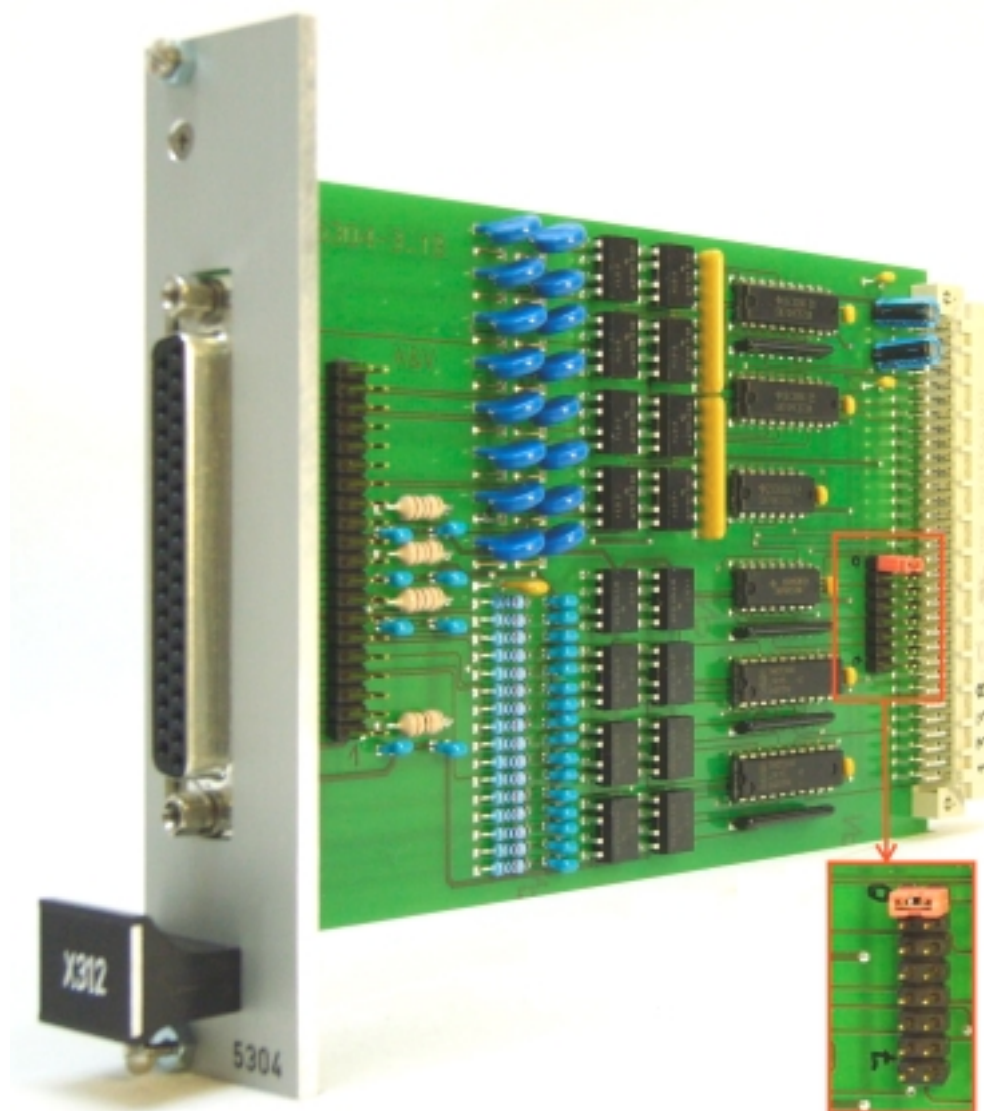
7.2 I/O Modules

The torque measuring unit contains three I/O modules.

7.2.1 16-Bit input/output module 5304.610

Connection X312

37-pole socket MIN D: rotation Right/Left to transverter

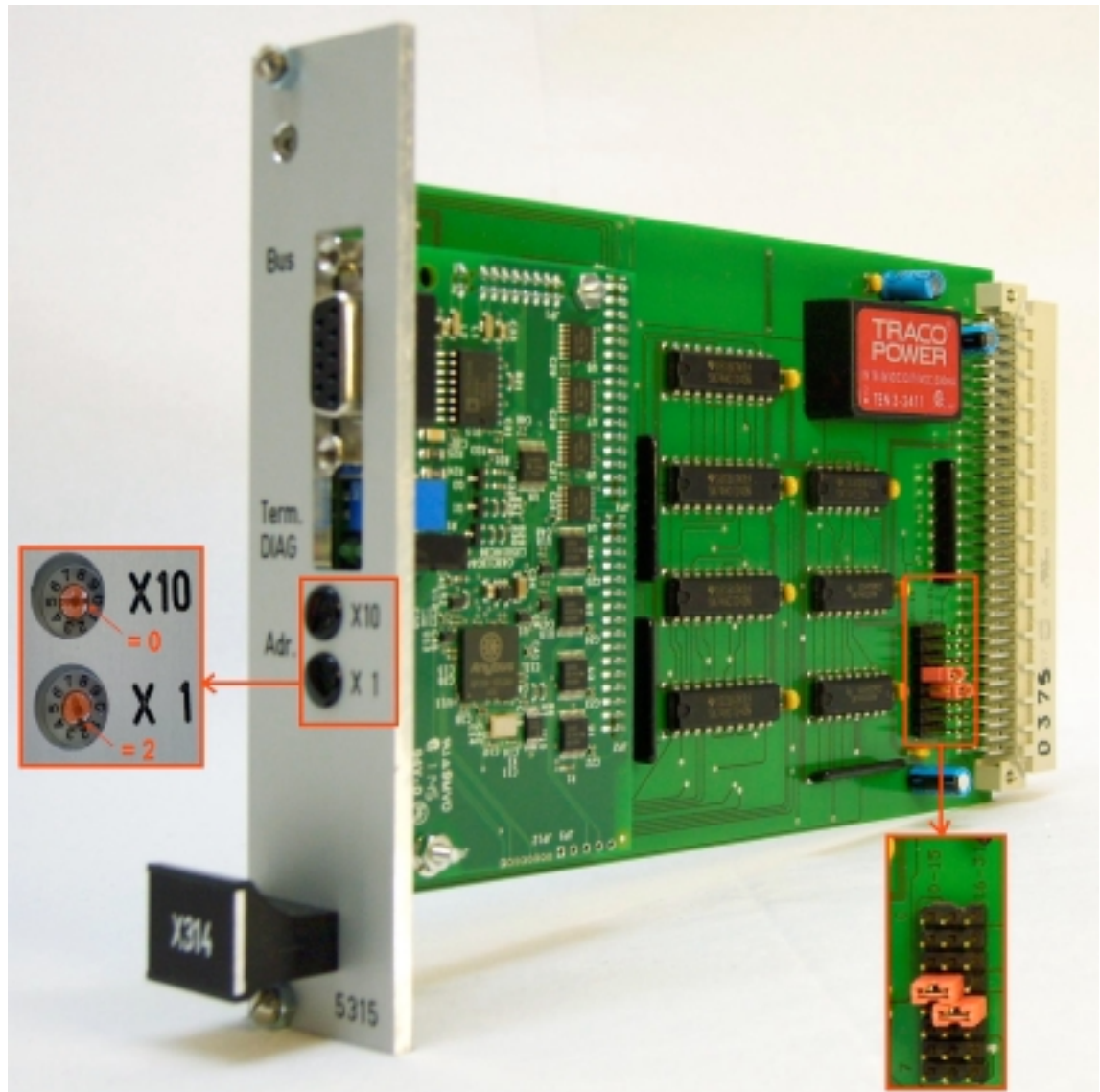


Address jumper: 0



7.2.2 32-Bit profibus module 5315.610

Connection X314  
9-pole socket MIN D: profibus interface



Example of profibus address:  
"02": X10 = 0, X1 = 2

Address jumper: 3 and 4

The profibus address is defined by  
the machine control !

For setting profibus address, please remove black cover caps.

For further information regarding this profibus module please refer to the manual under  
[www.arndtundvoss.de/5315.610E.pdf](http://www.arndtundvoss.de/5315.610E.pdf) .

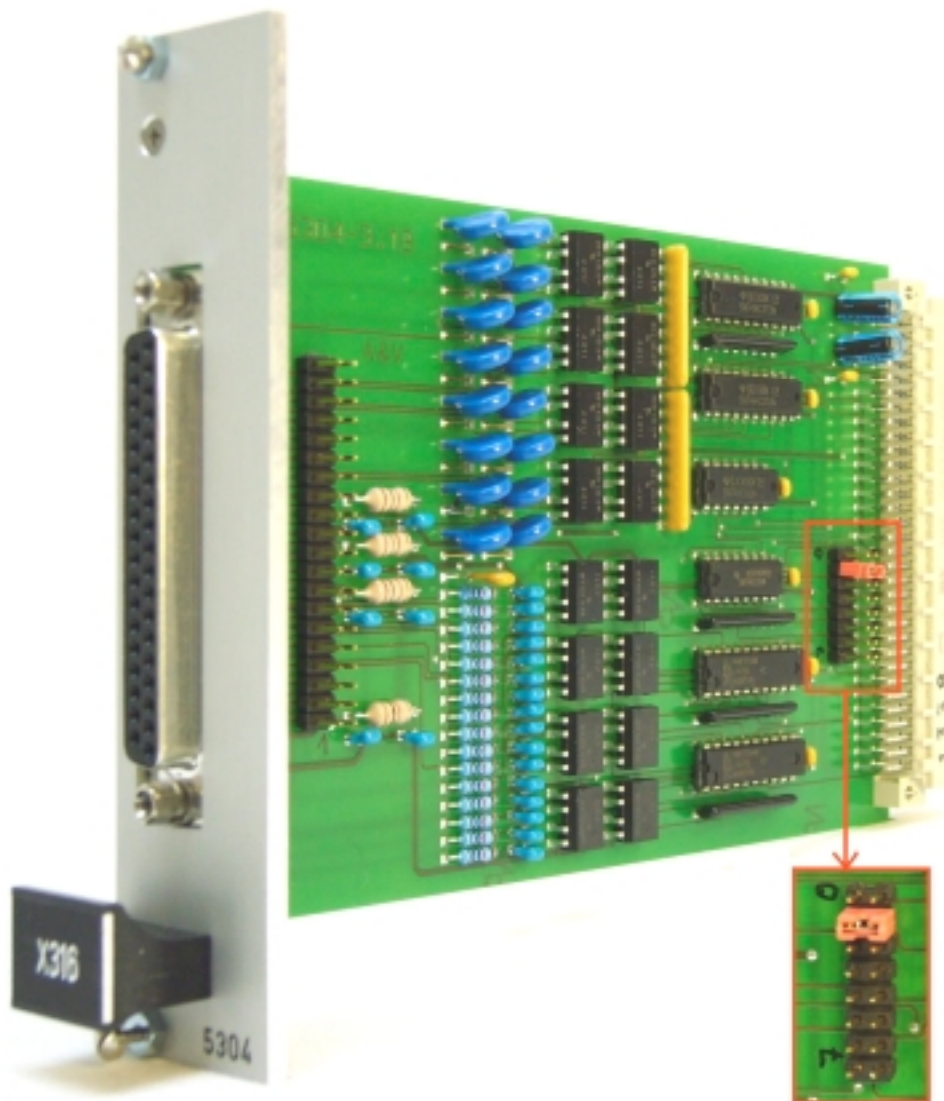
7.2.3 16-Bit input/output module 5304.610 or Profibus module 5327.630

Depending on the model, the measuring unit contains either a second 16-Bit input/output module 5304.610 or a profibus module 5327.630.

16-Bit input/output module 5304.610

Connection X316

37-pole socket MIN D: parallel input angular transmitter



Address jumper: 1



Profibus module 5327.630

Connection X316

9-pole socket MIN D: profibus input angular transmitter

COM 9-pole plug MIN D: test plug



Address jumper: 1

For further information regarding this profibus module please refer to the manual under [www.arndtundvoss.de/5327.630E.pdf](http://www.arndtundvoss.de/5327.630E.pdf) .

7.3 DAC module 5314.630

Connection X315  
6-pole socket 680: +/- 10V output to transverter

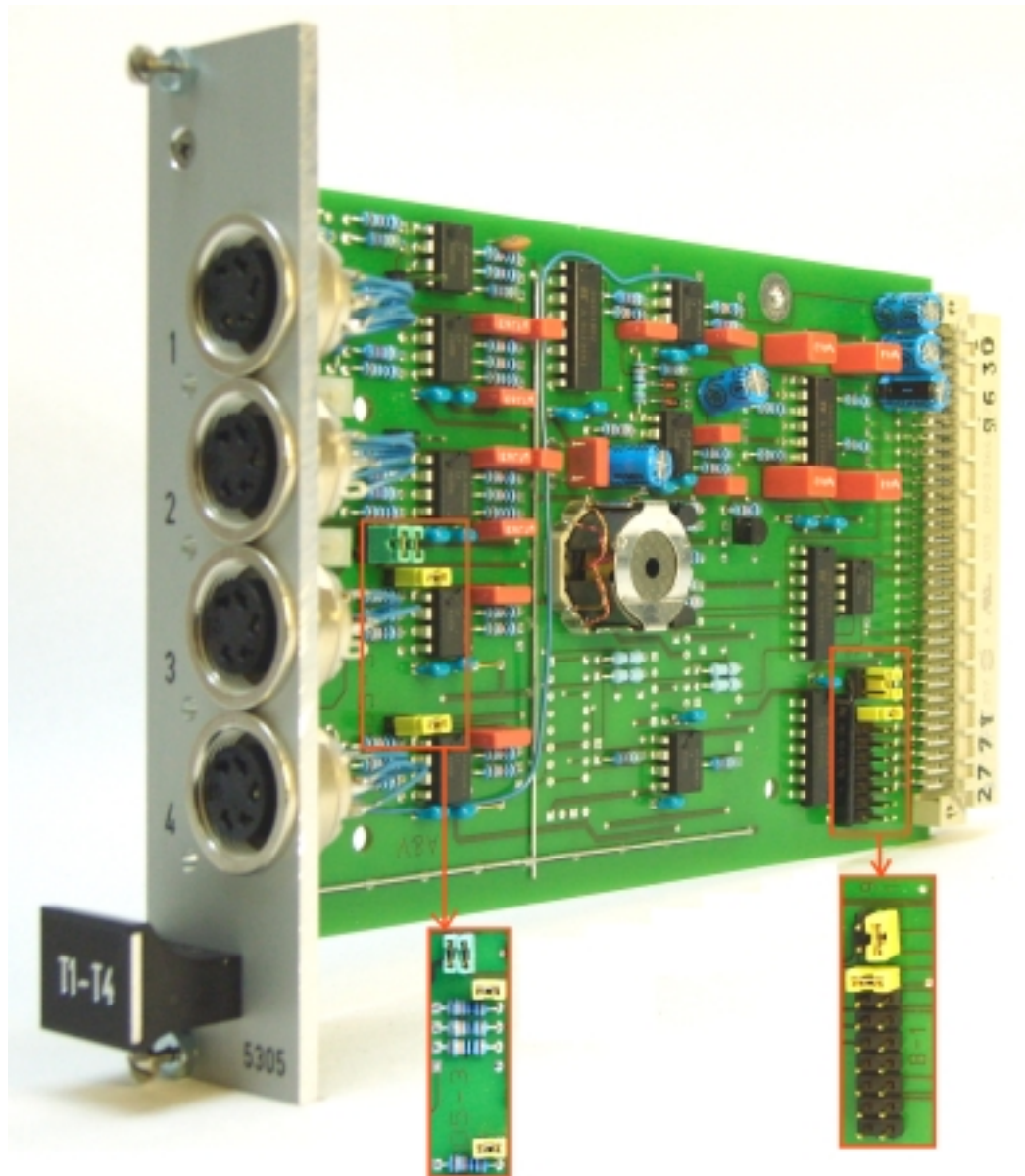


When exchanging this module, the link plug on the new module has to be set exactly like on the old module.

7.4 4-channel strain gauge measuring amplifier 5305.630

Connection T1-T4

T1-4/ (1): 5-pole socket 680: input torque gauge bar



Default settings T1-T4 for torque measuring unit M40097.V11

#### Technical data and security instructions according to VDE 0411

A&V Measuring Computer	<b>A&amp;V 8817.653 with colour monitor</b>	<b>A&amp;V 8861.600 without monitor</b>
Warm-up time	20 min.	20 min.
Max. ambient temperature	0...+40 °C	0...+40°C
Atmospheric humidity	up to 75% rel.	up to 75% rel.
Power supply voltage	230V/115 VAC 50/60 Hz	24 VDC
Power consumption	19-20 W	17 W
Protection classification	IP20	IP20
Case dimensions WxHxD without connectors	335x200x220 mm	335x133x200 mm
Case dimensions WxHxD incl. space for connectors	340x200x270 mm	340x180x260 mm
Fixing	-	35 mm DIN top-hat rail
Weight	approx. 5 kg	approx. 3 - 3,5 kg
Security	according to VDE 0411, protection class 1	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.
- if the unit does not work.
- after longer storage under unfavourable circumstances.
- after heavy stress of transport.