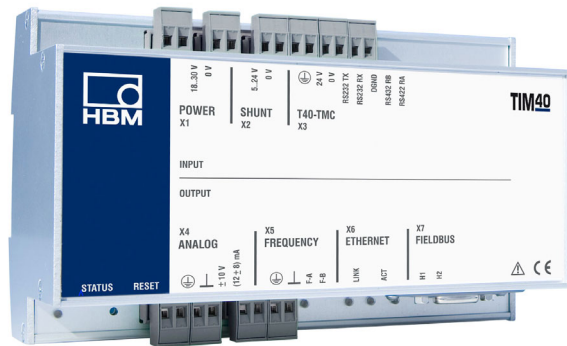


# Mounting Instructions

English



# TIM40



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They are not to be understood as a guarantee of quality or  
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# 1 Safety instructions

## Appropriate use

The TIM40 torque interface module is used exclusively for torque measurement tasks in combination with the T40 torque flange and control and adjustment tasks directly connected thereto. Use for any additional purpose shall be deemed to be *not* as intended.

In the interests of safety, the module should only be operated as described in the mounting instructions. It is also essential to comply with the legal and safety requirements for the application concerned during use. The same applies to the use of accessories.

The interface module is not a safety element within the meaning of its use as intended. Proper and safe operation of this transducer requires proper transportation, correct storage, assembly and mounting and careful operation.

Each time, before starting up the module, you must first run a project planning and risk analysis that takes into account all the safety aspects of automation technology. This particularly concerns personal and machine protection.

Additional safety precautions must be taken in plants where malfunctions could cause major damage, loss of data or even personal injury. In the event of a fault, these precautions establish safe operating conditions.

## Safety rules

The device must be operated with a separated extra-low voltage (18...30 V DC supply voltage).

Before commissioning, make sure that the mains voltage and type of current match the mains voltage and type of current at the place of operation and that the circuit used is sufficiently protected. Connecting electrical devices to low voltage: to separated extra-low voltage only (safety isolating transformer according to DIN VDE 0551/EN60742). Do not operate the device if the mains lead is damaged. Only operate built-in devices once they are installed in the housing provided. The device complies with the safety requirements of DIN EN 61010 Part 1 (VDE 0411 - Part 1); protection class I.

The device must be mounted on a support rail connected to protective ground potential. Both the support rail and the device must be free of paint, varnish and dirt at the point of installation.

The supply connection, as well as the signal and sense leads, must be installed in such a way that electromagnetic interference does not adversely affect device functionality (HBM recommendation: "Greenline shielding design", downloadable from the Internet at <http://www.hbm.com/hbmdoc/amplifiers/brochures>).

Automation equipment and devices must be covered over in such a way that adequate protection or locking against unintentional actuation is provided (such as access checks, password protection, etc.).

When devices are working in a network, these networks must be designed in such a way that malfunctions in individual nodes can be detected and shut down.

Safety precautions must be taken both in terms of hardware and software, so that a line break or other interruptions to signal transmission, such as via the bus interfaces, do not cause undefined states or loss of data in the automation device.

### **General dangers of failing to follow the safety instructions**

The TIM40 Module is a state of the art device and as such is failsafe. The module may give rise to further dangers if it is inappropriately installed and operated by untrained personnel. Any person instructed to carry out installation, commissioning, maintenance or repair of the module must have read and understood the mounting Instructions and in particular the technical safety instructions.

### **Conditions on site**

Protect the module from direct contact with water (protection class IP20).

### **Maintenance and cleaning**

The modules are maintenance-free. Please note the following when cleaning the housing:

- Before cleaning, disconnect the equipment completely.

- Clean the housing with a soft, slightly damp (not wet!) cloth. *Never* use solvents, since these could damage the labelling on the front panel and the display.
- When cleaning, ensure that no liquid gets into the equipment or connections.

### **Remaining dangers**

The scope of supply and performance of the module covers only a small area of torque measurement technology. In addition, equipment planners, installers and operators should plan, implement and respond to the safety engineering considerations of torque measurement technology in such a way as to minimize remaining dangers. Prevailing regulations must be complied with at all times. Reference must be made to remaining dangers connected with torque measurement technology.

### **Conversions and modifications**

The TIM40 module must not be modified from the design or safety engineering point of view except with our express agreement. Any modification shall exclude all liability on our part for any damage resulting therefrom.

In particular, any repair or soldering work on motherboards (replacement of components is prohibited. When exchanging complete modules, use only original parts from HBM.

The module is delivered from the factory with a fixed hardware and software configuration. Changes can only be made within the possibilities documented in the manuals.

### **Qualified personnel**

Qualified persons means persons entrusted with the installation, fitting, commissioning and operation of the product who possess the appropriate qualifications for their function. This device is only to be installed and used by qualified personnel, strictly in accordance with the specifications and the safety rules and regulations.

This includes people who meet at least one of the three following requirements:

- Knowledge of the safety concepts of automation technology is a requirement and as project personnel, you must be familiar with these concepts.

- As automation plant operating personnel, you have been instructed how to handle the machinery and are familiar with the operation of the equipment and technologies described in this documentation.
- As commissioning engineers or service engineers, you have successfully completed the training to qualify you to repair the automation systems. You are also authorized to activate, to ground and label circuits and equipment in accordance with safety engineering standards.





It is also essential to comply with the legal and safety requirements for the application concerned during use. The same applies to the use of accessories.



## 2 Markings used

### 2.1 The markings used in this document

Important instructions for your safety are specifically identified. It is essential to follow these instructions in order to prevent accidents and damage to property.

Symbol	Significance
 <b>CAUTION</b>	This marking warns of a <i>potentially</i> dangerous situation in which failure to comply with safety requirements <i>can</i> result in slight or moderate physical injury.
<b>Notice</b>	This marking draws your attention to a situation in which failure to comply with safety requirements <i>can</i> lead to damage to property.
 <b>Important</b>	This marking draws your attention to <i>important</i> information about the product or about handling the product.
 <b>Tip</b>	This marking indicates application tips or other information that is useful to you.
 <b>Information</b>	This marking draws your attention to information about the product or about handling the product.
<i>Emphasis</i> <i>See....</i>	Italics are used to emphasize and highlight text and references to other chapters and external documents.

## 2.2 Symbols on the product

### CE mark



The CE mark enables the manufacturer to guarantee that the product complies with the requirements of the relevant EC directives (the declaration of conformity is available at <http://www.hbm.com/HBMdoc>).

### Statutory marking requirements for waste disposal



National and local regulations regarding the protection of the environment and recycling of raw materials require old equipment to be separated from regular domestic waste for disposal.

For more detailed information on disposal, please contact the local authorities or the dealer from whom you purchased the product.

### 3 Scope of supply

- 1 TIM40 Torque Interface Module
- Connector for transducer connection
- Connector for frequency output
- Connector for analog outputs
- Connector for shunt signal triggering
- Connector for supply voltage
- TIM40 mounting instruction

## 4 Application

The interface module TIM40 processes the TMC interface digital measurement signals of the torque flange T40. The signals can be filtered, scaled and output at the analog outputs as current/voltage or frequency signals. The measurement signals are also available at the Ethernet interface; other digital interfaces can be optionally added via a universal interface (Anybus<sup>®</sup>).

## 5 Structure and mode of operation

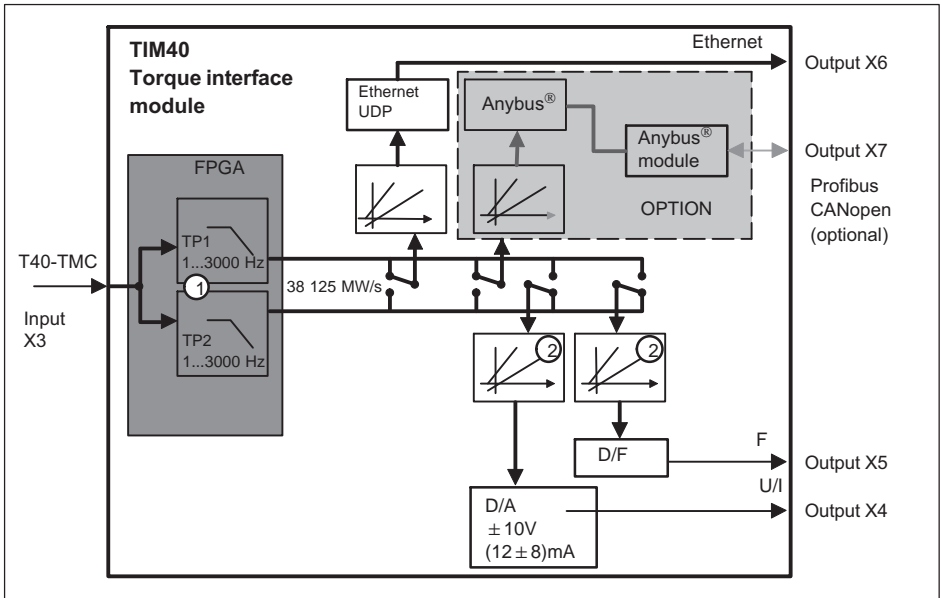


Fig. 5.1 Signal flow TIM40

The torque interface module TIM40 receives the measurement data of the T40 stator (38 125 measured values/s, 16 Bit) at input X3.

Two deactivatable digital filters (1) are available for all subsequent signal routes and scaling (2) for each output.

Scaling and filtering are set via the integrated web server. You can implement all settings from the PC with a web browser via an Ethernet connection.

The processed measurement signals are then available at analog output X4, frequency output X5 and the Ethernet interface X6 (and optionally Anybus®, output X7).

The supply voltage can be looped through without extra circuitry measures (from X1 to X3) to supply the T40 transducer.

## 6 Mounting

The TIM40 interface module is mounted on a DIN EN 60715 rail. A spring on the back holds the housing in position.

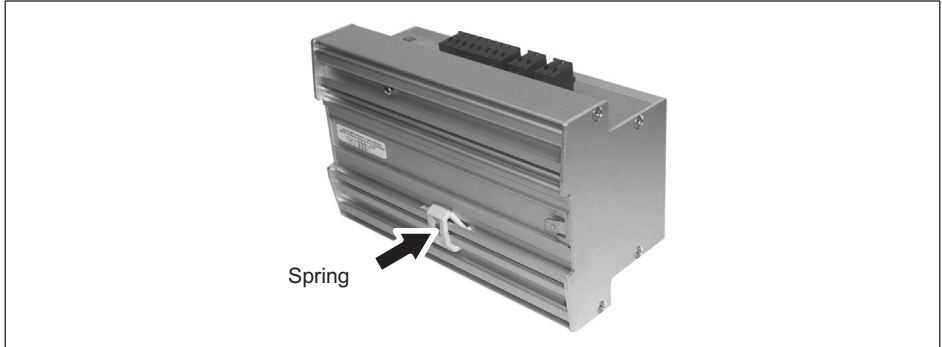


Fig. 6.1 Housing back

- ▶ Hook the interface module into the upper guide of the rail.
- ▶ Press the housing against the rail until the spring engages in the lower guide.

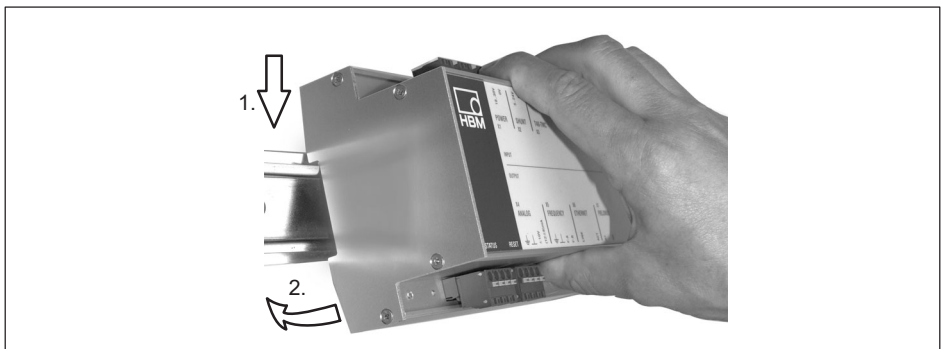


Fig. 6.2 Mounting on a DIN rail

## 7 Removal

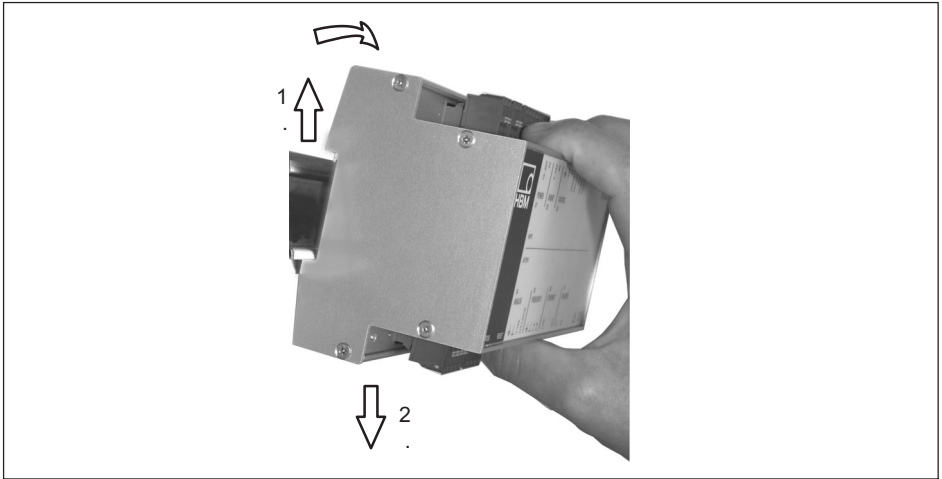


Fig. 7.1 Removal

- ▶ Push the housing up vertically and then tilt it lightly forwards.
- ▶ Pull the housing out downwards from the rail.

## 8 Mounting the Anybus<sup>®</sup>-module (accessory)

The housing of the interface module TIM40 has a slot for Anybus<sup>®</sup>-modules.

### Notice

*Take care when mounting the module. If the module is askew, the connection pins inside the housing may get bent.*

- ▶ Place the TIM40 housing on a flat surface as shown in *Fig. 8.1*.
- ▶ Remove the cover of the slot.

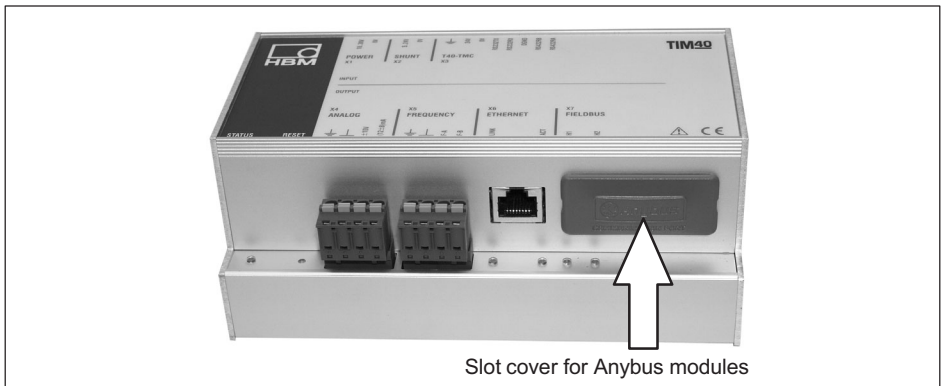


Fig. 8.1 Remove cover

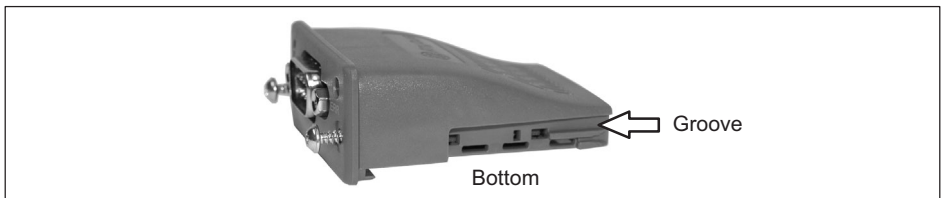


Fig. 8.2 Anybus<sup>®</sup>-module



## Hinweise zur Montage mit Anybus-Modul



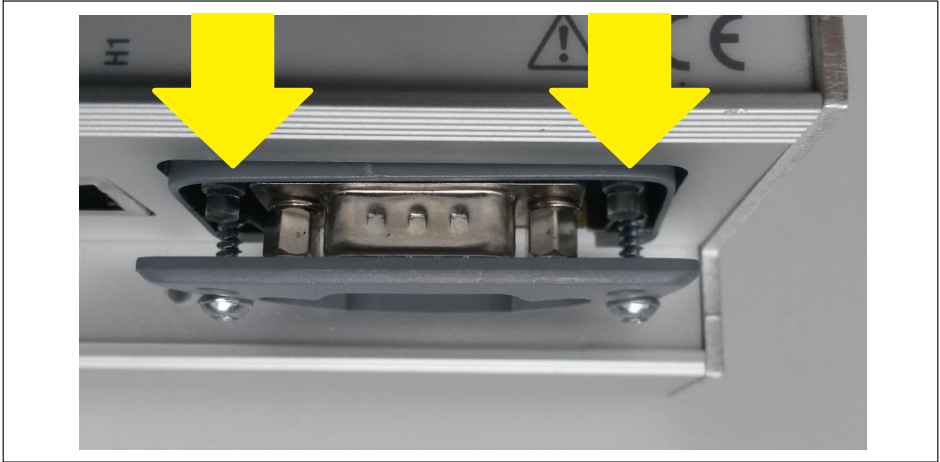
### Important

Achten Sie bitte darauf, dass die Befestigungsschrauben am Anybus-Modul vor der Montage min. 1 cm heraus geschraubt sind und die Arretierung (Pfeil) nicht heraus ragt:

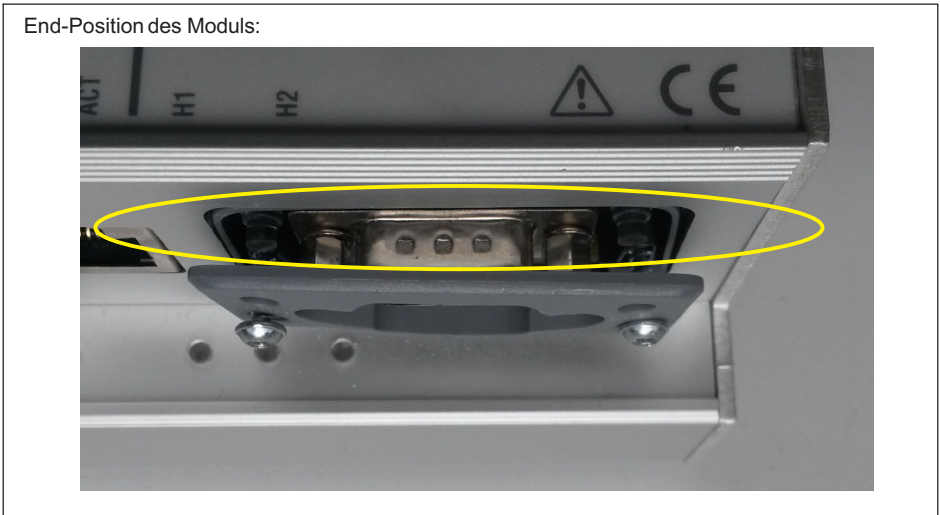


- ▶ Schieben Sie dann das Modul in das TIM40, bis das Modul nur noch etwa 3 mm heraus ragt.

- ▶ Führen Sie dann das Modul mit einem leichten Druck nach unten (Pfeile) in die endgültige Position:



End-Position des Moduls:



- ▶ Stellen Sie sicher, dass sich die Kunststoffhaken zwischen der Leiterplatte und dem Alu-Gehäuse eingehakt haben:



► Ziehen Sie abschließend beide Befestigungsschrauben fest.  
Das Anybus-Modul ist nun einsatzbereit.

- ▶ Push the module, with the flat side facing down, carefully into the housing. When the module protrudes approx. 1 cm from the housing, you will feel a resistance (see Fig. 8.3). The module will now be centered by the side grooves. Carefully push the module into the housing until it lies flush.

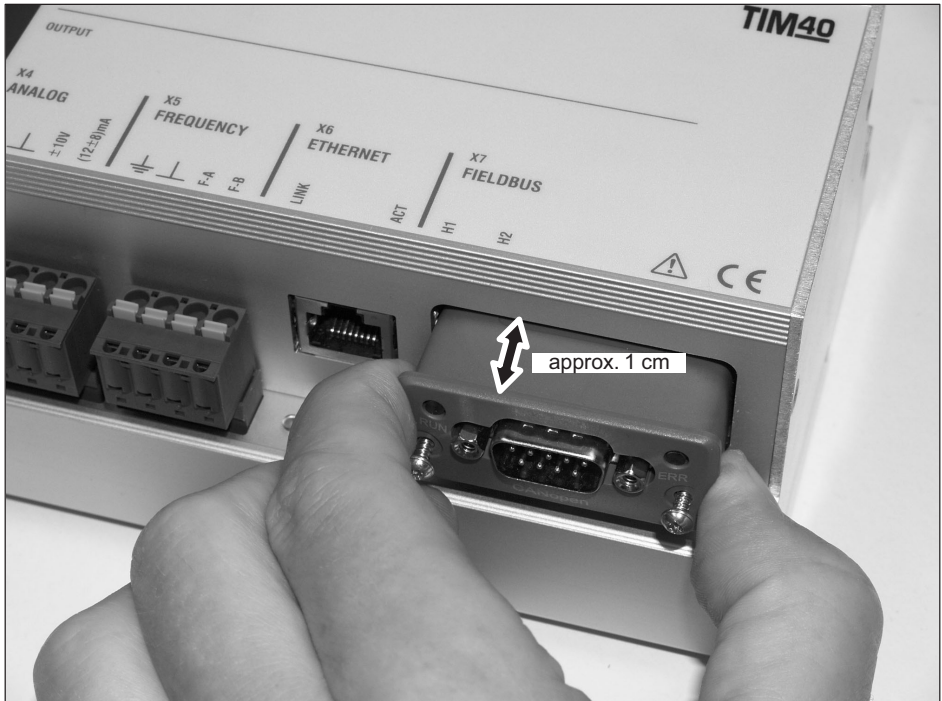


Fig. 8.3 Mounting the module

- ▶ Tighten both fastening screws (Torx<sup>®</sup> 8; 0.25 N·m).

## 9 Electrical connection

### 9.1 General information

To make the electrical connection between the torque transducer and the amplifier, we recommend using shielded, low-capacitance measurement cables from HBM.

With cable extensions, make sure that there is a proper connection with minimal contact resistance and good isolation. All plug connections or swivel nuts must be fully tightened.

Do not route the measurement cables parallel to power lines and control circuits. If this cannot be avoided (in cable pits, for example), maintain a minimum distance of 50 cm and also draw the measurement cable into a steel tube.

Avoid transformers, motors, contactors, thyristor controls and similar stray-field sources.

### 9.2 Shielding design

The cable shield should be connected to the protective housing according to the Greenline concept. This encloses the measurement system in a Faraday cage. It is important that the shield is laid flat on the housing ground at both ends of the cable. Any electromagnetic interference active here does not affect the measurement signal.

In the case of interference due to differences in potential (compensating currents), the connection between operating voltage zero and the housing ground must be cleared at the amplifier and a potential equalization line established between the stator housing and the amplifier (copper wire, 10 mm<sup>2</sup> wire cross-section).

### 9.3 Connector pin assignment

The TIM40 housing has 5 connector blocks with attached spring-loaded terminals (Phoenix Combicon 5 mm), an Ethernet socket and a slot for holding an

Anybus<sup>®</sup>-interface module. The terminal assignments are printed on the front panel.

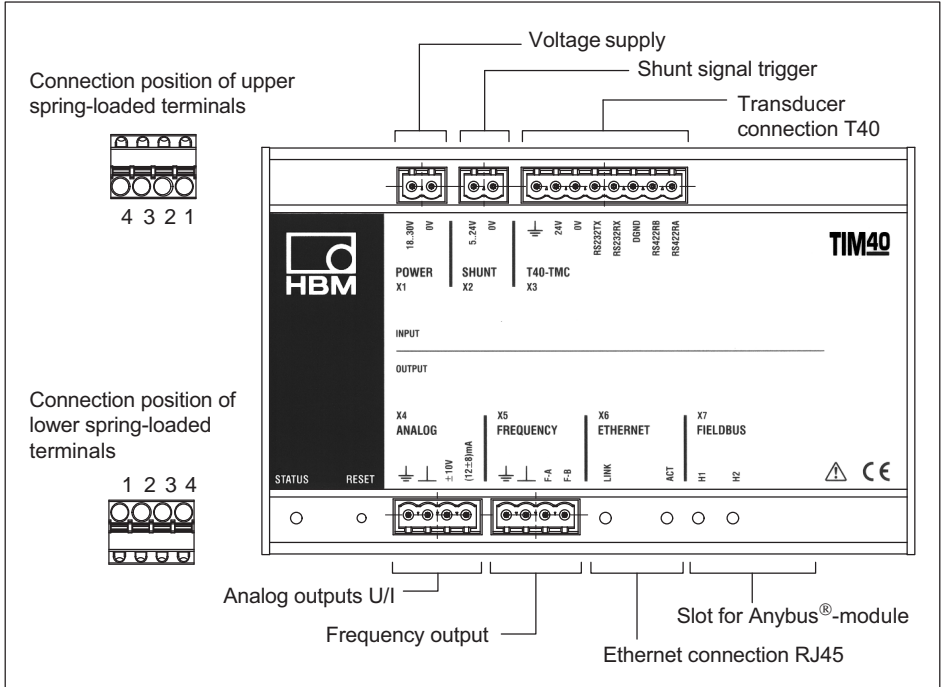


Fig. 9.1 TIM40 inputs/outputs

### 9.3.1 Connect cable wires to spring-loaded terminals

You can connect wires with a cross-section of maximum  $0.5 \text{ mm}^2$  to the spring-loaded terminals.

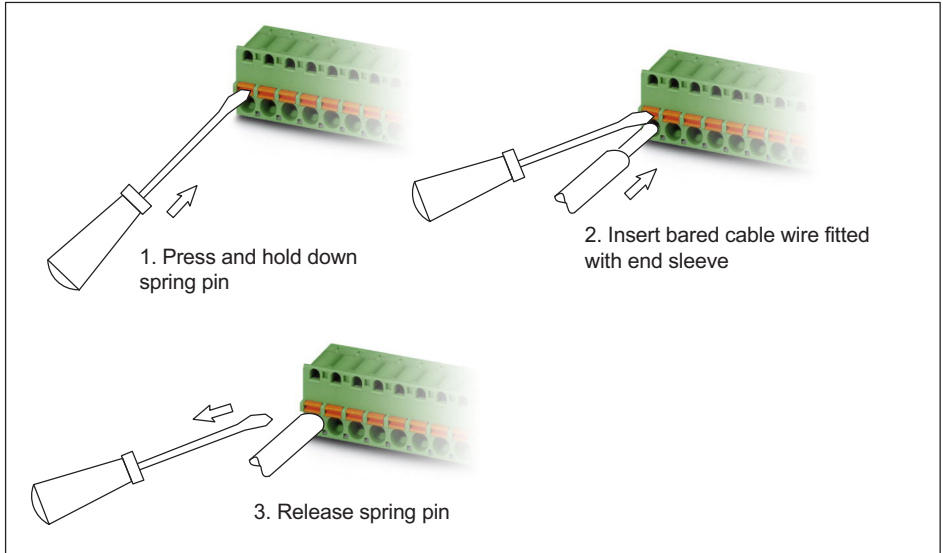

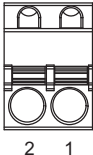


Fig. 9.2 Wire connection on spring-loaded terminals

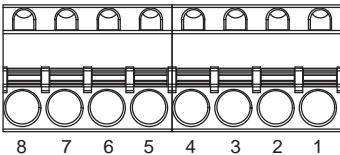
### Connection X1 for voltage supply

	<b>Terminal</b>	<b>Assignment</b>
	1	0 V
	2	18 ... 30 V

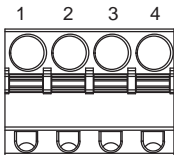
**Connection X2 for shunt signal trigger**

	Terminal	Assignment
	1	0 V
	2	5 ... 24 V

**Connection X3 for torque measurement flange T40**

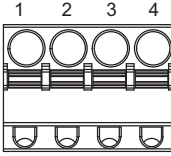
	Terminal	Assignment	Color code KAB174
	1	RS422-RA	rd
	2	RS422-RB	wh
	3	DGND	vt
	4	RS232-RX	gn
	5	RS232-TX	gy
	6	0 V	bu
	7	24 V	bk
	8	Shielding	ye

**Connection X4 for analog output**

	Terminal	Assignment
	1	Shielding
	2	GND
	3	$\pm 10$ V
	4	$12 \pm 8$ mA



### Connection X5 for frequency output

	Terminal	Assignment
	1	Shielding
	2	GND
	3	F-A
	4	F-B

### Connection X6 for Ethernet

Plug type	RJ45
-----------	------

### Connection X7 for fieldbus

Plug type	CANopen: SUB-D 9-pin PROFIBUS: SUB-D 9-pin
-----------	-----------------------------------------------

## 9.4 Supply voltage

The TIM40 module must be operated with a separated extra-low voltage (supply voltage 18 to 30 V DC). The supply voltage lead must be no more than 3 m long. Connecting to a direct voltage network in accordance with EN 61326 is not permitted. Instead, use a power pack that can be e.g. mounted together with the TIM40 in the control cabinet.

The supply voltage is electrically isolated from signal outputs and calibration signal inputs. Connect a separated extra-low voltage of 18 V to 30 V to Pin 1 and Pin 2 of terminal X1.

If a cable shield is present, apply the shield to the ground ( $\perp$ ) of input X3.

## 9.5 Connecting to a PC or network

You can operate the interface module either in a network or directly connected to a PC/laptop. The interface module has an Ethernet interface (RJ45 socket) for the connection. Use a cross cable (also called crossover cable) for the connection.

### 9.5.1 Single connection to PC/laptop

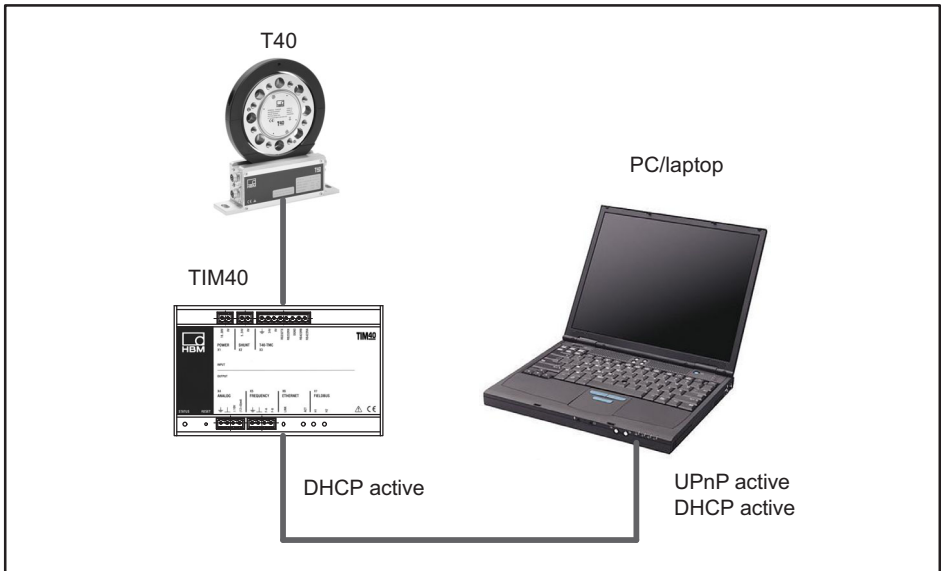


Fig. 9.3 Example: Direct connection to PC/laptop

In normal cases, TIM40 is automatically detected and addressed. If this is not the case, you will need to enter the IP address manually.

#### Manual input of IP address

- ▶ Hold the Reset button on the TIM40 for approx. 15 seconds while the power supply is switched on (this switches off DHCP in the TIM40).
- ▶ Open the network connections (Start/Settings/Network connections).

- ▶ Mark your LAN connection with a right-click and select "Properties" in the context menu.
- ▶ Select the tab "General" and mark the Internet (TCP/IP) under "This connection uses the following elements". Click on the "Properties" button.
- ▶ In the tab "General", select the option "Use following IP address" and enter "192.168.1.1" in the IP address line (the subnet mask is automatically set to "255.255.255.0").
- ▶ Confirm twice with "OK".
- ▶ Update the view by pressing the function key F5.
- ▶ Double-clicking on the TIM40 symbol opens the TIM40 start window. Alternatively, you can call up your web browser and enter the address "http://192.168.1.2", then confirm with "Return".

## 9.5.2 Connecting to a network

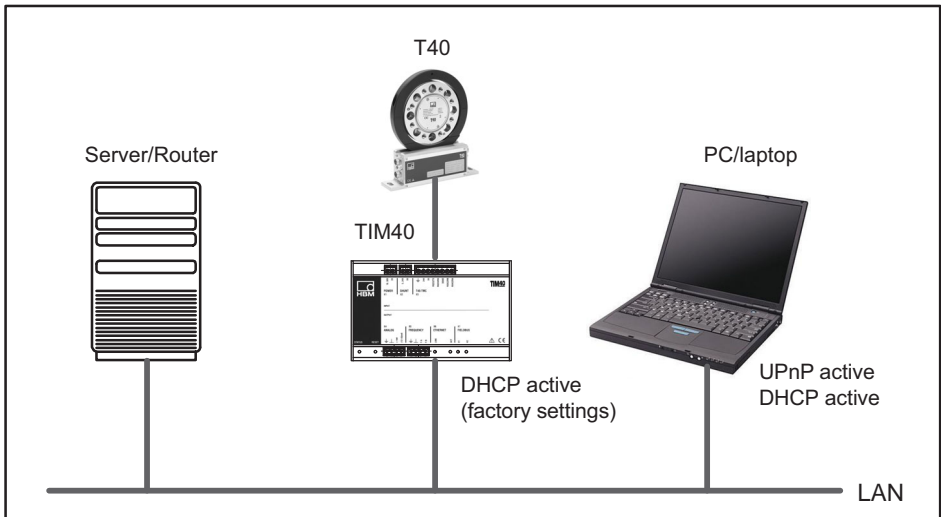


Fig. 9.4 Example: TIM40 in network

To access the TIM40, you must set the following settings under WindowsXP/ Vista:

- ▶ Activate UPnP user interface (Universal Plug and Play).
- ▶ Declare the UPnP framework as exception in the Windows firewall. Further information can be found in the Online Help of your operating system.

In order to see connected UPnP devices in the browser, you must also make the following settings in the network environment of your computer:

- ▶ Open the network connections (Start/Settings/Network connections).

Various links can be seen under "Network tasks" left in the opened window. If this is not the case, open "Folder options" via Extras and select "Display general tasks in folder".

- ▶ Open the network environment with a double-click.

Various options can be seen under "Network tasks" in the opened window. This should include the option "Hide Network-UPnP device symbols". If not, you can activate the option with a mouse click and confirmation (Yes).

In the factory settings, DHCP (Dynamic Host Configuration Protocol) is activated for the interface module TIM40. This ensures that the IP address in the network is automatically assigned by the Server/Router. The requirement for this is that DHCP is also activated in your computer.

After this setting, the interface module is automatically detected and integrated in the network environment.

- ▶ Open the network connections (Start/Settings/Network connections) and select TIM40. IF TIM40 is not visible, update the view with the function key F5. Double-click on the TIM40 symbol to open the TIM40 setup interface.

## 10 Shunt signal trigger

The torque measurement flange T40 supplies an electric shunt signal that corresponds to approx. 50% of its nominal (rated) measuring range.

The shunt signal can be triggered:

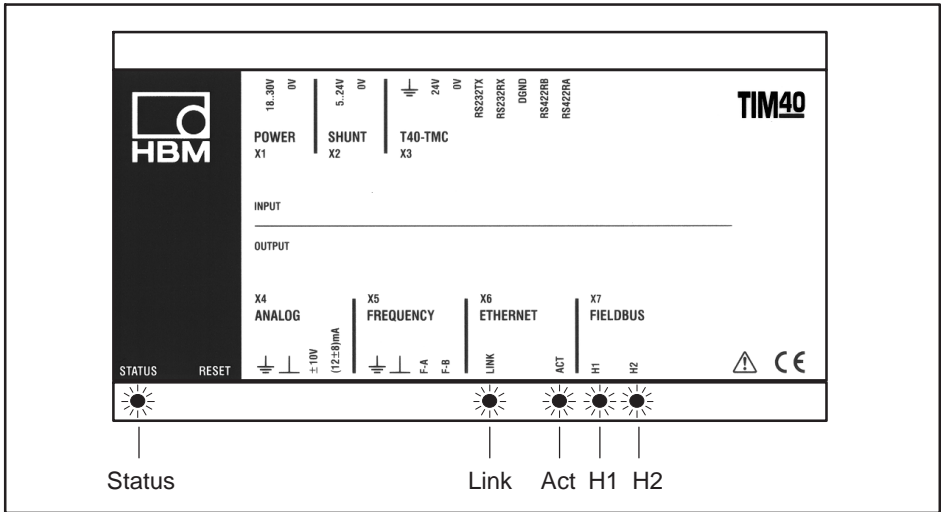
- By applying a separated extra-low voltage of 5 V to terminal X2.

The nominal (rated) voltage for triggering the shunt signal is 5 V (triggering at  $U > 2.5$  V). The trigger voltage is electrically isolated from the supply voltage and the measurement voltage. The maximum permissible voltage is 36 V. When voltages are less than 1.5 V, the torque flange is in measuring mode. Current consumption at nominal (rated) voltage is approx. 2 mA and at maximum voltage, approx. 30 mA.

- Via a control bit of the optional fieldbus.
- From PC via the web browser (signal conditioning Torque/Shunt signal/On).

The shunt signal is automatically switched off after 5 minutes.

# 11 Status display



LED	Function	Color/status	Meaning
Status	Transmission of measured values	Green	Transmission of measured values OK
		Red	Transmission of measured values not OK
		Flashing red	Parameter inconsistent or incorrect
Link	Link status	Green	Link status
Act	Ethernet communication	Flashing green	Transmission- / reception activity
H1	CAN Bus: Run PROFIBUS: Operation mode		For more information refer to <i>Chapter 13</i>
H2	CAN Bus: Error PROFIBUS: Status		

## 12 Settings

You can parameterize the TIM40 via an integrated software that displays all parameters in a web browser (we recommend Microsoft Internet Explorer) when connected via Ethernet.

### 12.1 Settings with the web browser

Start the web browser by double-clicking on the TIM40 symbol in the network environment as described in *Chapter 9.5*.

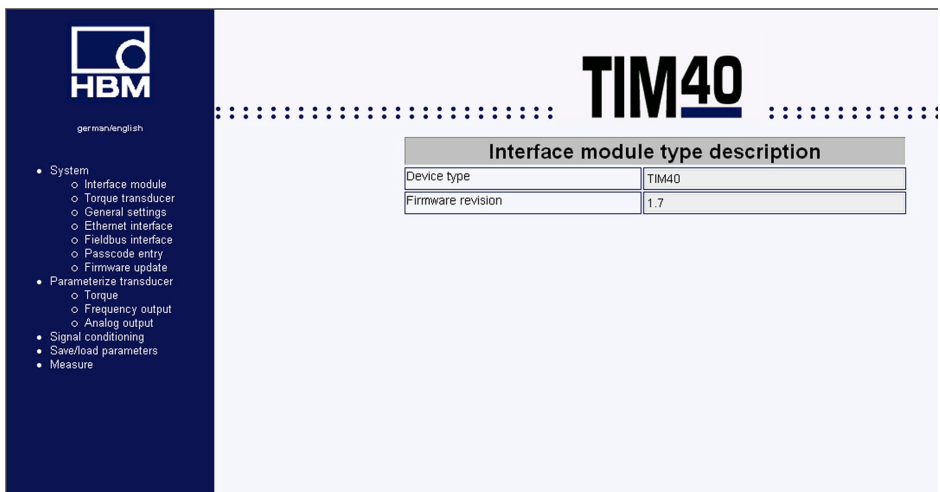


Fig. 12.1 TIM40 start window

Use the tree structure on the left side of the start window to open the required setup window.

### 12.1.1 System/Interface module

Displays the firmware version of your device (see also *Firmware update*).

### 12.1.2 System/Torque transducer

Lists the main data of the connected torque measurement flange (e.g. the nominal (rated) torque).

### 12.1.3 System/Default settings

You can select the menu language (Deutsch/English), assign a project name and protect your settings with a passcode (1 to 4 digit number code). If you activate the passcode, other users cannot change your settings, only read them.

The zeroing and activation of the shunt is independent of the passcode.

In delivery condition, no passcode is active.

### 12.1.4 System/Ethernet interface

You can find your Ethernet connection data here and can switch the DHCP Client on/off. You can select the signal and start/stop the data transmission here.

The activation of the UDP data output without configured recipient leads to a buffer overflow which is displayed in the status, the status display lights up red.

### 12.1.5 System/Fieldbus interface

This menu contains information about your fieldbus connection (CAN or PRO-FIBUS). You can set the CAN baud rate and the increments of the PDO output rate (e.g. Increment 2 → Measurement rate = 2.4 kHz). In addition, you can select if and which signal (TP1/TP2) is output via PDO1.

### 12.1.6 System/Passcode input

After entering the correct passcode, you can change all settings.



### 12.1.7 System/Firmware update

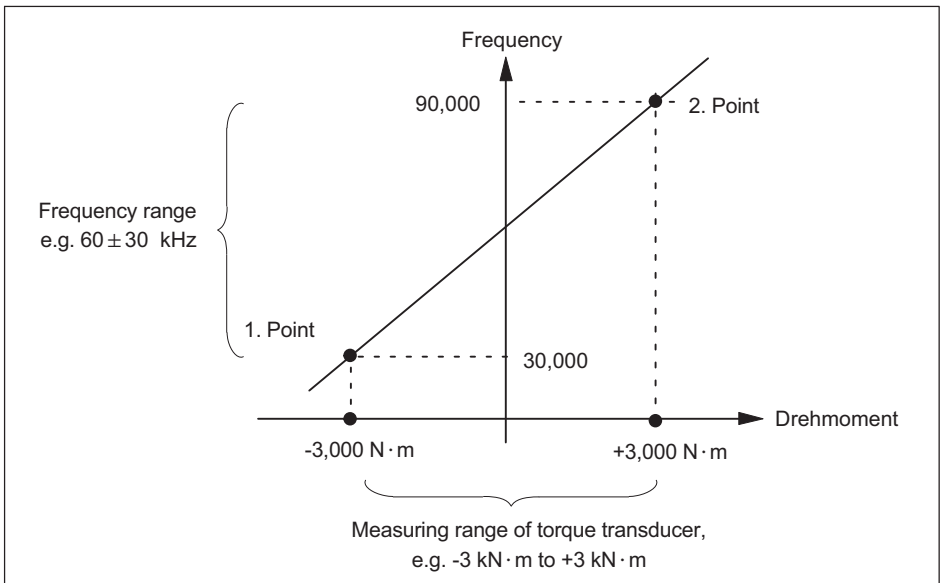
You can update the firmware of your device via the PC. The latest firmware (.tfw file) can be found on the HBM Internet website ([www.hbm.com](http://www.hbm.com)).

### 12.1.8 Transducer parameterization/Torque

You can assign a measurement point designation and measurement point number, select the required unit, number of decimal places and the sign. You can also activate two low-pass filters (1 Hz to 3 KHz).

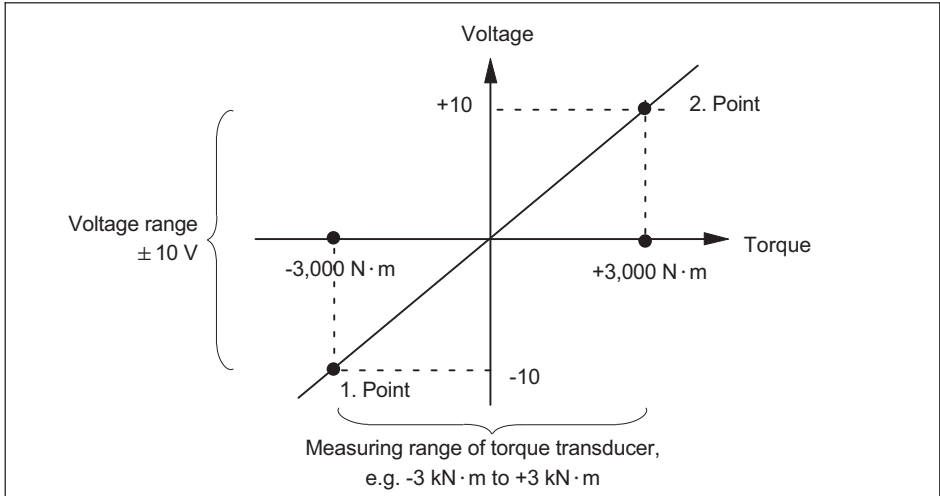
### 12.1.9 Transducer parameterization/Frequency output

Select the signal at the frequency output (low-pass 1 or 2) and the required output frequency ( $10 \pm 5$  kHz;  $60 \pm 30$  kHz;  $240 \pm 120$  kHz). Specify the scaling points with 2 values each of the torque setpoint and the frequency (only points in the selected output range can be assigned, e.g. in the range 30,000 Hz to 90,000 Hz at output frequency  $60 \pm 30$  kHz).



### 12.1.10 Transducer parameterization/Analog output

Select the signal at the current or voltage output (low-pass 1 or 2) and specify the scaling points with two values each (for voltages in the range -10 V to +10 V and for current 4 mA to 20 mA with reference to the selected torque measuring range).



### 12.1.11 Signal conditioning

You can connect a shunt and carry out a zero balance. We recommend zeroing only in the range within  $\pm 10\%$  of the nominal (rated) measuring range. Greater values are displayed in red in the browser.

### 12.1.12 Save/load parameters

You can save and load various settings in four parameter sets in the interface module and reset all settings to the factory settings.

If you need more than four parameter sets, you can save these on the hard drive of your PC (filename.tim40). Click on the link "*Configuration file*" and confirm the download into a directory of your choice.

### 12.1.13 Measuring

You can read the possibly filtered, but unscaled, "raw measured values" of both signals here, which are also unaffected by a zero balance. The sampling rate is approx. 1 MV/s.

## 13 Interface description

### 13.1 CANopen

#### 13.1.1 Connection

The TIM40 interface module has a slot for an Anybus<sup>®</sup>-CC-CANopen module, over which both measured values can be transmitted and simple parameterization of the module can be implemented (see 13.1.4 RPDO1). Different baud rates can be selected up to a maximum of 1 MBaud. The interface protocol corresponds to the CANopen standard.

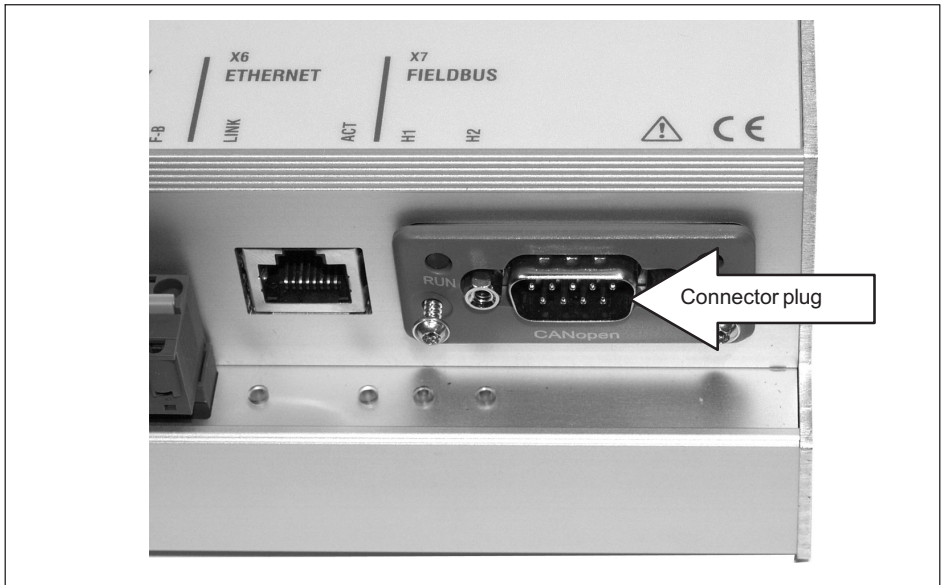
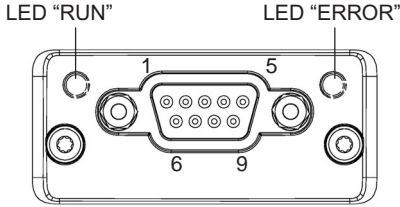


Fig. 13.1 Anybus<sup>®</sup>-CC-CANopen module

### Connector pin assignment

	Pin	Assignment
 <p data-bbox="277 555 364 577">Top view</p>	1	No function
	2	CAN LOW
	3	CAN GND
	4	No function
	5	Shielding connected to enclosure ground
	6	No function
	7	CAN HIGH
	8	No function
	9	No function

### 13.1.2 LED status display

For better visibility, the module LEDs "RUN" and "ERROR" are coupled with the enclosure LEDs H1 and H2.

LED RUN/H1	
Color/status	Meaning
Off	No voltage supply
Green	Status "Operational"
Green flashing continuously	Status "Pre-operational"
Green flashing 1x	Status "Stopped"
Green flickering	Baud rate detection on
Red <sup>1)</sup>	Status "EXCEPTION"

LED ERROR/H2	
Color/status	Meaning
Off	No voltage supply or device working
Red flashing 1x	Warning limit reached
Red flickering	LSS
Red flashing 2x	Error control event
Red <sup>1)</sup>	Bus off (fatal event)

1) If both LEDs are red, this indicates a serious error, the bus interfaces are physically switched to passive.

### 13.1.3 Cyclic transmission of measured values

The cyclic data are transmitted as so-called "Process Data Objects" (PDOs, in accordance with CANopen definitions). Interesting measured values are transmitted cyclically from the measurement module under a previously defined CAN Identifier, without any further identification. A query message is not required. A parameter setting determines how often the PDOs are transmitted. Data formats longer than one byte are always transmitted in LSB–MSB order.

### 13.1.4 PDO contents

#### TPDO1 Torque measured value

CAN Identifier (COB ID)	384 (180h) + CAN address	Data
1..4. data byte	Measured value (LSB-MSB), integer32	Torque TP1/TP2 <sup>2)</sup>

<sup>2)</sup> The required data are selected in the Web Interface (Signal PDO1)



#### Information

*TPDO1 packets are only transmitted from the TIM40 when the measured value has changed.*

#### TPDO2 Status

CAN Identifier (COB ID)	640 (280h) + CAN address	Data
1..2. data byte	Status	Status

#### Status

Byte	Meaning	Bit	Values	Meaning
1	Status byte (The value of the control byte can be read back here. The Bits are updated after the function has been implemented)	0	0 = no function 1 = zeroing of actual measured value	Torque zeroing
		1	0	Reserved
		2	0 = Shunt off 1 = Shunt on	Shunt calibration status
		3..5	0	Reserved

Byte	Meaning	Bit	Values	Meaning
		6..7	00 = Parameter set 1 01 = Parameter set 2 10 = Parameter set 3 11 = Parameter set 4	Actual parameter set
2	Error status	0..7	0	Reserved

### RPDO1 control byte

CAN Identifier (COB ID)	512 (200h) + CAN address	Data
1. data byte	Control byte	Control word

Byte	Meaning	Bit	Values	Meaning
1	Control byte	0	0 = no function 1 = zeroing of actual measured value	Torque zeroing
		1	0	Reserved
		2	0 = Shunt off 1 = Shunt on	Activate shunt calibration
		3..5	0	Reserved
		6..7	00 = Parameter set 1 01 = Parameter set 2 10 = Parameter set 3 11 = Parameter set 4	Load parameter set. Implemented when the value has changed

#### 13.1.5 Activation of PDO output

The exchange of cyclic PDOs only starts once the module has been brought to the "Operational" state. This is done with the "Start\_Remote\_Node" message.

Switch all configured PDO's to "operational":

CAN Identifier	0
1. data byte	1 (01hex)
2. data byte	Module address (0 =, ID 110 = 6e hex)



The message "Enter\_Pre\_Operational\_State" can be used to exit the "Operational" state.

Switch all configured PDO's to "pre-operational":

CAN Identifier	0
1. data byte	128 (80hex)
2. data byte	Module address (0 =, ID 110 = 6e hex)

### 13.1.6 Parameterization

Messages for module parameterization are transmitted as so-called "Service Data Objects" (SDOs, in accordance with CANopen definitions). The various parameters are addressed by an index number and a sub-index number. For the assignment of these index numbers, please refer to the object dictionary. Data formats longer than one byte are always transmitted in LSB–MSB order.

## Reading a parameter

Query (PC or PLC to TIM40)

CAN Identifier	1536 (600 Hex) + module address
1. data byte	64 (40 Hex)
2. + 3. data byte	Index (LSB_MSB)
4. data byte	Sub-index
5..8. data byte	0

Response (TIM40 to PC or PLC)

CAN Identifier	1408 (580 Hex) + module address
1. data byte	66 (42Hex)
2. + 3. data byte	Index (LSB-MSB)
4. data byte	Sub-index
5...8. data byte	Value (LSB-MSB)

## Writing a parameter

Transmit value (PC or PLC to TIM40)

CAN Identifier	1536 (600 Hex) + module address
1. data byte	47 (2FHex) = write 1 byte 43 (2BHex) = write 2 bytes 35 (23Hex) = write 4 bytes
2. + 3. data byte	Index (LSB-MSB)
4. data byte	Sub-index
5...8. data byte	Value (LSB-MSB)

Acknowledgement (TIM40 to PC or PLC)

CAN Identifier	1408 (580 Hex) + module address
1. data byte	96 (60Hex)
2. + 3. data byte	Index (LSB_MSB)
4. data byte	Sub-index
5...8. data byte	0

## 13.2 PROFIBUS

### 13.2.1 Connection

The TIM40 interface module has a slot for an Anybus<sup>®</sup>-PROFIBUS module, over which both measured values can be transmitted and simple parameterization of the module can be implemented.

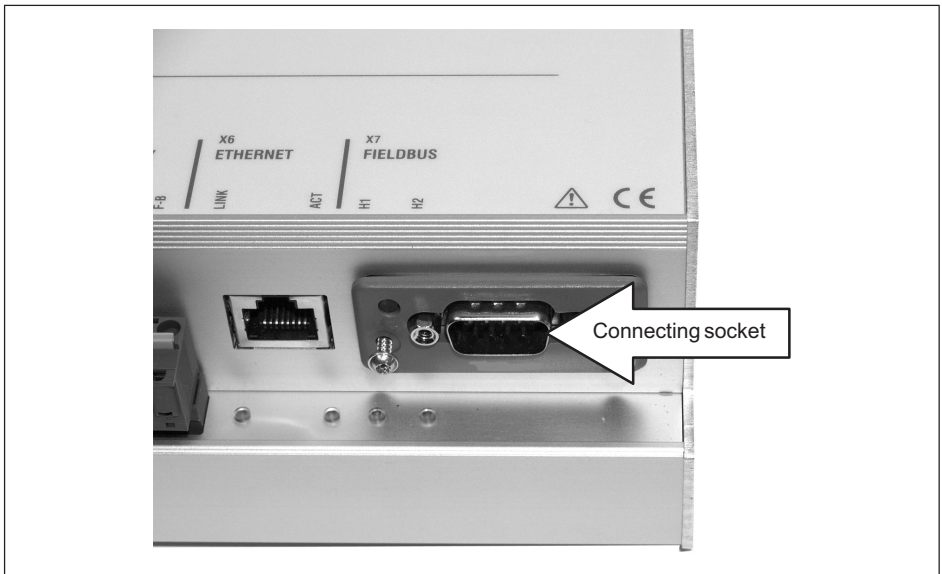
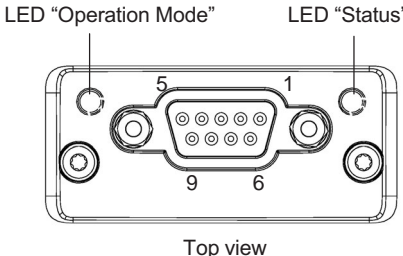


Fig. 13.2 Anybus<sup>®</sup>-PROFIBUS module

### Socket assignment

	Pin	Assignment
 <p>LED "Operation Mode"      LED "Status"</p> <p>Top view</p>	1	No function
	2	No function
	3	Data line B (RxD/TxD minus, RS 485)
	4	RTS
	5	GND Bus
	6	+5 V Bus output
	7	No function
	8	Data line A (RxD/TxD plus, RS 485)
	9	No function
		Cable shield connected to housing ground

### 13.2.2 LED status display

For better visibility, the module LEDs "Operation Mode" and "Status" are coupled with the enclosure LEDs H1 and H2.

LED Operation Mode/H1	
Color/status	Meaning
Off	Not online or no voltage supply
Green	Online, data exchange
Flashing green	Online, clear
Red flashing 1x	Parameterization error
Red flashing 2x	Profibus configuration error

LED Status/H2	
Color/status	Meaning
Off	No voltage supply or no initialization
Green	Initializing complete
Red	Exception error

### 13.2.3 Cyclic data traffic

Before you can communicate with the TIM40 interface module on Profibus, you have to configure and parameterize the message contents.

To do this, start your configuration software (e.g. Step 7) and load the GSD file from the HBM website ([www.hbm.com/T40/Downloads](http://www.hbm.com/T40/Downloads)). You can then configure the information relevant to your application from the "Hardware catalog".

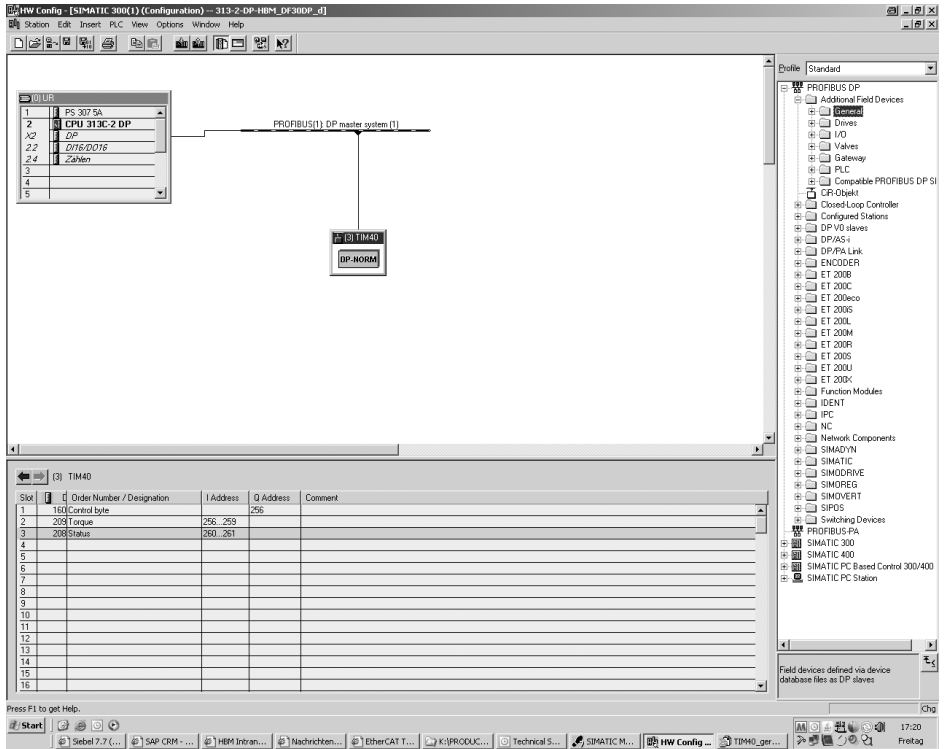


Fig. 13.3 TIM40 configuration

The TIM40 control bits must be explicitly enabled in the Profibus parameterization.

Notes for Simatic S7 PLC users:

- To transmit consistent data, you must use the special function blocks SFC14 to read and SFC15 to write.
- With S7 3xx, a maximum of 32 bytes of consistent data can be transmitted.

The TIM40 allows the following cyclic data to be transferred via Profibus DP:

Input data (sent from the TIM40 to the PLC):

- 32 Bit measured values (torque low-pass 1, torque low-pass 2; parameterizable via the web server)

- 8 Bit status information

Output data (from the PLC to the TIM40):

- 8 Bit control word with control bits (zeroing, changing the parameter set, shunt calibration)

The measured values and data of the TIM40 are transferred as integer values (integers).

The number of bytes complies with the value range, measured values are always transmitted as signed (two's complement) 32-bit quantities (4 bytes). To obtain the measured value in the physical quantity for displaying "n" decimal places, divide by 10<sup>n</sup>.

The byte sequence corresponds to the Profibus standard in that it always starts with the high byte (the so-called Motorola format).

Non-documented bits are reserved and sometimes assigned with internal functions.

## Signal inputs and outputs module TIM40

### TIM40 control word assignment

Bit	Function
0	Zero setting torque
1	Reserved
2	Activate shunt calibration
3	Reserved
4	Reserved
5	Reserved
6	Load parameter set
7	Load parameter set

Bit 7	Bit 6	
0	0	Parameter set 1
0	1	Parameter set 2

Bit 7	Bit 6	
1	0	Parameter set 3
1	1	Parameter set 4

The function "Load parameter set" is only implemented when the new parameter set number differs from the actual parameter set number.



## 14 Object dictionary: Manufacturer-specific objects (CAN)

Parameters that make reference to measured values are scaled true to number, coded as Long (32-bit integer). The position of the decimal point is defined in object 2120 Hex. Alternatively, these quantities are also available as Float values (IEEE754-1985 32-bit format).

### HBM T12 Object Dictionary

Index hex	Sub lx	Attr	Format	Name
1008	0	RO	VISIBLE STRING	Manufacturer device name
1009	0	RO	VISIBLE STRING	Manufacturer hardware version
100A	0	RO	VISIBLE STRING	Manufacturer software version
100B	0	RO	UINT32	Device address
100E	0	RW	UINT32	Identifier node guard
1014	0	RW	UINT32	Identifier emergency

Name	Slot number
Torque	1
Status	2
Control word	3

## 15 Maintenance

The torque interface module TIM40 is maintenance-free.

## 16 Specifications

<b>Type</b>		TIM40
<b>Accuracy class</b>		0.05
<b>Energy supply</b>		
Nominal (rated) supply voltage	V	18 ... 30
Nominal (rated) power consumption	W	< 20 W
<b>Transducers that can be connected</b>		HBM's T40 Torque Flange
<b>Inputs</b>		
Max. cable length	m	50
<b>Control signal input shunt</b>		
Input level "On"	V	> 2.5
Input level "Off"	V	< 1.5
Max. input voltage	V	36
Max. input current at 24 V	mA	24
<b>Outputs</b>		
<b>Frequency output</b>		
Nominal (rated) output signal at		
10 kHz	kHz	$10 \pm 5$
60 kHz	kHz	$60 \pm 30^{1)}$
240 kHz	kHz	$240 \pm 120$
Max. modulation range at		
10 kHz	kHz	4 ... 16
60 kHz	kHz	24 ... 96
240 kHz	kHz	96 ... 384
Output signal in case of error	kHz	0
Level	V	5 symmetrical <sup>2)</sup>
Max. group delay (scaled, without filter)	$\mu$ s	200
<b>Voltage output</b>		
Nominal (rated) output signal	V	-10.0 ... +10.0
Max. modulation range	V	-12.0 ... +12.0

Output signal in case of error	V	12.5 ... 15
Resolution	mV	0.5
Measurement frequency range (-3 dB)	Hz	0 ... 10000
Load resistance	kΩ	≥ 5
Long-term drift over 48 h	mV	±5
<b>Current output</b>		
Nominal (rated) output signal	mA	12 ± 8
Max. modulation range	mA	3.4 ... 21.6
Output signal in case of error	mA	23 up to 25
Measurement frequency range (-3 dB)	Hz	0 ... 8000
Burden	Ω	≤ 500
<b>Digital low-pass filter (Bessel; can be switched off)</b>		
Low-pass filter TP 1 (-1 dB)	Hz	1; 10; 100; 1000; 3000
Low-pass filter TP 2 (-1 dB)	Hz	1; 10; 100; 1000; 3000

- 1) Factory settings
- 2) Complementary signals per RS-422, observe terminating resistors

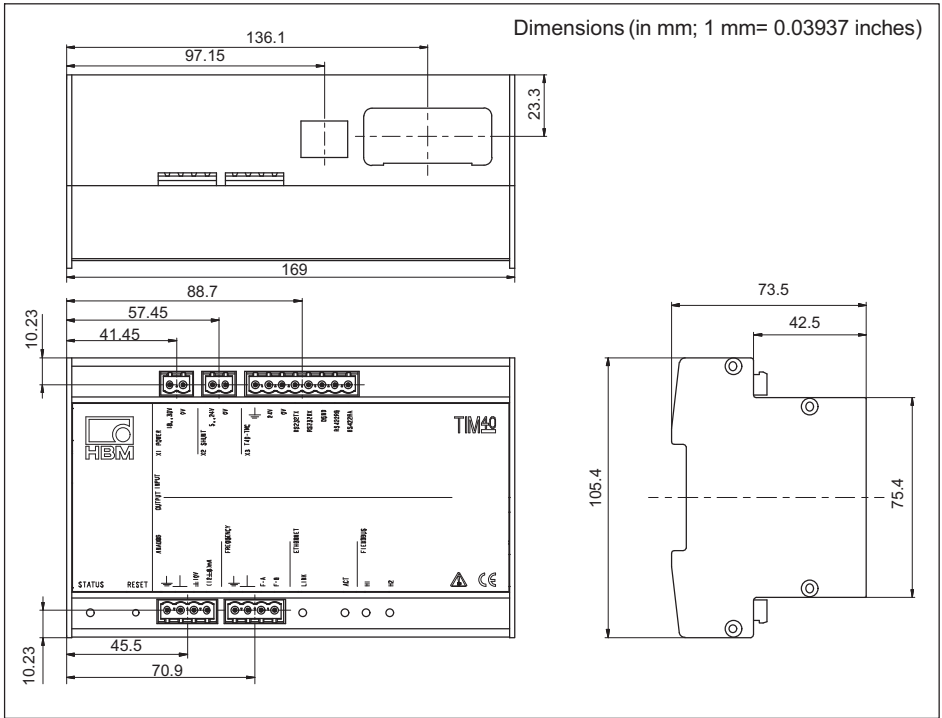
<b>Effect of temperature per 10 K in the nominal (rated) temperature range on the zero signal, related to the nominal (rated) sensitivity</b>		
Voltage output	%	0.05
Current output	%	0.05
<b>Fieldbuses</b>		
<b>Ethernet interface</b>		
Baud rate	MBit/s	10 and 100
Connection		RJ45
Protocol		TCP/IP, UDP, DHCP

<b>Slots for fieldbus modules</b>	Number	1								
Format		Anybus®-CC								
Protocol		Profibus-DP, CANopen								
<b>Fieldbuses</b>										
<b>CAN Bus</b>										
Protocol	-	CAN 2.0B, CAL/CANopen compatible								
<b>Hardware bus link</b>		according to ISO 11898								
Sampling rate	Mv/s	max. 1000 (PDO)								
Baud rate	kBaud	10	20	50	100	125	250	500	800	1000
Maximum line length	m	5000	2500	1000	500	500	250	100	50	25
<b>Profibus DP</b>										
<b>Protocol</b>		Profibus DP Slave, according to DIN 19245-3								
Max. update rate	Mv/s	1000								
Baud rate	MBaud	max. 12								
<b>Environmental requirements</b>										
Degree of protection per EN 60 529		IP20								
Weight, approx.	kg	0.65								
Nominal (rated) temperature range	°C [°F]	0 ... +60 [+32 ... +140]								
Operating temperature range	°C [°F]	-10 ... +60 [+14 ... +140]								
Permissible relative humidity, non-condensing	%	10 ... 90								

<b>Mechanical stress</b>		
<b>Vibration resistance (test per EN60068-2-6)</b>		
Frequency range	Hz	5 ... 65
Duration	h	0.5
Acceleration (amplitude)	m/s <sup>2</sup>	25

<b>Impact resistance (test per EN60068-2-27)</b>		
Number of impacts	n	3 in each direction
Duration	ms	11
Acceleration (half cosine)	m/s <sup>2</sup>	200
<b>EMC requirements</b>		
EMC		According to EN 61326:2006, industrial environment
Emission (EME)		DIN EN 61326:2006, Class A
Immunity from interference		DIN EN 61326:2006, industrial environment
Conducted HF		EN61000-4-6, 10V

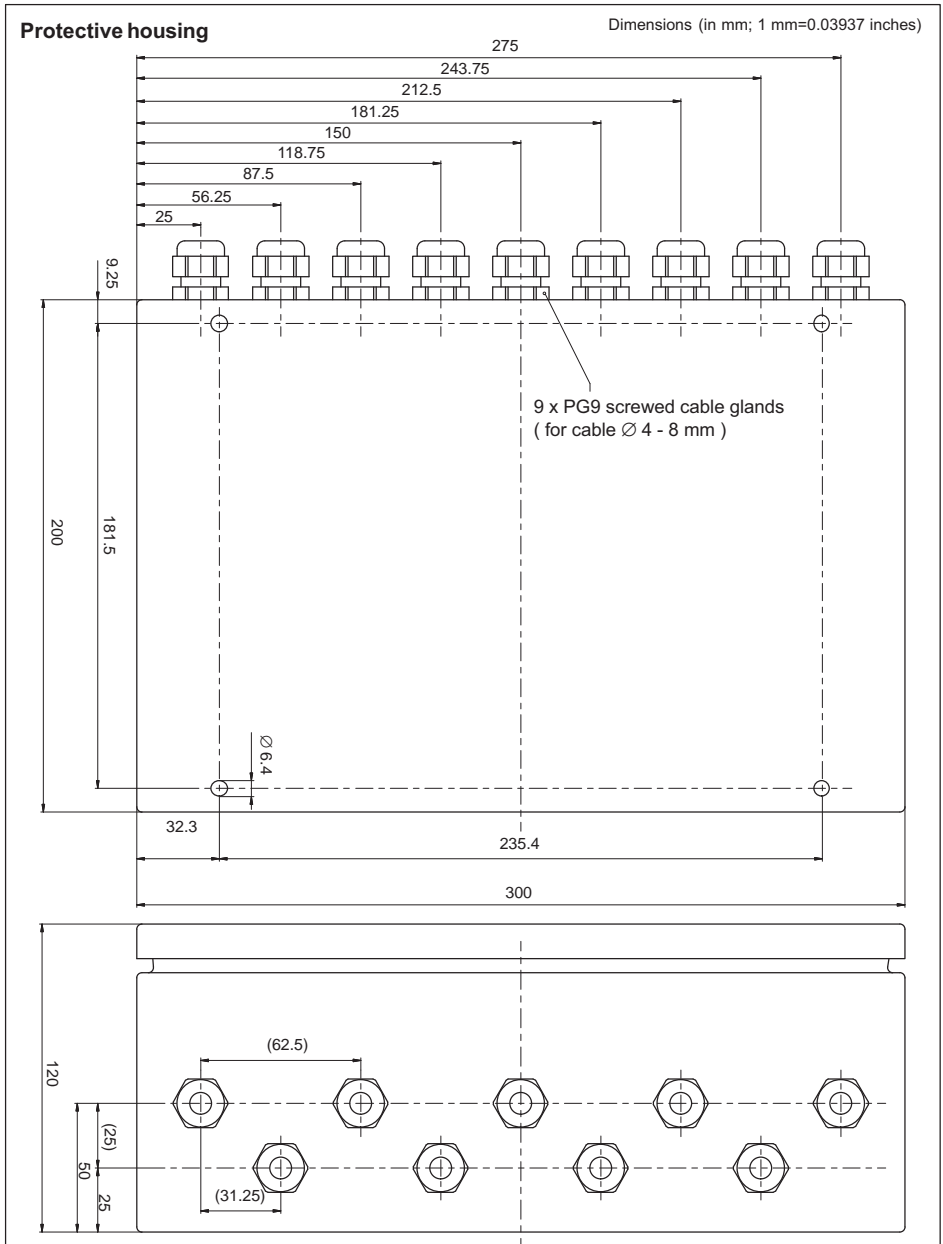
# 17 Dimensions



## 18 Accessories, to be ordered separately

Article	Order No.
<b>Connection cable, ready-made</b>	
Connection cable TIM40, Binder 423 16-pole - free ends, 6 m	1-KAB174-6
Protective housing for TIM40; protection class IP67; 9 screwed cable glands (clamping range 4.5 mm-10 mm)	3-6440.0148
<b>Anybus<sup>®</sup> modules</b>	
Anybus <sup>®</sup> -CompactCom-CANopen	1-ANYBUS-CAN
Anybus <sup>®</sup> -CompactCom-PROFIBUS DP	1-ANYBUS-PROFI





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