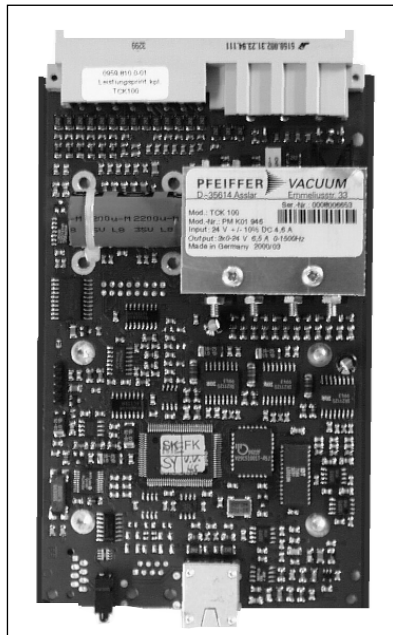


**Operating Instructions**

# TCK 100

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## Electronic Drive Unit



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## Please note

Current operating instructions are available via [www.pfeiffer-vacuum.de](http://www.pfeiffer-vacuum.de) under "infoservice".

# 1. Safety Precautions

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- ☞ Read and follow all the instructions in this manual.
- ☞ Inform yourself regarding:
  - Hazards which can be caused by the unit,
  - Hazards which can arise in your system.
- ☞ Observe all safety and accident prevention regulations.
- ☞ Check regularly that all safety requirements are being complied with.
- ☞ Take account of the ambient conditions when installing the TCK 100.  
The protection type is IP 00.
- ☞ Do not carry out any unauthorised conversions or modifications on the electronic drive unit.
- ☞ The operations voltage for the TCK 100 must be safety low voltage (SELV; 24 V DC  $\pm$  5%).
- ☞ Take account of the prescribed voltage when connecting the unit.
- ☞ When returning the unit please note the shipping instructions.

## Pictogram Definitions:



Danger of an electric shock.



Danger of personal injury.



Danger of damage to the unit or system.



Important information regarding the product, the handling of the product or the respective part of the documentation to which special attention should be paid.

Modifications reserved.

## **2. Understanding The Electronic Drive Unit TCK 100**

### **2.1. For Your Orientation**

#### **Abbreviations Used**

- TMP = Turbomolecular pump
- DCU = Display and control unit
- TCK = Electronic drive unit
- TPS = Mains unit

#### **Operating Instructions In The Text**

- ➔ Here, you have to do something.

### **2.2. Product Description**

The Electronic Drive Unit TCK 100 has been designed as an integratable component and serves to drive and monitor PFEIFFER turbomolecular pumps (TPD 011/TMH/U 071/262).

The electronic drive unit contains the following functional features:

- Motor drive
- Monitoring and process control
- Illuminating diode display with information concerning the operational status of the pump
- Serial Interface RS 485 on Plug X15 and X4.

#### **Connection Options**

The Electronic Drive Unit TCK 100 has connection options for:

- Remote control,
- Host computer or DCU via Serial Interface RS 485.

#### **Proper Use**

- The Electronic Drive Unit TCK 100 has been designed as an integratable component and may only be used to drive and monitor PFEIFFER turbomolecular pumps (TPD 011/TMH/U 071/262).
- The operations unit TCK- turbopump must only be operated together with a backing pump.
- Instructions concerning installation, start-up, operating and maintenance must be observed.

#### **Improper Use**

Improper is:

- Uses not covered above, and, in particular,
  - Connection to pumps and units which is not permitted in their operating instructions.
  - Connection too dangerous to touch voltages.

Improper use will cause any rights regarding liability and guarantees to be forfeited.

## 3. Installation TCK 100

### 3.1. Preparations For Installation



Unauthorised modifications or alterations to the electronic drive unit are not allowed.

The unit must be fitted in a housing taking account of the ambient conditions (see Section 7., "Technical Data").

Protection type is IP 00.

Electrical connection: Please refer to 9. "Connections Diagram" PM 051 451 -S.

### 3.2. Fitting The Unit Into A Rack

The Electronic Drive Unit TCK 100 has been designed to be fitted into a rack. The following should be taken account of when fitting:

- ➔ On installation the TCK 100 should be insulated.
- ➔ Ensure safe distance from the influence of extraneous voltages.
- ➔ Exclude influence of interference frequencies.
- ➔ Provide adequate air circulation (cooling). Fit the unit vertically. The ambient temperature in the rack casing should not exceed 40 °C.
- ➔ Secure electronic drive unit against falling out.

### 3.3. Connecting The Operations Voltage

The TCK 100 has been designed to operate on a voltage of 24 V DC  $\pm$  5% . This is applied to X4/z24 (+) and X4/d30 (-).

To improve the EMV compatibility it is advisable to additionally connect X4/z32 with PE (protective earthing).

The supply voltage should be of SELV type. PFEIFFER power packs (accessory) must be used for voltage supply purposes. These power packs have been tested with the TCK 100 and guarantee voltage safely separated from the mains in accordance with EN 60742. The use of other power packs require the express authorization from the manufacturer.

When the pump is switched off, the pump motor acts as a generator and feeds direct voltage to the Electronic Drive Unit TCK 100.

### 3.4. Connecting The Electronic Drive Unit

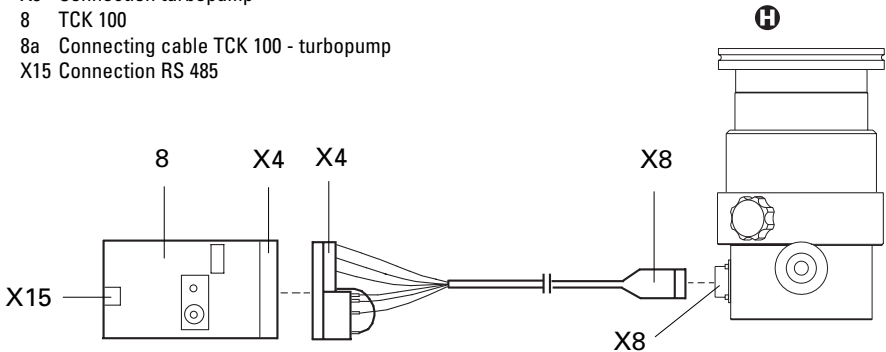


Only disconnect the plug connector to the electronic drive unit when the pump is completely at rest and the electronic drive unit is voltage-free.

- ➔ Connect the electronic drive unit using Connecting Cable PM 051 481-T (accessory) to plug connector X4 in accordance with Section 9. Connections Diagram PM 051 451 –S.
- ➔ Plug X8 into the pump and fasten with the bayonet lock.
- ➔ Additional electrical installations please refer to 9. Connections Diagram PM 051 451 -S.

#### Connection TCK 100 to the turbopump

- X4 Connection TCK 100
- X8 Connection turbopump
- 8 TCK 100
- 8a Connecting cable TCK 100 - turbopump
- X15 Connection RS 485



For the pump connection use PFEIFFER connecting cables only.

### 3.5. Connecting The Remote Control

The TCK 100 or the complete pumping station can be remote controlled.



For remote control purposes, connections should only be made using SELV type voltage.

Various remote functions are possible via the connector plug X4 on the TCK 100. Shielded cable must be used. The shielding on the plug side of the TCK 100 must be connected with the PE (X4/z32).

Inputs are activated by connecting them with + 24 V \*DC on X4/z28. The outputs are of type "High-Side" driver. Connection is executed against reference mass on the X4/z30 (please refer to the "Connections Diagram").

<b>Pin Arrangement and Function Of The In- And Outputs Of The Plug X4</b>			
<b>Pin . Nr.</b>	<b>Function</b>		
	<b>Inputs:</b>	<b>Open (low)</b>	<b>Closed (high)</b>
d4	Input remote/ Local <sup>1)</sup>	Remote: priority of Serial Interface RS 485	Local: priority of inputs
b4	Input accessory 1	No venting or heating OFF	Venting or heating ON
z4	Input accessory 2		
d6	Input pumping station	Pumping station OFF	Pumping station ON: turbo pump, fore pump and fan are driven
b6	Input standby / Reset	Standby OFF	Standby ON: pump is accelerated to 66% of the nominal rotation speed Reset: By supplying a pulse (T < 2 s) with an amplitude of 24 V a malfunction acknowledgement can be processed
z28	+ 24 V*DC		
	<b>Outputs</b>	<b>Low (0 V)</b>	<b>High (24 V)</b>
d10	Switch output 1	Rotation speed switch point not attained	Rotation speed switch point attained Output can be loaded with 24 V/ 50 mA
b10	Switch output 2	Collective malfunction message	Correct operation: Output can be loaded with 24 V/ 50 mA
z10	Accessory output 1	Accessory OFF	Accessory ON Works setting: fan
d12	Accessory output 2	Accessory OFF	Accessory ON Works setting: automatic venting
b8	Analog output	0 - 10 V DC = 0 - 100% x $f_{end}$ (choice of current/power)	
d2	Serial Interface RS 485	D + (DO/RI)	
b2	Serial Interface RS 485	D - (DO/RI)	
d30	Mass (Ground)		

1) Only possible if parameter 028 is active. No function on delivery.

### 3.6. Connecting Serial Interface RS 485

The connection of an external operating unit (DCU 001/DCU 100) is possible via plug X15.

Pin	Arrangement X15
1	not connected
2	+24 V output (loadable with $\leq 210$ mA)
3	not connected
4	not connected
5	RS 485: D+ (D $\bar{O}$ / R $\bar{I}$ )
6	Gnd
7	RS 485: D- ( $\bar{D}\bar{O}$ / $\bar{R}\bar{I}$ )
8	not connected



(View from the X15 plug side)

An external computer can be connected directly to Serial Interface RS 485 via connection X4 (d2, b2) or X15.



The connection of an RS 232 (for example a PC) is possible via a level converter (please refer to "Accessories").

#### Connection

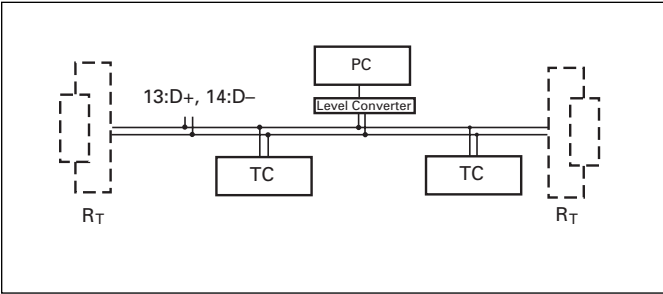
Designation	Value
d2: D +	
b2: D -	
Serial interface type:	RS 485
Baud rate:	9600 Baud
Data file word length:	8 bit
Parity:	no parity
Start bits:	1
Stop bits:	1..2

#### Connecting The RS 485

##### Connection to a fixed bus system

- ➔ Connect all units with D+ (d2/X4) and D- (b2/X4) on the bus.
- ➔ The bus must be closed at both ends.

The connections must be made in accordance with the Serial Interface RS 485 specifications.



All units connected to the bus must have differing serial interface addresses (parameter 797).

The group address of the TCK 100 is 950.



Only safety low voltage may be connected to the Serial Interface RS 485.

All switched on remote control functions have priority over the serial interface functions.



For further details regarding the operation of the Serial Interface RS 485 and its electrical data please refer to separate Operating Instructions PM 800 488 BN - PFEIFFER Protocol Serial Interface RS 232/485.

Profibus DP Gateway TIC 250 is available (accessory) for connecting an Electronic Drive Unit TCK 100 to a Profibus DP.

Please refer to the respective Operating Instructions PM 800 599 BN for detailed information on the operation of the TIC 250.

## 4. Operations TCK 100

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### 4.1. Switching ON The Electronic Drive Unit And The Turbopump

- ➔ Set the Electronic Drive Unit TCK 100 into operation by switching on the voltage supply.
- ➔ By connecting z28 and d6 to X4 the TMP is set to operation.

### 4.2. Self-Testing

After switching on the TCK 100 carries out a self-test in respect of the most important operations functions.

### 4.3. Serial Interface

Electronic Drive Unit TCK 100 is fitted with Serial Interface RS 485 as standard.

Operating conditions can be requested and parameters in the TCK 100 be changed via the serial interface.

Please refer to Operating Instructions PM 800 547 BN, "Pumping Operations With The DCU" and PM 800 477 BN, "DCU Display And Operating Unit".

### 4.4. Operations Via The Remote Control Unit

(Please refer to the table in Section 3.5.)

Remote control options are possible via Connecting Plug X4 on the TCK 100.

Please use only shielded cable. The shielding must be connected to the plug side of the TCK 100 at PE (X4/z32).

Inputs are activated when they are connected to 24 V\*DC on z28/X4 (active high).

### Local / Remote

*(d4/X4)*

This input is used to determine whether the control should be effected via remote control inputs or Serial Interface RS 485 (**only works in conjunction with parameter 028, please refer to Operating Instructions for Pumping Operations with the DCU, PM 800 547 BN**).

## ***Accessory Inputs***

### ***(b4/X4 and z4/X4)***

The components backing pump and air cooling (connectable to the accessory outputs) are switched automatically.

The remote control inputs b4 and z4 are then ineffective.

If the outputs are programmed to venting valve or the heating there is the option with the respective inputs "venting release" after the unit has been switched off and heating ON/OFF when the rotation speed switchpoint is exceeded.

Works setting: Out1 (b4) = air cooling  
Out2 (z4) = venting valve

The accessory inputs and outputs can be assigned several functions via a DCU or the Serial Interface RS 485.

## ***Pumping Station***

### ***(d6/X4)***

Connected pumping station components are started (e.g. backing pump, air cooling for example) and the turbopump is set in motion after successful completion of the self-test (duration approximately 10 seconds).

## ***Standby/Reset***

### ***(b6/X4)***

With the use of "standby" the turbopump can be operated optionally at 66% of the nominal rotation speed (standby ON) or with the nominal rotation speed (standby OFF).

By supplying a pulse ( $T < 2$  s) with an amplitude of 24 V a malfunction acknowledgement can be processed.

## ***Switch Outputs***

### ***(d10/X4 and b10/X4)***

The switch outputs 1 and 2 can be loaded with maximum 24 V/ 50 mA per output.

The following functions are assigned to the switch outputs:

**Switch output 1:** Active high after attainment of the rotation speed switchpoint. The switchpoint for the turbopump is set at 80% of the nominal rotation speed. It can be used, for example, for a signal "Pumpe betriebsbereit" ("pump ready to operate").

**Switch output 2:** Active low on collective error signal.

The connection of a relay must be executed between d30/X4 (ground) and the respective output switch d10 or b10 (see chapter 9., connections diagram).

## ***Accessory Outputs***

### ***(z10/X4 and d12/X4)***

The accessory outputs can be loaded with a maximum of 24 V/ 200 mA.

The works setting on the accessory outputs are:

#### **Accessory output 1:**

A connected air cooling system is started.

#### **Accessory output 2:**

A connected venting valve is started if venting release has been transmitted via accessory input 2.

## ***Analog Output***

### ***(b8/X4)***

A rotation speed proportional voltage (0 - 10 V DC correspond to 0 - 100% x  $f_{end}$ ) can be tapped via the analog output (load  $\geq 10 \text{ k}\Omega$ ).

Additional functions (power, current) can be assigned to the analog output via a DCU or Serial Interface RS 485.

## 4.5. Operations Display Via LED

Certain operations modes of the turbopump and the TCK 100 can be ascertained via the two integrated LEDs located on the front panel of the TCK 100.

The following operations modes are displayed:

LED		Cause
I	⚡	
Glows green		<ul style="list-style-type: none"> <li>– Power unit OK</li> <li>– Function "pumping station ON" carried out</li> </ul>
Flashes green		<ul style="list-style-type: none"> <li>– Power unit OK</li> <li>– Pumping station OFF</li> </ul>
Blinks green		<ul style="list-style-type: none"> <li>– Mains power supply failure</li> </ul>
	Glows red	<ul style="list-style-type: none"> <li>– Collective malfunction (e.g. run-up time error, overtemperature turbopump or TCK 100)</li> <li>– Switching output 2 active (low)</li> </ul>
	Blinks red	<ul style="list-style-type: none"> <li>– Warning (e.g. mains power supply failure)</li> </ul>



Differentiated malfunction and warning signals are only possible with the use of the DCU.

## 4.6. Turbopump Temperature Management

Where impermissible motor temperatures are involved or the temperature of the TCK 100 casing is too high, the motor current is reduced.

This can lead to dipping below the set rotation speed switchpoint and results in the turbomolecular pump being switched off.

LED on the TCK 100 glows red: Collective malfunction.

## 5. What To Do In Case Of Breakdowns ?

Problem	Possible Cause	Elimination
Pump does not start; None of the integrated LED's on the TCK 100 glow	<ul style="list-style-type: none"> <li>• Power supply disconnected</li> <li>• Incorrect operations voltage connected</li> <li>• Pin z28-d6 on plug X4 not connected</li> <li>• Operations voltage absent</li> <li>• TCK 100 defective</li> <li>• Voltage drop in the cable too high</li> </ul>	<ul style="list-style-type: none"> <li>• Check the fuse on the power pack</li> <li>• Check the plug connection on the power pack</li> <li>• Check the leads to the power pack</li> <li>• Check the voltage from the power pack (24 V DC)</li> <li>• Connect correct operations voltage</li> <li>• Connect Pin z28-d6 on plug X4</li> <li>• Check the plug connection on the power pack</li> <li>• Inform PFEIFFER Service of the need for repair</li> <li>• Use appropriate cable</li> </ul>
Pump does not attain nominal rotation speed within the set start-up time; pump switches off during operations	<ul style="list-style-type: none"> <li>• Fore-vacuum pressure too high</li> <li>• Leak or too high a gas load</li> <li>• Rotor sluggish caused by defective bearing</li> <li>• Start-up time on the TCK 100 set too short</li> <li>• Thermal overload caused by:               <ul style="list-style-type: none"> <li>– Inadequate water flow</li> <li>– Inadequate air supply</li> <li>– Fore-vacuum pressure too high</li> <li>– Ambient temperature too high</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Check function of the backing pump</li> <li>• Check seals</li> <li>• Seek and eliminate leak</li> <li>• Reduce process gas feed</li> <li>• Check bearing (noisy?): Inform PFEIFFER Service</li> <li>• Extend start-up time of the DCU or PC</li> <li>• Ensure free flow</li> <li>• Ensure adequate air supply</li> <li>• Reduce fore-vacuum pressure</li> <li>• Reduce ambient temperature</li> </ul>
Red LED on the TCK 100 glows	<ul style="list-style-type: none"> <li>• Collective malfunction</li> </ul>	<ul style="list-style-type: none"> <li>• Reset via mains ON/OFF with the TMP at rest or input b6/X4</li> <li>• Differentiated malfunction signal with the DCU possible</li> </ul>
Red LED on the TCK 100 flashes	<ul style="list-style-type: none"> <li>• Warning via:               <ul style="list-style-type: none"> <li>– Power failure</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Differentiated warning signal with the DCU possible</li> <li>• Check power pack voltage</li> <li>• Check power pack connection to the mains</li> </ul>

## 6. Maintenance, Service

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### Do Make Use Of Our Service Facilities

In the event that repairs are necessary a number of options are available to you to ensure any system down time is kept to a minimum:

- Have repairs of the unit carried out on the spot by PFEIFFER Service Engineers;
- Return the unit to the manufacturer for repairs;
- Replace with a new value unit.

Local PFEIFFER representatives can provide full details.

The power carrying current paths and the relevant operational voltages are shown in Connections Diagram PM 051 451 –S.



Units returned to us for repair or maintenance are covered by our general conditions of sale and supply.

### Contact addresses and telephone hotline:

Please refer to the back cover of this manual for contact addresses and telephone hotline numbers.

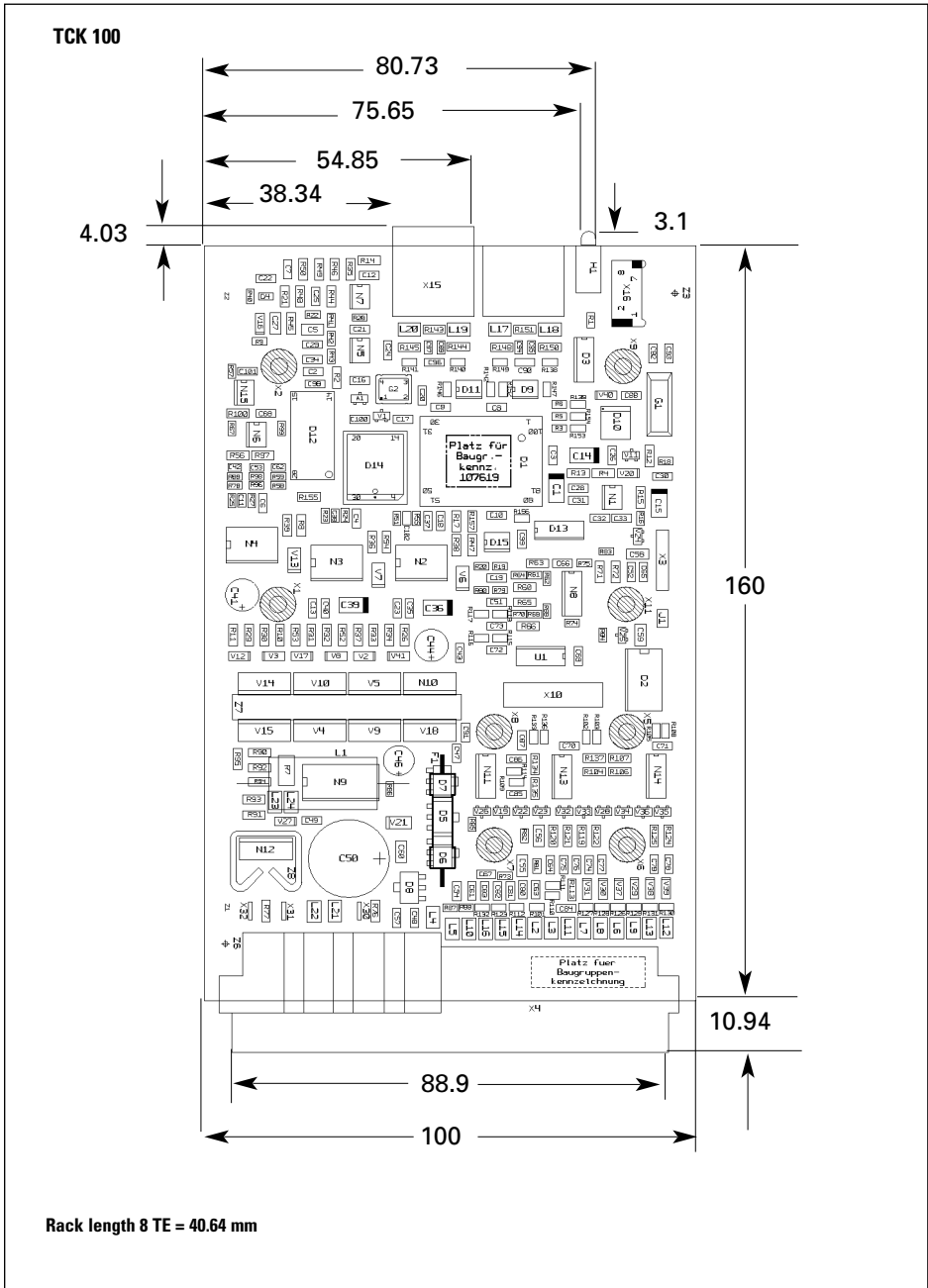
## 7. Technical Data

### 7.1. Data List

Electronic Drive Unit TCK 100	Unit	Pump Type		
		TPD 011	TMH/U 071	TMH/U 262
Operational voltage	V DC		24 (± 5 %)	
Constant-/max. power input	A	1/1.5	4.1/4.6	5.4/6.3
Constant-/max . power	W	24/36	100/110	130/150
Ambient temperature	°C		0 - 40	
Cooling type			convection	
Protection type			IP 00	
Weight	kg		0.21	
Dimensions			please refer to 7.2.	
Factory settings:			8	
- Run up time*	min.		80	
- Rotation speed switch point*	%			
- Nominal rotation speed*	Hz	1500	1500	1000
- Standby	Hz	1000	1000	666
Max. loading capacity of the accessory outputs, complete	mA		250	
Max. loading capacity per switch output	mA		50	
Max. loading capacity analog output	mA		10	
Contact current per input	mA		6	

\*Changeable via DCU or Serial Interface RS 485.

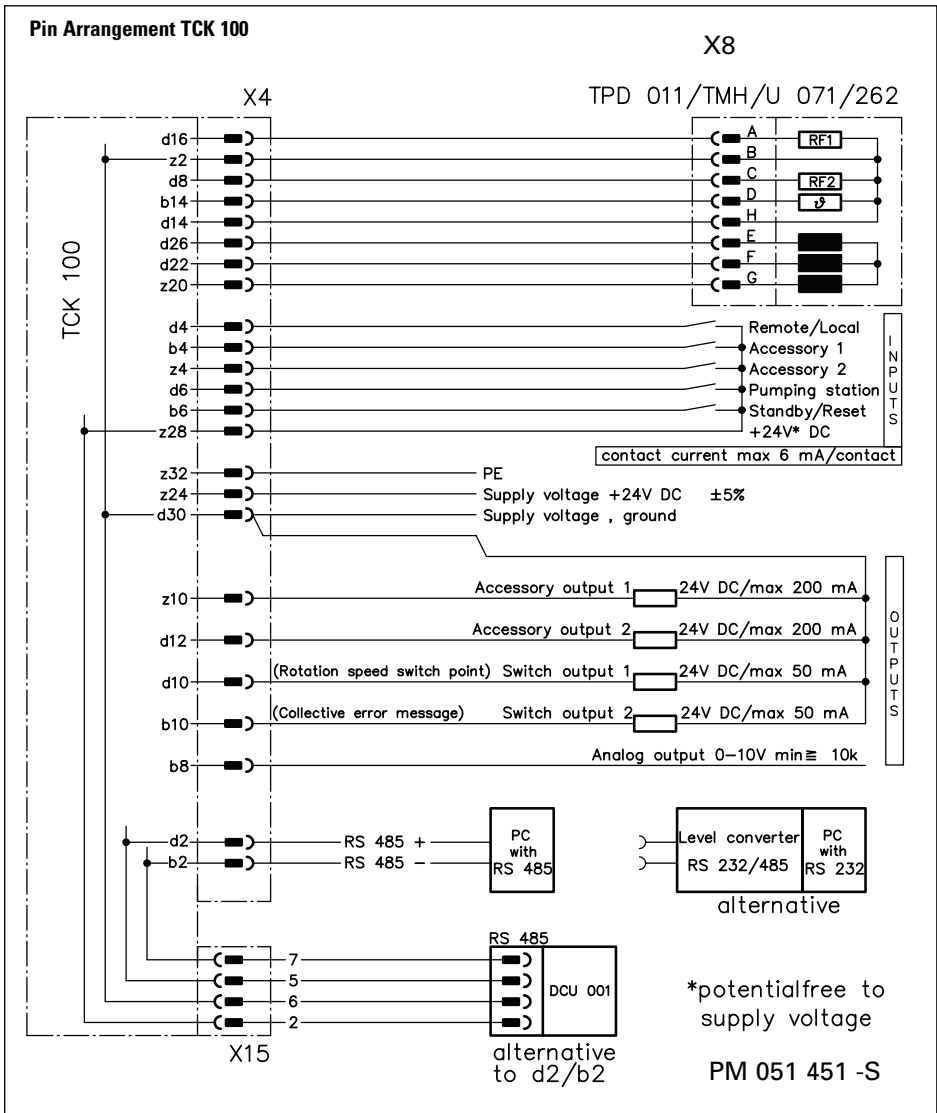
## 7.2. Dimensions



## 8. Accessories

Description	Size	Number	Operating Instructions	Order Quantity/ Comments
Connecting cable TCK - Turbo	1 m	PM 051 481 -T		Other lengths on request
DCU 001 Operating and Display Control Unit		PM 041 816 AT	PM 800 477 BN	
DCU 100 Operating and Display Control Unit with Power Unit		PM C01 694 B	PM 800 477 BN	
DCU 150 Operating and Display Control Unit with Power Unit		PM C01 698	PM 800 477 BN	
Power Unit TPS 100		PM 041 827 -T	PM 800 521 BN	
Power Unit TPS 150		PM 051 461 -T	PM 800 521 BN	
Pofibus DP Gateway				
TIC 250		PM 051 257 -AT	PM 800 599 BN	
Level Converter				
RS 232/485		PM 051 054 -T	PM 800 549 BN	

# 9. Connections Diagram



**CE** **Konformitätserklärung** **CE**  
**Declaration of Conformity**

im Sinne folgender EU-Richtlinien:  
*pursuant to the following EU directives:*

- **Elektromagnetische Verträglichkeit/***Electromagnetic Compatibility* **89/336/EWG**
- **Niederspannung/***Low Voltage* **73/23/EWG**

Wir bestätigen Konformität mit der EU-Richtlinie über elektromagnetische Verträglichkeit 89/336/EWG und der EU-Niederspannungsrichtlinie 73/23/EWG.

*We hereby certify that the product specified below is in accordance with the provision of EU Electromagnetic Compatibility Directive 89/336/EEC and EU Low Voltage Directive 73/23/EEC.*

**Produkt/Product:**  
**Antriebselektronik / Electronic Drive Unit TCK 100**

Angewendete Richtlinien, harmonisierte Normen und angewendete, nationale Normen:  
*Guidelines, harmonised standards, national standards in which have been applied:*

**EN 61010, EN 55011, EN 50081-1, EN 50082-2, IEC 801 1-4, VDE 0843-6**

Unterschrift/*Signature:*



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