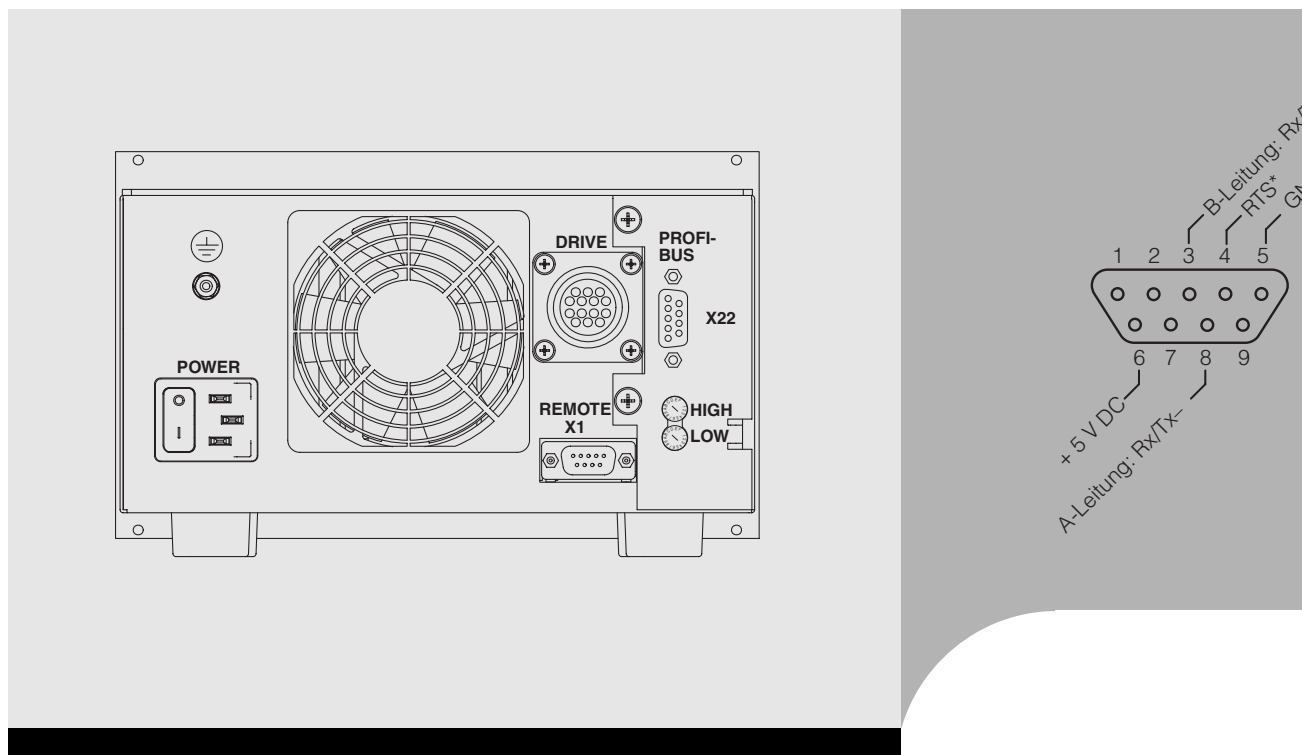


# OPERATING INSTRUCTIONS

17200049\_002\_00



## Profibus for Turbo.Drive TD20 *classic*

### Part Number

800075V0003

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Installation and operation of the Turbo.Drive TD20 *classic* is described in the Operating Instructions GA05228.  
Described in these Operating Instructions is only the Profibus interface of the Turbo.Drive TD20 *classic*.

## Important Safety Information

The Leybold Turbo.Drive TD20 *classic* frequency converter with Profibus interface has been designed for safe and efficient operation when used properly and in accordance with these Operating Instructions. It is the responsibility of the user to carefully read and strictly observe all safety precautions described in this section and throughout the Operating Instructions. The Interfaces **must only be operated in the proper condition and under the conditions described in the Operating Instructions**. It must be operated and maintained by trained personnel only. Consult local, state, and national agencies regarding specific requirements and regulations. Address any further safety, operation and/or maintenance questions to your nearest Leybold Vacuum office.

### Warning



Before making any connections, deenergise the frequency converter and wait until the pump no longer turns. Since in spite of this dangerous voltages can remain present, the equipment must only be opened by a trained electrician.

We reserve the right to alter the design or any data given in these Operating Instructions. The illustrations are not binding.

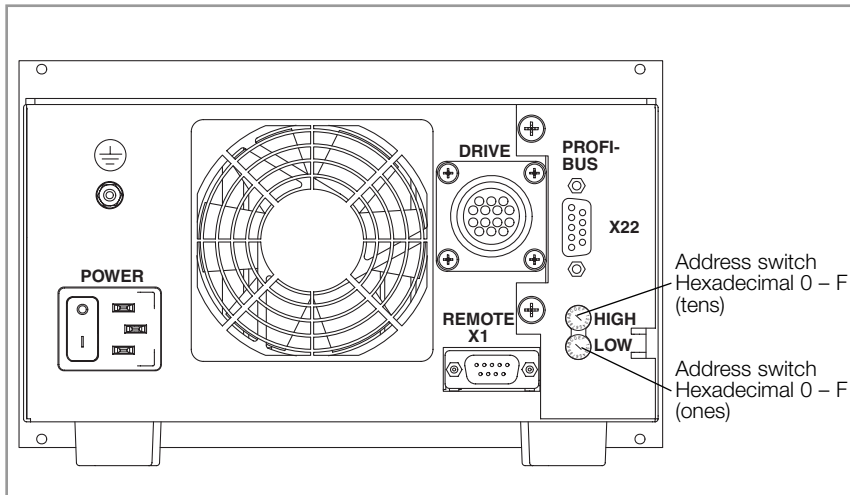


Fig. 1 Turbo.Drive TD20 *classic* with Profibus interface

# 1 Description

In a Profibus DP system, a difference is made between master and slave units. Here the master units control all traffic. They transmit data to the related slaves and request data from these. It is possible to run one or several masters in a system.

The frequency converter Turbo.Drive TD20 *classic* is a slave unit and thus responds to requests from the master, and supplies data exclusively after having received a request to do so from the master.

For more information on the Profibus system:

"The New Rapid Way to Profibus DP",

Manfred Popp, Profibus Nutzerorganisation e.V.

Haid-und-Neu-Str. 7

D-76131 Karlsruhe, Germany

P/N 4.072

[www.profibus.com](http://www.profibus.com)

At both ends of the bus a terminating resistor is required. Such a terminator must be incorporated in an external plug. The connections for this plug are provided through the interface connector. For this also see the standards.

## Standards

Profibus DP V0 corresponding to IEC 61158-2 and IEC 61784 Type 3.

## Protocol

In accordance with Profibus profile for variable speed drives Profile No. 3; Version 2.0.

Description

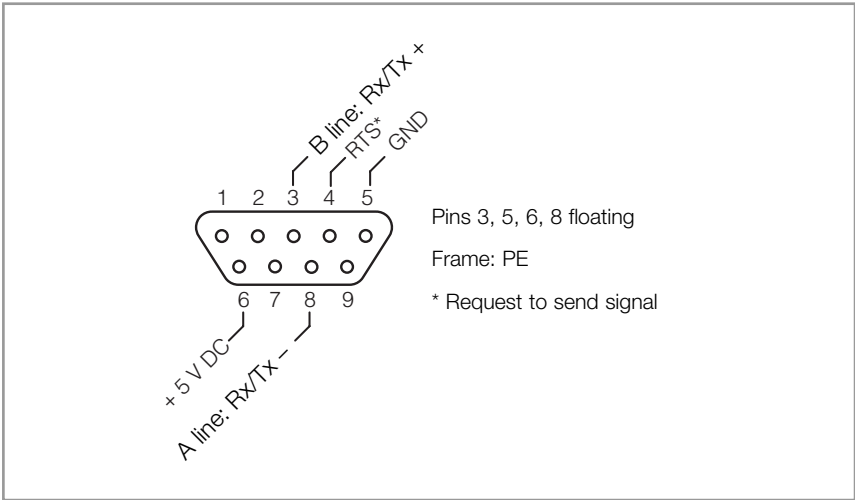


Fig. 2 Pin assignment for the socket

Transmission rates and cable lengths

(see also the standards)

Transmission rate (kBit/s)	max. segment length (m)
9.6 –93.75	1200
187.5	1000
500	400
1500	200
3000 - 12000	100

The baud rate is set automatically. The following baud rates are supported:

9.6 k Baud	19.2 k Baud	45.45 k Baud	
93.75 k Baud	187.5 k Baud	500 k Baud	
1.5 M Baud	3 M Baud	6 M Baud	12 M Baud

Address range	Hex \$01 ... \$7D (selectable via switch);
corresponding to	decimal 1 ... 126
Voltage level	see standards
Interface connection	Sub-D 9-way socket on the side of the instrument (female)
Thread	UNC4-40
The Profibus watchdog function has been implemented.	

## 2 Installation

Disconnect the frequency converter from the mains and wait until the pump no longer rotates before making any connections. Since dangerous voltages may nonetheless be encountered, the housing must be opened only by a qualified electrician.

### Warning



Connect the Profibus to the Profibus interface connector on the rear of the frequency converter. Both bus ends must be terminated. This must be done externally using a special plug. The connections required for this are provided in the interface connector.

Line type: SIEMENS-SINEC-L2- bus line;

P/N 6XV1830-0EH10

To change the bus address, set up the address switch accordingly.

The new address setting is enabled when the power is switched on again.

### 3 Description of the Telegram

Two types of protocol (PPO types) have been implemented. In the following only the payload data are described. Data which serve communication purposes (data link layer, layer 2 acc. to OSI, for example, start byte and addressing etc.) are processed automatically in the background by the Profibus.

#### 3.1 PPO Type 1

Length of the payload data block: 6 words = 12 bytes

Designator = 0xF3, 0xF1 (see 3.3 GSD File)

Byte No.	Abbreviation	Description	Read access to frequency converter	Write access to frequency converter	Response from the frequency converter
0-1	PKE	Parameter number and type of access	Value (s. 4.1)		
2	IND	Parameter index	Value (s. 4.1)		
3	–	reserved	0		
4-7	PWE	Parameter value	0	Value	Value
8-9	PZD1: ZSW STW	Status and control bits	Value (s. 4.2)		
10-11	PZD2: HIW HSW	Current stator frequency (= P3)	0	0	Value (Hz)

#### 3.2 PPO Type 6

Length of the payload data block: 1 word = 2 byte identifier = 0x00, 0xF0 (see 3.3 GSD file)

Byte No.	Abbreviation	Description	Read access to frequency converter	Write access to frequency converter	Response from the frequency converter
0-1	PZD1: ZSW STW	Status and control bits	Value (s. 4.2)		

#### 3.3 GSD File

Documented in the GSD file are the parameters of the Profibus DP interface. The file format has been defined in the standard so that project tools from different manufacturers can be used. The current GSD file is available from Leybold upon request.

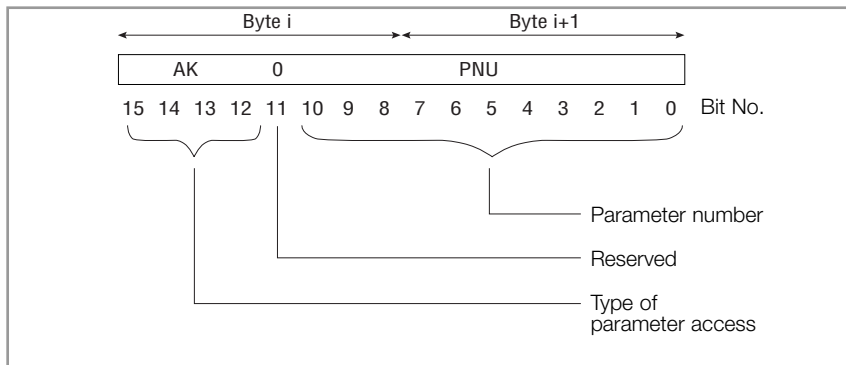


Fig. 3 Structure of the parameter section

## 4 Description of PKE, IND, Control and Status Bits

### 4.1 PKE: Parameter Number and Type of Access

The parameter number is sent when accessing the frequency converter and also in the response of the frequency converter.

The receiver is provided with information on the parameter value PWE: size, field value or individual value, read or write.

The parameters and error messages are listed in Operating Instructions GA05228 for the Turbo.Drive TD20 *classic*.

## PKE, IND, Bits

Type of Parameter Access to the Frequency Converter (Query Designator)					Type of Parameter Response from the Frequency Converter (Reply Designator)				
Bit number					Bit number				
15	14	13	12		15	14	13	12	
0	0	0	0	No access	0	0	0	0	No response
0	0	0	1	Parameter value requested	0	0	0	1	16 bit value is sent
					0	0	1	0	32 bit value is sent
0	0	1	0	Write a 16 bit value	0	0	0	1	16 bit value is sent
0	0	1	1	Write a 32 bit value	0	0	1	0	32 bit value is sent
0	1	1	0	Field value requested*	0	1	0	0	16 bit field value is sent
					0	1	0	1	32 bit field value is sent
0	1	1	1	Write a 16 bit field value*	0	1	0	0	16 bit field value is sent
1	0	0	0	Write a 32 bit field value*	0	1	0	1	32 bit field value is sent
1	0	0	1	Number of field elements of a field requested	0	1	1	0	Number of field elements of a field is sent
					<b>Further responses</b>				
					0	1	1	1	The frequency converter can not run the command
					1	0	0	0	During a write access: no permission to write

Depending on the query designator, only certain reply designators are possible. If the reply designator has the value 7 (query cannot be run) then in parameter value 2 (PWE2) an error number is provided.

## Parameter Index IND

\* The desired element of the index parameter is provided in IND.



## 4.2 Status and Control Bits (Status and Control Word) Profibus PPO-Type 1 and 6

The status and control bits are only temporarily available, i.e. after interrupting the power supply the bits revert to the default status.

### 4.2.1 Control Word (PZD1, STW) = 16 Control Bits

Is sent to the pump for each access.

Bit	Description	Remark
0	* 1 = Start; 0 = Stop	Is only run provided if * no error is present and * control bit 10 = 1
1 to 6	Reserved, must always be set to 0	
7	* 0 to 1 transition = Error reset	Is only run provided if * the cause for the error has been removed and * control bit 0 = 0 and * control bit 10 = 1
8	Reserved, must always be set to 0	
9	Reserved, must always be set to 0	
10	Enable process data; (bit 0, 7, 11, 12)	1 = Start/Stop through serial interface 0 = Start/Stop through keys or REMOTE (X1) Remark: control bit 10 sets status bit 15 when the frequency converter is ready to accept control commands from the interface.
11	* Error relay (REMOTE X1)	Relay contact 0 = passive 1 = active Is only run provided if Parameter 29 is set to 2.
12	* Status relay (REMOTE X1)	Relay contact 0 = passive 1 = active Is only run provided if Parameter 29 is set to 2.
13 to 15	Reserved, must always be set to 0	

\* In order to enable the control functions through the Profibus interface, bit 10 must be set. Control through the keys, the control connector X1 or through the service interface (RS 232/485) is then disabled.

#### 4.2.2 Status Word (PZD1, ZSW) = 16 Status Bits

Is sent together with each response from the frequency converter.

Bit	Description	Remark
0	Ready for switch on	1 = the frequency converter and the pump are ready to start; like P303, bit 1
1		ignore
2	Operation enabled	1 = active operation; the frequency converter drives the pump
3	Fault condition is active	1 = a pump or frequency converter error has occurred, the pump is being stopped (failure)
4	Pump speed is increasing	1 = the speed of the pump increases; like P303, bit 2
5	Pump speed is dropping	1 = the speed of the pump drops; like P303, bit 3
6	Switch on lock	1 = in case of an error, the pump cannot be started
7	Warning temperature	See P227; all temperature warnings
8		ignore
9	Frequency converter accepts parameter	1 = the frequency converter accepts parameters from the serial interface; normally always set to 1 (set)
10	Normal operation	1 = the pump is running in the normal operation mode
11	Pump is revolving	1 = the pump is turning (rotational frequency > 3 Hz) 0 = the pump stands still or runs down
12		ignore
13	Warning high load	see P227
14	Collective warning	is set for every warning
15	Remote has been activated	1 = start/stop (control bit 0) and reset (control bit 7) through serial interface is possible; is set with control bit 10 = 1 0 = start/stop and reset only through this serial interface not possible; is set to 0 through control bit 10 = 0

[illegible]

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