OPERATING INSTRUCTIONS

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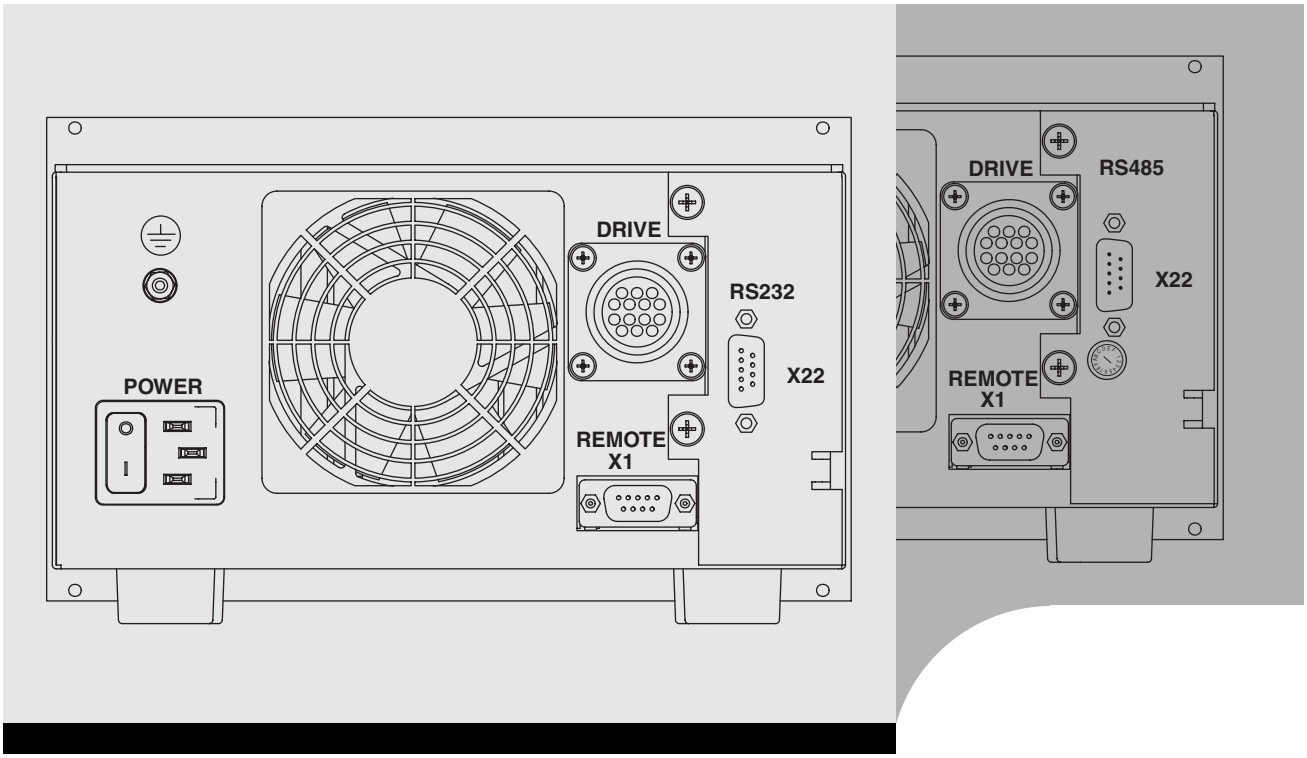


RS 232 and RS 485 Interfaces for Turbo.Drive TD20 *classic*

Part Nos.

800075V0002
800075V0004

Leybold
vacuum

Contents

Installation and operation of the TurboDrive TD20classic frequency converter is described in Operating Instructions GA05228. Described in these Operating Instructions are only the RS 232 and the RS 485 interfaces of the Turbo.Drive TD20 *classic*.

Important Safety Information

The Leybold Turbo.Drive TD20 *classic* frequency converter with RS 232 or RS 485 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.

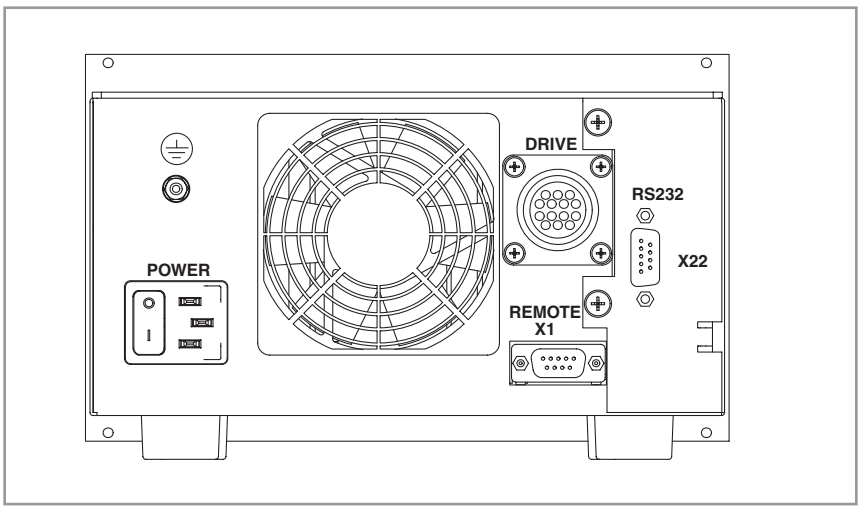


Fig. 1 Turbo.Drive TD20 *classic* with RS 232 interface

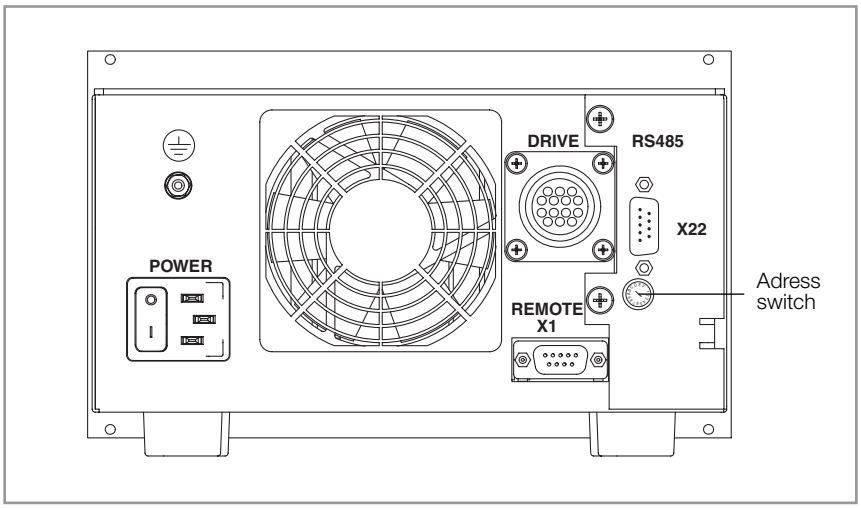


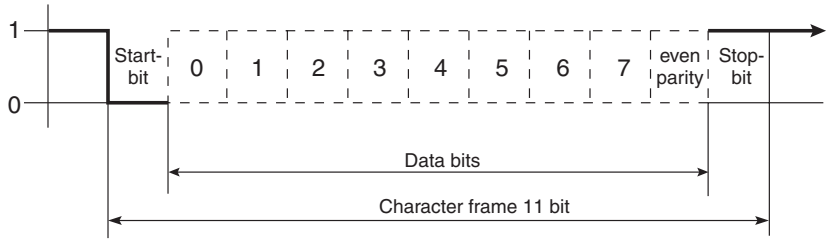
Fig. 2 Turbo.Drive TD20 *classic* with RS 485 interface

1 Description

The Operating Instructions for the frequency converter include for the RS 232 and RS 485 interfaces their data, the pin assignment of the interface connector as well as the wiring for the link. Also included is the parameter list for the frequency converter.

The frequency converter Turbo.Drive TD20 *classic* is a slave unit and thus responds to requests from the master, i.e. the interface of the frequency converter will always only respond to a read or write access to the frequency converter.

In the case of word data (16 or 32 bits long) the high byte is transferred first (Motorola standard).



- The even parity bit is a check bit; the number of “ones” of the data bits (including the parity bit) is an even number.
- Start bit = 0
- Stop bit = 1

Fig. 3 Structure of a data frame for transferring a string byte

Structure of the complete data string in accordance with USS protocol specification

Byte N0.	Abbre-viation	Description	Read access to frequency converter	Write access to frequency converter	Response from the frequency converter	
0	STX	Start byte	2			
1	LGE	Length of the payload data block in bytes (bytes 3 to 22) + 2: 22	22			
2	ADR	Frequency converter address	RS232: 0 RS485: 0...15			
3-4	PKE	Parameter number and type of access	Value (s. 2.1)			Payload data block for RS 232 and RS 485
5	–	Reserved	0			
6	IND	Parameter index	Value (s. 2.1)			
7-10	PWE	Parameter value	0	Value	Value	
11-12	PZD1 STW, ZSW	Status and control bits	Value (see 2.2)			
13-14	PZD2, HSW HIW, (MSW)	Current stator frequency (= P3)	0	0	Value (Hz)	
15-16	PZD3, HSW HIW, (LSW)	Current frequency converter temperature (= P11)	0	0	Value (°C)	
17-18	PZD4	Current motor current (= P5)	0	0	Value (0.1 A)	
19-20	PZD5	Current pump temperature (= P127)	0	0	Value (°C)	
21-22	PZD6	Current intermediate circuit voltage (=P4)	0	0	Value (0.1 V)	
23	BCC	Recursive calculation: Checksum (I = 0) = byte (I = 0) Checksum (i) = checksum (i-1) XOR byte (i); i from 1 to 22, i = byte No.	Checksum (i=22)			

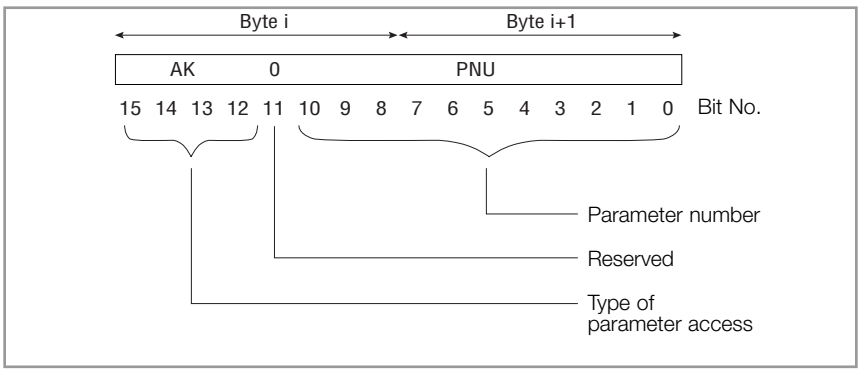


Fig. 4 Structure of the parameter section

2 PKE, IND, Control and Status Bits

2.1 PKE: Parameter Number and Type of Access

The parameter number is sent when accessing the frequency converter as 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
					Further responses				
					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.

2.2 Status and Control Bits (Status and Control Word)

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

2.2.1 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 RS 232/485 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.

2.2.2 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

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