

Rotary
Encoders

Linear
Encoders

Motion

System

INTERBUS

LE-200



User Manual

Laser Measuring Device LE-200 with INTERBUS - interface

- Additional safety instructions
- Installation
- Commissioning
- Configuration / Parameterization
- Troubleshooting / Diagnostic options



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Revision index

Revision	Date	Index
First release	09/16/03	04
Revision of the laser warning label	12/18/03	05
- Modification of the Laser Standard DIN EN 60825-1 - Warning bit "Plausibility measured value" - Additional reflector foils, chap. Ordering information - Max. measuring range 240 m	12/14/07	06
Implementation of new reflectors; Physical resolution = 0,1mm	02/05/09	07
Shield connection via cable screw glands removed	01/12/10	08
Switching the baud rate by means of DIP-switches	10/23/12	09
General changes; Modification of the warnings; Mounting removed	03/19/13	10

1 General information

This interface-specific User Manual includes the following topics:

- Safety instructions in addition to the basic safety instructions defined in the Assembly Instructions
- Electrical characteristics
- Installation
- Commissioning
- Configuration and parameterization
- Troubleshooting and diagnostic options

As the documentation is arranged in a modular structure, this User Manual is supplementary to other documentation, such as product datasheets, dimensional drawings, leaflets and the assembly instructions etc.

The User Manual may be included in the customer's specific delivery package or it may be requested separately.

1.1 Applicability

This User Manual applies exclusively to the following measuring systems with **INTERBUS** interface:

- LE-200

The products are labelled with affixed nameplates and are components of a system.

The following documentation therefore also applies:

- the operator's operating instructions specific to the system,
- this User Manual,
- and the assembly instructions **TR-ELE-BA-DGB-0018**, which is enclosed when the device is delivered

2 Additional safety instructions

2.1 Definition of symbols and instructions

**WARNING**

means that death or serious injury can occur if the required precautions are not met.

**CAUTION**

means that minor injuries can occur if the required precautions are not met.

NOTICE

means that damage to property can occur if the required precautions are not met.



indicates important information or features and application tips for the product used.

2.2 Additional instructions for intended use

The measurement system is designed for operation with CANopen networks according to the international standard IEC 61158 und IEC 61784 up to max. 2 Mbaud.

The technical guidelines for the structure of the INTERBUS network from the INTERBUS-Club migrated in Profibus registered user organization are always to be observed in order to ensure safe operation.

Intended use also includes:



- observing all instructions in this User Manual,
- observing the assembly instructions. The **"Basic safety instructions"** in particular must be read and understood prior to commencing work.

2.3 Organizational measures

- This User Manual must always be kept accessible at the site of operation of the measurement system.
- Prior to commencing work, personnel working with the measurement system must have read and understood
 - the assembly instructions, in particular the chapter "**Basic safety instructions**",
 - and this User Manual, in particular the chapter "Additional safety instructions".

This particularly applies for personnel who are only deployed occasionally, e.g. at the parameterization of the measurement system.

3 Technical data



The characteristics have validity, only after an operating time of approximate 30 minutes.

3.1 Electrical characteristics

Supply voltage	18 - 27 V DC ($\pm 5\%$)
with heating, optional	24 V DC ($\pm 5\%$)
Current consumption (no-load)	< 350 mA
with heating, optional	< 2.5 A
Measuring principle	Phase delay time measurement
Measuring range (on reflecting foil)	0.2 – 125 m standard, 170 m, 195 m, 240 m (special devices)
* Resolution	selectable, physical resolution 0.1 mm
Linearization	
up to 12 m (standard)	absolute linearity error ± 3 mm
complete measuring length	absolute linearity error ± 5 mm
Reproducibility	± 2 mm
Opto-transmitter	Laser diode (red light)
Wavelength λ	670 nm
Max. laser power	$P_{\max} \leq 1$ mW
Laser protection class	2 according to DIN EN 60 825-1: 2003-10
Lifetime:	50 000 h
Measured value output / refresh cycle	1000 values / s
Integration time	1 ms
Programming via RS485	WINDOWS [®] compatible (TRWinProg) / INTERBUS
INTERBUS Interface	INTERBUS according to DIN 19258 Two-wire remote bus for transmission and receive direction, RS422 with galvanic isolation
Profile	K3
Ident-No.:	55 dec.
Number of words:	2 IN / 2 OUT
Baud rate (programmable):	300 kbps net, 500 kbps gross or 2Mbaud (including control and status bytes)
Data refresh:	0,5 ms
Output code:	Binary
Special features:	Programming of the following parameters via the INTERBUS:
	- Resolution
	- Switch off or switch on laser diode, automatic
	- Preset preselection
	- Counting direction
	- Speed limit value
	- Error value
	- Programming of the ext. switching input/output
	- Clearing zero mark
* Switching input/output	
Levels switching input	1 level > +8 V, 0 level < +2 V, up to ± 35 V, 5 kOhm
Levels switching output	1 level > US-2 V, 0 level < 1 V, up to 100 mA
EMC	
Immunity to disturbance	DIN EN 61000-6-2: 2006
Transient emissions	DIN EN 61000-6-3: 2007

* programmable parameter

4 INTERBUS information

INTERBUS has been developed as a sensor/actuator bus system for the transmission of process data to increase productivity of machines and plants, while at the same time cutting costs.

The INTERBUS fieldbus technology is standardized in the IEC 61158 and IEC 61784 and connects all the I/O and field devices commonly used in control systems.

Being able to about the serial bus cable to integrate sensors and actuator into a network, to control engines and equipments, to integrate production cells into a network and to connect primary systems.

The assignment of the data to the individual participants is carried out via the physical layer of the participants in the system automatically. This plug-and-play functionality is a decisive advantage with respect to installation overhead and maintainability of the system.

INTERBUS specifications:

- Topology: Active ring
- Master slave, firm telegram length, deterministic
- Ring; every remote bus participant is repeater
- Baud rate: up to 2Mbaud
- max. 4096 I/O points
- Bus length: 400 m (between two remote bus participants) total length: 13 km

You receive further information about the Interbus of the "INTERBUS club migrated in Profibus Nutzerorganisation e.V." under the following Internet address:

<http://www.interbusclub.com/>

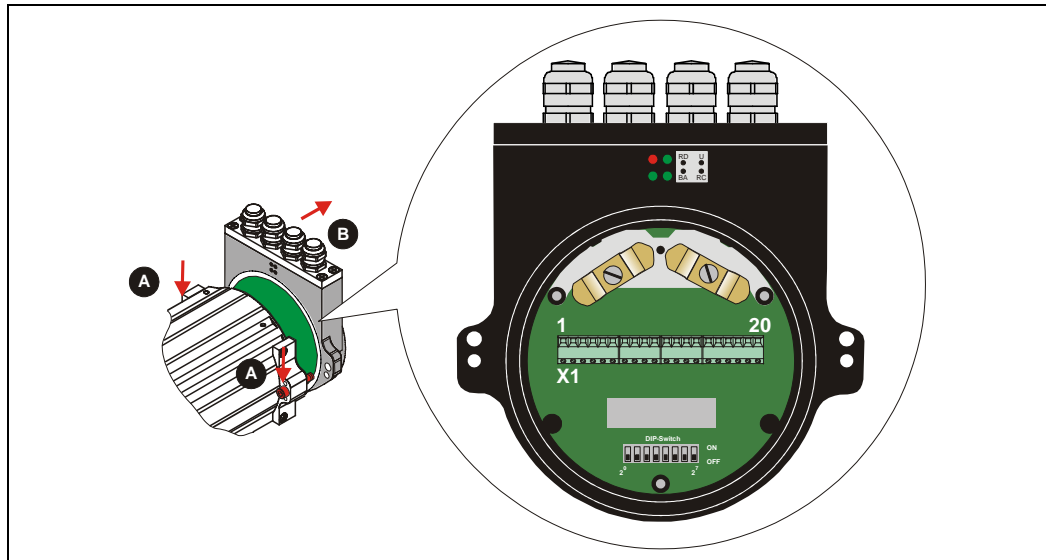
e-mail: germany@interbusclub.com

5 Installation / Preparation for start-up

5.1 Electrical connection

In order to be able to carry out the connection, the connection cap must be removed from the laser first.

For this the screws **(A)** are loosened and the cap **(B)** is removed away from the laser.



5.1.1 Supply voltage

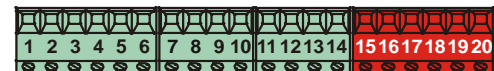
- Pin 7** 0V, GND
- Pin 8** Standard: 18 – 27 V DC
Device with heating: 24 V DC ($\pm 5\%$)



5.1.2 INTERBUS

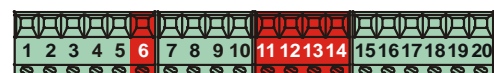
5.1.2.1 Remote IN

- Pin 15** GNDI, reference potential Remote IN
- Pin 16** Shield, internal RC-element onto case
- Pin 17** DO1 inverted
- Pin 18** DO1
- Pin 19** DI1 inverted
- Pin 20** DI1



5.1.2.2 Remote OUT

- Pin 6** GND, reference potential Remote OUT
- Pin 11** DO2 inverted
- Pin 12** DO2
- Pin 13** DI2 inverted
- Pin 14** DI2



5.1.2.3 Identification of following slaves

For the subsequent node to be detected, between PIN 5 "RBST inverted" and PIN 4 "GND" a jumper must be inserted.

- Pin 4** GND, reference potential for RBST
- Pin 5** RBST inverted



5.1.3 Switching input / Switching output

WARNING

Risk of injury and damage to property by an actual value jump when the preset function is performed!

NOTICE

- The *preset function* should only be performed at rest, otherwise the resulting actual value jump must be permitted in the program and application!

The programming of the switching input /switching output is carried out either directly via the bus, or via the PC software "TRWinProg".

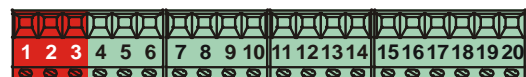
Functions of the switching input:

- Preset, - Switch off laser diode, - Failure quit

Functions of the switching output:

- Temperature- , - Intensity- , - Hardware-Fail-Output, - every fail
- Speed-check, Plausibility measured value, Switching output position

- Pin 1** GND, reference potential pin 2
- Pin 2** Switching output
- Pin 3** Switching input



5.1.4 RS485 - programming interface

The RS485 programming interface was developed mainly only as service interface for the technician.

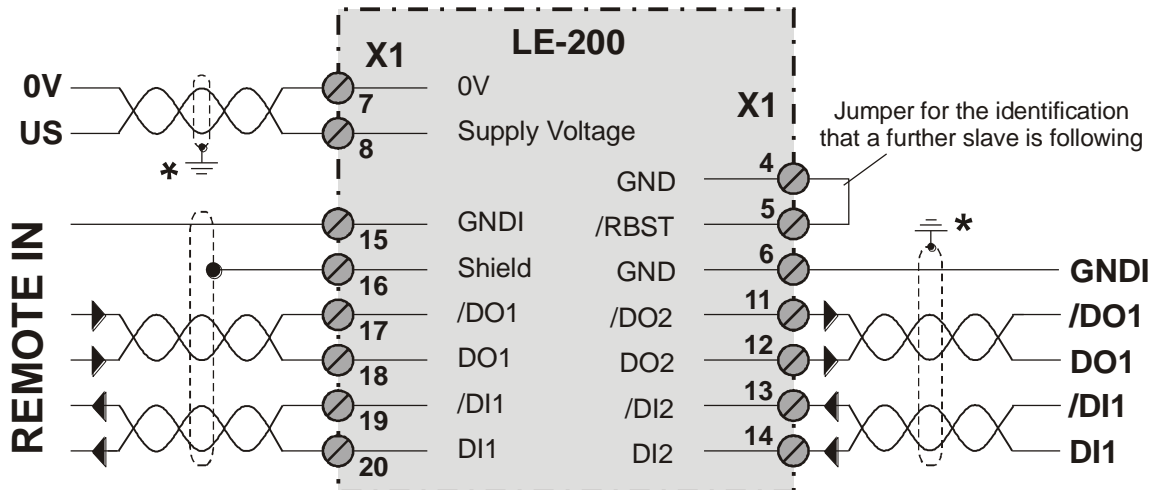
Primarily therefore the programming possibilities via the INTERBUS should be used. Via the PC software "TRWinProg" and a PC adapter the connection to the laser measuring device is established. More informations see page 13 or in the TRWinProg software manual.

- Pin 9** RS485-
- Pin 10** RS485+

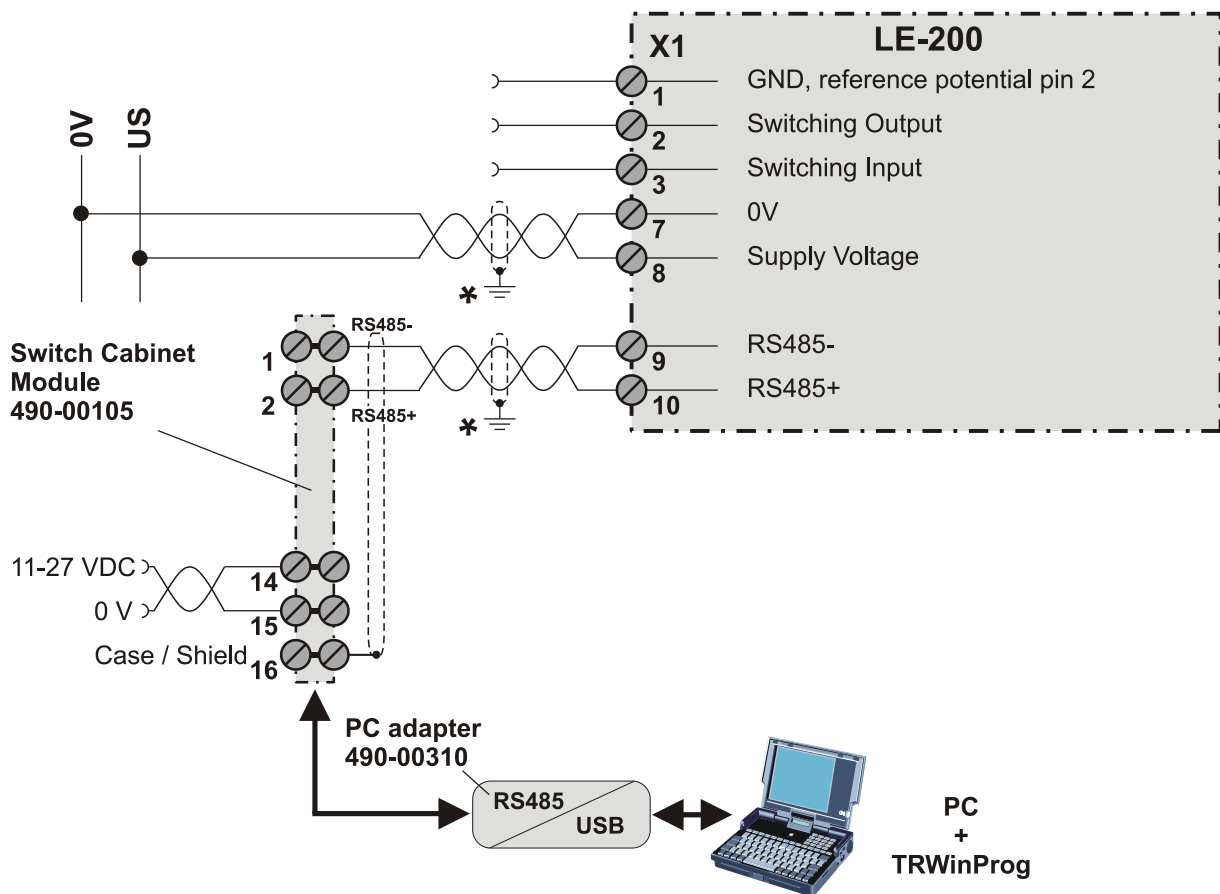


5.1.5 Wiring examples

INTERBUS – connection

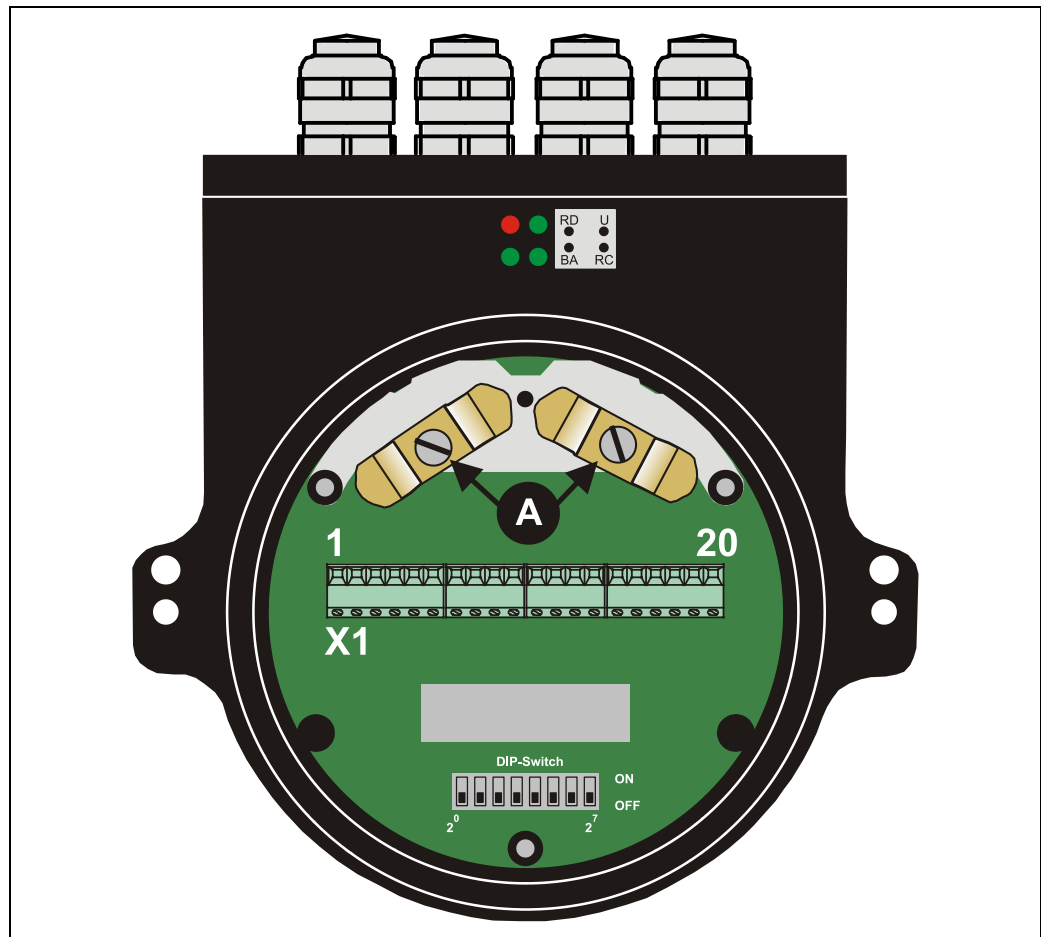


RS485-connection with parameter setting via "TRWinProg"



5.1.6 General interference suppression measures

- Lay the (shielded) connecting cable to the device at a sufficient distance or in a separate room from any power cables which are subject to interference. Otherwise the data transmission of the measured value can be interfered.
- To ensure reliable data transmission, use fully shielded cables and make sure they are well earthed. For differential data transfer (RS422, RS485 etc.), twisted-pair wires must be used in addition.
- Use a minimum cable cross-section of 0.22 mm^2 for data transfer purposes.
- Use a minimum earthing cable (machine base) cross-section of 10 mm^2 in order to avoid equipotential currents across the shield. Make sure the resistance of the earthing cable is much lower than that of the shield.
- Avoid crossing cables where possible. If unavoidable, only cross them at right-angles.
- Ensure continuous wiring of the shield and a large contact area on special shield clampings, see point **(A)** in the figure.



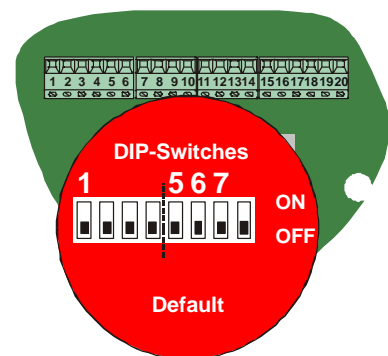
5.2 Adjusting of the speed monitoring (optional)

At active speed monitoring with exceeding of the adjusted speed level the corresponding warning bit in the malfunction code is set, see page 23.

This function is optional and can be used only, if the Function-DIP-switch is equipped on the connection circuit board:

- DIP-switches 5 – 7 = 000 (**Default**):
Settings under parameter "Speed limit value", page 27 are active
- DIP-switches 5 – 7 = 010:
Settings of the DIP-switches DIP-1 up to DIP-4 are active

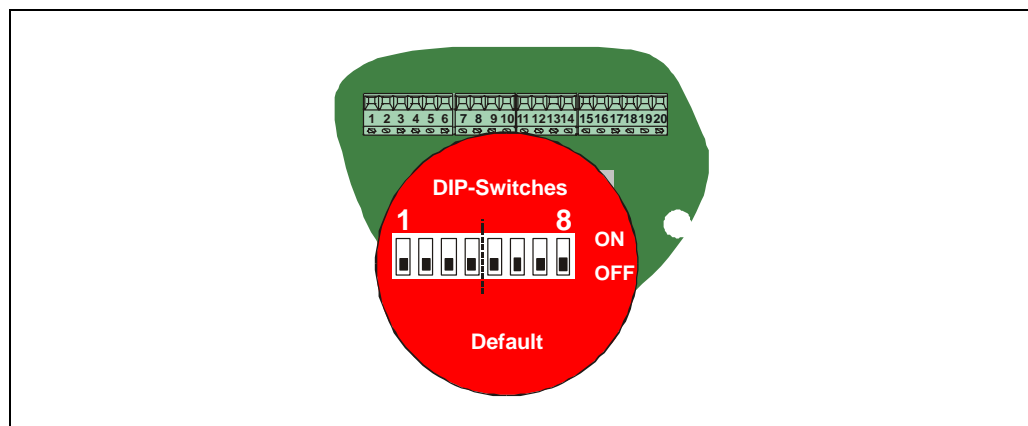
DIP-1	DIP-2	DIP-3	DIP-4	
0	0	0	0	not active
1	0	0	0	0,7 m/s
0	1	0	0	1 m/s
1	1	0	0	2 m/s
0	0	1	0	3 m/s
1	0	1	0	4 m/s
0	1	1	0	10 m/s



5.3 Adjusting of the baud rate (optional)

This function is optional and can be used only, if the Function-DIP-switch is equipped on the connection circuit board:

- DIP-switch 8 = 0 (**Default**): 500 kBit/s
- DIP-switch 8 = 1: 2000 kBit/s



6 Commissioning

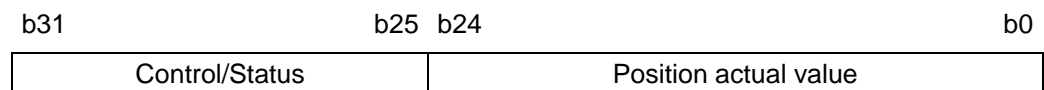
6.1 INTERBUS - Interface

The Laser Measuring Device LE-200 with INTERBUS interface is designed as a remote bus module with 32 I/O data. This makes it easy to integrate in the bus ring in the same way as a PHOENIX-CONTACT bus terminal. To ensure that the protocol meets INTERBUS requirements, an SUPI (serial microprocessor interface) is integrated between the LE-200 and the INTERBUS. The SUPI is an INTERBUS protocol chip developed by PHOENIX-CONTACT which carries out the following functions:

- BUS interfacing: Directions of reception and transmission
- CRC check
- Preset
- Transfer protocol etc.

The classification of the Laser Measuring Device is defined after the profile K3 and has the Ident-No. 55 dec.

According to this profile the Laser Measuring Device delivers 32 bits of process data. These 32 bits contain a 25-bit position actual value and a 7 bit status bit and control bits. The position actual value of the laser is coded binary and right aligned in the bits 0 - 24 of the process data word. Bits 25 – 31 contain the status bit and control bits. They are fixed in this profile class. When all control bits are set to 0 and the OPERATION condition is displayed on the status bits, the laser outputs a valid value for bits 0 to 24.



At programming, data is exchanged between the laser and the master in binary code.

6.2 Mapping of Laser Data in the Master (Controller)

In the master, the laser data uses two-word addresses for IN-data and two-word addresses for OUT-data. The position of the data in the controller depends on the physical or logical position of the laser within the ring. For detailed information, refer to the manual of the master (controller) used. The laser should be considered to be a PHOENIX I/O bus terminal and the system processes it as such.

Double Input Word ID x (Status Word)

Data byte 3							Data byte 2							Data byte 1							Data byte 0																				
AV	PA	X	P4	P3	P2	P1	Return Parameter Value, 25 bit																																		
B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0																										
2^{31}	2^{30}	2^{29}	2^{28}	2^{27}	2^{26}	2^{25}	2^{24}	2^{23}	2^{22}	2^{21}	2^{20}	2^{19}	2^{18}	2^{17}	2^{16}	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0										
Input byte x+0							Input byte x+1							Input byte x+2							Input byte x+3																				

- AV = Invalid position actual value
- PA = Parameterization
- X = not used
- P1 – P4 = Return parameter-no. / malfunction code

Double Output Word OD x (Control Word)

Data byte 3							Data byte 2							Data byte 1							Data byte 0																		
EO	SZ	X	P4	P3	P2	P1	Parameter Value, 25 bit																																
B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0																								
2^{31}	2^{30}	2^{29}	2^{28}	2^{27}	2^{26}	2^{25}	2^{24}	2^{23}	2^{22}	2^{21}	2^{20}	2^{19}	2^{18}	2^{17}	2^{16}	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0								
Output byte x+0							Output byte x+1							Output byte x+2							Output byte x+3																		

- EO = Enable operation
- SZ = Set zero shift
- X = not used
- P1 – P4 = Parameter-No.

6.3 Control Word (OUT-data relative to the master)

Via the control word functions activated and the operational states of the laser are defined.

Control Word, relative word address "0"

Bit	Name	mandatory	Bit-Nr. im PD-Kanal
0	Reserved		16
1	Reserved		17
2	Reserved		18
3	Reserved		19
4	Reserved		20
5	Reserved		21
6	Reserved		22
7	Reserved		23
8	Reserved		24
9	Parameter no.	X	25
10	Parameter no.	X	26
11	Parameter no.	X	27
12	Parameter no.	X	28
13	Manufacturer-specific		29
14	* Set zero shift	X	30
15	Enable operation	X	31

* see page 19, "Set zero shift"

Device Control Commands

The device control commands are triggered by the following bit combinations in the control word:

DEVICE CONTROL COMMAND	Control Word (bit)						
	Enable operation	Set zero shift	Manufac- turer- specific	Parameter-No.			
	15	14	13	12	11	10	9
ENABLE OPERATION	0>1	0	X	0			
PARAMETERIZATION	0	0	X	1 ... 15			

Parameter-No.

The bits 9 to 12 (D25 - D28) indicate the number of the parameter at the laser (see also "Parameter data", page 22). The parameter data will transfer via the bits 0 to 24 of the process out data channel. The activation of parameter transfer is receipted within a second in the status word.

Set zero shift

If in parameter-no. 1101 is programmed the value "0 = not clear", an edge change of "0" to "1" of the bit-no. 30 in the process out data channel is setting the laser to the preselected value in parameter-no. 0100 (see also "Parameter overview", page 22).

Manufacturer-Specific

Bits 0 - 8 are reserved. Bit 13 is manufacturer-specific.

6.4 Status Word (IN-data relative to the master)

Information concerning the state of the laser and messages are shown in the status word.

Status Word, relative word address "0"

Bit	Name	Mandatory	Bit-No. in PD-Channel
0	Reserved		16
1	Reserved		17
2	Reserved		18
3	Reserved		19
4	Reserved		20
5	Reserved		21
6	Reserved		22
7	Reserved		23
8	Reserved		24
9	Parameter no. or malfunction code	X	25
10	Parameter no. or malfunction code	X	26
11	Parameter no. or malfunction code	X	27
12	Parameter no. or malfunction code	X	28
13	Manufacturer-specific		29
14	Parameterization	X	30
15	Invalid position actual value	X	31

Device States

The device states are shown in the status word by the following bit combinations:

STATE	Status Word (bit)						
	Invalid position actual value	Parameterization	Manufacturer specific	Parameter-No.			
	15	14	13	12	11	10	9
OPERATION	0	0	X	0			
PARAMETERIZATION	1	1	X	1 ... 15			
MALFUNCTION	1	0	X	1 ... 15			

Parameter No. or Malfunction Code

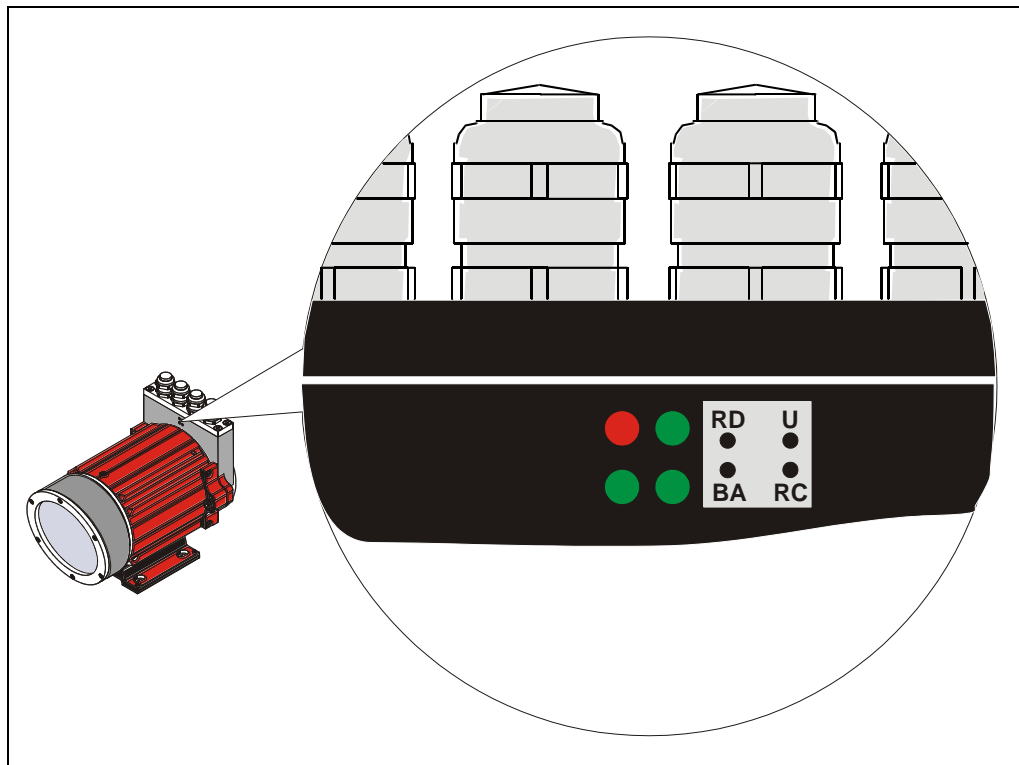
The number of the parameter that was transmitted to the laser is acknowledged via bits 9 to 12, or a malfunction code is transmitted (in "malfunction" state) (see page 23).

Manufacturer-Specific

Bits 0 - 8 are reserved. Bit 13 is manufacturer-specific.

6.5 Bus status

At the connection cap the laser has 4 LEDs, which display the bus status of the laser:



RD (red): Following IBS-Interface is disconnected, or bus communication disturbed
 U (green): SUPI Supply-Voltage
 RC (green): Remote-Control
 BA (green) : INTERBUS active

7 Parameterization and configuration

The configuration of the laser occurs alternatively via the configuration software of the INTERBUS - master or via the TRWinProg-software. With a download of the control parameters the parameters, which were configured via the TRWinProg-software, will be overwritten by the control.

In this instruction only the configuration via the INTERBUS - master is described. The PC program TRWinProg is described in an instruction of its own.

7.1 Parameter data

The parameter data can be transferred via the bits 0 to 24 of the process out data channel of the master to the laser. To this the laser must be set to the parameterization state. This is achieved by outputting a parameter number unequal to zero on bits 9 to 12 of the control word (bits 25 to 28 of the process out data channel).

Parameter overview

Parameter No. B12 B9	Function
0 0 0 0	Output in "operation" state
0 0 0 1	Resolution: 0 = 10 mm 1 = 1 mm 2 = 0,1 mm 3 = 0,01 mm 4 = 1 Inch 5 = 0,1 Inch
0 0 1 0	Switch off laser diode
0 0 1 1	Switch on laser diode
0 1 0 0	Preselection preset value
0 1 0 1	Automatic switching-off of the laser diode, if bus 15min. inactively: 0 = disabled 1 = active
0 1 1 0	Not defined !
0 1 1 1	Not defined !
1 0 0 0	Counting direction: 0 = with increasing distance to the laser, values increasing 1 = with increasing distance to the laser, values decreasing
1 0 0 1	Speed limit value in 0,1m/s: 0 = no check 1 – 200 = 0,1 m/s – 20 m/s
1 0 1 0	Error value at beam interruption: 0 = NULL 1 = 0xFF 2 = Last valid position value
1 0 1 1	Not defined !

Continuation parameter overview

Parameter No. B12 B9	Function
1 1 0 0	Function external input: 0 = disabled 1 = Preset 2 = Switch off laser diode 3 = Failure quit
1 1 0 1	Clear preset (Zero mark is deleted): 0 = no clearing 1 = clearing
1 1 1 0	Function external output: 0 = disabled 1 = Temperature 2 = Intensity 3 = Hardware-Fail 4 = every fail 5 = Speed-check 6 = Plausibility measured value
1 1 1 1	Save parameters, D0 – D24 = "0"

The laser switches over to the "parameterization" state and indicates the successful transmission of the parameter with the return of the corresponding parameter number.

The new parameter takes effect after the user has set the laser to the 'operation' state with the 'enable operation' device control command. If it was not possible for the parameter to take effect, the laser switches over to the 'malfunction' state –after the user has sent the 'enable operation' device control command - and outputs a malfunction number on bits 9 to 12 of the status word (bit 25 to 28 of the process data channel).

Malfunction code

Malfunction-No. b12 b9	Meaning
0 0 0 0	No malfunction
0 0 0 1	Invalid parameters from the host
0 0 1 1	Hardware error
1 0 0 1	Intensity warning (intensity <12%)
1 0 1 0	Laser diode is switched off
1 1 0 0	Intensity error (e.g. beam interruption)
1 1 0 1	Speed-check
1 1 1 0	Device temperature (outside the range of 0-50 °C)
1 1 1 1	Plausibility measured value (position jump)

EXAMPLE 1: Example of a Parameter Transmission

	Host to Laser			Laser to Host			Comment
	Control Word		D0-D24	Status Word		D0-D24	
	D31	D25-D28		D30-D31	D25-D28		
1	0	0	X	0 0	0	Actual value	Normal operation
2	0	P.No.	Parameter	0 0	0	Actual value	Host transmits parameter to laser, laser does not yet react
3	0	P.No.	Parameter	0 0	0	Actual value	Host continues to wait for acknowledgement from laser
4	0	P.No.	Parameter	1 1	1)	X	Laser has accepted the parameter and begins processing
5	0	P.No.	Parameter	1 1	1)	X	Parameter processing still running in laser
6	0	P.No.	Parameter	1 1	P.No.	Parameter	Processing of parameter is completed. Laser remains in "parameterization" state
7	1	0	0	1 1	P.No.	Parameter	Device control command "enable operation" from host to the laser. Laser does not yet react
8	1	0	0	0 0	0	Actual value	Laser once more in "operation" state
9	0	0	0	0 0	0	Actual value	Normal operating mode once more reached by both devices

1): You must make sure that when a parameter is transmitted, the same parameter number as that which has already been acknowledged by the laser is not sent. The repeated transmission of the same parameter is not valid without first leaving the "parameterization" state.

The parameter number must be consistent.

To transmit several parameters, repeat steps 4 to 6.

When transmitting a parameter, make sure that the parameter number is not output before the parameter.

When invalid or inconsistent parameters are sent, the laser goes into the "malfunction" state when trying to enable operation.

EXAMPLE 2: Sequence when Transmitting Inconsistent Parameters

	Host to Laser			Laser to Host			Comment
	Control Word		D0-D24	Status Word		D0-D24	
	D31	D25-D28		D30-D31	D25-D28		
1	0	0	X	0 0	1)	Actual value	Normal operation
2	0	1	5	0 0	1)	Actual value	Host sends the first value for programming of the resolution
3	0	1	5	0 0	1)	Actual value	Host continues to wait for acknowledgement from Laser
4	0	1	5	1 1	1)	X	Laser has accepted the parameter and begins processing
5	0	1	5	1 1	1)	X	Parameter processing still running in Laser
6	0	1	5	1 1	1	5	Processing of parameter is completed. Laser remains in "parameterization" state
7	0	8	1	1 1	1	5	Host sends the second value for programming of the counting direction (increasing to the Laser)
8	0	8	1	1 1	1	5	Host continues to wait for acknowledgement from laser
9	0	8	1	1 1	8	1	Processing of parameter is completed. Laser remains in "parameterization" state
10	1	0	0	1 1	8	1	Device control command "enable operation" from host to the laser. Laser does not yet react
11	1	0	0	0 1	1	Actual value	Laser switches to "malfunction" state, the malfunction code is "1". The position actual value is output on the process data channel.

An illegal parameter value (5) was programmed into line 2 for the parameter "resolution" which at first is accepted by the laser device and remains in the operational state "parameterization" furthermore.

In line 7, the counting direction of the laser was then programmed (increasing to the Laser).

In line 10, after finished programming the device control command "enable operation" was sent to the laser device.

The programmed values are checked only now (line 11) for their validity and the laser passes into the state "malfunction". The position value is output on the process data channel. This value is possibly faulty depending on which programmed parameter was illegal.

7.2 Parameter description

The range of values of parameter data in D0 - D24 is to be entered in two's complement. In the case of a value limit error, after the device control command "enable operation" the laser is switching over to the "malfunction" state, no programming occurs.

(e.g. +1 dec.: Parameter data = 1 HEX

-1 dec.: Parameter data = 1 FF FF FF HEX)

7.2.1 Resolution

Determination of the measuring system resolution

Parameter-No. B12 B9	Parameter value in D0 - D24	Value range	Default
0 0 0 1	0 = 10 mm 1 = 1 mm 2 = 0,1 mm 3 = 0,01 mm 4 = 1 Inch 5 = 0,1 Inch	0 - 5	1

7.2.2 Switching-off laser diode

For increase the life time of the laser diode the laser diode can be switched inactively with transmission of this parameter-no.. If in parameter-no. 1100 "Function external input", page 28 the parameter value "2" = "Switch off laser diode" was programmed, or the parameter 0101 "Switch off laser diode automatic if INTERBUS is inactive", page 27 is active, this parameter is ineffective.

Parameter-No. B12 B9	Parameter value in D0 - D24	Value range	Default
0 0 1 0	-	-	-

7.2.3 Switching-on laser diode

With transmission of this parameter-no. the laser diode is switched actively. If in parameter-no. 1100 "Function external input", page 28 the parameter value "2" = "Switch off laser diode" was programmed, or the parameter 0101 "Switch off laser diode automatic if INTERBUS is inactive", page 27 is active, this parameter is ineffective.

Parameter-No. B12 B9	Parameter value in D0 - D24	Value range	Default
0 0 1 1	-	-	-

7.2.4 Preset preselection

Determination of the position value on which the laser is adjusted when the preset function or the preset-input is activated
 (see " Control Word, relative word address "0" ", page 18 /
 "Set zero shift", page 19 and "Function external input", page 28).

Parameter-No. B12 B9	Parameter value in D0 - D24	Value range	Default
0 1 0 0	Freely selectable	Programmed measuring initial value to measuring length in steps	0

7.2.5 Switch off laser diode automatic if INTERBUS is inactive

If the parameter is active, in case of an inactive INTERBUS the laser diode is switched off automatically after approx. 15 min.. If the INTERBUS will be active again, the laser diode is switched on again immediately.

If in parameter-no. 1100 "Function external input", page 28 the parameter value "2" = "Switch off laser diode" was programmed, this parameter is ineffective.

Parameter-No. B12 B9	Parameter value in D0 - D24	Value range	Default
0 1 0 1	0 = disabled 1 = active	0 - 1	0

7.2.6 Counting direction

Determination of the measuring system counting direction.

Parameter-No. B12 B9	Parameter value in D0 - D24	Value range	Default
1 0 0 0	0 = with increasing distance to the laser, values increasing 1 = with increasing distance to the laser, values decreasing	0 - 1	0

7.2.7 Speed limit value

Optional input of the limit value in 0.1 m/s for the speed-monitoring. At active speed monitoring with exceeding of the adjusted speed level the corresponding warning bit in the malfunction code is set, see page 23. This function can be used only, if the hardware function "**Fehler! Verweisquelle konnte nicht gefunden werden.**", page 14 is switched off. This is the case, if the DIP-switch is not equipped, or no valid switch identification (DIP 5/7 = ON) is adjusted.

Parameter-No. B12 B9	Parameter value in D0 - D24	Value range	Default
1 0 0 1	0 = no check 1 - 200 = 0,1 - 20 m/s	0 - 200	0

7.2.8 Error value

Determination of the error value which is output instead of the actual value at a beam interruption.

Parameter-No. B12 B9	Parameter value in D0 - D24	Value range	Default
1 0 1 0	0 = NULL 1 = 0xFF 2 = Last valid position value	0 - 2	0

7.2.9 Function external input

⚠ WARNING

Risk of injury and damage to property by an actual value jump when the preset function is performed!

NOTICE

- The *preset function* should only be performed at rest, otherwise the resulting actual value jump must be permitted in the program and application!

Determines, whether the switching input is to be used as

- Preset input, - Switch-off Laser-Diode (LD) or Failure reset - input

With connection of the switching input as Preset-input the laser is adjusted on the predefined position value (see also "Preset preselection", page 27). With connection the switching input as LD-input the laser diode is switched off for the extension of the life time. If in the PC-program "TRWinProg" in the basic parameters the switching-off of the laser diode is carried out automatically, the LD-switching input does not have a function.

Parameter-No. B12 B9	Parameter value in D0 - D24	Value range	Default
1 1 0 0	0 = disabled 1 = Preset 2 = Switch off laser diode 3 = Failure quit	0 - 3	0

7.2.10 Clear Preset

⚠ WARNING

Risk of injury and damage to property by an actual value jump when the clear preset function is performed!

NOTICE

- The *clear preset function* should only be performed at rest, otherwise the resulting actual value jump must be permitted in the program and application!

Via this parameter, the zero-point correction calculated under the parameter "Preset preselection, 0100" is deleted. The correction arises from the difference of the desired preset value to the physical laser position. That means, after deletion of the zero-point correction the laser outputs his "real" physical position.

Parameter-No. B12 B9	Parameter value in D0 - D24	Value range	Default
1 1 0 1	0 = no clearing 1 = clear Preset	0 - 1	0

7.2.11 Function external output

Specifies the function of the error output (external switching output). Definition of the error see "Malfunction code", page 23 and "Causes of Faults and Remedies", page 30.
Options:

Parameter-No. B12 B9	Parameter value in D0 - D24	Value range	Default
1 1 1 0	0 = disabled 1 = Temperature 2 = Intensity 3 = Hardware-Fail 4 = every fail 5 = Speed-check 6 = Plausibility measured value	0 – 6	0

7.2.12 Save parameters

Via this parameter all programmed parameters are saved permanently. The parameters are also available after switch on the laser again.

Parameter-No. B12 B9	Parameter value in D0 - D24	Value range	Default
1 1 1 1	0	0	-

8 Causes of Faults and Remedies

The fault causes are defined according to the malfunction code (see page 23). For the resetting of the malfunction code, at first the error must be eliminated. After this the device control command "Enable Operation" must be sent to the laser. If the switching input was adjusted via the TRWinProg-software for error resetting, the error can be acknowledged also about the external switching input.

Malfunction Code	Cause	Remedy
0001 Invalid parameters from the host	Invalid parameter data, a parameter range error is available.	Check all programmed parameters after valid ranges of values (see "Parameter overview", page 22 and "Parameter description", starting from page 26).
0011 Memory error	Hardware error	If the error occurs at repeated service type, the device must be replaced.
1001 Intensity warning	The device determined an intensity of < 12%.	This message is only a warning and means that the measuring system optics, or the reflecting foil is to be cleaned. However, the device operates error-free furthermore.
1010 Laser diode switched off	The bit is set, if the laser diode was switched off over the bus, or the switching input.	Serves only for information purposes.
1100 Intensity error	The device checks the intensity of the received laser signal continuously, it was detected a below-minimum intensity.	<ol style="list-style-type: none"> 1. Clean measuring system optics 2. Clean reflecting foil 3. Rule out an interruption of the laser beam If the possibility of soiling or interruption of the laser signal can be ruled out, the device must be replaced.
1101 Speed-check	The adjusted speed level was exceeded.	Serves only for information purposes, whether the adjusted speed level was exceeded. (Function see chapter 0, page 14 and chapter 7.2.7, page 27).
1110 Device temperature	The temperature has exceeded or fallen short of the range of 0 - 50°C in the housing of the device.	Appropriate measures must be taken to prevent the device from overheating or undercooling.
1111 Plausibility warning	The plausibility of the measured value couldn't be guaranteed any more.	This message is a warning and means that possibly corresponding measures must be taken, so that no system components will be damaged.

9 Appendix

9.1 Ordering information

9.1.1 Laser devices

Article-No.:	Description
2200-00200	Laser device INTERBUS 125 m
2200-00202	Laser device INTERBUS 125 m, linearized
2200-01200	Laser device INTERBUS 170 m
2200-01202	Laser device INTERBUS 170 m, linearized

9.1.2 Accessories

Article-No.:	Description
490-00105	TR-PT-15/2: switch cabinet module for PC adapter connection
490-00310	Device: PC adapter (RS485 <--> USB)
490-01001	Soft-No.: 490-00416 "TRWinProg" PC-software with user manual German and English
Reflecting foils for measurements up to 125m	
¹⁾ 49-500-020	200 x 200 mm, package contents / alternative type 49-500-046
¹⁾ 49-500-038	200 x 300 mm / alternative type 49-500-048
¹⁾ 49-500-031	749 x 914 mm / alternative type 49-500-047
49-500-046	200 x 200 mm, package contents
49-500-048	200 x 300 mm
49-500-047	749 x 914 mm
Other sizes upon request. In addition, the foils can be stucked-on side-by-side up to the desired size.	
Fresnel Reflecting foils for measurements > 125m	
49-500-032	554 x 480 mm, package contents
49-500-034	554 x 480 mm, predrilled
49-500-036	720 x 693 mm
49-500-037	1108 x 960 mm
49-500-039	200 x 200 mm, for measurements approx. up to 130m

¹⁾ can be supplied only transitionally