wenglor®

Interface Protocol for Transit Time Sensors Y1TA/X1TA Version 1.4.7 / OY1P Version 1.0.0

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1 Utilized Data Format

1.1 Long/Short

The little endian data format is used in this protocol.

Explanation:

The term little endian signifies placement of the least significant byte (LSB) in a particular position within the data structure of a memory module. If the LSB is the first byte of the data structure in the memory module, we speak of a little endian arrangement.

Examples:

16 bit (short) value: DE45

Address	n-1	n	n+1	n+2
Little endian	xx	45	DE	xx

32 bit (long) value: FF01DE45

Address	n-1	n	n+1	n+2	n+3	n+4
Little endian	xx	45	DE	01	FF	xx

1.2 Float

Float variables are laid out in accordance with the IEEE standard for binary floating point arithmetic (ANSI/IEEE standard 754-1985).

2 Control Characters

Character	ASCII Value (decimal)	ASCII Value (hexadecimal)	Function
$	36	0x24	Start character
.	46	0x2E	Stop character 1
;	59	0x3B	Stop character 2

3 Frame Layout for Data Transmission

	Length	Frame Segment
Start character	1 byte	Frame header 12 bytes
Frame type	1 byte	
MSG_ID	1 byte	
Repeat	1 byte	
ProtocolLen	2 bytes	
MsgType	2 bytes	
Address	4 bytes	
CMD0: command type 0	1 byte	Data header 16 bytes
CMD1: command type 1	1 byte	
Parameter 1	2 bytes	
Parameter 2	2 bytes	
Parameter 3	2 bytes	
Parameter 4	4 bytes	
Data length:	4 bytes	
1st data byte	1 byte	User data
2nd data byte	1 byte	
...		
n^{th} data byte	1 byte	
Checksum	2 bytes	Frame end 4 bytes
Stop_character_0	1 byte	
Stop_character_1	1 byte	

3.1 Frame Header

- **Start character (1 byte):**
  The <$> start character indicates the beginning of a protocol.
- **Frame type (1 byte):**
  The frame type is always set to 0.
- **MSG_ID (1 byte):**
  Message identification is a consecutive number which can be selected as desired. The sensor responds with the same number in the response protocol.
- **Repeat (1 byte):**
  Repeat is the identifier for a protocol repetition.
- **ProtocolLen (2 bytes):**
  ProtocolLen describes the total length in bytes of the transmitted frame.
- **MsgType (2 bytes):**
  MsgType describes the type of message (see section 4.1, "Acknowledge").
- **Address (4 bytes):**
  Address describes the device's address.

3.2 Data Header

- **CMD0 (1 byte) and CMD1 (1 byte):**
  CMD0 gathers commands hierarchically into groups. All data packets which involve, for example, teach-in, begin with the same CMD0 identifier.
  CMD1 differentiates the commands unequivocally within this group (see section 5, "Commands").

- **Parameters 1 through 4 (10 bytes):**
  Transmission parameters 1 through 4 can be used for the respectively required parameters depending upon the command header or the data header.

- **Data length (4 bytes):**
  The length of the user data which follows is entered to the data length parameter (max. 900 bytes [X1TA/Y1TA], max. 1058 bytes [OY1P]).

3.3 Data Stream

The data stream includes user data which varies in length, but has a maximum length of 900 bytes (X1TA/Y1TA), 1058 (OY1P). Length is defined by means of the data length parameter in the data header.

3.4 Frame End

- **Checksum (2 bytes):**
  The checksum must be recalculated for each send frame (see section 3.4.1, "Calculating the Checksum").

- **Stop character (2 bytes):**
  The stop characters indicate the end of the protocol.
  Stop_character_0 <.>
  Stop_character_1 <;>

3.4.1 Calculating the Checksum, BCC (block check character)

The checksum is calculated by XORing all of the characters in the frame header, the data header and the user data, bit by bit.

Example:

PC → sensor

Representation as stream:
24 00 01 00 20 00 00 00 00 00 00 00 0A 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 **0F 00** 2E 3B

Byte		Date	Protocol Segment
1		0x24	
2	XOR	0x00	Protocol header
3	XOR	0x01	
4	XOR	0x00	
5	XOR	0x20	
6	XOR	0x00	
7	XOR	0x00	
8	XOR	0x20	
9	XOR	0x00	
10	XOR	0x00	
11	XOR	0x00	
12	XOR	0x00	
13	XOR	0x0A	Data header
14	XOR	0x00	
15	XOR	0x00	
16	XOR	0x00	
17	XOR	0x00	
18	XOR	0x00	
19	XOR	0x00	
20	XOR	0x00	
21	XOR	0x00	
22	XOR	0x00	
23	XOR	0x00	
24	XOR	0x00	
25	XOR	0x00	
26	XOR	0x00	
27	XOR	0x00	
28	XOR	0x00	
29	=	0x0F	Frame end
30	Checksum	0x00	
31	Stop 1	0x2E	
32	Stop 2	0x3B	

3.5 Sample Protocol

A sample of an interface protocol is representatively depicted in this section, and is described in detail. The sample serves as a basis for all of the rest of the sections of this document, i.e. only those protocol building blocks which change, and which are relevant for the respective function, are described in the following sections.

Example: read out distance value from section 5.4.1, "Read Out Process Data"

Character string, PC => sensor:

	Frame header (header)						
	Start char.	Frame type	MSG_ ID	Repeat	Protocol Len	Msg type	Address
Value (hexa-decimal)	24	00	01	00	20 00	00 00	00 00 00 00

Data header							User data	Frame end		
CMD0	CMD1	Param1	Param2	Param3	Param4	Data length	Data	Check-sum	Stop-character_0	Stop_character_1
0A	00	00 00	00 00	00 00	00 00 00 00	00 00 00 00		0F 00	2E	3B

Sensor response:

	Frame header (header)						
	Start character	Frame type	MSG_ ID	Repeat	Protocol Len	Msg type	Address
Value (hexadecimal)	24	00	01	00	40 00	01 00	00 00 00 00

Data header						
CMD0	CMD1	Param1	Param2	Param3	Param4	Data length
0A	00	00 00	00 00	00 00	00 00 00 00	20 00 00 00

User data	Frame end		
Data	Checksum	Stop-character_0	Stop-character_1
92 05 00 00 10 27 00 00 **F6 05 00 00** E 02 00 00 E 02 00 00 E 02 00 00 00 00 00 00 00 00 00 00	11 00	2E	3B

The absolute position of the current distance value within the stream is 36 and has a length of 4 bytes.

The distance value is underlined in the stream and, as a result of the utilized little endian data format, it corresponds to the hexadecimal number 00 00 05 F6. This is equivalent to a distance value of 1526 mm.

4   Communications Sequence

4.1   Acknowledge

Each command which is transmitted from the PC to the sensor is confirmed by means of an acknowledge packet.

The ACK flag in the Msg_Type parameter is set for every data packet which the PC receives from the sensor.

Sample header:

Request (PC → sensor)

Frame header:

Start	Frame type	MSG_ID	Repeat	ProtocolLen	MsgType	Gap	Address
$	0	0x10	0	0x20 (+ data length)	0	0	0

Response (sensor → PC)

Remains unchanged   Changes

Frame header (header):

Start	Frame type	MSG_ID	Repeat	ProtocolLen	MsgType	Gap	Address
$	0	0x10	0	0x20 (+ data length)	0x01	0	0

5 Commands

The following provides an overview of the command groups (CMD0). Differentiation amongst the command groups is assured by CMD1, and is described in the respective sections.

CMD0	CMD1	Param1	Param2	Param3	Param4	Data length
0x01 Teach-In	0x00 Teach-in object	Output				
	0x01 Teach-in background	Output				
	0x06 Teach-in tolerance window	Output				
	0x07 Set current distance to 0 V (4 mA)	Output				
	0x08 Set current distance to 10 V (20 mA)	Output				
0x02 Reset	0x01 Restore default values					
0x08 Language	0x01 Select language	Language				
0x09 Interface	0x01 Set mode	Mode				
	0x02 Set baud rate	Port	Baud rate			
	0x03 Select protocol	Port	Config-uration:			
	0x04 Set interval				Value	
	0x05 Select mask				Mask	
0x00 Identification data	0x00 Read out identification data					X1TA/Y1TA: 56 bytes OY1P: 72 bytes
0x0A Process data	0x00 Read out process data					X1TA/Y1TA: 32 bytes OY1P: 36 bytes
	0x01 Read out sensor config.					Y1TA/X1TA Version 1.4.2: 600 Byte from Version 1.4.6: 604 Byte OY1P: 1058 Byte
	0x02 Write sensor configuration					Y1TA/X1TA Version 1.4.2: 600 Byte from Version 1.4.6: 604 Byte OY1P:

						1058 Byte
	0x03 Read out configuration for digital outputs					16 bytes
	0x04 Write configuration for digital outputs					16 bytes
	0x05 Read out configuration for analog output					52 bytes
	0x06 Write configuration for analog output					52 bytes
	0x07 Read out parameters config.					X1TA/Y1TA: 96 bytes OY1P: 84 bytes
	0x08 Write parameters config.					X1TA/Y1TA: 96 bytes OY1P: 84 bytes
	0x09 Switch laser on or off		0 = on 1 = off			
	0x0A Set filter			Filter		
	0x0B Set analog output to voltage or current	Output		UI mode		
	0x0C Set digital output to normally closed or normally open	Output	Mode			
	0x0D Set digital output to PNP, NPN or push-pull	Output	Mode			
	0x0E Set on-delay, off-delay and pulse length	Output	Mode		Value	
	0x0F Change on-delay, off-delay and pulse length	Output	Mode		+/– Value	
	0x10 Convert error output to digital output	Mode				
	0x11 Set display intensity	Value				
0x03 Switching points	0x01 Set switching points to <Parameter4>	Output		Teach-In mode	Value	
	0x02	Output			+/-	

CMD0	CMD1	Param1	Param2	Param3	Param4	Data length
	Shift switching points by <Parameter4>				Value	
	0x03 Set user hysteresis to <Parameter4> and refresh switching points	Output			Value	
	0x04 Shift user hysteresis by <Parameter4> and refresh switching points	Output			+/- Value	
	0x05 Set window width to <Parameter4>	Output			Value	
	0x06 Change window width by <Parameter4>	Output			+/- value	
	0x10 Unused					
	0x11 Set distance of <Parameter4> to 0 V (4 mA)	Output		U/I	Value	
	0x12 Set distance of <Parameter4> to 10 V (20 mA)	Output		U/I	Value	
	0x13 Change 0 V (4 mA) distance by <Parameter4>	Output		U/I	+/- value	
	0x14 Change 10 V (20 mA) distance by <Parameter4>	Output		U/I	+/- value	

5.1 Action

Parameter 1 is used for output selection in the following sections. The outputs are defined as follows:

Value	Function
0	Output 1
1	Output 2
2	XTA/YTA: Output 3 OY1P303: Output V
3	Output F

5.1.1 Teach-In

The various teach-in functions are described in this subsection.

CMD0	CMD1	Param1	Param2	Param3	Param4	Data length
0x01 Teach-In	0x00 Teach-in object	Output				
	0x01 Teach-in background	Output				
	0x06 Teach-in tolerance window	Output				

	0x07 Set current distance to 0 V (4 mA)	Output					
	0x08 Set current distance to 10 V (20 mA)+	Output					

5.1.1.1 Teach In the Object

Parameter 1: output
(see section 5.1, "Action")

5.1.1.2 Teach In the Background

Parameter 1: output
(see section 5.1, "Action")

5.1.1.3 Teach In the Tolerance Window

Parameter 1: output
(see section 5.1, "Action")

5.1.1.4 Set Current Distance to 0 V (4 mA)

Parameter 1: output
(see section 5.1, "Action")

5.1.1.5 Set Current Distance to 10 V (20 mA)

Parameter 1: output
(see section 5.1, "Action")

5.2 Parameters

5.2.1 Reset

CMD0	CMD1	Param1	Param2	Param3	Param4	Data
0x02 Reset	0x01 Restore default values					

5.2.2 Language

CMD0	CMD1	Param1	Param2	Param3	Param4	Data
0x08 Language	0x01 Select language	Language				

5.2.2.1 Select Language

Parameter 1: language

Value	Function
0	German
1	English
2	French
3	Spanish
4	Italian

5.2.3 Interface

CMD0	CMD1	Param1	Param2	Param3	Param4	Data
0x09 Interface	0x01 Set mode	Mode				
	0x02 Baudrate einstellen	Port	Baud rate			
	0x03 Set ASCII	0=Binary 1=ASCII				
	0x04 Set Interval				Value	
	0x05 Select mask				Mask	
	0x06 Set interface protocol TA/T	Mode				

5.2.3.1 Set the Mode

Parameter 1: mode

Value	Function
0	Menu
1	Communication
2	Continuous transmission

5.2.3.2 Set the Baud Rate

Parameter 1: port

The port is always set to 0.

Parameter 2: baud rate

Value	Function
0	9600
1	38,400
2	115,200

5.2.3.3 Set ASCII

Parameter 1: Value

Value	Function
0	Binary
1	ASCII

5.2.3.4 Set interval

Parameter 4: Value

Value	Function
10...10 000	Intervall in ms

5.2.3.5 Select mask

Parameter 4: Mask

Mask	Function
1...31	No. of mask

1	2	3	4	5	6	7		
Mask	Current distance	Statuses of the digital outputs	Difference between current distance and the selected switching point (for each output)	Digital read-out of the current or the voltage value (depending on the setting in the "Analog" menu)	Time stamp in ms	Transmission time in ms (packet) is displayed in line 4 of the "Mask" menu function.		
						115200	38400	9600
String	+#######mm	####	+#######mm+#######mm+#######mm	########mV	########			
1	x					0,94	2,82	11,28
2		x				0,41	1,23	4,92
3	x	x				1,35	4,05	16,2
4			x			2,82	8,46	33,84
5	x		x			3,76	11,28	45,12
6		x	x			3,23	9,69	38,76
7	x	x	x			4,17	12,51	50,04
8				x		0,94	2,82	11,28
9	x			x		1,88	5,64	22,56
10		x		x		1,35	4,05	16,2
11	x	x		x		2,29	6,87	27,48
12			x	x		3,76	11,28	45,12
13	x		x	x		4,7	14,1	56,4
14		x	x	x		4,17	12,51	50,04
15	x	x	x	x		5,11	15,33	61,32
16					x	0,85	2,55	10,2
17	x				x	1,79	5,37	21,48
18		x			x	1,26	3,78	15,12
19	x	x			x	2,2	6,6	26,4
20			x		x	3,67	11,01	44,04
21	x		x		x	4,61	13,83	55,32
22		x	x		x	4,08	12,24	48,96
23	x	x	x		x	5,02	15,06	60,24
24				x	x	1,79	5,37	21,48
25	x			x	x	2,73	8,19	32,76
26		x		x	x	2,2	6,6	26,4
27	x	x		x	x	3,14	9,42	37,68
28			x	x	x	4,61	13,83	55,32
29	x		x	x	x	5,55	16,65	66,6
30		x	x	x	x	5,02	15,06	60,24
31	x	x	x	x	x	5,96	17,88	71,52

From Operating Instruction X1TA/Y1TA

5.2.3.6 Set interface protocol TA/T

Parameter 1: Mode

Mode	Function
0	X1TA / Y1TA
1	YT

Not possible for OY1P

5.3 Sensor Identification

CMD0	CMD1	Param1	Param2	Param3	Param4	Data length
0x00 Identification data	0x00 Read out identification data					56 bytes 104 bytes

5.3.1 Read Out Identification Data

Sensor identification data are read out in the form of a data stream. In order to better be able to identify the position of the data, a table in provided below which includes function, the absolute position of the data within the stream, the data type and the default value.

Function	Absolute Position in the Stream	Data Type	Default Value
Serial number	28	Unsigned char [12]	e.g. "000000001234"
Sensor type	40	Short	See table 1 below
Sensor group	42	Short	19
Firmware major	44	Short	e.g. 1
Firmware minor	46	Short	e.g. 1
Firmware revision	48	Short	e.g. 2
Firmware calendar week	50	Short	e.g. 46
Firmware year	52	Short	e.g. 06
Reserved	54	Short	–
Sensor Name	56	Unsigned char [Y1TA/X1TA: 20] [OY1P: 12]	For example OY1P0189
Reserved	76	Unsigned char [Y1TA/X1TA: 8] [OY1P: 4]	–

Data length: 56 bytes (Y1TA/X1TA), 72 bytes (OY1P)

5.4 Process Data

CMD0	CMD1	Param1	Param2	Param3	Param4	Data length
0x0A Process data	0x00 Read out process data					32 bytes
	0x01 Read out sensor configuration					612 bytes
	0x02 Write sensor configuration					Y1TA/ X1TA: 612 bytes OY1P: 1058 bytes
	0x03 Read out configuration for digital outputs					16 bytes
	0x04 Write configuration for digital outputs					16 bytes
	0x05 Read out configuration for analog output					52 bytes
	0x06 Write configuration for analog output					52 bytes
	0x07 Read out parameters configuration					X1TA/ Y1TA: 96 Byte OY1P: 84 Byte
	0x08 Write parameters configuration					X1TA/ Y1TA: 96 Byte OY1P: 84 Byte
	0x09 Switch laser on or off		0 = on 1 = off			
	0x0A Set filter			Filter		
	0x0B Set analog output to voltage or current	Output		UI mode		
	0x0C Set digital output to normally closed or normally open	Output	Mode			
	0x0D Set digital output to PNP, NPN or push-pull	Output	Mode			
	0x0E Set on-delay, off-delay and pulse length	Output	Mode		Value	
	0x0F Change on-delay, off-delay and pulse length	Output	Mode		+/– value	
	0x10 Set digital output	Output	Mode			
	0x11 Set display intensity	Value				
	0x12 Ask for pass word				0=OFF 1=ON	
	0x13				Pass	

	Enter pass word				word	
	0x14 Change pass word				Pass word	
	0x15 Input polarity	Mode				
	0x16 External Teach-In	Mode				

5.4.1 Read Out Process Data

Process data are read out in the form of a data stream. In order to better be able to identify the position of the data, a table in provided below which includes function, the absolute position of the data within the stream, the data type, the lowest possible value, the highest possible value, the default value and the unit of measure.

Function	Absolute Position in the Stream	Data Type	Min. Value	Max. Value	Default Value	U/M
Momentary output voltage in mV	28	Signed long	0	10000	–	mV
Momentary output current in mA	32	Signed long	20 00	10000	–	* 2 mA
Momentary distance value in mm	36	Signed long	Y1TA: 100 X1TA: 200	Y1TA: 12000 X1TA: 101000	–	mm
Momentary distance – switching threshold in mm, output 1	40	Signed long	Y1TA: -11900 X1TA: -100800	Y1TA: +11900 X1TA: +100800	–	mm
Momentary distance – switching threshold in mm, output 2	44	Signed long	Y1TA: -11900 X1TA: -100800	Y1TA: -11900 X1TA : -100800	–	mm
Momentary distance – switching threshold in mm, output 3	48	Signed long	Y1TA: -11900 X1TA: -100800	Y1TA: -11900 X1TA: -100800	–	mm
Reserved	52	Long	–	–	–	–
Momentary switching status, output 1	56	Unsigned char	0 = on	1 = off	–	–
Momentary switching status, output 2	57	Unsigned char	0 = on	1 = off	–	–
Momentary switching status, output 3	58	Unsigned char	0 = on	1 = off	–	–
Momentary switching status, output F	59	Unsigned char	0 = on	1 = off	–	–

Data length: 32 bytes

5.4.2 Read Out / Write Sensor Configuration

All sensor configuration data can be read out and written here.

The data field has a length of 612 bytes and can be used directly for saving or restoring a configuration.

5.4.3 Read Out / Write Configuration for Digital Outputs

Configuration data for the digital outputs are read out in the form of a data stream. In order to better be able to identify the position of the data, a table in provided below which includes function, the absolute position of the data within the stream, the data type, the lowest possible value, the highest possible value, the default value and the unit of measure.

Function	Absolute Position in the Stream	Data Type	Min. Value	Max. Value	Default Value	U/M
On-delay in ms	28	Long	0	10000	0	ms
Off-delay in ms	32	Long	0	10000	0	ms
Pulse duration in ms	36	Long	0	10000	0	ms
NO / NC	40	Unsigned short	0	1	0	
NPN / PNP / push-pull	42	Unsigned short	0	2	0	

Data length: 16 bytes

Adjustable values:

NPN/PNP/push-pull	
0	PNP
1	Push-pull
2	NPN

NO/NC	
0	NO
1	NC

Only for OY1P	
0	PNP
1	NPN
2	Push-pull

5.4.4 Read Out / Write Configuration for the Analog Output

Configuration data for the analog output are read out in the form of a data stream. In order to better be able to identify the position of the data, a table in provided below which includes function, the absolute position of the data within the stream, the data type, the lowest possible value, the highest possible value, the default value and the unit of measure.

Function	Absolute Position in the Stream	Data Type	Min. Value	Max. Value	Default Value	U/M
0 V / 4 mA point in mm	28	Signed long	Y1TA: 100 X1TA: 200	Y1TA: 10099 X1TA: 100199	Y1TA: 100 X1TA: 200	mm
10 V / 20 mA point in mm	32	Signed long	Y1TA: 100 X1TA: 200	Y1TA: 10099 X1TA: 100199	Y1TA: 10100 X1TA: 100200	mm
Reserved	36	Signed long [2]	–	–	–	
Analog output U/I	44	Unsigned char	0 = voltage	1 = current	0 = voltage	
Reserved	45	Unsigned char [35]	–	–	–	

Data length: 52 bytes

5.4.5 Read Out/Write Parameters Configuration

Function	Absolute Position in the Stream	Data Type	Min. Value	Max. Value	Default Value	U/M
Hysteresis in mm	28	Long	0	1000	0	mm
Window width in mm	32	Long	10	1000	50	mm
Baud rate	36	Long	0	2	1	
UART mode	40	Long	0 = menu	1 = Continuous transmission	1 = Comm	
Protocol (not for OY1P)	44	Long	0 = Y1TA protocol	1 = YT protocol	0 = Y1TA protocol	
Reserved	48	Unsigned char [32]	–	–	–	
Display intensity	80	Long	0	2	4	
Display mode	84	Unsigned char	0 = digital	1 = analog	0 = digital	
Language	85	Unsigned char	0	4	1	
Direction of display rotation	86	Unsigned char	0	1	0	
Laser	87	Unsigned char	0 = on	1 = off	0 = on	
Filter	88	Unsigned char	0	8	Y1TA 0 X1TA100 0 X1TA101 0 OY1P 2	
Password on	89	Unsigned char	0 = off	1 = on	0 = off	
Reserved	90	Unsigned char [34]	–	–	–	

Data length: 96 bytes

Adjustable values:

Baud rate	
0	9600
1	38,400
2	115,200

Language	
0	German
1	English
2	French
3	Spanish
4	Italian

Direction of display rotation	
0	0°
1	180°

5.4.6 Switch Laser On or Off

Parameter 2: Value

Value	Function
0	Laser on
1	Laser off

5.4.7 Set Sampling Rate

Parameter 3: Filter

Filter			
	Y1TA	X1TA	X1TA
0	1	1	1
1	5	5	2
2	10	10	5
3	20	25	10
4	–	–	20
5	–	–	50
6	–	–	100
7	–	–	200
8	–	–	500

5.4.8 Set Analog Output to Voltage or Current

Parameter 1: output
(see section 5.1, "Action")

Parameter 3: mode

Value	Function
0	Voltage
1	Current

5.4.9 Set Digital Output to Normally Closed or Normally Open

Parameter 1: output
(see section 5.1, "Action")

Parameter 2: mode

Value	Function
0	NO (normally open)
1	NC (normally closed)

5.4.10 Set Digital Output to PNP, NPN or Push-Pull

Parameter 1: output
(see section 5.1, "Action")

Parameter 2: mode

Value	Function
0	PNP
1	Push-pull
2	NPN

Only for OY1P	
0	PNP
1	NPN
2	Push-pull

5.4.11 Set On-delay, Off-delay and Pulse Length

Parameter 1: output
(see section 5.1, "Action")

Parameter 2: mode

Value	Function
0	On-delay
1	Off-delay
2	Pulse duration

Parameter 4: value in ms

5.4.12 Change On-delay, Off-delay and Pulse Length

Parameter 1: output
(see section 5.1, "Action")

Parameter 2: mode

Value	Function
0	On-delay
1	Off-delay
2	Pulse duration

Parameter 4: (signed) value in ms

5.4.13 Set Digital Output

Y1TA/X1TA

Parameter 1: Output

Value	Function
0	Output A1
1	Output A2
2	Output A3

Parameter 2: Mode

Depending on value of parameter 1 the value of parameter 2
Has a different function!

Value	Function for A1
0	Digital- Output
1	Analog- Output

Value	Function for A2
0	Digital-Output
1	Error-Output

Value	Function for A3 as Output
0	Digital- Output
1	Analog Output
2	Switch OFF emitting light
3	Apply Offset
4	External Teach-In of Output A1
5	External Teach-In of Output A2

OY1P

Parameter 1: Output

Value	Function
0	Output A1
1	Output A2

Parameter 2: Mode

Depending on value of parameter 1 the value of parameter 2
Has a different function!

Value	Function for A1
0	Digital Output
1	Error Output
2	Contamination Output
3	Laser Input
4	External Teach Input (A1)
5	Offset-Input

Value	Function for A2
0	Digital Output
1	Error Output
2	Contamination Output
3	Analog Output
4	Laser Input
5	External Teach Input (A2)
6	Offset Input

5.4.14 Adjust Display Intensity

Parameter 1: Value

Display brightness	
0	Minimum
1	Medium
2	Maximum
3	Power Save Mode
4	Screen Saver Mode

5.4.15 Ask for pass word

Parameter 4: Mode

Value	Function
0	Pass word OFF
1	Pass word ON

5.4.16 Set Password

Parameter 4: Value

Value	Function
0000...9999	Pass word

5.4.17 Change pass word

Parameter 4: Value

Value	Function
0001...9999	Pass word

5.4.18 Input polarity

Parameter 1: Mode

Value	Function if E/A Input
0	Input not inverted
1	Input inverted

5.4.19 External Teach-In

Parameter 1: Mode

Value	Function
0	Object-Teach-In
1	Background Teach-In
2	Window Teach-In

5.5 Offset Function

CMD0	CMD1	Param1	Param2	Param3	Param4	Data length
0x0B Offset	0x00 Preset Offset value					
	0x01 Change Offset value				+/– Value	
	0x02 Offset value Reset					
	0x03 Apply Offset value					
	0x05 Set back Offset function					

5.5.1 Preset Offset value

Teach-In value of Offset presettings.

5.5.2 Change Offset value

Parameter 4: +/– value
Changement value (long)

5.5.3 Offset value Reset

Set back value of Offset presetting to 0.

5.5.4 Apply Offset value

Current displayed value is taken as Offset preset value.

5.5.5 Set back Offset function

The function Offset is set back.

5.6 Set the Switching Points

Switching thresholds can be set for a digital output, or voltage values can be set for an analog output here.

CMD0	CMD1	Param1	Param2	Param3	Param4	Data length
0x03 Switching points	0x01 Set switching points to <Parameter4>	Output		Teach Mode	Value	
	0x02 Shift switching points by <Parameter4>	Output			+/– Value	
	0x03 Set user hysteresis to <Parameter4> and refresh switching points	Output			Value	
	0x04 Shift user hysteresis by <Parameter4> and refresh switching points	Output			+/– Value	
	0x05 Set window width to <Parameter4>	Output			Value	
	0x06 Change window width by <Parameter4>	Output			+/– Value	
	0x10 Unused					
	0x11 Set distance of <Parameter4> to 0 V (4 mA)	Output		U/I mode	Value	
	0x12 Set distance of <Parameter4> to 10 V (20 mA)	Output		U/I mode	Value	
	0x13 Change 0 V (4 mA) distance by <Parameter4>	Output		U/I mode	+/– Value	
	0x14 Change 10 V (20 mA) distance by <Parameter4>	Output		U/I mode	+/– Value	

5.6.1 Set Switching Points to <Parameter4>

Parameter 1: output
(see section 5.1, "Action")

Parameter 3: Teach-In Mode

Value	Function
0	Teach-in object
1	Teach-in background
2	Window teach-in

Parameter 4: (absolute) value in mm

5.6.2 Shift Switching Points by <Parameter4>

Parameter 1: output
(see section 5.1, "Action")

Parameter 4: (signed) value in mm

5.6.3 Set User Hysteresis to <Parameter4> and Refresh Switching Points

Parameter 1: output
(see section 5.1, "Action")

Parameter 4: (signed) value in mm

5.6.4 Shift User Hysteresis by <Parameter4> and Refresh Switching Points

Parameter 1: output
(see section 5.1, "Action")

Parameter 4: (signed) value in mm

5.6.5 Set Window Width to <Parameter4>

Parameter 1: output
(see section 5.1, "Action")

Parameter 4: (signed) value in mm

5.6.6 Change Window Width by <Parameter4>

Parameter 1: output
(see section 5.1, "Action")

Parameter 4: (signed) value

5.6.7 Set Distance of <Parameter4> to 0 V (4 mA)

Parameter 3: U/I Mode

Value	Function
0	Voltage
1	Current

Parameter 4: distance in mm

5.6.8 Set Distance of <Parameter4> to 10 V (20 mA)

Parameter 3: U/I Mode

Value	Function
0	Voltage
1	Current

Parameter 4: distance in mm

5.6.9 Change 0 V (4 mA) Distance by <Parameter4>

Parameter 3: U/I Mode

Value	Function
0	Voltage
1	Current

Parameter 4: distance in mm

5.6.10 Change 10 V (20 mA) Distance by <Parameter4>

Parameter 3: U/I Mode

Value	Function
0	Voltage
1	Current

Parameter 4: distance in mm

6 Changements history

6.1 Version 1.0.0 ➔ Version 1.1.2

CMD0 0x0A Process data CMD1 0x13 Ask for pass word
CMD0 0x0A Process data CMD1 0x14 Change pass word

6.2 Version 1.1.2 ➔ Version 1.2

CMD0 0x09 Interface commands

6.3 Version 1.2 ➔ Version 1.3

CMD0 0x0B Offset Funktion
CMD0 0x0A Process data CMD1 0x10 Set digital output
CMD0 0x0A Process data CMD1 0x15 Input polarity

6.4 Version 1.3 ➔ Version 1.4.2

CMD0 0x0A Process data CMD1 0x16 External Teach-In

6.5 Y1TA/X1TA Version 1.4.2 ➔ Y1TA/X1TA Version 1.4.7 and OY1P Version 1.0.0

Language Spanish and Italian
Display Intensity power save and screen saver
OY1P Set ouput and filter