RS485 Index Command List.

OM70 laser point / laser line – Distance sensors.
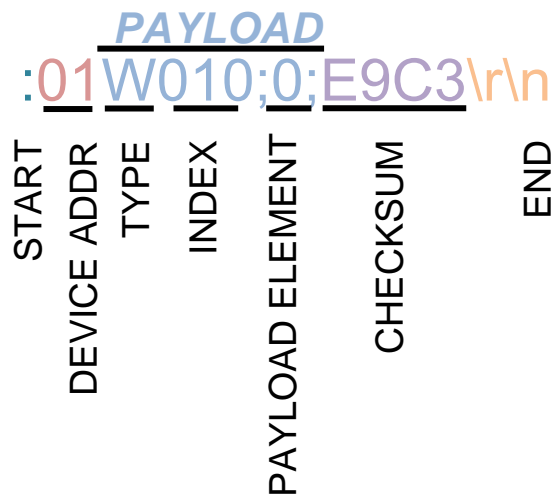
Contents

1 Introduction

This manual supplements the manual "RS485 Protocol Structure" and is valid for the Baumer OM70 laser point / laser line sensors.

1.1 UART Interface Settings

Index Command	Value
Baud rate at power up	57600
Databits	8
Startbit	1
Stopbit	1
Parity	Even

2 Command Structure

An RS485 command is structured as follows (RS485 unlock):

The information to be transmitted is called PAYLOAD and has to be sent in a so-called frame so that the command can be recognized and processed.

This frame always has the same structure and contains a start, a device address, a PAYLOAD, a checksum and an end.

START	DEVICE ADDR	PAYLOAD	CHECKSUM	END
1 char	2 char	n char	4 char	2 char
:	01…99	Index Command List	****	\r\n

3 Index Command List

Values marked with * are the Factory settings

6 (0x6)	RW		**Baudrate** Communication baud rate	Stored in configuration yes
	0	UINT8	0 38'400 1 * 57'600 2 115'200	

3.1 Application Errors

0 (0x0)	R		**Application error** Contains the application error code of the last command. If an application error occurs, it is signalled using the underlying protocol. The error code has to be read immediately after the error is signalled. It will be overwritten by any other command.	Stored in configuration no
		UINT32	Application error 0 no error 1 value not accessible 99 argument out of range	

3.2 Device identification

1 (0x1)	R		**Vendor info** Vendor information	Stored in configuration no
		UINT32	Vendor id 1 Baumer Electric AG	
		STRING 65	Vendor name default: Baumer Electric AG	

2 (0x2)	R		**Device info** Device information	Stored in configuration no
		UINT32	Device id	
		UINT32	Product id Material number	
		STRING 65	Sensor type Eg. OXE7.E25T-MB3E.SIMD.A7	
		STRING 15	Serial number 1234567890AB	

3.3 Communication features

5 (0x5)	RW		**Bus address**	Stored in configuration yes
		UINT8	Bus address Value range: `1 ... 99`	

6 (0x6)	RW		**Baudrate** Communication baud rate	Stored in configuration yes
		UINT8	Baudrate `0` 38'400 `1 *` 57'600 `2` 115'200 `3` 230'400 `4` 460'800 `5` 921'600 `6` 1'500'000	

3.4 User interface features

10 (0xA)	RW		**RS485 lock** Access lock for RS485. If the lock is activated, the sensor can be controlled using the touch buttons and all RS485 commands will be rejected (except access to this index). If the lock is deactivated, the sensor can be controlled using RS485. In this case, all physical outputs (analog, switching and alarm out) and the LEDs will be set to a fixed state. Writing into this index also automatically deactivates the diagnose mode (50), if it was previously enabled.	Stored in configuration no
		UINT8	RS485 lock `0` Lock deactivated `1 *` Lock activated	

11 (0xB)	RW		**Output reactivation** If enabled, the physical outputs (analog, switching and alarm out) will be re-enabled. Be aware that using physical outputs and RS485 simultaneously may lead to interferences. When RS485 lock (10) is active, the outputs are also activated regardless of this index. This index is not accessible during RS485 streaming mode (44).	Stored in configuration yes
		UINT8	Output reactivation `0 *` Outputs deactivated `1` Outputs activated	

15 (0xF)	RW		**Display language**	Stored in configuration yes
		UINT8	Display language `0 *` English `1` German `2` Italian `3` French	

17 (0x11)	RW		**Touch button lock**	Stored in configuration yes
		UINT8	Touch button lock 0 * Touch buttons not locked 1 Touch buttons locked	

18 (0x12)	RW		**Trigger mode**	Stored in configuration yes
		UINT8	Trigger mode This index defines how the sensor outputs will react on changes on the trigger/Sync line. When "Triggered free running measurement" is set, the sensor outputs will be continuously updated when the trigger/Sync line is low. When "Triggered single shot measurement" is set, the outputs are updated only with falling edge on the trigger/Sync line. Trigger mode cannot be changed during RS485 streaming mode (44) and during diagnose mode (50). 0 * Triggered free running measurement 1 Triggered single shot measurement	

3.5   Measurement features

20 (0x14)	R		**Measurement type selection**	Stored in configuration no
		UINT8	Measurement type selection Measurement type to use for outputs. 27 * Distance 34 Tolerance	

21 (0x15)	R		**Measurement value** Measurement value selected by the "Measurement type selection" index.	Stored in configuration no
		FLOAT32	Measurement value [mm]	
		UINT8	Quality Quality of the optical input signal and other additional information to measurement. 0 Valid 1 Low signal 4 No signal 6 Lost trigger 7 Poor quality and lost trigger 8 Poor quality 9 Invalid signal 10 Too much ambient light 11 Behind range 12 Before range 13 Warm-up	

33 (0x21)	RW		**Precision** Adjust the filtering of the measured values.	Stored in configuration yes
		UINT8	Precision 0 Standard 1 High 2 * Very high 3 Highest	

34 (0x22)	RW		**Laser off data hold** If activated, the measurement will be suspended and the laser is switched off. All outputs will hold the current value. If deactivated, the measurement will continue. This index will also be activated with the trigger line being high or trigger mode (18) being set to „Triggered single shot measurement".	Stored in configuration no
		UINT8	Laser off data hold 0 * Measurement is running 1 Measurement is holding	

3.6 Output configuration

40 (0x28)	RW		**Digital output configuration** Settings of the digital output pin. The reply to configuring this index may take up to t_answer_extended (200ms).	Stored in configuration yes
		FLOAT32	Switch point 1 [mm]	
		FLOAT32	Switch point 2 [mm]	
		UINT8	Digital output type 0 Point 1 * Window	
		UINT8	Digital output polarity 0 * Active high 1 Active low	

41 (0x29)	RW		**Analog output configuration** The analog output can be set as current or voltage output.	Stored in configuration yes
		UINT8	Analog output type 0 * Current 1 Voltage	
		UINT8	Analog output slope Slope of the analog characteristic curve. Can be positive (minimum output at minimum measurement value, fullscale output at maximum measurement value) or negative (vice versa). 0 * Positive 1 Negative	

42 (0x2A)	RW		**Analog output scaling** Points within the measuring range where the analog output value reaches its minimum/full scale value (depends on "Analog output slope" setting).	Stored in configuration yes
		FLOAT32	Analog scaling near point [mm]	
		FLOAT32	Analog scaling far point [mm]	

43 (0x2B)	W		**Set analog out scale to MAX command** Sets the analog output scaling to its maximum values.	Stored in configuration no
		UINT8	Set analog out scale to MAX command 1 Set analog out scale to MAX.	

44 (0x2C)	RW		**RS485 streaming mode** When enabled, measured data is pushed to the RS485 bus without request as soon as it is available (the used trigger mode (18) has to be considered). Data is sent in the format corresponding to index "measurement value" (21) with special message type - 'S' for human readable coding (instead of common 'A' for ACK), 0x08 for machine coding. During RS485 streaming mode it is only possible to configure the sensor while the trigger line is high. All other outputs (11) are deactivated when RS485 streaming mode is enabled. The reply to configuring this index may take up to t_answer_extended (200ms).	Stored in configuration no
		UINT8	Streaming mode 0 * RS485 streaming mode disabled 1 RS485 streaming mode enabled	

45 (0x2D)	RW		**Digital out hysteresis configuration** Settings of the digital output hysteresis - its width and alignment. Values for Hysteresis 1 and Hysteresis 2 must be equal.	Stored in configuration yes
		FLOAT32	Hysteresis 1 Width of hysteresis 1 [mm] (for SP1)	
		FLOAT32	Hysteresis 2 Width of hysteresis 2 [mm] (for SP2)	
		UINT8	Hysteresis alignment 4 INNER ALIGNMENT 5 * OUTER ALIGNMENT	

3.7   Diagnosis features

50 (0x32)	RW		**Diagnose mode** If diagnose mode is activated, the diagnosis features (live monitor) can be used. To activate diagnose mode, following preconditions need to be met: trigger line signal is low, trigger mode (18) is configured to "Triggered free running measurement", the RS485 streaming mode (44) is disabled and the measurement is running (34). To deactivate diagnose mode or to read its state, no preconditions need to be met.	Stored in configuration no
		UINT8	Diagnose mode 0 * Deactivated 1 Activated	

54 (0x36)	R		**Live monitor** Live monitor values	Stored in configuration no
		FLOAT32	Measuring rate [Hz]	
		FLOAT32	Current distance [mm]	
		FLOAT32	Object reflectivity exposure reserve [-] (max possible exposure divided by current exposure)	

3.8 Configuration storage features

200 (0xC8)	W		**Load configuration command** Loads the selected configuration to ram (current configuration). For permanent storage of the loaded values, the "Store configuration command" has to be used. This command is not accessible during RS485 streaming mode (44) and during diagnose mode (50).	Stored in configuration no
		UINT8	Configuration number 0 Active config 1 Config 1 2 Config 2 3 Config 3	

201 (0xC9)	W		**Store configuration command** Permanently stores the current configuration. This command is not accessible during the RS485 streaming mode (44).	Stored in configuration no
		UINT8	Configuration number 0 Active config Current configuration will be stored to the active configuration. 1 Config 1 Current configuration will be stored to Config 1. 2 Config 2 Current configuration will be stored to Config 2. 3 Config 3 Current configuration will be stored to Config 3.	

202 (0xCA)	W		**Reset to factory settings command** All configurations will be reset to factory settings. The sensor will reboot after execution of this command.	Stored in configuration no
		UINT8	Reset to factory settings command 0 Reset to factory settings	

207 (0xCF)	R		**Configuration 1** Values stored in configuration 1.	Stored in configuration no
		UINT32	Product id Material number	
		UINT8	Measurement type selection Measurement type to use for outputs. 27 * Distance 34 Tolerance	
		UINT8	Precision 0 Standard 1 High 2 * Very high 3 Highest	
		UINT8	Trigger mode This index defines how the sensor outputs will react on changes on the trigger/Sync line. When "Triggered free running measurement" is set, the sensor outputs will be continuously updated when the trigger/Sync line is low. When "Triggered single shot measurement" is set, the outputs are updated only with falling edge on the trigger/Sync line. Trigger mode cannot be changed during RS485 streaming mode (44) and during diagnose mode (50). 0 * Triggered free running measurement 1 Triggered single shot measurement	
		UINT8	Analog output type 0 * Current 1 Voltage	
		UINT8	Analog output slope Slope of the analog characteristic curve. Can be positive (minimum output at minimum measurement value, fullscale output at maximum measurement value) or negative (vice	

			versa). `0  *` Positive `1` Negative		
		`UINT8`	Digital output type `0` Point `1  *` Window		
		`UINT8`	Digital output polarity `0  *` Active high `1` Active low		
		`UINT8`	Hysteresis alignment `4` INNER ALIGNMENT `5  *` OUTER ALIGNMENT		
		`FLOAT32`	Analog scaling near point [mm]		
		`FLOAT32`	Analog scaling far point [mm]		
		`FLOAT32`	Switch point 1 [mm]		
		`FLOAT32`	Switch point 2 [mm]		
		`FLOAT32`	Hysteresis 1 Width of hysteresis 1 [mm] (for SP1)		
		`FLOAT32`	Hysteresis 2 Width of hysteresis 2 [mm] (for SP2)		

208 (0xD0)	R		**Configuration 2** Values stored in configuration 2.	Stored in configuration no
		`UINT32`	Product id Material number	
		`UINT8`	Measurement type selection Measurement type to use for outputs. `27  *` Distance `34` Tolerance	
		`UINT8`	Precision `0` Standard `1` High `2  *` Very high `3` Highest	
		`UINT8`	Trigger mode This index defines how the sensor outputs will react on changes on the trigger/Sync line. When "Triggered free running measurement" is set, the sensor outputs will be continuously updated when the trigger/Sync line is low. When "Triggered single shot measurement" is set, the outputs are updated only with falling edge on the trigger/Sync line. Trigger mode cannot be changed during RS485 streaming mode (44) and during diagnose mode (50). `0  *` Triggered free running measurement `1` Triggered single shot measurement	
		`UINT8`	Analog output type `0  *` Current `1` Voltage	
		`UINT8`	Analog output slope Slope of the analog characteristic curve. Can be positive (minimum output at minimum measurement value, fullscale output at maximum measurement value) or negative (vice versa). `0  *` Positive `1` Negative	

		UINT8	Digital output type 0 Point 1 * Window	
		UINT8	Digital output polarity 0 * Active high 1 Active low	
		UINT8	Hysteresis alignment 4 INNER ALIGNMENT 5 * OUTER ALIGNMENT	
		FLOAT32	Analog scaling near point [mm]	
		FLOAT32	Analog scaling far point [mm]	
		FLOAT32	Switch point 1 [mm]	
		FLOAT32	Switch point 2 [mm]	
		FLOAT32	Hysteresis 1 Width of hysteresis 1 [mm] (for SP1)	
		FLOAT32	Hysteresis 2 Width of hysteresis 2 [mm] (for SP2)	

209 (0xD1)	R		**Configuration 3** Values stored in configuration 3.	Stored in configuration no
		UINT32	Product id Material number	
		UINT8	Measurement type selection Measurement type to use for outputs. 27 * Distance 34 Tolerance	
		UINT8	Precision 0 Standard 1 High 2 * Very high 3 Highest	
		UINT8	Trigger mode This index defines how the sensor outputs will react on changes on the trigger/Sync line. When "Triggered free running measurement" is set, the sensor outputs will be continuously updated when the trigger/Sync line is low. When "Triggered single shot measurement" is set, the outputs are updated only with falling edge on the trigger/Sync line. Trigger mode cannot be changed during RS485 streaming mode (44) and during diagnose mode (50). 0 * Triggered free running measurement 1 Triggered single shot measurement	
		UINT8	Analog output type 0 * Current 1 Voltage	
		UINT8	Analog output slope Slope of the analog characteristic curve. Can be positive (minimum output at minimum measurement value, fullscale output at maximum measurement value) or negative (vice versa). 0 * Positive 1 Negative	
		UINT8	Digital output type 0 Point 1 * Window	

		`UINT8`	Digital output polarity `0 *` Active high `1` Active low	
		`UINT8`	Hysteresis alignment `4` INNER ALIGNMENT `5 *` OUTER ALIGNMENT	
		`FLOAT32`	Analog scaling near point [mm]	
		`FLOAT32`	Analog scaling far point [mm]	
		`FLOAT32`	Switch point 1 [mm]	
		`FLOAT32`	Switch point 2 [mm]	
		`FLOAT32`	Hysteresis 1 Width of hysteresis 1 [mm] (for SP1)	
		`FLOAT32`	Hysteresis 2 Width of hysteresis 2 [mm] (for SP2)	

210 (`0xD2`)	`R`		**Active configuration** Values stored in active configuration.	Stored in configuration no
		`UINT32`	Product id Material number	
		`UINT8`	Measurement type selection Measurement type to use for outputs. `27 *` Distance `34` Tolerance	
		`UINT8`	Precision `0` Standard `1` High `2 *` Very high `3` Highest	
		`UINT8`	Trigger mode This index defines how the sensor outputs will react on changes on the trigger/Sync line. When "Triggered free running measurement" is set, the sensor outputs will be continuously updated when the trigger/Sync line is low. When "Triggered single shot measurement" is set, the outputs are updated only with falling edge on the trigger/Sync line. Trigger mode cannot be changed during RS485 streaming mode (44) and during diagnose mode (50). `0 *` Triggered free running measurement `1` Triggered single shot measurement	
		`UINT8`	Analog output type `0 *` Current `1` Voltage	
		`UINT8`	Analog output slope Slope of the analog characteristic curve. Can be positive (minimum output at minimum measurement value, fullscale output at maximum measurement value) or negative (vice versa). `0 *` Positive `1` Negative	
		`UINT8`	Digital output type `0` Point `1 *` Window	
		`UINT8`	Digital output polarity `0 *` Active high `1` Active low	

		UINT8	Hysteresis alignment 4 INNER ALIGNMENT 5 * OUTER ALIGNMENT
		FLOAT32	Analog scaling near point [mm]
		FLOAT32	Analog scaling far point [mm]
		FLOAT32	Switch point 1 [mm]
		FLOAT32	Switch point 2 [mm]
		FLOAT32	Hysteresis 1 Width of hysteresis 1 [mm] (for SP1)
		FLOAT32	Hysteresis 2 Width of hysteresis 2 [mm] (for SP2)

4   Appendix

4.1   Dependencies

Because some commands are dependent on one another, they can be executed only if certain settings were configured in advance. Important: Before RS485 commands can be sent, RS485 must be unlocked via the command :01W010;0;E9C3\r\n (010 RS485 lock).

Input configuration columns: RS485 lock (10), Laser off data hold * (34), Diagnose mode ** (50), RS485 Streaming mode (44)

Configuration	10	34	50	44	0	1	2	5	6	10	11	15	16	17	18	20	21	33	34	40	41	42	43	44	45	46	47	48	49	50	54	200	201	202	207	208	209	210	253	254
locked										R/W																														
unlocked, laser on (0), Diagnose on, Streaming off			on	off	R	R	R	R/W	R/W	R/W	R/W	R/W		R/W		R	R	R/W		R/W	R/W	R/W	W		R/W					R/W	R		W	W	R	R	R	R	Ri	Ri
unlocked, laser on (0), Diagnose off, Streaming off			off	off	R	R	R	R/W	R/W	R/W	R/W	R/W		R/W	R/W	R	R	R/W	R/W	R/W	R/W	R/W	W	R/W	R/W					R/W		W	W	W	R	R	R	R	Ri	Ri
unlocked, laser on (0), Streaming on				on	R	R	R	R/W	R/W			R/W		R/W		R	R	R/W		R/W	R/W	R/W	W	R/W	R/W									W	R	R	R	R	Ri	Ri
unlocked, laser off		1			R	R	R	R/W	R/W	R/W	R/W	R/W		R/W	R/W	R	R	R/W	R/W	R/W	R/W	R/W	W		R/W						R		W	W	R	R	R	R	Ri	Ri

Legend

W	Index unlocked for write access
R	Index unlocked for read access
Ri	Index with read access, only for internal use inside Baumer (accessible if parameter ProductionBlock->RS485Settings->b_Rs485_EnableInternalIndices = 1)
R/W	Index unlocked for read/write access
(dark)	Index locked

* Laser of data hold command (34) has similar impact as pulling the trigger/sync signal line. If set to 1, the laser is switched off regardless the trigger line state and current trigger mode (18). If set to 0, the laser state is controlled by trigger line depending on current trigger mode (18). Reading from this index always returns the actual state of the laser.

** Diagnose mode (50) can be activated (by writing 1 into it) only when following preconditions are met: RS485 streaming mode (44) disabled, trigger mode (18) set to "Triggered free running measurement", Laser on (34) and trigger line signal being low. No preconditions have to be met to disable the diagnose mode (by writing 0 into it). If not specified otherwise by the table above, the diagnose mode index is unlocked for read access.

5   History of changes

Date	Version	Description
10.11.2017	1.0	Document created

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