

RS485 Index Command List

Radar RS485



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1 Introduction

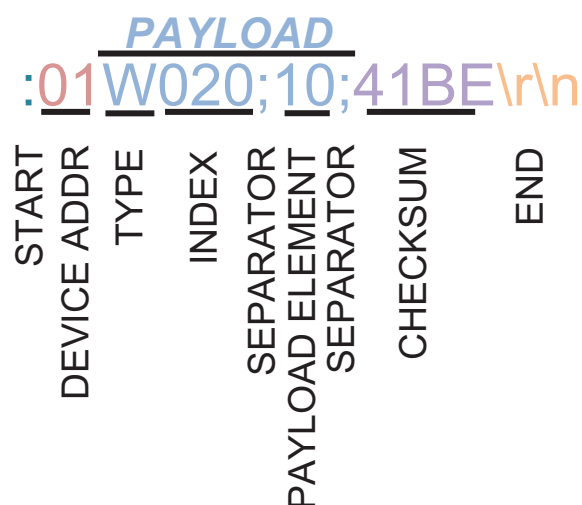
This manual supplements the manual "Radar RS485 Protocol Structure" and is valid for the Baumer Radar RS485 sensors.

1.1 UART Interface Settings

Index Command	Value
Baud rate at power up	57'600
Databits	8
Startbit	1
Stopbit	1
Parity	Even

2 Command Structure

An RS485 command is structured as follows.



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

Index	Read/Write	Content	Can be stored in configuration
6 (0x6)	RW		
		Baudrate Communication baud rate	Stored in configuration: yes (for all configuration sets)
		Baudrate 0 * 57'600 1 115'200 2 1'000'000 3 2'000'000 4 3'000'000	
		Data type	Description (0 stands for 57'600 Baud here)

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 signaled using the underlying protocol. The error code has to be read immediately after the error is signaled. It will be overwritten by any other command.	Stored in configuration: no, read-only
		UINT32	Application error 0 no error 99 argument out of range	

3.2 Device identification

1 (0x1)	R		Vendor info Vendor information	Stored in configuration: no, read-only
		UINT32	Vendor id 1 Baumer Electric AG	
		STRING 65	Vendor name Baumer Electric AG	

2 (0x2)	R		Device info Device information	Stored in configuration: no, read-only
		UINT32	Device id 122 Radar 122 GHz	
		UINT32	Variant id Material number 11167367	
		STRING 65	Sensor type RR30.DAH5-TGPT.9VF	
		STRING 15	Serial number 123456789AB	

3.3 Communication features

5 (0x5)	RW		Bus address Sensors bus address	Stored in configuration: yes (global)
		UINT8	Bus address default: 1 Value range: 1 ... 99	

6 (0x6)	RW		Baudrate Communication baud rate	Stored in configuration: yes (global)
		UINT8	Baudrate 0 * 57'600 1 115'200 2 1'000'000 3 2'000'000 4 3'000'000	

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 QTeach and all RS485 commands will be rejected (except access to this index). If the lock is deactivated, the sensor can be controlled using RS485. QTeach is locked in this case.	Stored in configuration: no
		UINT8	RS485 lock 0 RS485 lock deactivated 1 * RS485 lock activated	

19 (0x13)	RW		QTeach lock If enabled, the QTeach is locked and cannot be used.	Stored in configuration: yes (global)
		UINT8	QTeach lock 0 QTeach lock deactivated 1 * QTeach lock activated	

3.5 Measurement features

20 (0x14)	RW		Sensor type selection Selects the sensor type to measure either up to 8.5m or up to 40m	Stored in configuration: yes
		UINT8	Sensor type selection 40 * Distance measurement range up to 8.5m 41 Distance measurement range up to 40m	

27 (0x1B)	R		Measurement value Returns the measurement value (Distance or Velocity), depending on the Measurement type selection	Stored in configuration: no, read-only
		UINT32	Timestamp Counts the sensors operating time. Resets at a value of 4'294'967'296 ms. [ms]	
		UINT32	Quality Indicates if the reflected signal is of good quality. 0 Valid 1 Low signal 4 No signal	
		FLOAT32	Distance [mm]	
		FLOAT32	Velocity [m/s]	
		UINT8	Digital input / output status Digital input /output status bit-field. Bit0 indicates the Digital input / output. 0 Input / Output off 1 Input / Output on	

28 (0x1C)	R		All measurement values Reads all the available measurement values.	Stored in configuration: no, read-only
		UINT32	Timestamp Counts the sensors operating time. Resets at a value of 4'294'967'296 ms. [ms]	
		VARLIST [UINT32] 32	Quality data Includes the Quality indication for each peak. [0]: Valid, [1]: Low signal Answer array structure: [N Q(1) Q(2) Q(3) ... Q(N)] N: Number of detected peaks Q(X) : Quality information of peak number X	
		VARLIST [FLOAT32] 32	Distance data Includes the Distance values for each peak. [mm] Answer array structure: [N D(1) D(2) D(3) ... D(N)] N: Number of detected peaks D(X) : Measured distance of peak number X	
		VARLIST [FLOAT32] 32	Velocity data Includes the Velocity values for each peak. [m/s] Answer array structure: [N V(1) V(2) V(3) ... V(N)] N: Number of detected peaks V(X) : Measured velocity of peak number X	
		VARLIST [FLOAT32] 32	Amplitude data Includes information about the amplitude of each peak. [in % of maximal possible amplitude] Answer array structure: [N A(1) A(2) A(3) ... A(N)] N: Number of detected peaks A(X) : Amplitude information of peak number X	
		UINT8	Digital input / output status Digital input /output status bit-field. Bit0 indicates the Digital input / output. 0 Input / Output off 1 Input / Output on	

Example:

Command: :00R028;****\r\n

Answer: :01A;163044;3 0 0 1;3 375.880 978.373 3637.290;3 0.000 0.000
0.000;3 8.800 37.300 0.600;47FB\r\n

Situation:

The command was settled out 163044 ms after sensors startup. The sensor detected three peaks, two of them of good quality and one target reflected a low signal. The targets are not in motion. The sensor detects a metallic target (978.373 mm) behind a plastic faceplate (375.880 mm). The third peak is reflected by an arbitrary target (3637.290 mm) in the background. These peaks and their signal powers are illustrated in the drawing below (Figure 1).

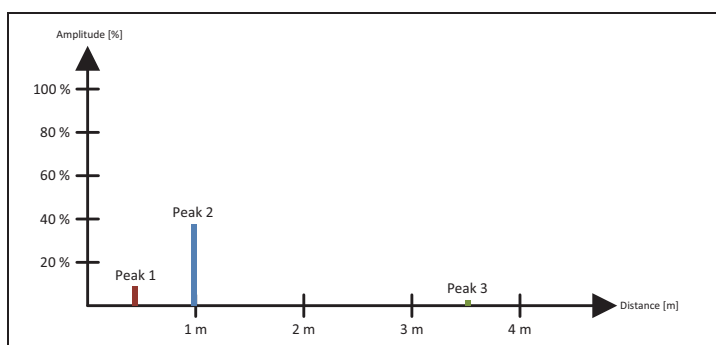


Figure 1: Example *All measurement values* command

38 (0x26)	RW		Measuring range Defines the area where peaks can be detected.	Stored in configuration: yes
		FLOAT32	Measuring range start No peaks can be detected before the Measuring range start value. [mm] Value range: 100 ... 12000 (8.5m sensor type) Value range: 100 ... 44000 (40m sensor type)	
		FLOAT32	Measuring range end No peaks can be detected after the Measuring range end value. [mm] Value range: 100 ... 12000 (8.5m sensor type) Value range: 100 ... 44000 (40m sensor type)	

33 (0x21)	RW		Precision Adjusts the filtering of the measured values. Increasing the sensors precision results in a more stable measurement value in exchange of a higher sensor measurement time and vice versa.	Stored in configuration: yes
		UINT8	Precision levels 0 Low (no filtering) 1 * Standard 2 High 3 Very high 4 Ultra high	

81 (0x51)	RW		Sensitivity Adjusts the sensitivity of the sensor. Attention: Higher sensitivity means more sensitive to weak signals of disrupters as well.	Stored in configuration: yes
		UINT8	Sensitivity levels 0 Low 1 * Standard 2 High	

100 (0x64)	R		Radar temperature Internal sensor temperature	Stored in configuration: no, read-only
		INT16	Radar Temperature [°C]	

3.6 Digital Input / Output configuration

40 (0x28)	RW		Digital input / output configuration Settings of the digital input / output pin	Stored in configuration: yes
		FLOAT32	Switch point 1 [mm] Value range: 200 ... 10000 (8.5m sensor type) Value range: 400 ... 42000 (40m sensor type)	
		FLOAT32	Switch point 2 [mm] (only needed for Window Switch) Value range: 200 ... 10000 (8.5m sensor type) Value range: 400 ... 42000 (40m sensor type)	
		UINT8	Digital input / output type 0 None 1 * Proximity switch (Output) 2 Window switch (Output) 3 Trigger (Input)* 4 Encoder (Input)**	
		UINT8	Digital input / output polarity 0 * Active high (Trigger: Rising Edge, Encoder: no functionality) 1 Active low (Trigger: Falling Edge, Encoder: no functionality)	

* If 'Digital input type' 'Trigger' is selected, the sensor automatically switches to 'PrecisionLevel' 'Low (no filtering)' to avoid filtering of multiple shots.

** If 'Digital input type' 'Encoder' is selected, the digital input state is read on every measurement cycle. This state can be read by reading the 'digital input status'.

Example:

- Switch point 1: 2000 mm, Switch point 2: 6000 mm
- Digital input / output polarity: Active high (Rising Edge)

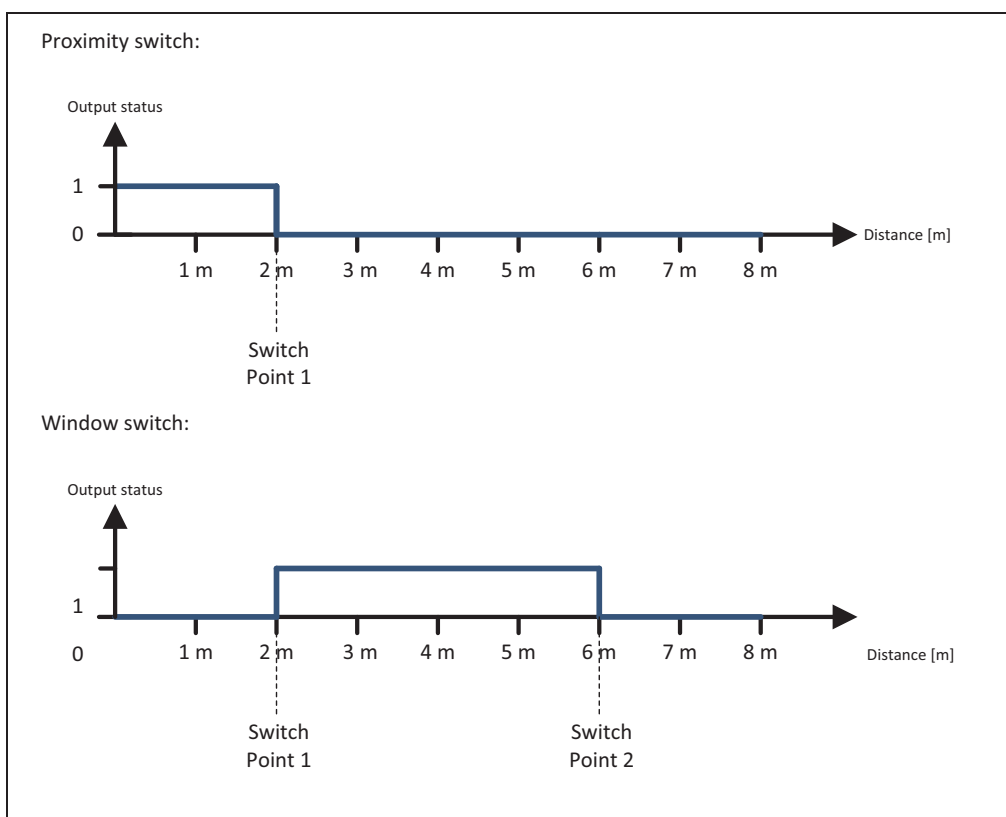


Figure 2: Description Digital output types

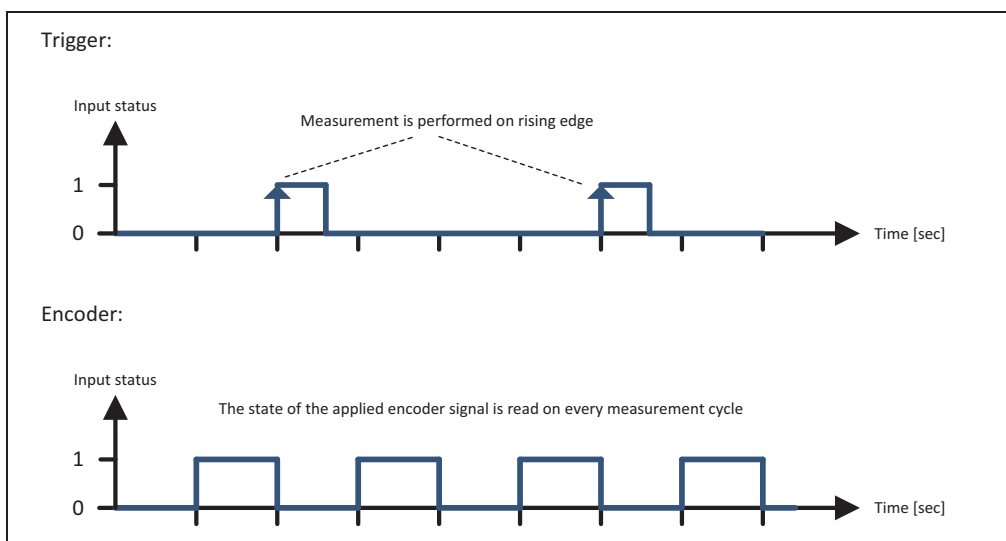


Figure 3: Description Digital input types

3.7 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.	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.	Stored in configuration: no
		UINT8	Configuration number 0 Active config 1 Config 1 2 Config 2 3 Config 3	Current configuration will be stored to the active configuration. Current configuration will be stored to Config 1. Current configuration will be stored to Config 2. 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	

203 (0xCB)	R		Configuration 1 Values stored in configuration 1.	Stored in configuration: no
		UINT8	Sensor type selection 40 * Distance measurement range up to 8.5m 41 Distance measurement range up to 40m	
		UINT8	Sensitivity levels 0 Low 1 * Standard 2 High	
		UINT8	Precision levels 0 Low (no filtering) 1 * Standard 2 High 3 Very high 4 Ultra high	
		INT8	Dummy_4	
		UINT32	Dummy_5	
		UINT32	Dummy_6	
		UINT16	Dummy_7	
		UINT16	Dummy_8	
		UINT32	Dummy_9	
		FLOAT32	Dummy_10	
		INT8	Dummy_11	
		INT8	Dummy_12	
		UINT8	Digital input / output type 0 None 1 * Proximity switch (Output) 2 Window switch (Output) 3 Trigger (Input) 4 Encoder (Input)	
		UINT8	Digital output/input polarity 0 * Active high (Trigger: Rising Edge, Encoder: no functionality) 1 Active low (Trigger: Falling Edge, Encoder: no functionality)	
		FLOAT32	Switch point 1 [mm] Value range: 200 ... 10000 (8.5m sensor type) Value range: 400 ... 42000 (40m sensor type)	
		FLOAT32	Switch point 2 [mm] (only needed for Window Switch) Value range: 200 ... 10000 (8.5m sensor type) Value range: 400 ... 42000 (40m sensor type)	
		FLOAT32	Measuring range start [mm] Value range: 100 ... 12000 (8.5m sensor type) Value range: 100 ... 44000 (40m sensor type)	
		FLOAT32	Measuring range end [mm] Value range: 100 ... 12000 (8.5m sensor type) Value range: 100 ... 44000 (40m sensor type)	
		FLOAT32	Dummy_19	

204 (0xCC)	R		Configuration 2 Values stored in configuration 2.	Stored in configuration: no
		UINT8	Sensor type selection 40 * Distance measurement range up to 8.5m 41 Distance measurement range up to 40m	
		UINT8	Sensitivity levels 0 Low 1 * Standard 2 High	
		UINT8	Precision levels 0 Low (no filtering) 1 * Standard 2 High 3 Very high 4 Ultra high	
		INT8	Dummy_4	
		UINT32	Dummy_5	
		UINT32	Dummy_6	
		UINT16	Dummy_7	
		UINT16	Dummy_8	
		UINT32	Dummy_9	
		FLOAT32	Dummy_10	
		INT8	Dummy_11	
		INT8	Dummy_12	
		UINT8	Digital input / output type 0 None 1 * Proximity switch (Output) 2 Window switch (Output) 3 Trigger (Input) 4 Encoder (Input)	
		UINT8	Digital input / output polarity 0 * Active high (Trigger: Rising Edge, Encoder: no functionality) 1 Active low (Trigger: Falling Edge, Encoder: no functionality)	
		FLOAT32	Switch point 1 [mm] Value range: 200 ... 10000 (8.5m sensor type) Value range: 400 ... 42000 (40m sensor type)	
		FLOAT32	Switch point 2 [mm] (only needed for Window Switch) Value range: 200 ... 10000 (8.5m sensor type) Value range: 400 ... 42000 (40m sensor type)	
		FLOAT32	Measuring range start [mm] Value range: 100 ... 12000 (8.5m sensor type) Value range: 100 ... 44000 (40m sensor type)	
		FLOAT32	Measuring range end [mm] Value range: 100 ... 12000 (8.5m sensor type) Value range: 100 ... 44000 (40m sensor type)	
		FLOAT32	Dummy_19	

205 (0xCD)	R		Configuration 3 Values stored in configuration 3.	Stored in configuration: no
		UINT8	Sensor type selection 40 * Distance measurement range up to 8.5m 41 Distance measurement range up to 40m	
		UINT8	Sensitivity levels 0 Low 1 * Standard 2 High	
		UINT8	Precision levels 0 Low 1 * Standard 2 High 3 Very high 4 Ultra high	
		INT8	Dummy_4	
		UINT32	Dummy_5	
		UINT32	Dummy_6	
		UINT16	Dummy_7	
		UINT16	Dummy_8	
		UINT32	Dummy_9	
		FLOAT32	Dummy_10	
		INT8	Dummy_11	
		INT8	Dummy_12	
		UINT8	Digital input / output type 0 None 1 * Proximity switch (Output) 2 Window switch (Output) 3 Trigger (Input) 4 Encoder (Input)	
		UINT8	Digital input / output polarity 0 * Active high (Trigger: Rising Edge, Encoder: no functionality) 1 Active low (Trigger: Falling Edge, Encoder: no functionality)	
		FLOAT32	Switch point 1 [mm] Value range: 200 ... 10000 (8.5m sensor type) Value range: 400 ... 42000 (40m sensor type)	
		FLOAT32	Switch point 2 [mm] (only needed for Window Switch) Value range: 200 ... 10000 (8.5m sensor type) Value range: 400 ... 42000 (40m sensor type)	
		FLOAT32	Measuring range start [mm] Value range: 100 ... 12000 (8.5m sensor type) Value range: 100 ... 44000 (40m sensor type)	
		FLOAT32	Measuring range end [mm] Value range: 100 ... 12000 (8.5m sensor type) Value range: 100 ... 44000 (40m sensor type)	
		FLOAT32	Dummy_19	

206 (0xCE)	R		Active configuration Values stored in the active configuration (0).	Stored in configuration: no
		UINT8	Sensor type selection 40 * Distance measurement range up to 8.5m 41 Distance measurement range up to 40m	
		UINT8	Sensitivity levels 0 Low 1 * Standard 2 High	
		UINT8	Precision levels 0 Low 1 * Standard 2 High 3 Very high 4 Ultra high	
		INT8	Dummy_4	
		UINT32	Dummy_5	
		UINT32	Dummy_6	
		UINT16	Dummy_7	
		UINT16	Dummy_8	
		UINT32	Dummy_9	
		FLOAT32	Dummy_10	
		INT8	Dummy_11	
		INT8	Dummy_12	
		UINT8	Digital input / output type 0 None 1 * Proximity switch (Output) 2 Window switch (Output) 3 Trigger (Input) 4 Encoder (Input)	
		UINT8	Digital input / output polarity 0 * Active high (Trigger: Rising Edge, Encoder: no functionality) 1 Active low (Trigger: Falling Edge, Encoder: no functionality)	
		FLOAT32	Switch point 1 [mm] Value range: 200 ... 10000 (8.5m sensor type) Value range: 400 ... 42000 (40m sensor type)	
		FLOAT32	Switch point 2 [mm] (only needed for Window Switch) Value range: 200 ... 10000 (8.5m sensor type) Value range: 400 ... 42000 (40m sensor type)	
		FLOAT32	Measuring range start [mm] Value range: 100 ... 12000 (8.5m sensor type) Value range: 100 ... 44000 (40m sensor type)	
		FLOAT32	Measuring range end [mm] Value range: 100 ... 12000 (8.5m sensor type) Value range: 100 ... 44000 (40m sensor type)	
		FLOAT32	Dummy_19	

4 History of changes

Date	Version	Description
06.02.2017	1.0	First approved version
10.11.2017	1.1	Added new functionalities