PEPPERL FUCHS MWL2A P+F Radar L2 CAN Ultrasonic Sensors with CAN Interface User Manual

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Contents

Purpose & Scope

General Notes

This document describes the Radar Sensor from Pepperl+Fuchs, build state ‘Development Sample 2.2’. This build state is the pre-build of series versions and made in production environment. Thus the sensors in this build state are suitable for qualification testing, real world testing and field application use.

Provided is this manual in order to allow users of the sensors the proper setup for the intended use.

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Documentation
Document Version 1.8, Draft Version

Validity

This document applies to DS2.2 devices from hardware HW01.00 and firmware FW01.00. The version numbers can be found in CANopen parameter ‘Manufacturer Hardware Revision’ with Object Index 0x1009 and ‘Manufacturer Software Revision’ with Object Index 0x100A according to section 4.3 of this document.

For devices with newer versions, documentation will be available on request.

Product build state

The current build state is the Development Sample 2.2 (DS2.2). The unit can but must not show a complete labeling, but latest build states will show complete part marking. At least a 2D data matrix code is attached in order to apply a unique serial number to each DS2.2 sensor.

The sensor is currently available in four different versions defined according to Table 1 as listed below. The sensor housing and electronics except the kind of electrical connection is for all versions identical.

Part number	Type code	Interface type	Connector type	Pigtail/cable type	Datasheet
70134318-100000	MWC25M-L2M-B16-V15	CANopen	M12x1	no	70134318-100000_ENG
70134318-100001	MWC25M-L2M-B16-0,3M-APS5P	CANopen	AMP	0.3m pigtail	70134318-100001_ENG
70134318-100002	MWC25M-L2M-B16-0,3M-DT6P	CANopen	DEUTSCH	0.3m pigtail	70134318-100002_ENG
70134318-100003	MWC25M-L2M-B16-2M	CANopen	no connector	2m cable	70134318-100003_ENG

Unit description

Intended Use

The radar sensor series MWC25M-L2M-B16 emits electromagnetic waves (radar waves) that are reflected from objects in the sensing range and received back by the radar sensor to detect objects, measure their distance from the sensor, and measure the relative velocity of an object. The radar sensor operates according to the Frequency Modulated Continuous Wave (FMCW) method in the 122 GHz – 123 GHz ISM band, approved for industrial use. The sensor it emits a continuous radar signal that is varied in frequency within the frequency range of the ISM band. With this method, the sensor is able to reliably detect the distance and velocity of static and moving objects. When measuring velocity, the radar sensor detects the velocity of an object in the radial direction only, without measuring tangential velocity or parts of speeds.

Use and application

The radar sensor series MWC25M-L2M-B16 with CAN open interface for distances up to 25 m range is optimized for use in industrial applications. Its compact cubic housing of the L2 series is proven in many industrial areas due to its high robustness.

The radar sensor has a standardized CANopen interface according to CiA 301 specification. Via Service Data Objects (SDOs) the sensor can be parameterized for specific features in each application. You can e.g. parameterize the measurement mode, the foreground and background suppression as well as the minimum and maximum velocity suppression. In addition, it is possible to set many other parameters, such as the filter operating mode, the filter strength and the sampling rate. Alternatively to the parameterization via CAN-Bus, P+F offers a device type manager (DTM) using the FTD framework program PACTware. Herewith you can additionally use various evaluation and filter settings for distance and velocity values.

Typically, radar sensors are used in a variety of applications such as:

- Distance measurement (between two vehicles, in a crane arm, between two cranes, etc.)
- Velocity measurement (of trains, on AGVs, etc.)
- Area monitoring/anti-collision monitoring (on front and rear of vehicles, etc.)
- Fill level control (silo, agricultural tanks, etc.)
- Height control (scissor lift table, work platforms, etc.)

Specific regulations

Europe

This device complies with the following standards:

EN 305550-1
EN 301489-1
EN 301489-3
EN 62368-1
EN 62311

With this the sensor fulfils the regulatory requirements in order to cover the requirements for the frequency band usage, the avoidance of electromagnetic interference, the robustness against accepted interference and the requirements for health and safety limits for the user, respectively.

For a complete list of all supported standards please refer to the respective data sheet and the declaration of conformity, available on the P+F product web page.

USA & Canada

This device contains license exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s) and complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation of the device.

Note:
The operation on board of an aircraft and or / on board of a satellite is prohibited!

Note:

Canada specific regulation: The device should not point >30° elevation towards the sky in normal operation.

Note:
Changes or modifications made to this equipment not expressly approved by Peppers & Fuchs may void the FCC authorization to operate this equipment!

Note:
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Radiofrequency radiation exposure Information:
This equipment complies with FCC and ISED radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

FCC ID : IRE-MWL2A

IC ID : 7037A-MWL2A
HVIN/PMN : MWL2A

Installation

Safety Information

Caution!

Risk of short circuit Carrying out work while the system is energized may result in damage to the device.

- Always disconnect the supply voltage before carrying out work on the device.
- Only connect the device to the supply voltage once all work has been completed.

Preparation

Unpacking the Device

1. Check the packaging and contents for damage.
    - In the event of damage, inform the shipping company and notify the supplier.
2. Check the package contents against your order and the shipping documents to ensure that all items are present and correct.
    - Should you have any questions, direct them to Pepperl+Fuchs.
3. Retain the original packaging in case the device is to be stored or shipped again at a later date.

Connection

Applying Supply Voltage for a Sensor with V15 Connector Plug
To supply voltage to the sensor, proceed as follows:

1. Insert the prepared connection cable into the connector plug provided for this purpose on the sensor.
2. Screw the union nut onto the connector plug as far as it will go. This ensures that the power cable cannot be pulled out inadvertently.
3. Now connect the supply voltage to the cables provided for this purpose and switch it on.
    - The sensor is now ready for operation.

Applying Supply Voltage to a Sensor Fixed Cable with Plug
To supply voltage to the sensor, proceed as follows:

1. Connect the prepared connection cable to the plug of the sensor connection cable.
2. If present, secure the plug connection with the securing elements provided.
3. Now connect the supply voltage to the cables provided for this purpose and switch it on.
    - The sensor is now ready for operation.

Note:

- Use a shielded 5-wire sensor connection cable to connect the sensor to a CAN open bus, because the pinout of the CAN open specification differs from the standard pinout.
- For pin assignment or cable color assignment refer to the respective data sheet.

LED Indicators
The sensor has a status LED and a sensor LED.

Status LED
The Status LED is a two colour LED with green colour or red colour. A mixture of both colours in order to obtain an orange colour is not used. The status LED indicates the sensor / CAN-Bus status according to the definitions in the table detailed below,

Part number	Type code	Interface type	Connector type	Pigtail/cable type	Datasheet
70134318-100000	MWC25M-L2M-B16-V15	CANopen	M12x1	no	70134318-100000_ENG
70134318-100001	MWC25M-L2M-B16-0,3M-APS5P	CANopen	AMP	0.3m pigtail	70134318-100001_ENG
70134318-100002	MWC25M-L2M-B16-0,3M-DT6P	CANopen	DEUTSCH	0.3m pigtail	70134318-100002_ENG
70134318-100003	MWC25M-L2M-B16-2M	CANopen	no connector	2m cable	70134318-100003_ENG

Sensor LED
The sensor LED indicates the measurement result of the sensor with a yellow colour. Two states are implemented:

- LED is on, permanent yellow light indicates an object detected in the sensing range.
- If the LED is off no object has been detected.

LED Configuration
The sensor configuration allows a LED off mode. The indication by LEDs can be completely disabled over the object 0x4001 according to section 4.3 of this document.

CANopen Interface

Commissioning

Supported Features and Standards

The CANopen interface on the Pepperl+Fuchs Radar Sensor DS2 supports the following CANopen features:

- Network management (NMT)
- Heartbeat
- Acyclic parameter access via service data objects (SDO)
- 4 transmit process data objects (TPDO)
- Layer setting services (LSS) for configuring the node ID and baud rate

- Store/restore configuration

The CANopen interface for the 1D Radar Sensor works with the following standard configuration (factory setting):

- **Node ID:** 16
- **Baud rate:** 250 kBit/s (CiA)

Note:

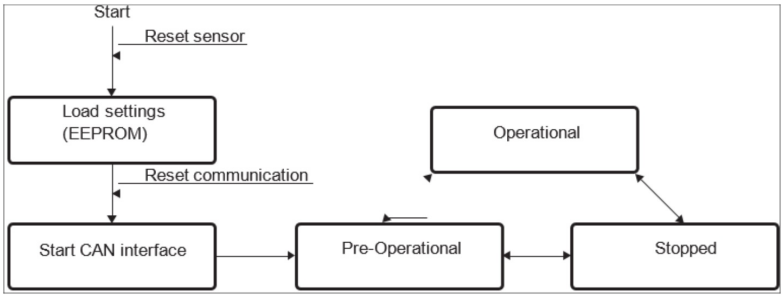
Before connecting the device to a network, make sure to configure the node ID according to the IDs present in the network. A node ID must be unambiguous, otherwise message collisions and errors can occur.

Network management (NMT)

The CANopen standard CiA301 specifies 3 possible states for the sensor node.

- Preoperational
- Operational
- Stopped

The node can be set to any of these states as required. When activated, a sensor always starts in preoperational state and issues a boot up message.



Preoperational
PDO (process data) messages cannot be sent in the “preoperational” state; as such, this state is used to parameterize the sensor or indicate a standby state.

Operational
In the “operational” state, all communication services are performed and process data is exchanged.

Stopped
In the “stopped” state, only NMT (network management) messages can be sent; redundant or defective sensors can be isolated from the bus almost completely in this state. The network manager can issue NMT messages to prompt the sensor to change from one state to another. Other NMT functions include 2 reset commands for resetting either the entire sensor or bus communication only.

Example of an NMT message sent by the network manager (start node #16)

0x000h	0x80h	0x10h	–	–	–	–	–	–
CAN-ID	Command	Node	not used					
	Data byte 1	Data byte 2	Data byte 3	Data byte 4	Data byte 5	Data byte 6	Data byte 7	Data byte 8

CAN-ID: 000h, NMT message from the network manager
Command: 80h, switch to preoperational state
Command: 02h, switch to stopped state
Command: 01h, switch to operational state
Command: 82h, reset communication
Command: 81h, reset sensor
Node: 01h … 7Fh, to address nodes 1 … 127 individually
Node: 00h, to address all nodes in the network simultaneously

Setting the Baud Rate and Node ID
For DS2 baud rate and node ID can be configured via LSS.

Note:
Configuration of Node ID and Baud rate via LSS is active after power cycle.

Heartbeat Function
The interval after which status messages are sent can be set via the object 1017h “Producer heartbeat time”. Entering the value 0 will deactivate the function. Every other 16-bit value determines the heart- beat interval in milliseconds. Default value is 0 ms, Heartbeat disabled (acc. to CiA301 profile requirements).

Heartbeat of the sensor (sensor in operation)

0x710h	0x05h	–	–	–	–	–	–	–
CAN-ID	Status	not used						
	Data byte 1	Data byte 2	Data byte 3	Data byte 4	Data byte 5	Data byte 6	Data byte 7	Data byte 8

CAN-ID: 0x710h, heartbeat message from the node with node number 16 (0x700h + 0x10h)
Status: 7Fh, sensor in “preoperational” state
Status: 04h, sensor in “stopped” state
Status: 05h, sensor in “operational” state

Error Register
The error register shows the appearance of event or errors of the sensor. Each event or error is coded bit by bit and multiple errors can be indicated at any time. A value of 0 is indicated if no error occurred. The error register can be accessed using object 0x1001h.

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Manufac- tu rer specific	Re- ser ved	Device pro- file specific	Communica- tion error	Tempera- t ure	Voltage	Current	Generic error

Detailed description:
Manufacturer specific: is indicated if a no target event or a hardware failure occurred
Device profile specific: currently not implemented

Communication error: currently not implemented
Temperature: is indicated if an over temperature warning occurred, Sensor outside specified temperature
Voltage: is indicated if an under voltage warning occurred
Generic error: is indicated in addition to any other error in this register

Operation and Communication

Process Data Object (PDO)

A maximum of 8 bytes of useable data can be sent in each message using the process data object (PDO). This feature is only available in the operational state and can be activated in dif ferent modes, set using the object 0x1800 “TPDO Communication Parameter” and 0x1A00 “TPDO mapping parameter.” A total of 2 transmit PDOs will be supported in the final product – currently in use is only 1 transmit PDO. The protocol supports dynamic PDO mapping. Example of the default PDO1 message: This PDO message contains measuring readings of the sensor that are sent periodically and automatically once new values are available (event triggered). The measuring rate of the device is 50Hz (per default value).

0x190	0x07AA	0x0000	0x03	0x4D
CAN-ID	Distance	Velocity	Signal quality	Cycle counter
	Data word 1	Data word 2	Data byte 1	Data byte 2

CAN-ID: 190h, PDO1 channel of node 16 (0x180h + 0x10h)
Distance: 0x07AA, corresponds to 1962 mm
Velocity: 0x0000, corresponds to 0 cm/s
Signal quality: 0x03, corresponds to excellent signal quality
Cycle counter: 0x4D, corresponds to 77 cycles

Service Data Object (SDO)

The device from Pepperl+Fuchs is equipped with service data channel 1 as required by CiA 301.
The channel is permanently set to CAN-IDs 580h + node ID for transmission and 600h + node ID for reception. A maximum of 4 bytes of usable data can be transmitted in a single message. Larger quantities of data are divided among several messages.

Example of reading an object with max. 4 bytes of data
Request to node #16:

0x610h	0x40h	0x00h	0x20h	0x01h	0x00h	0x00h	0x00h	0x00h
CAN- ID	Com-mand	Object index		Subin-dex	Data			
	Data byte 1	Data byte 2	Data byte 3	Data byte 4	Data byte 5	Data byte 6	Data byte 7	Data byte 8

Request CAN-ID: 0x610h, SDO1 channel of node 16 (0x600h + 0x10h)
Command: 40h, read object 0x2000:1.

Reply of node #16:

0x590h	0x4Bh	0x00h	0x20h	0x01h	0xAAh	0x07h	–	–
CAN- ID	Command r eply	Object index		Subin- de x	Data			
	Data byte1	Data byte 2	Data byte 3	Data byte 4	Data byte 5	Data byte 6	Data byte 7	Data byte 8

Reply CAN-ID: 0x590h, SDO1 channel of node 16 (0x580h + 0x10h)
Command Reply: 0x4Bh (Return has 2 Bytes of Data), object 0x2000:1, 0x7AAh (Returned Data).

Object Directory

Communication Segment

Index	Sub-Index	Parameter name	Data Type	Code descriptio n	Default value	Notes
0x1000	0	Device Type	u32		0x00000000	0 means that no device pro- file is used
0x1001	0	Error register	U8		0x00	Can be mapped to TP DO 0x00/0 No Error0x 03/3 Current 0x05/5 U ndervoltage0x09/9 Ov ertemperature 0x11/17 Communication0x21/3 3 DeviceProfiler 0x81/ 129 Manuf. Spec.
0x1002	0	Manufacturer statu s register	u32		0x00000000	0x00/0 NoError0x01/1 YetNoMeasurement 0x02/2 HardwareFailur e 0x04/4 Undervoltage 0x08/8 Overtemperatu re 0x10/16 NoTarget E mrgency (only if config - ured)0x20/32 SignalE rror (in case of noise/u nexpectedsignal)
0x1003	0	Preferred error field	u32		0x01	This object provides th e er- rors that occurred on the CANopen devic e and were signaled vi a the emergencyobject.
0x1005	0	COB ID SYNC	u32		0x00000080	This object indicates th e configured COB-ID o f the synchronization o bject (SYNC). Further, it defineswhether the CANopen de- vice gen erates the SYNC.

0x1008	0	Manufacturer Device Name	String	Type code like M WC25M-L2M- B1 6-V15	MWC25M-L2M-B16-V15	This object provides th e name of the device a s given by the manufacturer.
0x1009	0	Manufacturer Hard - ware Revision	String	Revision code lik e “1.0”	HW01.00	This object provides th emanufacturer hardwa re ver- sion description .
0x100A	0	Manufacturer Soft- ware Revision	String	Revision code lik e “1.0.0”	FW01.00	This object provides th e manufacturer softwar e ver- sion description.
0x1010	1	Save all parameter s	u32			This object controls th e saving of parameters in non-volatile memory .
0x1011	1	Restore all default parameters	u32			With this object the def ault values of paramet ers ac- cording to the c ommunica- tion profile, device profile and appl ication profile are resto red.0x01/1 Restore pa rameters
0x1014	0	COB ID EMCY	u32		$NODEID+0x80	This object indicates th econfigured COB-ID fo r the EMCY write servi ce.

Index	Sub-Index	Parameter name	Data Type	Code descriptio n	Default value	Notes
0x1015	0	Inhibit time emerge ncy	u16			This object indicates the configu red inhibit time forthe EMCY me ssage.
0x1017	0	Producer Heartbea t Time	u16		0x00/0	The producer heartbeat time ind icates the config- ured cycle tim e of the heart- beat produced by the de- vice.The value shall be g iven in multiples of 1 ms. The va lue 0 shall disable the producer heartbeat. 0x00 BootUp 0x04 St opped 0x05 Operational0x7F Pr e-operational
	Identity Object					
	0	Number of entries	u8		0x04	This object provides gen- eral id entification infor- mation of the C ANopen de-vice.

0x1018	1	Vendor ID	u8		0xAD/173 (=Pep-perl-Fuchs)	Subindex 1 contains the unique value that is allo- cated uniquely to each ven-dor of a CANopen device.
	2	Product Code	u32	Byte 1: Product Group CodeByte 2-4: Sequen- tial number	0x07000001 (example for MWC 25M-L2M- B16-V15)	Subindex 2 contains the unique value that identifies a specific type of CANopen devices.
0x1018	Identity Object					
	3	Revision Number	u32		0x01	Subindex 3 contains the major revision number and the minor revision number of the revision of the CANo-pen device.
	4	Serial Number	u32	32-bit P+F CANo-pen serial number	0x01234567	Not implemented yetSubindex 4 contains the se- rial number that identifies uniquely a CANopen device within a product group anda specific revision.
0x1020	Verify configuration					
	1	Configuration date	u32			Can be parametrized Value shall contain the number of days since Janu-ary 1,1984.
	2	Configuration time	u32			Can be parametrizedValue shall be number of ms after midnight.
0x1200	Server SDO Parameter					
	1	COB ID Client to Server	u32		$NODEID+0x600	In order to describe the SDOs used on a CANopen device the data type SDO parameter is introduced.
	2	COB ID Server to Client	u32		$NODEID+0x580	

Index	**Sub-Index**	**Parameter name**	**Data Type**	**Code description**	**Default value**	**Notes**
	Transmit PDO Communication Parameter					
	1	COB ID	u32		$NODEID+0x280	Subindex 1 contains the COB-ID of the TPDO.

0x1800	2	Transmission Type	u8		0xFE/245	Subindex 2 defines the transmission character of the TPDO. 0x00/0 synchronous (acy- clic)0x01/1 synchronous (cyclic every SYNC)0x02/2 synchronous (cyclic every 2nd SYNC)…0xF0/240 synchronous (cy- clic every 240th SYNC) 0xF1/241 reserved…0xFB/251 reserved 0xFC/252 RTR-only (syn- chronous)0xFD/253 RTR-only (event- driven)0xFE/254 event-driven (manufacturer-specific) 0xFF/255 event-driven (pro-file-specific)
	3	Inhibit time	u16		0x00/0	Subindex 3 contains the in- hibit time. The time is the minimum interval for PDO transmission if the trans- mission type is set to 0xFE and 0xFF. The value is de- fined as multiple of 100ms.The value of 0x00 shall dis- able the inhibit time.
	5	Event timer	u16		0x00/0	Subindex 5 contains the event-timer. The time is the maximum interval for PDO transmission if the trans- mission type is set to 0xFE and 0xFF.The value is defined as multiple of 1 ms.The value of 0x00 shall dis- able the event-timer.
	6	SYNC start value	u8		0x00/0	Subindex 6 contains the SYNC start value.The SYNC start value of 0x00 shall indicate that the counter of the SYNC mes- sage shall not be pro- cessed for this PDO.The SYNC start value 1 to 240 shall indicate that the counter of the SYNC mes- sage shall be processed fort his PDO.
0x1801	Transmit PDO Communication Parameter					
	1	COB ID	u32			Can be parametrized
	…	…	…			

Index	Sub-Index	Parameter name	Data Type	Code de scriptio n	Default value	Notes
0x1802	Transmit PDO Communication Parameter					
	1	COB ID	u32			Can be parametrized
	…	…	…			
0x1803	Transmit PDO Communication Parameter					
	1	COB ID	u32			Can be parametrized
	…	…	…			
0x1A00	Transmit PDO Mapping Parameter					
	1	Mapping Entry 1	u32		0x20000110	Subindex from 1 to 8 con- tains th e information of the mapped applic ation objects from process data ob ject 0x2000
	2	Mapping Entry 2	u32		0x20000210	
	3	Mapping Entry 3	u32		0x20000308	
	4	Mapping Entry 4	u32		0x20000508	
	…	Mapping Enrty …	u32		0x00000000	
0x1A01	Transmit PDO Mapping Parameter					
	1	Mapping Entry 1	u32		0x00000000	Can be parametrized
	…	Mapping Entry …	u32		0x00000000	
0x1A02	Transmit PDO Mapping Parameter					
	1	Mapping Entry 1	u32		0x00000000	Can be parametrized
	…	Mapping Entry …	u32		0x00000000	
0x1A03	Transmit PDO Mapping Parameter					
	1	Mapping Entry 1	u32		0x00000000	Can be parametrized
	…	Mapping Entry …	u32		0x00000000	

Manufacturer Segment

Index	Sub-Index	Parameter name	Data Type	Code description	Default value	Notes
0x2000	Process Data					
	1	Distance	u16	0x0000: target in blindzone 0xFFFF: no target detected		Distance value to the target in mm. Val ues will be given out between 500…50 000 mm.
						Mapped to TPDO on de- fault
	2	Velocity	int16	0x7FFF: target in blindzone 0x7FFF: no target detected		Relative velocity value be- tween the s ensor and a tar- get in cm/s.A target ap proaches if the algebraic sign of the vel oc- ity value is negative.A positive alge braic sign in- dicates a target which mo ves away. Values will be given out between-8000…8000 cm/s.
						Mapped to TPDO on de- fault
	3	Signal Quality	u8	0x00 – no target> 0x01 – Acceptable> 0x05 – Good> 0x0A – Excellent> 0x0F – Perfect (≙ corner reflector)		This object contains re- ceived signal s trength of a reflection.The signal qualit y can help to adjust the orientation of t he sensor in the applica- tion.The maxi mum signal quality value is dependent on the target distance and radar cross section of the target.
						0x00/0 no target0x01/1 worst signal qu ality…0x14/20 best signal quality (high est possible value)
						Mapped to TPDO on de- fault
	4	Cycle Counter16	u16	Counts from 0x01/ 1 to 0xFFFF/6553 5		This object contains a counter which is incre- mented if a measurement cycle has been finished. In case of an overflow, the cy- cle counter restarts at the value 1.
						Mapped to TPDO on de- fault
	5	Cycle Counter8	u8	Counts from 0x01/ 1 to 0xFF/255		This object contains a counter which is incre- mented if a measurement cycle has been finished. In case of an overflow, the cy- cle counter restarts at the value 1.
						Mapped to TPDO on de- fault

Index	Sub-Index	Parameter name	Data Type	Code description	Default value	Notes

0x2001	0	Operating Hours	u32			This object contains th e time duration the sen sor was operating. The time duration shows th e value infull hours.
0x2010	Identification & Info – public					
	1	Vendor Name	Strin g		“Pepperl+Fuchs”	This object contains a list of identification p arameters.
	2	Vendor Text	Strin g	Web link	www.pepperl-fuc hs.com/CANo- pen	
	3	Product ID	Strin g	Part number	70000001	
	4	Product Text	Strin g		“Radar Distance Sensor”	
	5	Serial Number	Strin g		40000000000001	
	6	Application Sepcifi c Tag	Strin g			
	7	Functional Tag	Strin g		***	
	8	Location Tag	Strin g		***	
	9	Unique Product ID	Strin g		https://pefu.de/ + Serial Number	
0x4000	Measurement Configuration					
	1	Measurement Mod e	u8	0x00: Closest dis- tance0x01: Best re flexion 0x02: Faste st veloc-ity	0x00	Subindex 1 allows to s elect the measurement mode for the sensor.
	2	Sampling Rate	u16	Sampling Rate in Hz [1; 2; …; 200 H z]	0x0032 / 50	Subindex 2 allows to s et the sampling rate in opera-tional mode in H z.
	3	Filter Mode	u8	0x00 – No filter 0x 01 – Median filter	0x01	Subindex 3 allows to s elect the measurement filter mode. The streng th of the median filter c an be config-ured in subindex 4.

	4	Filter Strength (Median filter)	u8	0x00 – Low 0x01 – Standard 0x02 – High 0x03 – Very high	0x01	Subindex 4 allows to select the filter strength for the median filter. The sliding window size can be se- lected from low to very high.The parameter has no influ- ence if “No filter” is se- lected.
						low = 3×2 std = 7×4 high = 11x6very high = 15×8
	5	Event Configuration	u8	0x00: No Target re- sults in Replacement Value0x01: No Target out- puts Emergency Message	0x00	Subindex 5 allows to con- figure an event to trigger an emergency message
	6	Foreground Suppression	u16	Range in mm	0x012C	Subindex 6 allows to set a distance value in mm tosuppress targets in the foreground sensing range.

Index	Sub-Index	Parameter name	Data Type	Code description	Default value	Notes
	7	Background Suppression	u16	Range in mm	0x7EF4	Subindex 7 allows to set a distance value in mm tosuppress targets in the background sensing range.
	8	Minimum velocity suppression	u16	Range in cm/s	0x00	Subindex 8 allows to set an absolute velocity value in cm/s to suppress targets below it.
						Lowest limit with 0cm/s
	9	Maximum velocity suppression	u16	Range in cm/s	0x00C8	Subindex 9 allows to set an absolute velocity value in cm/s to suppress targets above it.
						Highest range with 8000cm/s (80m/s)
0x4001	LED Configuration					
	1	LED Config	BOOL	0x00: Disable all	0x01	This object contains the
				LEDs0x01: Enable all LEDs		configuration of the LED be-havior. It allows to ena- ble/disable all indicatorLEDs of the sensor.
0x4100	Reflections Array List					
	1	1 Distance	real32	[300; 50000 mm]0 if no target de- tected		This object contains up to ten reflections of targets. All reflections are output without any influence of fil- ters or suppressions. Each reflection shows the following values:-distance in mm-velocity in cm/s-amplitude in digits
	2	2 Velocity	real32	[0; +/-8000 cm/s]0 if target does not move		
	3	3 Amplitude	real32	[0; 100000]0 if no target de- tected		
	…	… Distance… Velocity… Amplitude				
	31	GetAll	String			Subindex 31 returns all re- flections at once. The val- ues need to be converted from bytes to float.

Documents / Resources

	PEPPERL FUCHS MWL2A P+F Radar L2 CAN Ultrasonic Sensors with CAN Interface [pdf] User Manual MWL2A P F Radar L2 CAN Ultrasonic Sensors with CAN Interface, MWL2A P F Radar L2 CAN, Ultrasonic Sensors with CAN Interface, Sensors with CAN Interface, CAN Interface

References

- User Manual