



Model Number

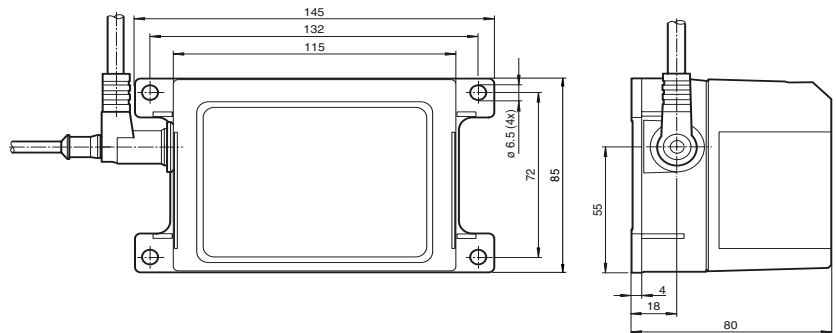
VDM54-6000-R-3999/20/88/105

Distance sensor
with 5-pin, M12 connector

Features

- Measuring method PRT (Pulse Ranging Technology)
- Not sensitive to ambient light
- Standard interface RS 485
- Settings for LJU control preset ex works
- Direct integration in the control system due to high measuring rate

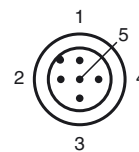
Dimensions



Electrical connection

1/BN	+UB
2/WH	RS 485 B (+)
3/BU	0 V
4/BK	RS 485 A (-)
5/GY	n. c.

Pinout



Technical data

General specifications

Reference target	Reflector H100-2R
Light source	laser diode
Light type	modulated infrared light
Laser nominal ratings	
Laser class	1
wave length	900 nm
Beam divergence	120 mrad
Pulse length	≤ 8 ns
Repetition rate	≥ 4 kHz
Maximum optical power output	2.6 W
Approvals	CE
Measuring method	Pulse Ranging Technology (PRT)
Measurement range	0 ... 6 m
Ambient light limit	halogen light 50000 Lux

Indicators/operating means

Operating display	LED green
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Electrical specifications

Operating voltage	U_B	18 ... 30 V DC
Ripple		10 % within the supply tolerance
No-load supply current	I_0	≤ 200 mA
Time delay before availability	t_v	≤ 300 ms

Interface

Interface type	RS 485
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Output

Interfaces	RS 485	
Baudrate	62.5 kBaud (Factory setting)	
Switching current	max. 200 mA	
Voltage drop	U_d	≤ 2.4 V

Ambient conditions

Ambient temperature	0 ... 50 °C (32 ... 122 °F)
Storage temperature	-20 ... 70 °C (-4 ... 158 °F)

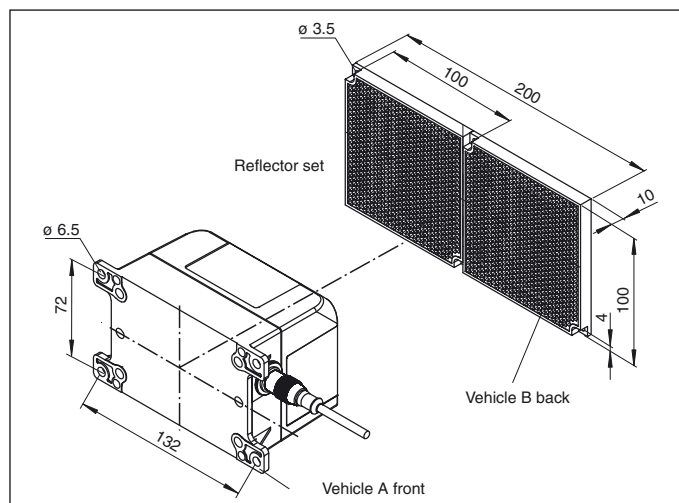
Mechanical specifications

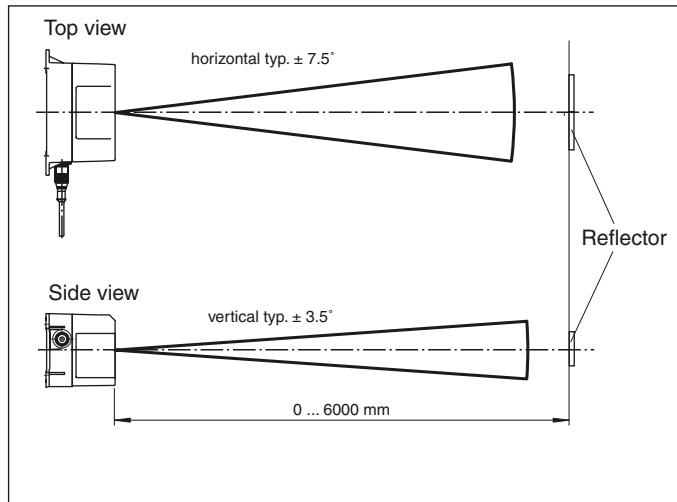
Protection degree	IP54
Connection	M12 x 1 connector, 5-pin
Material	
Housing	ABS
Mass	200 g

Compliance with standards and directives

Directive conformity	
EMC Directive 2004/108/EC	EN 60947-5-2
Standard conformity	
Laser class	IEC 60825-1:2007

Curves/Diagrams





Serial Communication

VDM54-6000-R transmission frame

The sensor has a half-duplex-capable RS-485 interface. Although it is therefore bus-capable, it normally works only as a slave, i.e. it must be addressed by a higher-level control unit working in master mode to be able to send results. The following protocol is implemented:

- 8-bit data + 1-bit address selection + 1 start/stop bit; at 62,500 baud (1 byte = 9 bits + start bit + stop bit) (factory setting).
- If the 9th bit (address selection) was set, the slave recognizes that the contents of this byte is an address (ID).

It compares this address with its own. If the two match, it responds immediately after the frame end of the master is detected. When data is transferred, the 9th bit is always reset. The structure of the transfer frame is as follows:

General:

1st byte	2nd byte	3rd byte	Last byte
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Request (from master):

Slave ID	Master ID	Length	Command	Parameter(s)	Checksum (request from master)
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Answer (from VDM54):

Master ID	Own ID	Length	Command	Parameter(s)	Checksum (answer from slave)
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where:

- xxx_id = address or sender (1 byte)
- Length = number of characters sent including frame (1 byte)
- Command = control command (1 byte)
- Parameter = 0 ... n, depending on command (0 ... n bytes), nmax = 48
- Checksum = checksum based on "Exclusive OR" of all characters sent (1 byte)

The master request (= command) and slave answer are both transferred in the frame described above. Values returned by the slave are included in the parameters that are sent back.

The **slave** (VDM54 ...) always returns the currently measured distance as the last two parameter bytes (coding as in the command <C>, i.e. value *1 mm). In general, it recognizes the following possible **answers**:

Invalid command ("No Acknowledge"):

Master ID	Own ID	Length = 7	Command = 0x15	Distance 2 bytes	Checksum
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Valid command without return parameter ("Acknowledge"):

Master ID	Own ID	Length = 7	Command = 0x06	Distance 2 bytes	Checksum
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Valid command with return parameter (valid answer "XON"):

Master ID	Own ID	Length = 7+n	Command = 0x11	Nparameters 1 2 3 ... n	Distance 2 bytes	Checksum
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Command set

Implemented control commands are described below. All commands that change the configuration of the sensor are stored in user-programmable memory (flash). However, this does not apply to commands identified by (**)! Continuous measurement is not interrupted by communication. After the end of command, new states are accepted in ongoing operation unless the states are defined to interrupt operation (e.g. "RESET"). The individual control commands are described in the following table:

Command (4th byte) ASCII	Command [designation]	Master parameter	Description (5th byte and following) hex
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<A>(**)	Select Set (select receiver segment)	Parameters 1:80h ... 87h	The slave switches its receiver segment depending on the 1st parameter sent by the Master (curve device only).
	Reserved	81h	81h
	Reserved	Reserved	
	Reserved	82h(*)	
	Reserved	83h	
	Reserved	84h	
	Reserved	85h	
	Reserved	86h	
Reserved	87h		
	Set user baudrate (customer-specific baudrate)	Parameter 1:00h ... FFh (default = 09h / 62.5 kBaud)	Setting of customer-specific baudrate. Parameter 1 from master: 81h 4.8 kBaud 40h 9.6 kBaud 20h 19.2 kBaud 10h 38.4 kBaud 0Ah 57.6 kBaud 09h 62.5 kBaud
<C>	Get Distance (request distance value)	None	The slave sends the currently measured distance as an answer, in the first (higher-value) and second (lower value) parameters (= 2 bytes) in the form of a whole number multiple of 1 mm. Resolution is limited to 16 mm. The maximum possible distance is 65535 mm. Parameter value if no object is detected: 8992
<D>	Delay Set (change pause time between the end of requests and the beginning of answer)	Parameter 1:00h ... FFh (default = 04h)	Pause setting between end of request and beginning of answer. Approx. 80 µs of delay can be set per count.
<E>	Config Own ID (change sensor address)	0 ... 255d (default = 222d)	Change sensor address (Own ID)
<F>	Reserved		
<G>	Reset	None	Reset sensor
<H>-<O>	Reserved		
<P>	Get Power	None	Generate current receiving power
<Q>-<R>	Reserved		
<S>	Strobe	None	Currently no function. Returns only "Valid command"
<T>-<W>	Reserved		
<X>	Get Software Version	None (request software version)	The slave sends the software version in 3 parameters, e.g.: 5 1 0
<Y>-<Z>	Reserved		

(*) Basic setting after the operating voltage is applied

(**) The parameters of these commands are only stored in SPRAM. This means they are lost after a "RESET"! The only way to store parameters permanently is with the STROBE command (storage in flash)

Default values indicate factory settings. Reserved commands must not be used!

Notes on the distance measurement

Resolution is limited to 16 mm.

Close range: At distances < 200 mm, the sensor generates a value of 0 measured on the reflector.

This corresponds to an emergency shutoff in the close range.

Remote range: For distances > 6100 mm, the sensor generates a value of 8992 to the reflector H100-2R if there is sufficient power