



# DMT/DML: Non-contact measurement of large distances

	<b>Distance sensors Proximity mode</b>
	<b>Distance sensors Reflector mode</b>



Two additional switching outputs with programmable parameters are also available: the operator can, for example, define certain work points as fixed distances which signal whenever the set value is exceeded or not met. The devices are also available with an Profibus interface. The system parameters are programmed via the RS 232 interface, using a laptop. DMT10-2-2xxx with electronic mask is specifically suited for dynamic procedures.

The large measuring range make these devices ideal for use in a wide range of branches for many different applications:

- level measurement in silos,
- goods profile measurement in connection with crane controls,
- determining the diameter of paper rolls in the printing and paper industry,
- level measurement of water, paper pulp or molten metal,
- measuring and regulating sag,
- measuring the dimensions of slabs,
- outdoor crane positioning.

**T**he devices in the DMT10-2 series use the time-of-flight method to measure the distance to naturally reflecting objects in a distance of up to 155 m. The DML variant even functions at distances of up to 1200 m with reflector.

The DMT/DML operates by emitting extremely short pulses of light and by measuring the travel time of these pulses to the object and back. It then uses the pulse travel time to calculate the distance to the object.

Once identified, the distance is indicated via a serial RS 232 or RS 422 interface. If required, the distance can also be transmitted via an analogue 4 ... 20 mA interface.




▲ The human eye is incapable of crane positioning in external applications. Exact distance measurement using the distance measuring devices DMT and DML ensures the necessary accuracy is achieved.



▲ Hot surfaces are no problem for the DMT – up to 800 °C. A special high-temperature version measures molten metal with a surface temperature of up to 1200 °C.



▲ Occupied or free – distance measuring devices with long scanning ranges provide reliable information on object and stack profiles. They assist in quickly finding the right position, to ensure that everything moves as planned.



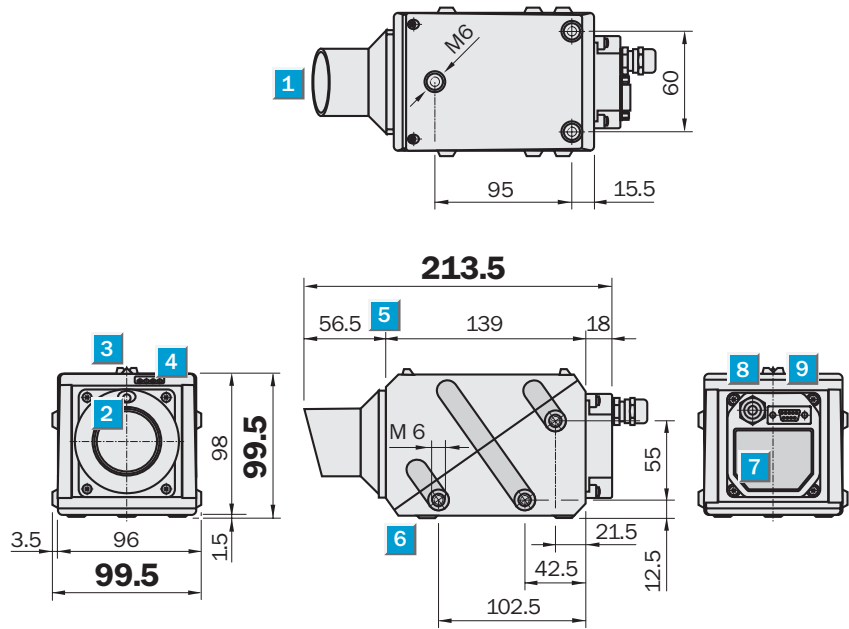
**Measurement range up to 155 m**

Distance measuring devices

- Excellent measurement accuracy thanks to time-of-flight measurement
- Simple adjustment using pilot light
- Freely programmable parameters - 2 switching outputs
- RS 422/RS 232 serial interface
- Analogue output

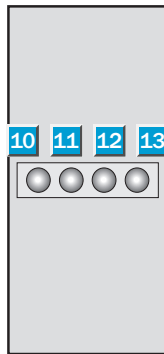


**Dimensional drawing**



**Adjustments possible**

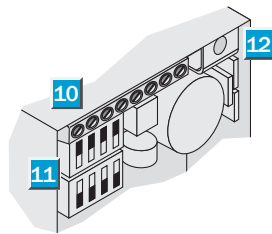
- DMT10-2-1111
- DMT10-2-1113



- 1 Dust protection tube
- 2 Laserpointer pilot light
- 3 Alignment sight
- 4 Function indicator
- 5 Zero level
- 6 Mounting hole M6 threaded – 6 mm deep
- 7 Plug cover
- 8 PG9
- 9 9-pin plug Sub D 9
- 10 Q<sub>1</sub> function indicator
- 11 Q<sub>2</sub> function indicator
- 12 Operating active, LED green
- 13 Plausibility (measurement error) LED red

**Connection type**

all Types



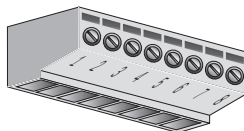
- 10 Terminals
- 11 DIP switch  
RS 232/RS 422 switch
- 12 Shield



**See chapter Accessories**

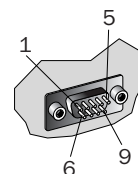
- Cables and connectors
- Mounting systems

**PG9, terminal assignment**



- |                  |                        |
|------------------|------------------------|
| 1 L+             | 5 L+/Q, Q <sub>A</sub> |
| 2 M              | 6 M/Q, Q <sub>A</sub>  |
| 3 Q <sub>1</sub> | 7 Q <sub>A</sub>       |
| 4 Q <sub>2</sub> | 8 NC                   |

**9-pin plug Sub D**



- | RS 232 |        | RS 422 |        |
|--------|--------|--------|--------|
| 1 NC   | 5 GND  | 6 Tx + | 7 Tx - |
| 2 Rx D | 8 Rx + | 9 Rx - |        |
| 3 Tx D |        |        |        |
| 4 NC   |        |        |        |

Technical data RS 232/RS 422		DMT10-2	1111	1113	2111						
<b>Measurement range</b>	0.5 ... 155 m										
	0.5 ... 20 m, max. object temp. 1200 °C										
Light spot diameter/distance	20 mm + (5 mm x distance in m)										
Resolution	1 mm										
<b>Light source, light type</b>	Laser diode, infrared light										
Laser category	1 (EN 60825-1: Nov. 2001; IEC 60825-1:AM2:2001)										
<b>Supply voltage V<sub>S</sub></b>	18 ... 30 V DC <sup>1)</sup>										
Residual ripple	< 5 V <sub>SS</sub> <sup>2)</sup>										
Power consumption	≤ 6 W <sup>3)</sup>										
<b>Switching outputs Q<sub>1</sub>, Q<sub>2</sub>, Q<sub>A</sub></b>											
Input L+/Q, Q <sub>A</sub> <sup>4) 5)</sup>	+5 V ... +30 V DC, supply outputs										
Output current I <sub>A</sub> max.	100 mA										
Analogue output	4 ... 20 mA, scalable										
<b>Serial interface</b>	RS 422/RS 232 switchable										
<b>Measured value output</b>											
Mean value creation	1/16/64/256/1024 values										
Output rate (min)	1 ms, 16 ms, 64 ms, 256 ms, 1024 ms										
<b>Response time</b>											
	Max. 1024 ms										
	1 ms										
<b>Temperature drift</b>											
0 °C ... +40 °C	Typ. 0.3 mm/K										
-10 °C ... 0 °C; +40 °C ... +55 °C	Typ. 0.6 mm/K										
-10 °C ... +55 °C	Typ. 3.0 mm/K										
<b>Initialisation period</b>	6 s										
<b>VDE protection class<sup>4)</sup></b>	III										
<b>Circuit protection<sup>5)</sup></b>	A, B										
<b>Enclosure rating</b>	IP 65										
<b>Ambient temperature T<sub>A</sub></b>	Operation - 10 °C ... + 55 °C										
	Storage - 25 °C ... + 70 °C										
<b>Weight</b>	Approx. 1200 g										

1) Limit values

2) May not exceed or fall short of V<sub>S</sub> tolerances

3) Without load

4) Reference voltage 50 V DC PELV- voltage (EN 50178)

5) A = V<sub>S</sub> connections reverse-polarity protected

B = Output Q short-circuit protected

6) Environmental conditions constant, minimal switching period 30 min

7) 23 °C air temperature, 977 hPa, minimal switching period 30 min

8) Accuracy may be reduced by factor 2.5 operating in +40 °C ... 55 °C


#### Reproducibility and accuracy as a function of measurement distance<sup>6) 7) 8)</sup>

Measurement distance	DMT10-2				
	1 m	15 m	40 m	65 m	155 m
<b>Reproducibility<sup>6)</sup></b>					
White, 90 % remission	7 mm	7 mm	7 mm	7 mm	10 mm
Grey, 18 % remission	7 mm	7 mm	7 mm	10 mm	–
Black, 6 % remission	7 mm	7 mm	10 mm	–	–
<b>Accuracy<sup>7)</sup></b>					
White, 90 % remission	±10 mm	±10 mm	±10 mm	±10 mm	±10 mm
Grey, 18 % remission	±10 mm	±10 mm	±10 mm	±10 mm	–
Black, 6 % remission	±10 mm	±10 mm	±10 mm	–	–

Accuracy of DMT10-2-2111 may be reduced by factor 4 compared with DMT10-2-111x.

#### Order information RS 232/RS 422

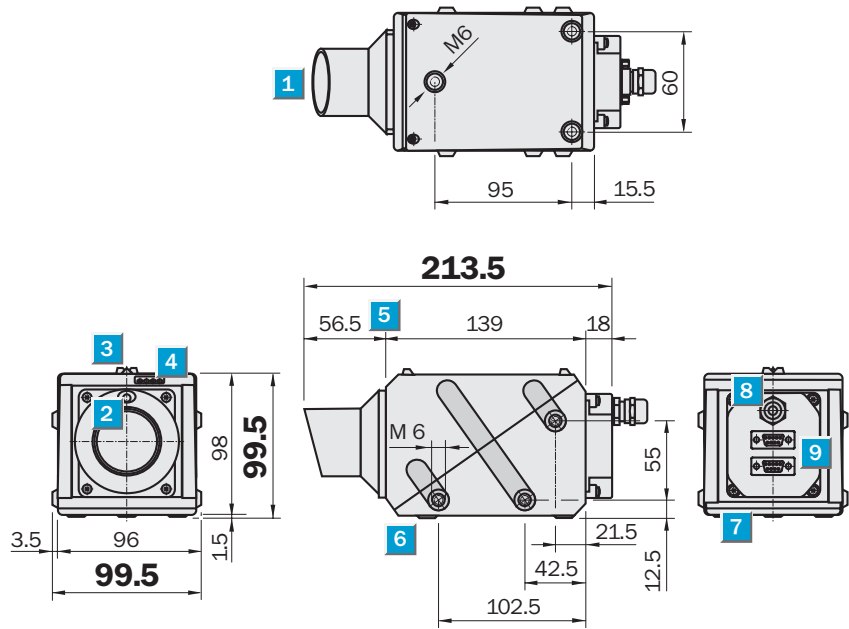
Type	Order no.
DMT10-2-1111	1027603
DMT10-2-1113	1027605
DMT10-2-2111	1028540


**Measurement range up to 155 m**  
 Distance measuring devices

- Excellent measurement accuracy thanks to time-of-flight measurement
- Simple adjustment using pilot light
- Freely programmable parameters
- Profibus/RS 232 interface

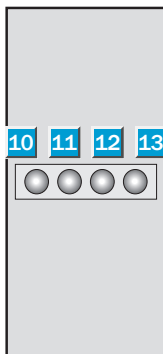


## Dimensional drawing



## Adjustments possible

- DMT10-2-1211
- DMT10-2-1213

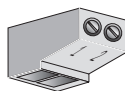


- 1 Dust protection tube
- 2 Laserpointer pilot light
- 3 Alignment sight
- 4 Function indicator
- 5 Zero level
- 6 Mounting hole M6 threaded – 6 mm deep
- 7 Plug cover
- 8 PG9
- 9 9-pin plug Sub D 9
- 10 Not in use
- 11 Data exchange
- 12 Operating active, LED green
- 13 Plausibility (measurement error) LED red

## Connection scheme und data interface

all Types

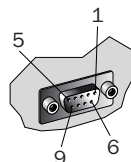
Terminal



- 1 L+
- 2 M

9-pin plug (bush) Sub D

Profibus

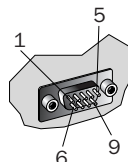


- 1 NC
- 2 NC
- 3 B
- 4 RTS

- 5 M
- 6 L+
- 7 NC
- 8 A
- 9 NC

9-pin plug Sub D

RS 232



- 1 nReset
- 2 RxD
- 3 TxD
- 4 NC

- 5 M
- 6 NC
- 7 NC
- 8 NC
- 9 NC



## See chapter Accessories

- Cables and connectors
- Mounting systems

Technical data Profibus		DMT10-2	1211	1213	2211						
<b>Measurement range</b>	0.5 ... 155 m										
	0.5 ... 20 m, max. object temp. 1200 °C										
Light spot diameter	20 mm + (5 mm x distance in m)										
Resolution	1 mm										
<b>Light source, light type</b>	Laser diode, infrared light										
Laser category	1 (EN 60825-1: Nov. 2001; IEC 60825-1:ÄM2:2001)										
<b>Supply voltage V<sub>S</sub></b>	18 ... 30 V DC <sup>1)</sup>										
Residual ripple	< 5 V <sub>SS</sub> <sup>2)</sup>										
Power consumption	≤ 6 W <sup>3)</sup>										
<b>Serial interface</b>	Profibus DP, max. 12 mBaud										
<b>Interface</b>	RS 232										
<b>Measured value output</b>											
Mean value creation	1/16/64/256/1024 values										
Output rate (min)	1 ms, 16 ms, 64 ms, 256 ms, 1024 ms										
<b>Response time</b>											
	max. 1024 ms										
	1 ms										
<b>Temperature drift</b>											
0 °C ... +40 °C	Typ. 0.3 mm/K										
-10 °C ... 0 °C; +40 °C ... +55 °C	Typ. 0.6 mm/K										
-10 °C ... +55 °C	Typ. 3.0 mm/K										
<b>Initialisation period</b>	6 s										
<b>VDE protection class<sup>4)</sup></b>	III										
<b>Circuit protection<sup>5)</sup></b>	A, B										
<b>Enclosure rating</b>	IP 65										
<b>Ambient temperature T<sub>A</sub></b>	Operation - 10 °C ... + 55 °C										
	Storage - 25 °C ... + 70 °C										
<b>Weight</b>	Approx. 1200 g										

1) Limit values

2) May not exceed or fall short of V<sub>S</sub> tolerances

3) Without load

4) Reference voltage 50 V DC PELV- voltage (EN 50178)

5) A = V<sub>S</sub> connections reverse-polarity protected

B = Output Q short-circuit protected

6) Environmental conditions constant, minimal switching period 30 min

7) 23 °C air temperature, 977 hPa, minimal switching period 30 min

8) Accuracy may be reduced by factor 2.5 operating in +40 °C ... 55 °C


#### Reproducibility and accuracy as a function of measurement distance<sup>6) 7) 8)</sup>

Measurement distance	DMT10-2				
	1 m	15 m	40 m	65 m	155 m
<b>Reproducibility<sup>6)</sup></b>					
White, 90 % remission	7 mm	7 mm	7 mm	7 mm	10 mm
Grey, 18 % remission	7 mm	7 mm	7 mm	10 mm	-
Black, 6 % remission	7 mm	7 mm	10 mm	-	-
<b>Accuracy<sup>7)</sup></b>					
White, 90 % remission	±10 mm	±10 mm	±10 mm	±10 mm	±10 mm
Grey, 18 % remission	±10 mm	±10 mm	±10 mm	±10 mm	-
Black, 6 % remission	±10 mm	±10 mm	±10 mm	-	-

Accuracy of DMT10-2-2211 may be reduced by factor 4 compared with DMT10-2-121x.

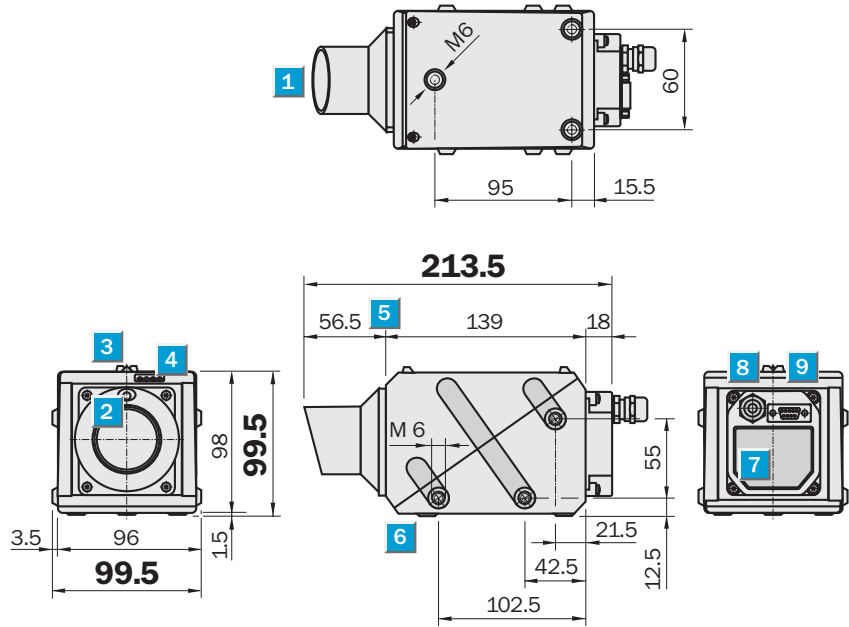
#### Order information Profibus

Type	Order no.
DMT10-2-1211	1027604
DMT10-2-1213	1027606
DMT10-2-2211	1028541


**Measurement range up to 1200 m**  
 Distance measuring devices

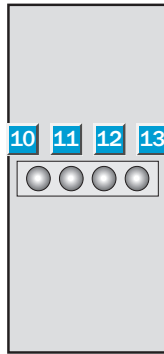
- Excellent measurement accuracy thanks to time-of-flight measurement
- Simple adjustment using pilot light
- Freely programmable parameters - 2 switching outputs
- RS 422/RS 232 serial interface
- Analogue output

**Dimensional drawing**



**Adjustments possible**

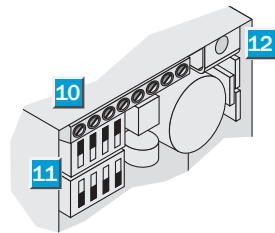
DML40-2-1111



- 1 Dust protection tube
- 2 Laserpointer pilot light
- 3 Alignment sight
- 4 Function indicator
- 5 Zero level
- 6 Mounting hole M6 threaded – 6 mm deep
- 7 Plug cover
- 8 PG9
- 9 9-pin plug Sub D 9
- 10 Q<sub>1</sub> function indicator
- 11 Q<sub>2</sub> function indicator
- 12 Operating active, LED green
- 13 Plausibility (measurement error) LED red

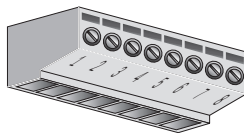
**Connection type**

DML40-2-1111

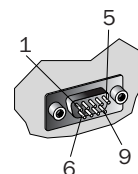


PG9, terminal assignment

- 10 Terminals
- 11 DIP switch  
RS 232/RS 422 switch
- 12 Shield



9-pin plug Sub D



1	L+
2	M
3	Q <sub>1</sub>
4	Q <sub>2</sub>

5	L+/Q, Q <sub>A</sub>
6	M/Q, Q <sub>A</sub>
7	Q <sub>A</sub>
8	NC

RS 232	
1	NC
2	RxD
3	TxD
4	NC

RS 422	
5	GND
6	Tx +
7	Tx -
8	Rx +
9	Rx -



**See chapter Accessories**

- Cables and connectors
- Mounting systems
- Reflectors

Technical data RS 232/RS 422	DML40-2	1111											
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**Measurement range**

	0.5 ... 600 m on Diamond Grade	
	0.5 ... 800 m on reflector PL 880 FS01	
	0.5 ... 1200 m on reflector OP 55	
Light spot diameter	20 mm + (5 mm x distance in m)	
Resolution	1 mm	
<b>Light source, light type</b>	Laser diode, infrared light	
Laser category	1 (EN 60825-1: Nov. 2001; IEC 60825-1:ÄM2:2001)	
<b>Supply voltage V<sub>S</sub></b>	18 ... 30 V DC <sup>1)</sup>	
Residual ripple	< 5 V <sub>SS</sub> <sup>2)</sup>	
Power consumption	≤ 6 W <sup>3)</sup>	
<b>Outputs Q<sub>1</sub>, Q<sub>2</sub>, Q<sub>A</sub></b>		
Input L+/Q, Q <sub>A</sub> <sup>4) 5)</sup>	DC +5 V ... +30 V, supply outputs	
Output current I <sub>A</sub> max.	100 mA	
Analogue output	4 ... 20 mA, scalable	
<b>Serial interface</b>	RS 422/RS 232 switchable	

**Measured value output**

Mean value creation	1/16/64/256/1024 values	
Output rate (min)	1 ms/3.2 ms/12.8 ms/50 ms/200 ms	

**Temperature drift**

0 °C ... +40 °C	Typ. 0.3 mm/K	
-10 °C ... 0 °C; +40 °C ... +55 °C	Typ. 0.6 mm/K	

**Initialisation period**

	6 s	
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**VDE protection class<sup>6)</sup>**

	III	
--	-----	--

**Circuit protection<sup>7)</sup>**

	A, B	
--	------	--

**Enclosure rating**

	IP 65	
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**Ambient temperature T<sub>A</sub>**

Operation	- 10 °C ... + 55 °C	
Storage	- 25 °C ... + 70 °C	

**Weight**


	Approx. 1200 g	
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1) Limit values  
 2) May not exceed or fall short of V<sub>S</sub> tolerances  
 3) Without load  
 4) Reference voltage 50 V DC PELV- voltage (EN 50178)  
 5) A = V<sub>S</sub> connections reverse-polarity protected  
 B = Output Q short-circuit protected  
 6) Environmental conditions constant, minimal switching period 30 min  
 7) 23 °C air temperature, 977 hPa, minimal switching period 30 min  
 8) Accuracy may be reduced by factor 2.5 operating in +40 °C ... 55 °C

Reproducibility and accuracy as a function of measurement distance <sup>6) 7) 8)</sup>	
	DML40-2
Measurement distance	0.5 ... 1200 m
Reproducibility <sup>6)</sup>	6 mm
Accuracy <sup>7)</sup>	±10 mm

Order information RS 232/RS 422	
Type	Order no.
DML40-2-1111	1027607

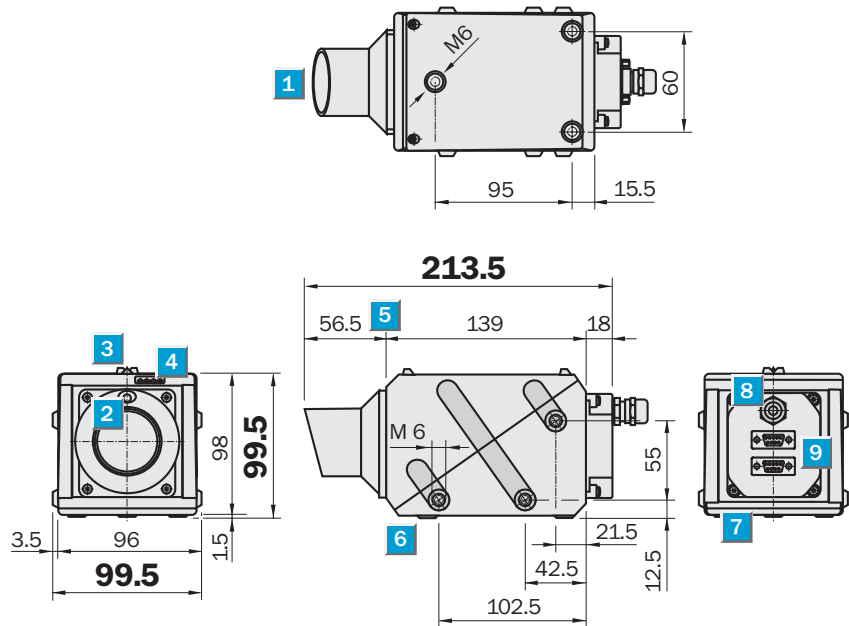



**Measurement range up to 1200 m**  
**Distance measuring devices**

- Excellent measurement accuracy thanks to time-of-flight measurement
- Simple adjustment using pilot light
- Freely programmable parameters
- Profibus/RS 232 interface

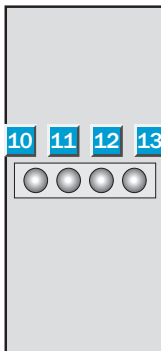


### Dimensional drawing



### Adjustments possible

DML40-2-1211

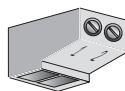


- 1** Dust protection tube
- 2** Laserpointer pilot light
- 3** Alignment sight
- 4** Function indicator
- 5** Zero level
- 6** Mounting hole M6 threaded – 6 mm deep
- 7** Plug cover
- 8** PG9
- 9** 9-pin plug Sub D 9
- 10** Plausibility (measurement error) LED red
- 11** Operating active, LED green
- 12** Q<sub>1</sub> function indicator
- 13** Q<sub>2</sub> function indicator

### Connection scheme and data interface

DML40-2-1211

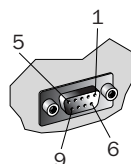
#### Terminal



- 1** L+
- 2** M

#### 9-pin plug (bush) Sub D

Profibus

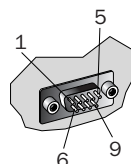


- 1** NC
- 2** NC
- 3** B
- 4** RTS

- 5** M
- 6** L+
- 7** NC
- 8** A
- 9** NC

#### 9-pin plug Sub D

RS 232



- 1** nReset
- 2** RxD
- 3** TxD
- 4** NC

- 5** M
- 6** NC
- 7** NC
- 8** NC
- 9** NC

#### See chapter Accessories

- Cables and connectors
- Mounting systems
- Reflectors



<b>Technical data Profibus</b>	DML40-2	1211												
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<b>Measurement range</b>		
	0.5 ... 600 m on Diamond Grade	
	0.5 ... 800 m on reflector PL 880 FS01	
	0.5 ... 1200 m on reflector OP 55	
Light spot diameter	20 mm + (5 mm x distance in m)	
Resolution	1 mm	
<b>Light source, light type</b>	Laser diode, infrared light	
Laser category	1 (EN 60825-1: Nov. 2001; IEC 60825-1:ÄM2:2001)	
<b>Supply voltage V<sub>S</sub></b>	18 ... 30 V DC <sup>1)</sup>	
Residual ripple	< 5 V <sub>SS</sub> <sup>2)</sup>	
Power consumption	≤ 6 W <sup>3)</sup>	
<b>Serial interface</b>	Profibus DP, max. 12 mBaud	
<b>Interface</b>	RS 232	
<b>Measured value output</b>		
Mean value creation	1/16/64/256/1024 values	
Output rate (min)	1 ms/3.2 ms/12.8 ms/50 ms/200 ms	
<b>Temperature drift</b>		
0 °C ... +40 °C	Typ. 0.3 mm/K	
-10 °C ... 0 °C; +40 °C ... +55 °C	Typ. 0.6 mm/K	
<b>Initialisation period</b>	6 s	
<b>VDE protection class<sup>4)</sup></b>	III	
<b>Circuit protection<sup>5)</sup></b>	A, B	
<b>Enclosure rating</b>	IP 65	
<b>Ambient temperature T<sub>A</sub></b>	Operation - 10 °C ... + 55 °C	
	Storage - 25 °C ... + 70 °C	
<b>Weight</b>	Approx. 1200 g	

- 1) Limit values
- 2) May not exceed or fall short of V<sub>S</sub> tolerances
- 3) Without load
- 4) Reference voltage 50 V DC PELV- voltage (EN 50178)
- 5) A = V<sub>S</sub> connections reverse-polarity protected  
B = Output Q short-circuit protected
- 6) Environmental conditions constant, minimal switching period 30 min
- 7) 23 °C air temperature, 977 hPa, minimal switching period 30 min
- 8) Accuracy may be reduced by factor 2.5 operating in +40 °C ... 55 °C

<b>Reproducibility and accuracy as a function of measurement distance<sup>6) 7) 8)</sup></b>	
	<b>DML40-2</b>
<b>Measurement distance</b>	0.5 ... 1200 m
<b>Reproducibility<sup>6)</sup></b>	6 mm
<b>Accuracy<sup>7)</sup></b>	±10 mm

<b>Order information Profibus</b>	
<b>Type</b>	<b>Order no.</b>
DML40-2-1211	1027608