

DMT/DML: Non-contact measurement of large distances



the distance can also be transmitted via an analogue 4 ... 20 mA interface.

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 makes 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.

	Distance sensors Proximity mode
	Distance sensors Reflector mode

The 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,



Technical data RS 232/RS 422		DMT10-2	1111	1113	2111						
Measurement range	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										
Light source, light type	Laser diode, infrared light										
Laser category	1 (EN 60825-1: Nov. 2001; IEC 60825-1:ÄM2:2001)										
Supply voltage V_S	18 ... 30 V DC ¹⁾										
Residual ripple	< 5 V _{SS} ²⁾										
Power consumption	≤ 6 W ³⁾										
Switching outputs Q₁, Q₂, Q_A											
Input L+/Q, Q _A ^{4) 5)}	+5 V ... +30 V DC, supply outputs										
Output current I _A max.	100 mA										
Analogue output	4 ... 20 mA, scalable										
Serial interface	RS 422/RS 232 switchable										
Measured value output											
Mean value creation	1/16/64/256/1024 values										
Output rate (min)	1 ms, 16 ms, 64 ms, 256 ms, 1024 ms										
Response time											
	Max. 1024 ms										
	1 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										
-10 °C ... +55 °C	Typ. 3.0 mm/K										
Initialisation period	6 s										
VDE protection class⁴⁾	III										
Circuit protection⁵⁾	A, B										
Enclosure rating	IP 65										
Ambient temperature T_A	Operation - 10 °C ... + 55 °C										
	Storage - 25 °C ... + 70 °C										
Weight	Approx. 1200 g										

¹⁾ Limit values

²⁾ May not exceed or fall short of V_S tolerances

³⁾ Without load

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

⁵⁾ A = V_S 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^{6) 7) 8)}

Measurement distance	DMT10-2				
	1 m	15 m	40 m	65 m	155 m
Reproducibility⁶⁾					
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	-	-
Accuracy⁷⁾					
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.

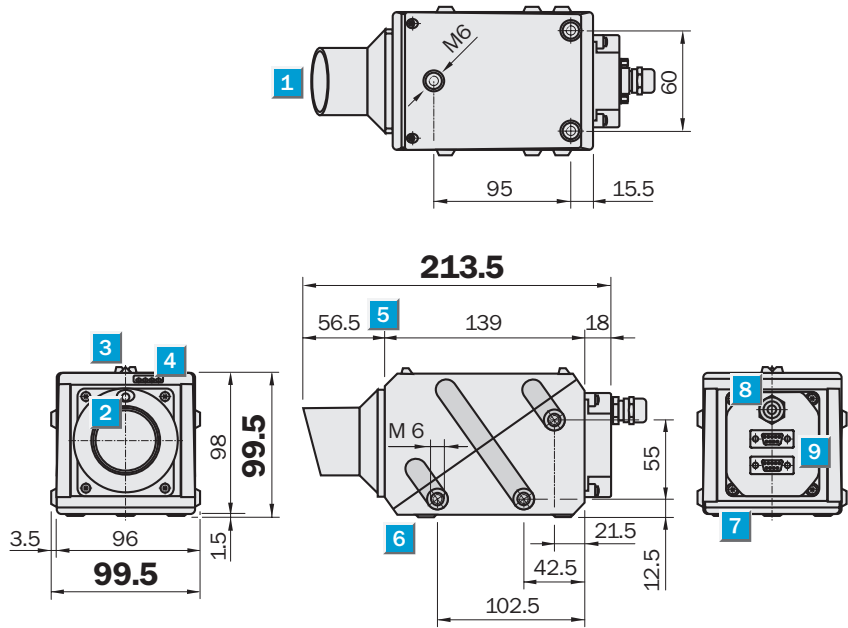
Order information RS 232/RS 422

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


Measurement range up to 155 m
 Distance measuring devices

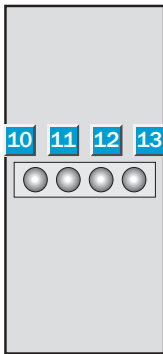
- Excellent measurement accuracy thanks to time-of-flight measurement
- Simple adjustment using pilot light
- Freely programmable parameters
- PROFIBUS/RS 232 interface

Dimensional drawing



Adjustments possible

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



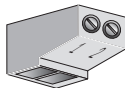
- 1 Dust protection tube
- 2 Laserpointer pilot light
- 3 Alignment sight
- 4 Function indicator
- 5 Zero level
- 6 Mounting hole M6 threaded – 6 mm deep
- 7 Plug cover
- 8 PG9
- 9 9-pin plug Sub D 9
- 10 Not in use
- 11 Data exchange
- 12 Operating active, LED green
- 13 Plausibility (measurement error)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



Connection scheme und data interface

all types

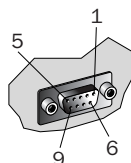
Terminal



- 1 L+
- 2 M

9-pin plug (bush) Sub D

PROFIBUS

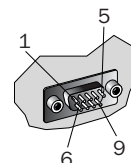


- 1 NC
- 2 NC
- 3 B
- 4 RTS

- 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

Accessories

- Cables and connectors
- Mounting systems



Technical data PROFIBUS		DMT10-2	1211	1213	2211						
Measurement range	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										
Light source, light type	Laser diode, infrared light										
Laser category	1 (EN 60825-1: Nov. 2001; IEC 60825-1:ÄM2:2001)										
Supply voltage V_S	18 ... 30 V DC ¹⁾										
Residual ripple	< 5 V _{SS} ²⁾										
Power consumption	≤ 6 W ³⁾										
Serial interface	PROFIBUS DP, max. 12 mBaud										
Interface	RS 232										
Measured value output											
Mean value creation	1/16/64/256/1024 values										
Output rate (min)	1 ms, 16 ms, 64 ms, 256 ms, 1024 ms										
Response time											
	Max. 1024 ms										
	1 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										
-10 °C ... +55 °C	Typ. 3.0 mm/K										
Initialisation period	6 s										
VDE protection class⁴⁾	III										
Circuit protection⁵⁾	A, B										
Enclosure rating	IP 65										
Ambient temperature T_A	Operation - 10 °C ... + 55 °C										
	Storage - 25 °C ... + 70 °C										
Weight	Approx. 1200 g										

1) Limit values

2) May not exceed or fall short of V_S tolerances

3) Without load

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

5) A = V_S 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^{6) 7) 8)}

Measurement distance	DMT10-2				
	1 m	15 m	40 m	65 m	155 m
Reproducibility⁶⁾					
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	-	-
Accuracy⁷⁾					
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.

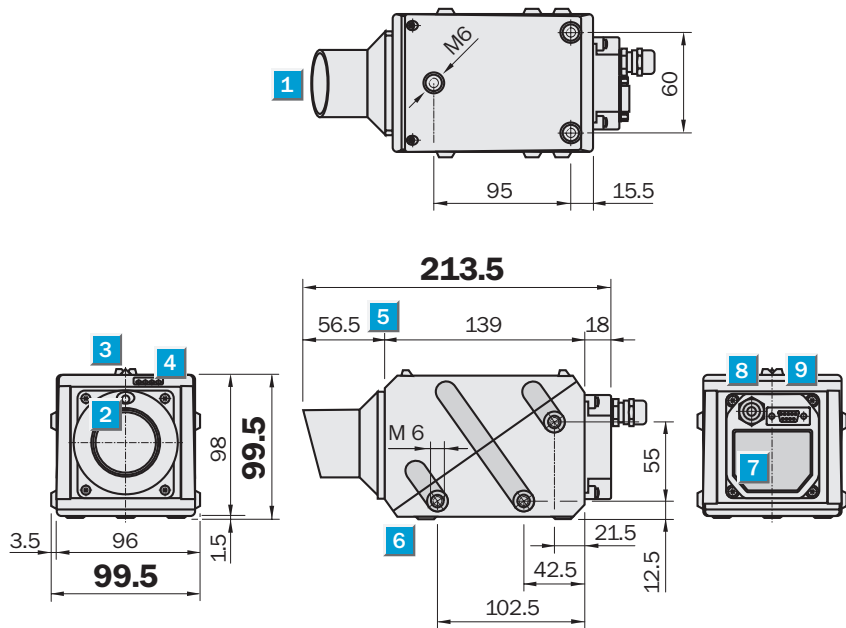
Order information PROFIBUS

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


Measurement range up to 1200 m
 Distance measuring devices

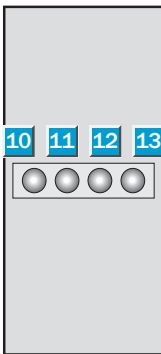
- Excellent measurement accuracy thanks to time-of-flight measurement
- Simple adjustment using pilot light
- Freely programmable parameters - 2 switching outputs
- RS 422/RS 232 serial interface
- Analogue output

Dimensional drawing



Adjustments possible

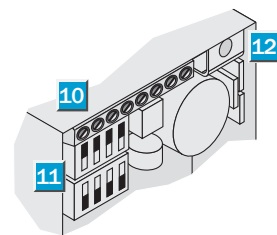
DML40-2-1111



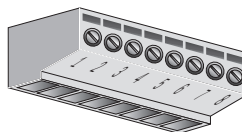
- 10 Terminals
- 11 DIP switch
- 12 RS-232/RS-422 switch
- 13 Shield

Connection type

DML40-2-1111

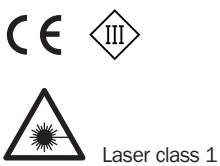
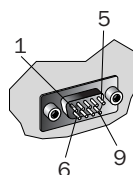


PG9, terminal assignment



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

9-pin plug Sub D



Accessories

Cables and connectors
Mounting systems
Reflectors

1	L+
2	M
3	Q ₁
4	Q ₂
5	L+/Q, Q _A
6	M/Q, Q _A
7	Q _A
8	NC

RS 232

1	NC
2	RxD
3	TxD
4	NC

RS 422

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

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 PL880FS01	
	0.5 ... 1200 m on reflector OP55	
Light spot diameter	20 mm + (5 mm x distance in m)	
Resolution	1 mm	
Light source, light type	Laser diode, infrared light	
Laser category	1 (EN 60825-1: Nov. 2001; IEC 60825-1:ÄM2:2001)	
Supply voltage V_S	18 ... 30 V DC ¹⁾	
Residual ripple	< 5 V _{SS} ²⁾	
Power consumption	≤ 6 W ³⁾	
Outputs Q₁, Q₂, Q_A		
Input L+/Q, Q _A ^{4) 5)}	DC +5 V ... +30 V, supply outputs	
Output current I _A max.	100 mA	
Analogue output	4 ... 20 mA, scalable	
Serial interface	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	
VDE protection class⁶⁾	III	
Circuit protection⁷⁾	A, B	
Enclosure rating	IP 65	
Ambient temperature T_A	Operation - 10 °C ... + 55 °C Storage - 25 °C ... + 70 °C	
Weight	Approx. 1200 g	

¹⁾ Limit values
²⁾ May not exceed or fall short of V_S tolerances
³⁾ Without load
⁴⁾ Reference voltage 50 V DC PELV- voltage (EN 50178)
⁵⁾ A = V_S 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 ^{6) 7) 8)}	
	DML40-2
Measurement distance	0.5 ... 1200 m
Reproducibility⁶⁾	6 mm
Accuracy⁷⁾	±10 mm

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

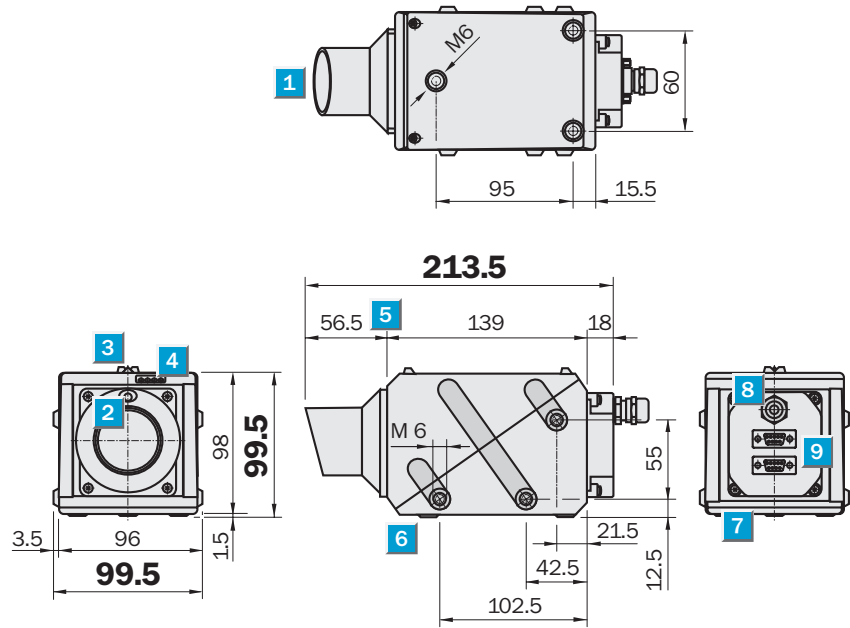
Measurement range up to 1200 m

Distance measuring devices

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

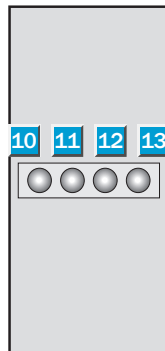


Dimensional drawing



Adjustments possible

DML40-2-1211

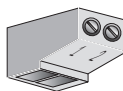


- 1 Dust protection tube
- 2 Laserpointer pilot light
- 3 Alignment sight
- 4 Function indicator
- 5 Zero level
- 6 Mounting hole M6 threaded – 6 mm deep
- 7 Plug cover
- 8 PG9
- 9 9-pin plug Sub D 9
- 10 Plausibility (measurement error) LED red
- 11 Operating active, LED green
- 12 Q₁ function indicator
- 13 Q₂ function indicator

Connection scheme and data interface

DML40-2-1211

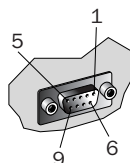
Terminal



- 1 L+
- 2 M

9-pin plug (bush) Sub D

PROFIBUS

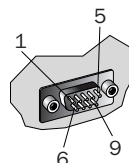


- 1 NC
- 2 NC
- 3 B
- 4 RTS

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

9-pin plug Sub D

RS 232

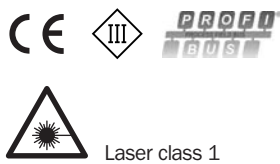


- 1 nReset
- 2 Rx D
- 3 Tx D
- 4 NC

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

Accessories

Cables and connectors
Mounting systems
Reflectors



Technical data PROFIBUS	DML40-2	1211											
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Measurement range		
	0.5 ... 600 m on Diamond Grade	
	0.5 ... 800 m on reflector PL880FS01	
	0.5 ... 1200 m on reflector OP55	
Light spot diameter	20 mm + (5 mm x distance in m)	
Resolution	1 mm	
Light source, light type	Laser diode, infrared light	
Laser category	1 (EN 60825-1: Nov. 2001; IEC 60825-1:ÄM2:2001)	
Supply voltage V_S	18 ... 30 V DC ¹⁾	
Residual ripple	< 5 V _{SS} ²⁾	
Power consumption	≤ 6 W ³⁾	
Serial interface	PROFIBUS DP, max. 12 mBaud	
Interface	RS 232	
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	
VDE protection class⁴⁾	III	
Circuit protection⁵⁾	A, B	
Enclosure rating	IP 65	
Ambient temperature T_A	Operation - 10 °C ... + 55 °C	
	Storage - 25 °C ... + 70 °C	
Weight	Approx. 1200 g	

- 1) Limit values
- 2) May not exceed or fall short of V_S tolerances
- 3) Without load
- 4) Reference voltage 50 V DC PELV- voltage (EN 50178)
- 5) A = V_S 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^{6) 7) 8)}	
	DML40-2
Measurement distance	0.5 ... 1200 m
Reproducibility⁶⁾	6 mm
Accuracy⁷⁾	±10 mm

Order information PROFIBUS	
Type	Order no.
DML40-2-1211	1027608

Dimension drawings and order information

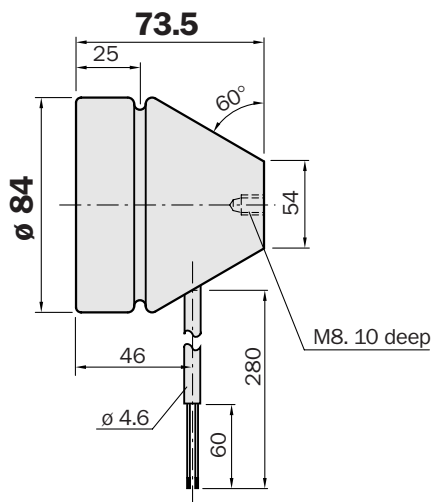
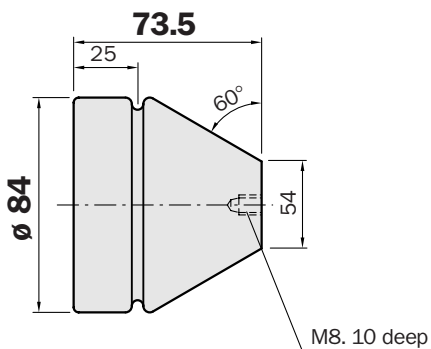
Special reflectors

Triple reflector, glass for DML

Type	Part no.
OP55	5309131

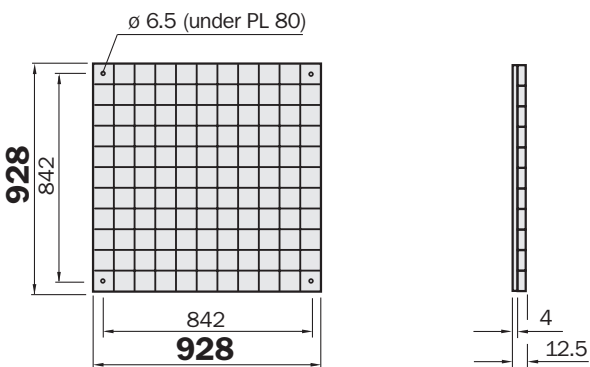
Triple reflector, glass, with heating for DML

Type	Part no.
OP55H	5309132



Combi-reflector, 11 x 11 PL80A, centre reflectivity reduced

Type	Part no.
PL880F	1013786

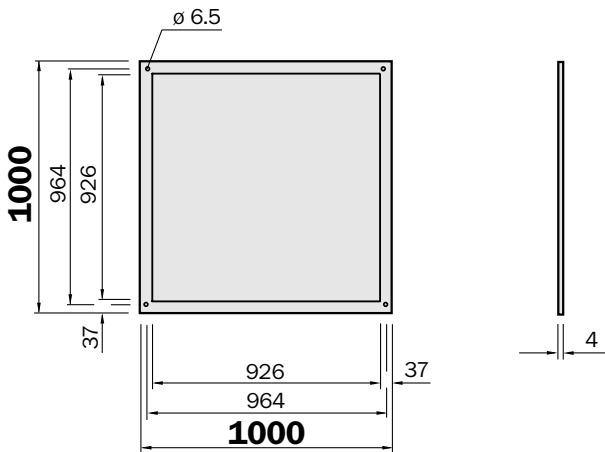


Dimension drawings and order information

Special reflectors

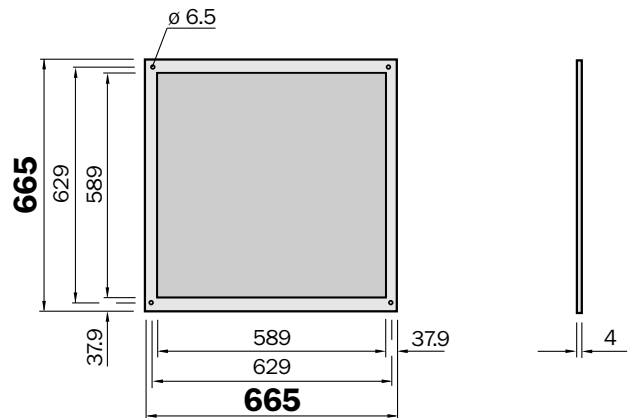
Reflector, 914 x 914 mm, Diamond Grade

Type	Part no.
PL880DG	1018975



Reflector, 605 x 605 mm, Diamond Grade

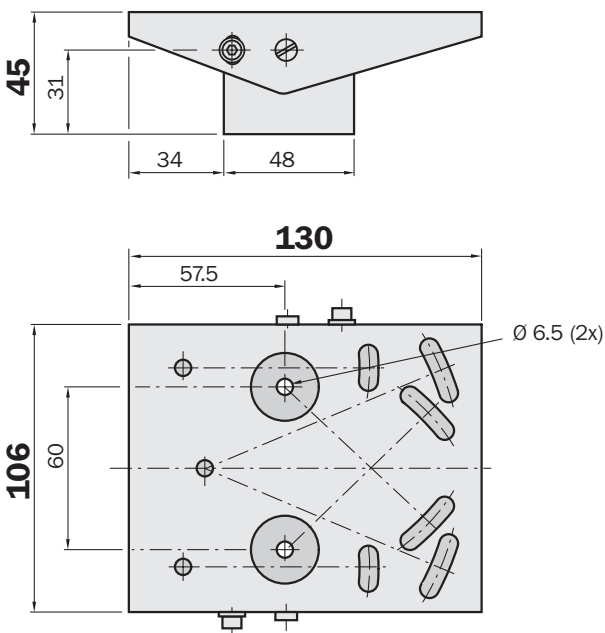
Type	Part no.
PL560DG	1016806



Mounting bracket

Articulated mounting for DMT/DML

Type	Part no.
BEF-GH-DMT	5309130



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