



Dx1000

GREAT PERFORMANCE AT GREAT DISTANCE

Long range distance sensors

SICK
Sensor Intelligence.

CONSISTENTLY STABLE MEASUREMENT RESULTS





When it comes to taking reliable measurements of extremely long distances both indoors and out, the Dx1000 long range distance sensor is particularly impressive thanks to its exceptional performance. Equipped with modern HDDM⁺ technology, the Dx1000 ensures stable measurement results in a rugged housing even in inclement weather. Designed by SICK, this measuring technology is the ideal choice for adverse ambient conditions and offers a flexible range of applications at high speeds. The intuitive nature of the Dx1000 makes it easy to use while also ensuring quick and trouble-free commissioning.

DISTANCE MEASUREMENT FOR BOTH INDOOR AND OUTDOOR APPLICATION

The Dx1000 is innovative

The Dx1000 is an infrared-laser distance sensor which is based on the principle of time-of-flight measurement. It uses innovative HDDM+ technology: Laser pulse packets are generated in a swift chronological sequence in the device. Using statistical methods, the distance to the measuring object is unambiguously calculated from the time between sending the laser pulse, reflection on the measuring object, and the pulse being received again by the sensor.



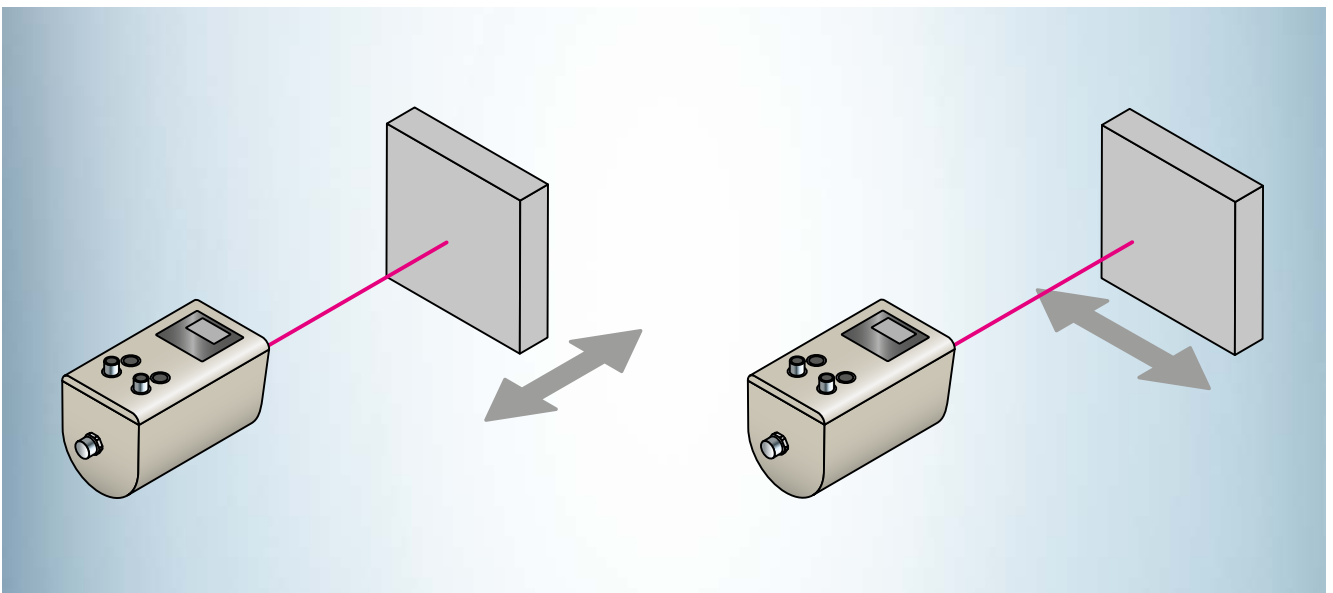
+ Innovative technology ensures reliable measurement results

The Dx1000 is versatile

The sensor variants DT1000 for distance measurement on natural objects and DL1000 for measuring on reflectors cover a wide spectrum of uses and offer high flexibility in application. The comprehensive options of adjustments allow you to make the optimal adaptations to meet various requirements and reduce the number of variants and therefore the storage costs. In addition to axial object tracking, whereby the measuring object moves continuously along the laser beam, the Dx1000

is also suited for applications in which the measuring object enters the laser beam from the side, e.g., when measuring edges. The sensor can also detect and monitor distances and object velocities at the same time. With configurable digital output and input signals, the current output signal, and the switchable serial RS-422/SSI interface, the Dx1000 can be integrated flexibly into its control environment.

+ High level of application flexibility

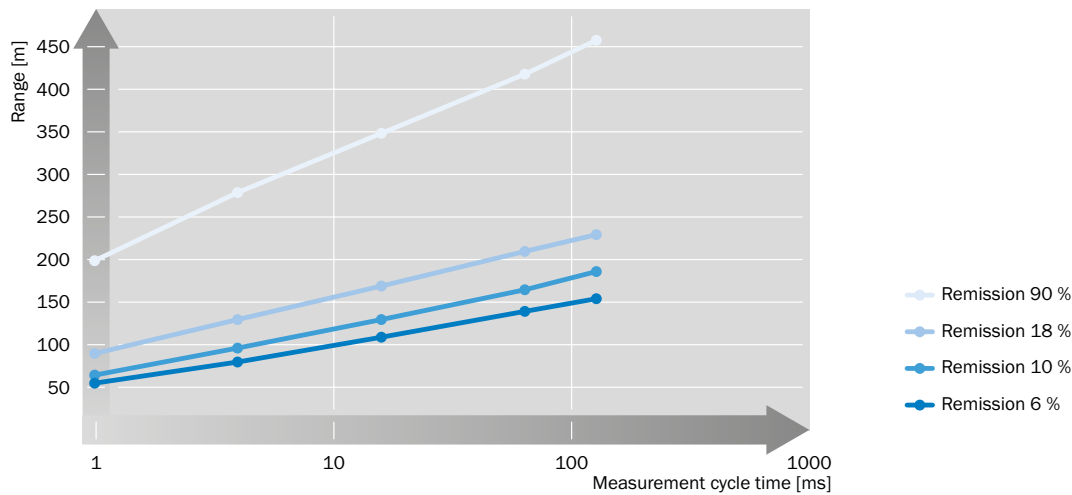


The Dx1000 rapidly maintains visibility over distances

The HDDM+ technology of the Dx1000 is superbly useful for measuring very long distances with relatively short measurement cycle times as little as 1 ms and low noise in measurement value data. The scalability of the measuring range represents a key feature of the DT1000: When measuring on natural objects the range of the sensor can be increased and

optimally adjusted to the measuring task by setting a longer measurement cycle time. By this method, the DT1000 can manage distances over 450 m when measuring on natural objects (see graph). The DL1000 has a maximum sensing range of 1,500 m when measuring on diamond-grade reflector foil.

+ Very long distances with short measurement cycle times



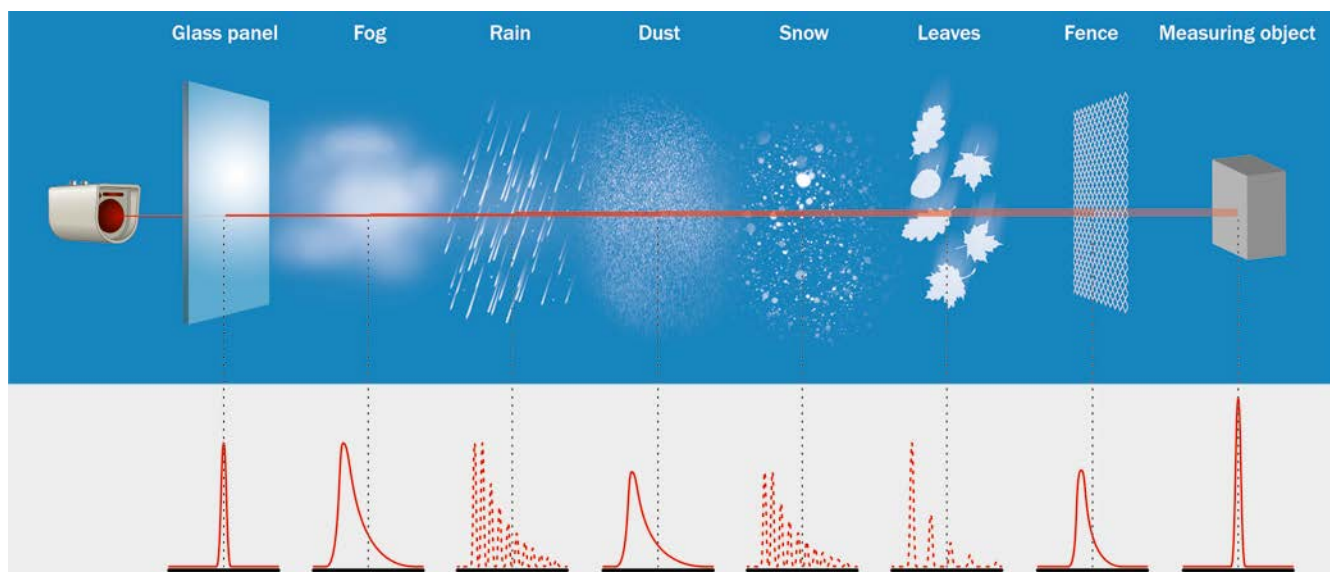
The maximum sensing range of the DT1000 during measurement on natural objects with remissions of 6 % (black) to 90 % (white).

The Dx1000 is well suited for outdoor use

The HDDM+ measurement technology of the Dx1000 with infrared measurement laser excels thanks to a high level of insensitivity to ambient light and interferences in the measuring path, which are caused by ambient conditions such as rain,

snow, or fog.⁴⁾ The housing of the Dx1000 consists of a highly corrosion-resistant aluminum alloy and is resistant to dust and water in accordance with IP 65 and IP 67. The Dx1000 is connected by means of industry-grade M12 plug connectors.

+ High reliability even under adverse ambient conditions



⁴⁾ Within the system limits.

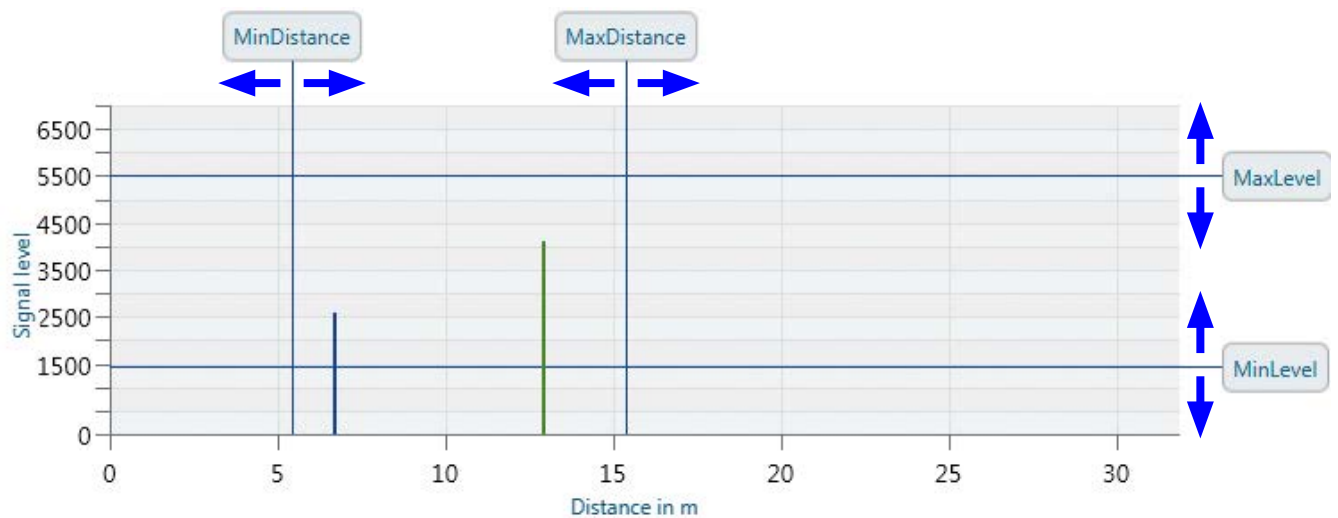
HIGH RELIABILITY WITH INTUITIVE OPERATION

The Dx1000 is a discerning sensor

In most applications, the distance sensor accurately receives one echo from the reflection on the measuring object and converts this into a distance value. In real application situations, however, protective windows and ambient conditions such as rain, snow, fog, or smoke can cause undesirable echoes in the measuring path (see graph on page 5). Moreover, any reflections from side panels may compromise the measure-

ment result. HDDM⁺ with multi-echo technology in the Dx1000 can distinguish between up to eight echoes along the measuring path. From these echoes, the relevant echo can then be graphically identified and selected for distance measurement using the SOPAS ET user interface. Only then is it possible to carry out distance measurements with high measurement certainty, even in the presence of multiple echoes.

+ High measurement certainty even with multiple echoes



Hardly anything is too hot for the Dx1000

The measuring technology of the DT1000 is designed for distance measurements on hot surfaces. As a result, it is superbly useful for non-contact measurements or positioning of hot steel slabs, for example.

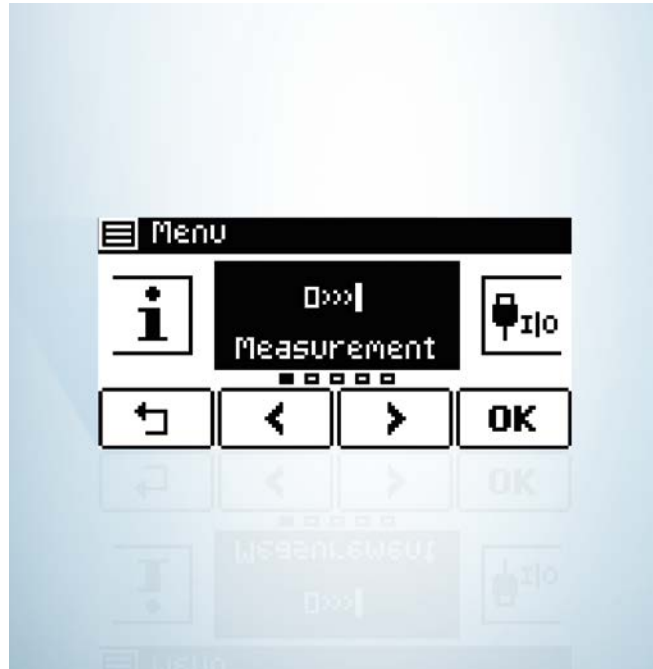
+ Reliable measurement on hot surfaces



The Dx1000 is simple and intuitive

The comprehensive options of adjustments possible with the Dx1000 can be performed quickly, easily, and with a high degree of reliability – either directly on the device using the graphical touch display or using the convenient SOPAS ET user interface via the Ethernet interface of the PC. The innovative user guidance consistently organizes the configuration parameters by function in a logical navigational structure and is easy to get to grips with.

+ Saving time thanks to ease of operation



The Dx1000 is rapidly ready for use

Combined with the alignment bracket available as an accessory, the red flashing alignment laser helps to align the Dx1000 to the measuring object. The signal strength indication (RSSI) of the sensor is displayed on the device display either as a bar graph or a numerical value. This allows the Dx1000 to be aligned quickly and optimally.

+ Alignment aid enables fast commissioning



PORTS

Gain competitive advantages with innovative sensor solutions from SICK. All over the world, operators of container terminals are investing in modern automation for their facilities in order to increase handling capacity and minimize risks.

Crane-to-crane collision avoidance

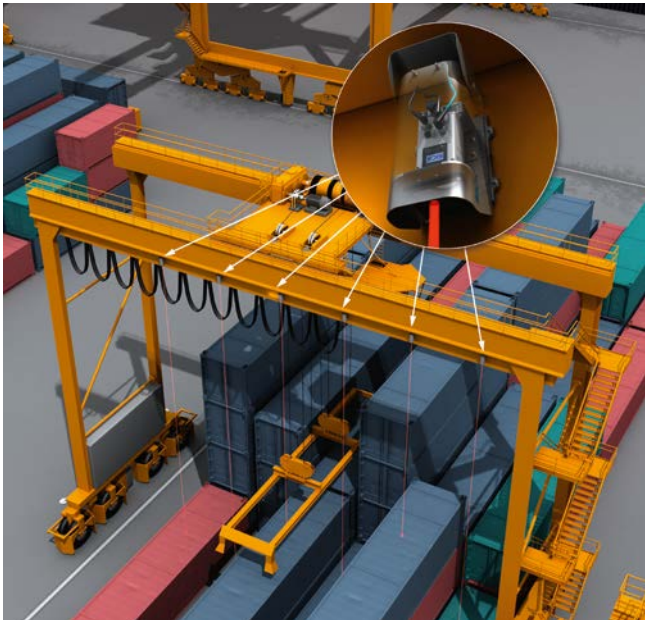


With a low amount of installation work required, DT1000 distance sensors enable reliable and non-contact distance measurement between rail-mounted ship-to-shore cranes (STS) or stacking cranes (RMG) for crane-to-crane collision avoidance. If the adjustable distance limits are reached or the relative velocity of the cranes to one another is too high, this will be transmitted by means of a switching signal to the higher-level control. Using the configurable RS-422/SSI interface and the scalable analog output signal, the DT1000 can also provide data to distance and speed. The DT1000 therefore contributes significantly toward increasing system availability in the port.



Determining the height position of the spreader

The DT1000 long range distance sensor continuously transmits to the operator of the ship-to-shore crane or stacking crane accurate information about the current height of the spreader to avoid the spreader colliding with containers.



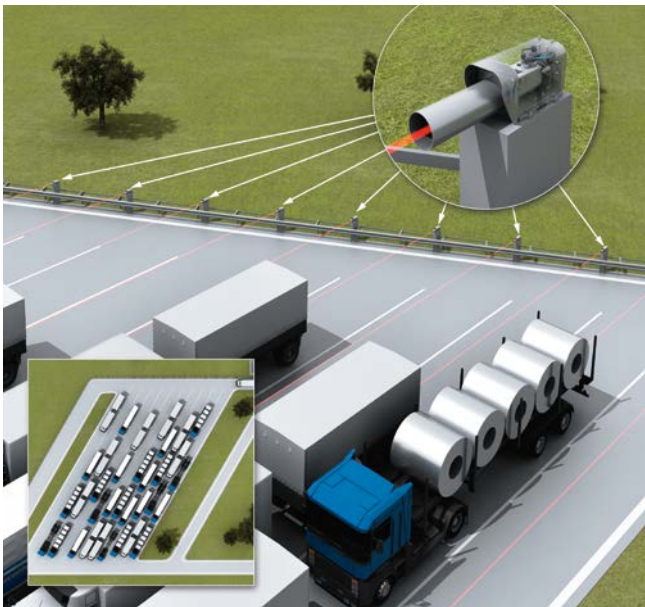
Container stack measurement

In order to optimize the transport path of the container and to avoid collisions with container stacks, accurate information is required regarding the containers located in the working range of the stacking crane. Vertically measuring DT1000 distance sensors determine the position and height of container stacks in the working range of the crane. The DT1000 sensors can be fixed on the crane for each container aisle or traversed horizontally with the trolley in order to register the container stacks below. The abrupt distance changes that occur when the edges of containers are scanned are precisely determined to a high standard of accuracy and with short response times.

TRAFFIC

The Dx1000 provides stable measurement results even in traffic-related applications.

Determining free capacity in truck parking rows



To determine available spaces in a parking row, the trailing edge of the last truck to enter the row must be reliably measured. The DT1000 is the ideal solution for this problem primarily when there are long parking rows without road sign structures.

Position detection of trains at stops

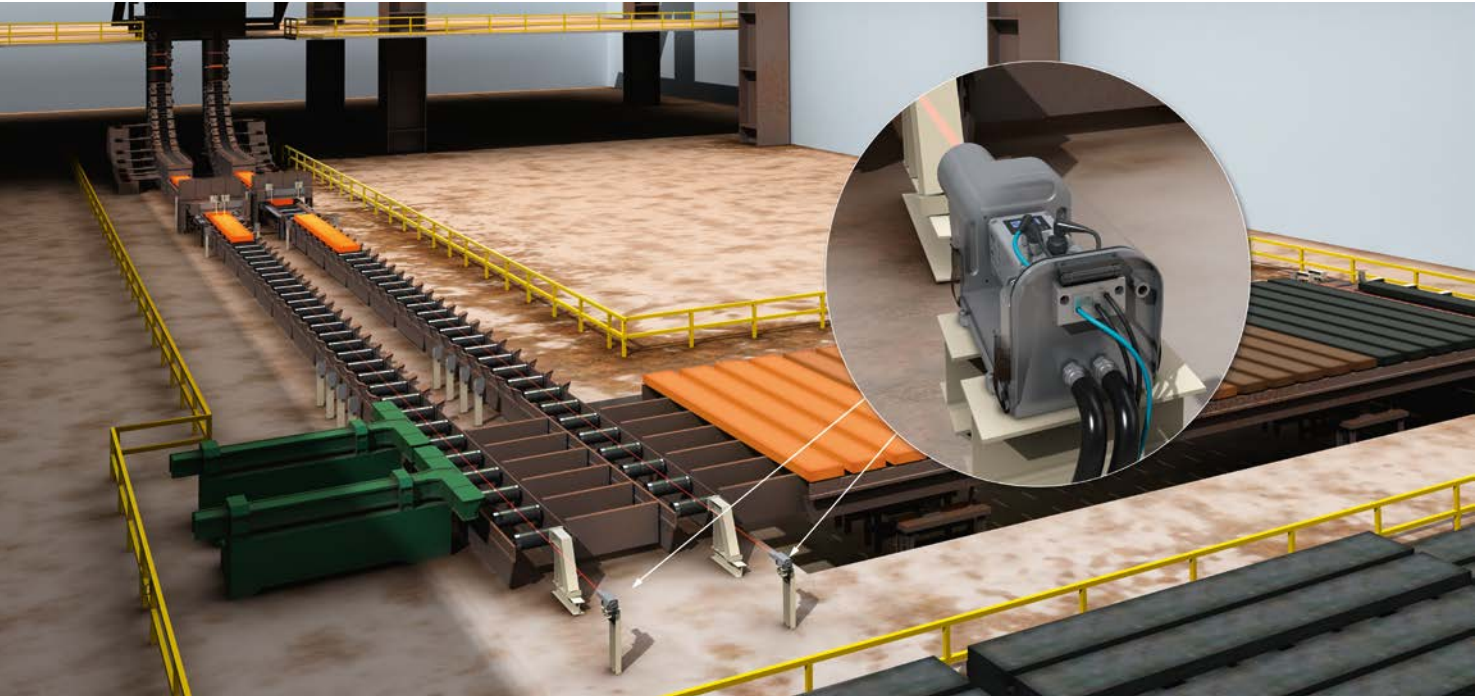


At stops featuring platform screen doors, the train must stop at the exact position specified. The DT1000 continuously measures the position of the front of the train. This allows the braking process to be controlled and the correct stop position to be verified. This reliable solution is ideal for controlling the arrival of automated, guided trains.

METAL AND STEEL

Thanks to its reliable measurement capabilities under adverse ambient conditions and on hot surfaces, the DT1000 represents the ideal solution for the metal and steel industry.

Slab length measurement



Hot steel slabs are singulated by means of an oxygen cutting torch. In order to cut the slabs to the desired length and control the oxygen cutting torch, the DT1000 determines the position of the front of the hot slabs on the roller without any contact. By determining the dimensions, the end products can be classified and managed. In post production logistics, the DT1000 long range distance sensor determines the length and width of steel slabs, for example.

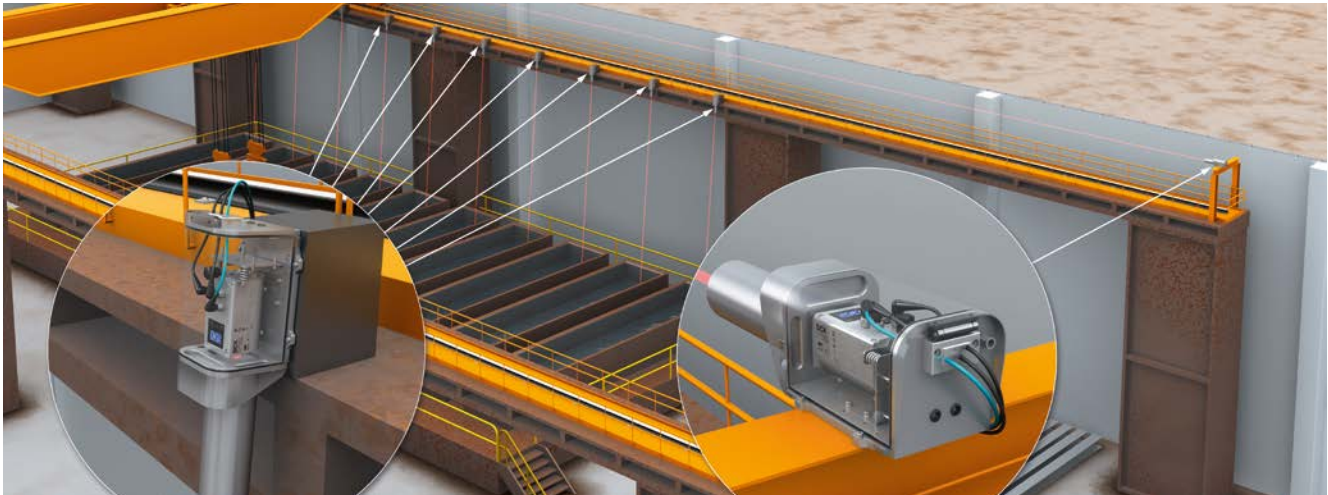


Presence detection, length measurement, and positioning in the rolling process

In order to optimize the timing for the following process steps, it is often necessary during the rolling process to know the time at which an object reaches a certain position in the furnace. Sufficiently protected with an optional protective housing with cooling, a DT1000 is attached to an opening in the ceiling or side panel of the furnace for this purpose, and is aligned to the transport rails.

As the rolled material moves through the furnace, the sensor detects its presence and records its length as required. The sensor then transmits this information to machines in downstream processes.

Crane positioning and level measurement during galvanizing process



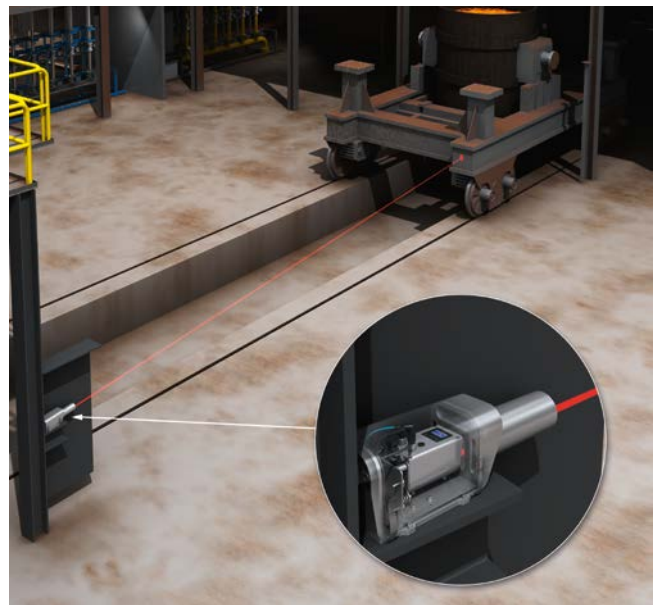
Owing to their wide measuring ranges, the DT1000 and DL1000 are both superbly useful for positioning cranes. In combination with the optional protective housing, the DT1000 in a galvanizing plant enables accurate measurement of the tank fill level under the typically harsh ambient conditions that prevail in such applications.

Level measurement of molten steel in the ladle car



The DT1000 verifies the filling process of the ladle cars immediately after blast-furnace run-off. Level measurement is performed on the surface of the hot molten metal without any contact.

Monitoring and positioning the ladle car in a ladle furnace



In a steel works, the correct positioning of the ladle cars is essential. Ladle cars that are not to be localized or are incorrectly positioned are not just inefficient – they can cause serious malfunctions. The DT1000, which can be combined with a linear encoder as necessary, allows the tracking and precise positioning of ladle cars.

GREAT PERFORMANCE AT GREAT DISTANCE



Product description

For reliable distance measurement, both indoors and outdoors: The Dx1000 long range distance sensor with infrared laser is ideal for use on cranes, for detecting vehicles in traffic applications, and for measuring hot steel slabs in a steel mill. The Dx1000 features exceptional versatility in any application – HDDM⁺ (High Definition Distance Measurement with multi-echo technology) enables

distance measurements with high measurement accuracy, even in the presence of ambient light, rain, snow, and fog. It excels at axial object tracking and quickly detecting the edges of objects moved in from the side. The device does all this at measurement cycle times of down to one millisecond, making it ideal for use in control loops.

At a glance

- Long range distance sensor with infrared laser featuring HDDM⁺ technology
- Measures natural objects (DT1000) or reflectors (DL1000)
- Dust-proof and waterproof housing (IP 65 and IP 67) made of highly corrosion-resistant aluminum alloy
- Configurable digital inputs and outputs, analog output, RS-422/SSI
- Measures hot surfaces (DT1000)

Your benefits

- Reliable distance measurement indoors and outdoors enables high system throughput
- Multi-echo technology can suppress undesirable reflections – enabling use in a wider range of applications
- Comprehensive options for adjustments enable perfect adaptation to the individual measuring task
- Fast, safe commissioning using a graphical touch display, convenient SOPAS ET user interface and red alignment laser
- A small number of device variants (standardization) accommodating a wide range of requirements keeps costs down
- Laser class 1 and therefore eye-safe



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→ www.sick.com/Dx1000

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.



Detailed technical data

Performance

	DL1000	DT1000
Measuring range ¹⁾	0.2 m ... 1,500 m, see measuring range diagram ^{2) 3)}	0.2 m ... 460 m, see measuring range diagram ^{4) 5)}
Resolution ⁶⁾	0.001 mm ... 100 mm, adjustable	
Repeatability ^{1) 7) 8)}	1 mm ... 15 mm, see reproducibility curves ²⁾	1 mm ... 15 mm, see reproducibility curves ⁴⁾
Accuracy ⁹⁾	± 20 mm (0.2 m ... 5 m) ± 10 mm (5 m ... 50 m) ± 20 mm (50 m ... 100 m) ± 24 mm (300 m) ¹⁰⁾ ± 48 mm (1.500 m)	± 10 mm (0.2 m ... 50 m) ± 20 mm (50 m ... 100 m) ± 24 mm (100 m ... 200 m)
Response time ⁸⁾	3 ms ... 384 ms	
Measurement cycle time	1 ms, 4 ms, 16 ms	1 ms, 4 ms, 16 ms, 64 ms, 128 ms
Light source	Measurement laser, infrared (905 nm) Alignment laser, red (650 nm)	
Laser class	1 (IEC 60825-1, even with simultaneous operation of measurement and alignment laser)	
Typ. light spot size (distance) ¹¹⁾	5 mm x 20 mm (at 1 m) 20 mm x 20 mm (at 10 m) 140 mm x 30 mm (at 50 m) 280 mm x 60 mm (at 100 m) 560 mm x 120 mm (at 200 m) 4,200 mm x 900 mm (at 1,500 m)	5 mm x 20 mm (at 1 m) 20 mm x 20 mm (at 10 m) 140 mm x 30 mm (at 50 m) 280 mm x 60 mm (at 100 m) 560 mm x 120 mm (at 200 m)
Filter	Rain and snow filter Fog filter Moving average distance value Kalman filter Moving average speed value	
Max. object temperature	-	+1,400 °C ¹²⁾
Additional function	Selection of relevant distance and signal level range, Selection of first or last echo in selected distance and signal level range	
Average laser service life (at 25 °C) ¹³⁾	100,000 h	

¹⁾ With max. ambient light 100 kLux sunlight.

²⁾ On "Diamond Grade" reflective tape (DG 983).

³⁾ Dependent on reflector size and measuring cycle time.

⁴⁾ 6 % ... 90 % remission.

⁵⁾ Dependent on remission and measuring cycle time.

⁶⁾ Data interface resolution.

⁷⁾ Statistical error 1 σ , environmental conditions constant, min. warm-up time > ca. 15 min.

⁸⁾ Dependent on selected filter settings and measuring cycle time.

⁹⁾ At T = +23° C and after warm-up time > ca. 15 min.

¹⁰⁾ Add ± 2 mm per 100 m (20 ppm).

¹¹⁾ See light spot size diagram.

¹²⁾ For object temperatures > +1.200 °C, the use of the additional filter is required for high-temperature applications. The additional filter reduces the measuring range limit by approx. 25%.

¹³⁾ Measuring laser.

Interfaces

Inputs/outputs	In1/Q1	Digital input, digital output (Switchable)
	QA/Q2	Analog output, digital output (Switchable)
	Q3	Digital output
	Q4	Digital output
	In2	Digital input
Digital inputs		Internal pull-down circuit HIGH switching voltage: min. 13 V ... max. supply voltage LOW switching voltage: max. 5 V Switching functions: deactivate measuring laser, activate alignment laser, preset
Digital outputs		Push-pull Max. switching current of 100 mA, short-circuit protected Switching voltage $V_s - 4$ V
Analog output ¹⁾		4 mA ... 20 mA, scalable
	Resolution analog output	16 bit
SSI, RS-422	Function	Switchable Output of measurement data
Ethernet	Function	Parameterization

¹⁾ Max. load = $(V_s - 7 \text{ V}) / 21.5 \text{ mA}$.

Mechanics/electronics

Supply voltage V_s	DC 18 V ... 30 V, reverse polarity protected
Ripple ¹⁾	$\leq 5 V_{pp}$
Power consumption ²⁾	With heating switched off ($\leq 10 \text{ W}$) With heating switched on ($\leq 17 \text{ W}$)
Initialization time	< 15 s
Housing material	Aluminum alloy (AlSi12), Glass, Polycarbonat, PA
Connection type	Round connector M12 x 1
Indication	Graphical, resistive touch display, status LEDs
Weight	980 g
Enclosure rating ³⁾	IP 65, IP 67 (IEC 60529)
Protection class	III (EN 61140)

¹⁾ May not fall short of or exceed V_s tolerances.

²⁾ Without external load.

³⁾ When plugged in with a suitable mating connector.

Ambient data

Ambient temperature	Operation: $-40 \text{ }^\circ\text{C} \dots +55 \text{ }^\circ\text{C}$ ¹⁾ Storage: $-40 \text{ }^\circ\text{C} \dots +75 \text{ }^\circ\text{C}$
Max. rel. humidity (not condensing)	$\leq 95 \%$
Effect of air pressure	0.3 ppm/hPa
Effect of air temperature	-1 ppm/K
Temperature drift	Typ. 0.25 mm/K
Mechanical load	Shock: 30 g / 6 ms according to DIN EN 60068-2-27 (Ea), 6 axes Continuous shock: 25 g / 6 ms according to DIN EN 60068-2-27 (fatigue), 500 shocks, 6 axes

¹⁾ At a temperature of $-40 \text{ }^\circ\text{C}$, a warm-up time of typ. 20 minutes is required (when supply voltage $V_s = 24 \text{ V}$)

Ordering information

Measuring range ¹⁾	Type	Part no.
0.2 m ... 1,500 m, see measuring range diagram ^{2) 3)}	DL1000-S11101	1075438
0.2 m ... 460 m, see measuring range diagram ^{4) 5)}	DT1000-S11101	1075436

¹⁾ With max. ambient light 100 kLux sunlight.

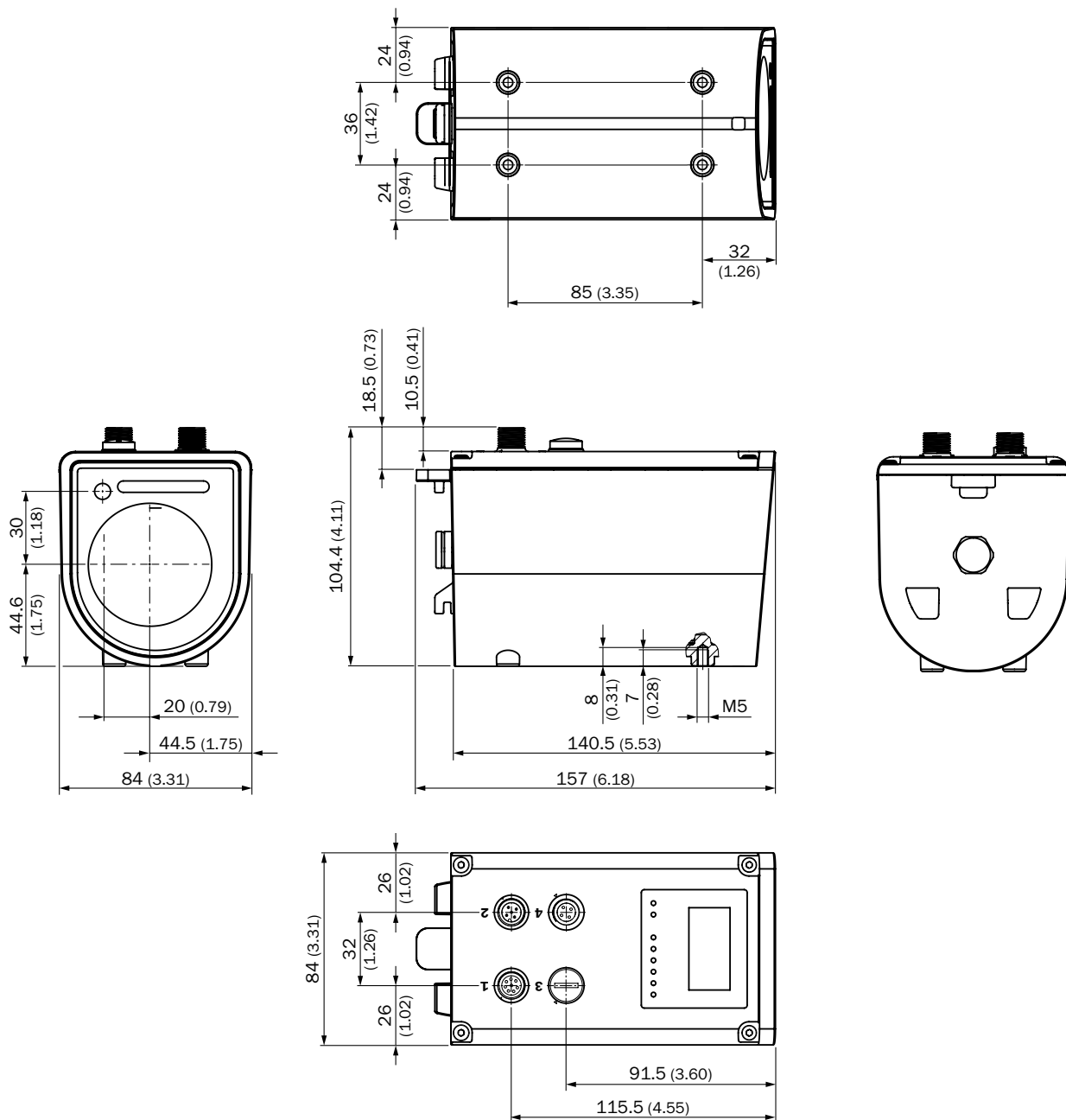
²⁾ On "Diamond Grade" reflective tape (DG 983)

³⁾ Dependent on reflector size and measuring cycle time.

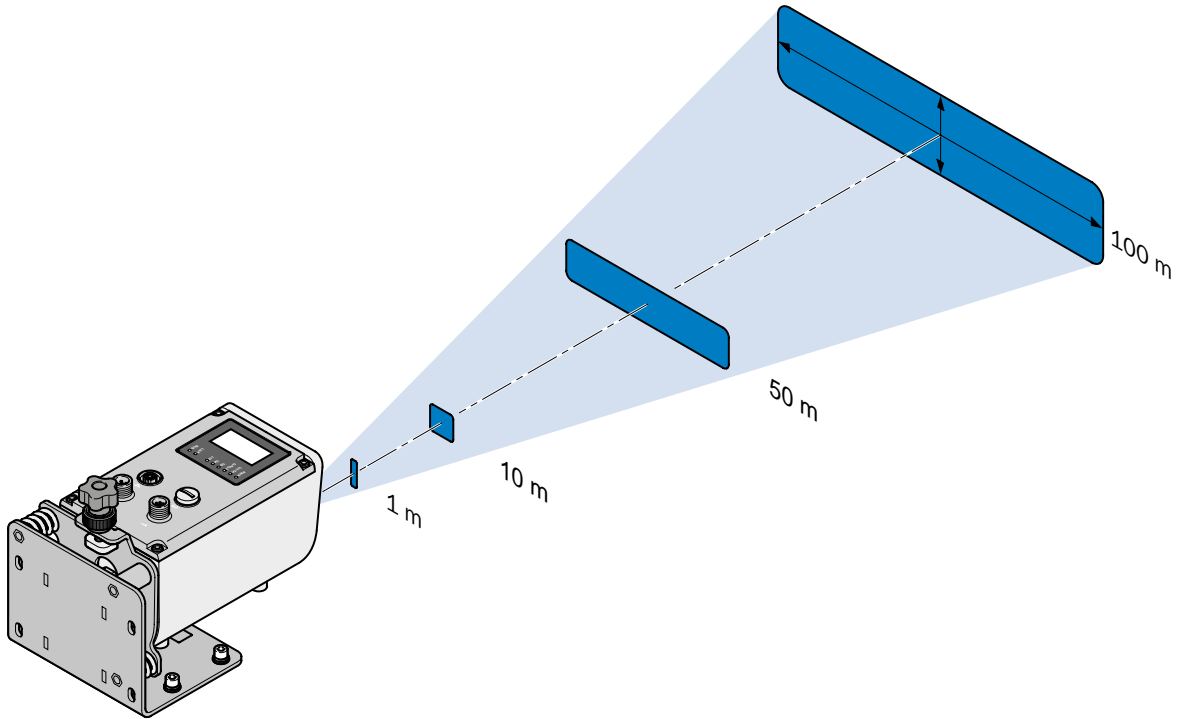
⁴⁾ 6 % ... 90 % remission.

⁵⁾ Dependent on remission and measuring cycle time.

Dimensional drawing (Dimensions in mm (inch))

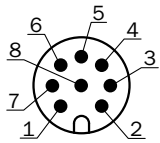


Light spot size



Electrical connection

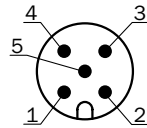
Connection 1: Power, RS-422/SSI, Q1/In1, Q2/QA



Connector M12, 8-pin, A-coded

- ① Q1/In1
- ② L+
- ③ RX-/CLK-
- ④ RX+/CLK+
- ⑤ TX-/Data-
- ⑥ TX+/Data+
- ⑦ M
- ⑧ Q2/QA

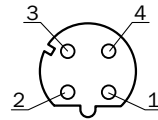
Connection 2: Auxiliary



Connector M12, 5-pin, A-coded

- ① nc
- ② Q3
- ③ nc
- ④ Q4
- ⑤ In2

Connection 4: Ethernet

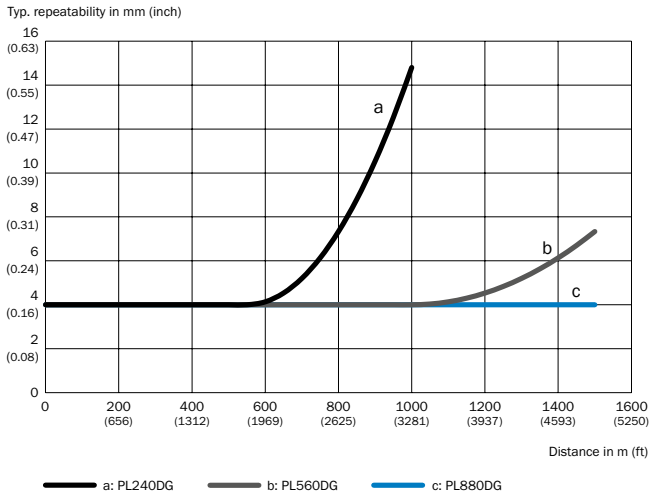


Female connector M12, 4-pin, D-coded

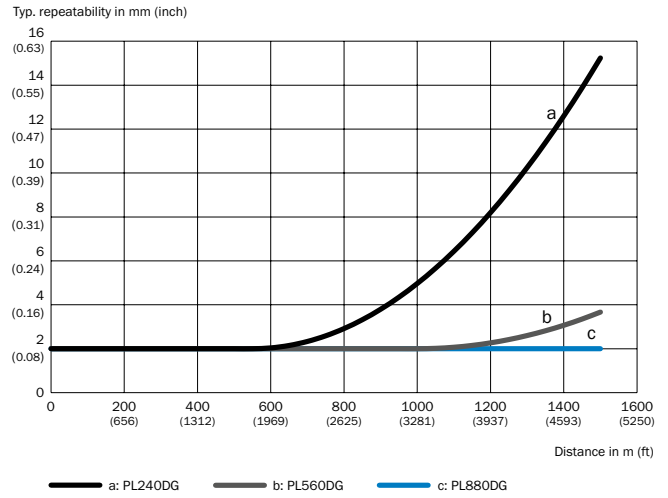
- ① TX+
- ② RX+
- ③ TX-
- ④ RX-

Repeatability

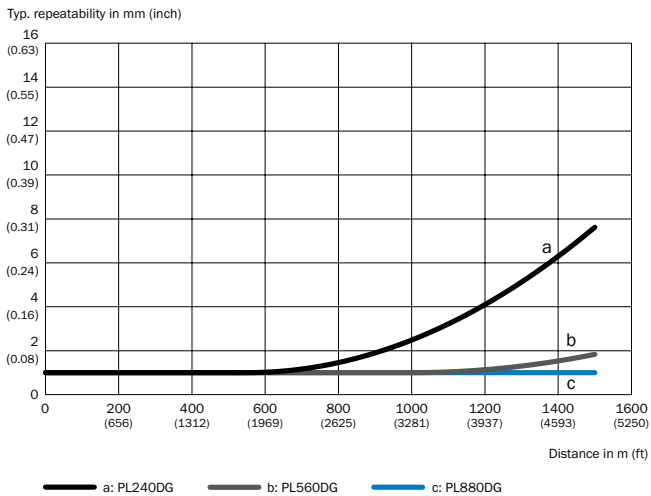
DL1000 for various reflector types, with 1 ms measurement cycle time



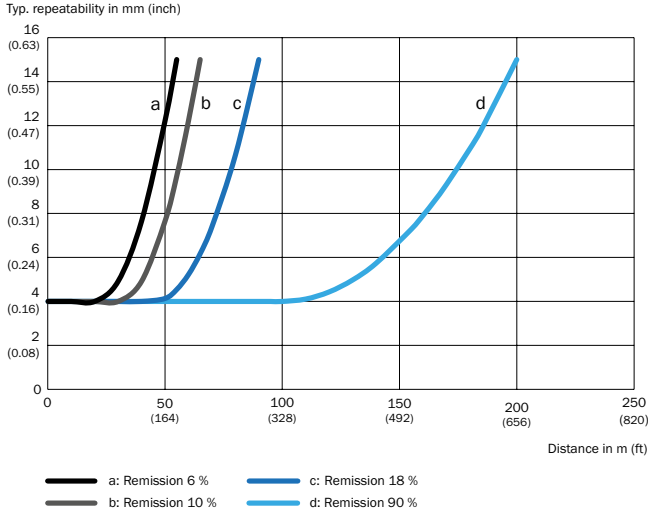
DL1000 for various reflector types, with 4 ms measurement cycle time



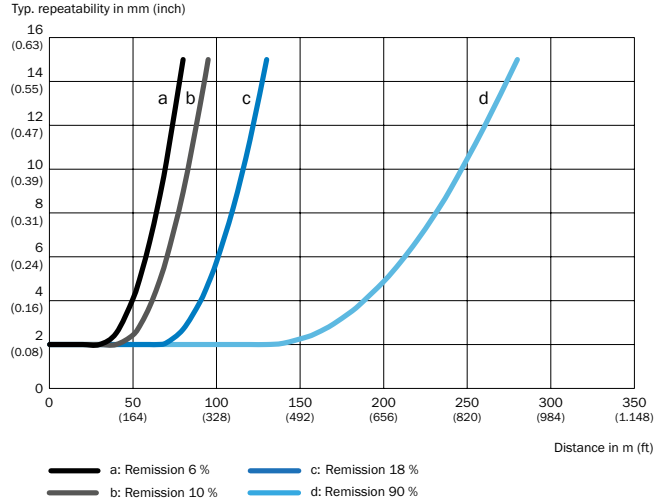
DL1000 for various reflector types, with 16 ms measurement cycle time



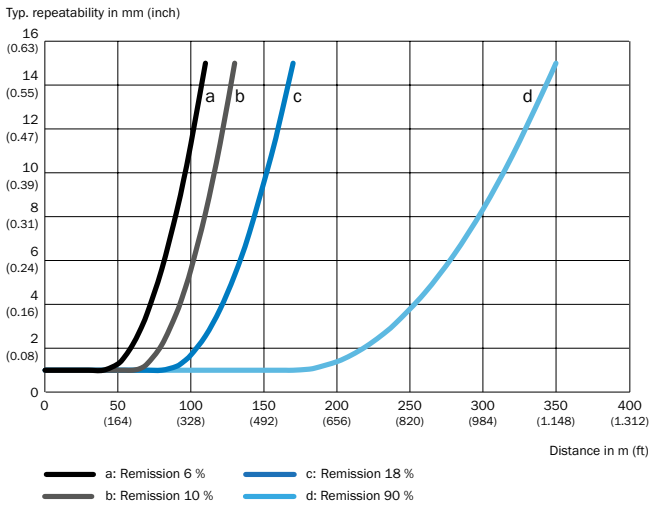
DT1000, with 1 ms measurement cycle time



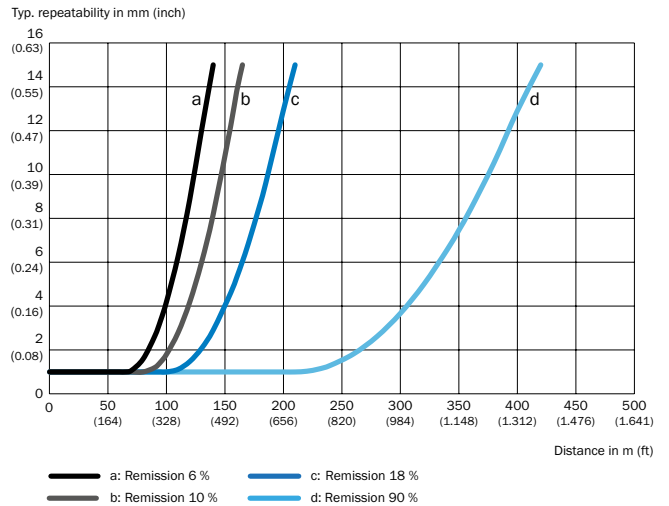
DT1000, with 4 ms measurement cycle time



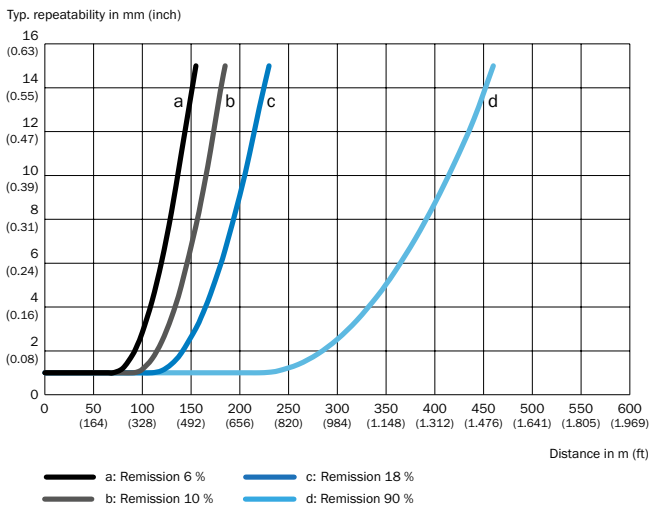
DT1000, with 16 ms measurement cycle time



DT1000, with 64 ms measurement cycle time

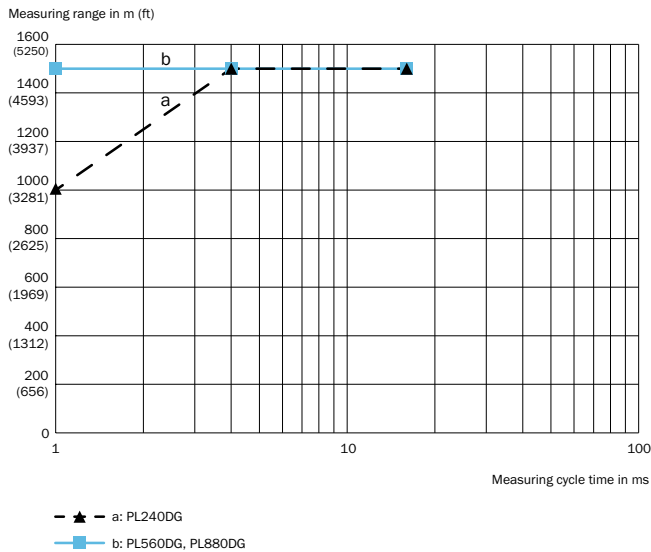


DT1000, with 128 ms measurement cycle time

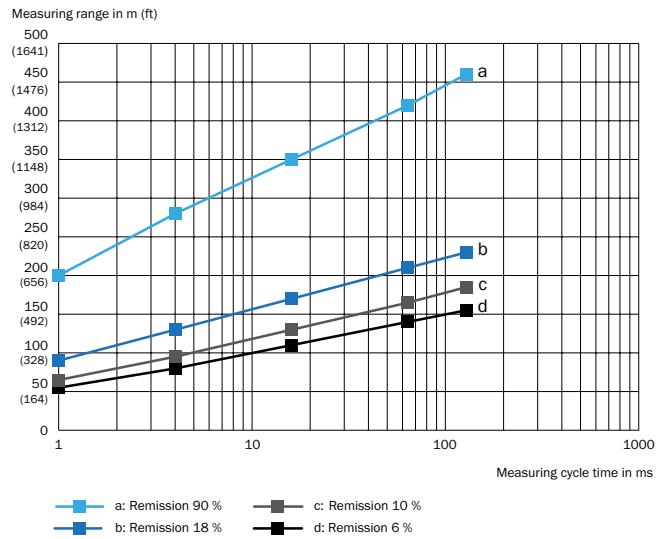


Measuring range diagram

DL1000 measuring range based on measurement cycle time and reflector type



DT1000 measuring range based on measurement cycle time and object remission



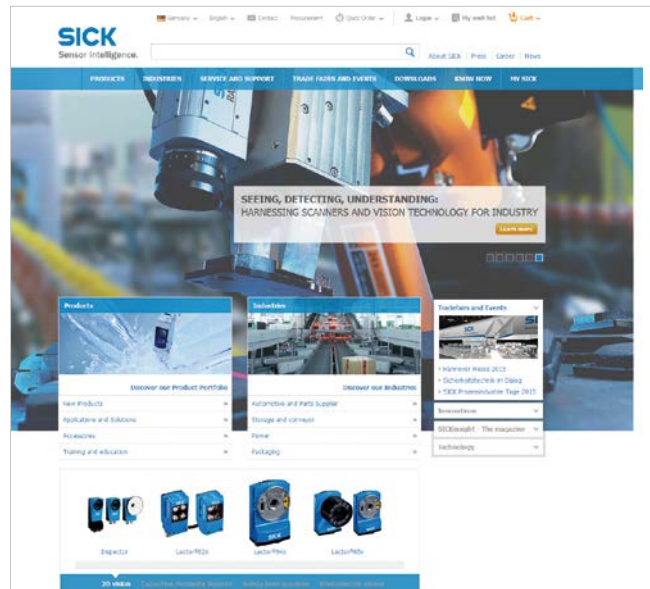
Recommended accessories

Brief description	Part no.	DL1000	DT1000
Device protection (mechanical)			
Weatherproof housing	2087690	●	●
Protective tube for weatherproof housing	2087693	●	●
Terminal and alignment brackets			
Alignment unit for Dx1000, incl. mounting material, steel	2080392	●	●
Adapters and distributors			
Y-distribution, shielded, female connector, M12, 8-pin, to 2x open cable ends, 4-pin, 0.25 mm ² , twisted pair, length 2x2 m	6048329	●	●
Plug connectors and cables			
Head A: female connector, M12, 5-pin, angled Head B: cable	6025911	●	●
Cable: drag chain use, PUR, halogen-free, unshielded, 10 m			
Head A: female connector, M12, 8-pin, angled Head B: cable	6051482	●	●
Cable: drag chain use, PUR, halogen-free, shielded, 10 m			
Head A: male connector, RJ45, 4-pin, straight Head B: male connector, M12, 4-pin, angled, D-coded Cable: PVC, 10 m	6061538	●	●
Optical filters			
Filter accessory for high temperature applications	2088511	-	●
Reflectors			
Reflector plate, reflective tape "Diamond Grade", 665 mm x 665 mm, material base plate: aluminum, screw-on, 4 hole mounting	1016806	●	-

You can find additional accessories online → www.sick.com/Dx1000

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- ✔ Easily repeat previous orders.
- ✔ Conveniently export quotations and orders to work with your systems.



SERVICES FOR MACHINES AND SYSTEMS: SICK LifeTime Services

Our comprehensive and versatile LifeTime Services are the perfect addition to the comprehensive range of products from SICK. The services range from product-independent consulting to traditional product services.



-  **Consulting and design**
Safe and professional
-  **Product and system support**
Reliable, fast and on-site
-  **Verification and optimization**
Safe and regularly inspected
-  **Upgrade and retrofits**
Easy, safe and economical
-  **Training and education**
Practical, focused and professional

SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 7,400 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, we are always close to our customers. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

We have extensive experience in various industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

Comprehensive services round out our offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

For us, that is “Sensor Intelligence.”

Worldwide presence:

Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, India, Israel, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Romania, Russia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Arab Emirates, USA, Vietnam.

Detailed addresses and further locations → www.sick.com