

microsonic

EVERY  
THING  
ULTRA  
SONIC

Extract from our online catalogue:

nano ultrasonic sensors

Current to: 2018-09-13



nano – what's in a name? At just 55 mm long, including plug, the nano is the shortest M12 ultrasonic sensor on the market.

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## HIGHLIGHTS

- › Ultrasonic sensor in the M12 threaded sleeve
- › The total length including plug is only 55 mm
- › Improved temperature compensation › adjustment to working conditions within 45 seconds

## BASICS

- › 1 switching output in pnp or npn variant
- › Analogue output 4–20 mA or 0–10 V
- › 2 detection ranges with a measurement range of 20 mm to 350 mm
- › microsonic Teach-in on pin 2
- › 0.069 mm resolution
- › Operating voltage 10–30 V › for use with various voltage networks

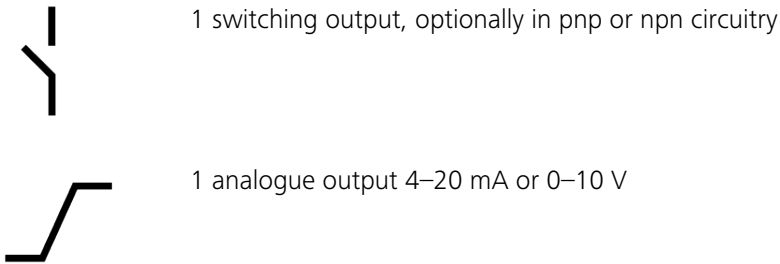
# Description

## With a housing length of only 55 mm

nano sensors with switching outputs are the smallest ultrasonic sensors inside the M12 threaded sleeve on the market. Analogue sensors are 60 mm long. The nano has a 4-pole M12 circular plug and are taught via pin 2.

## For the nano sensor family

there are 4 output stages and 2 measuring ranges available:



## The temperature compensation

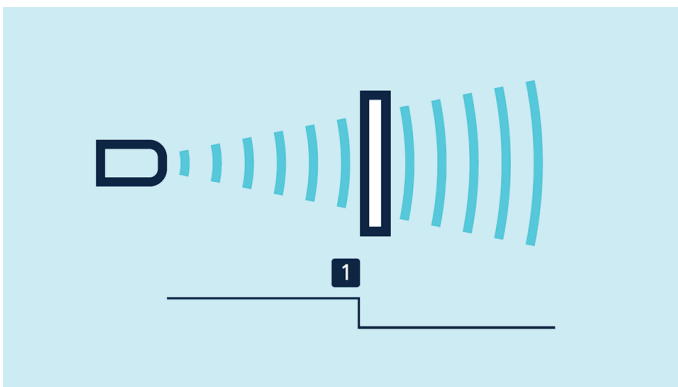
of the sensors profits from a significant improvement. The sensors reach their operating point only 45 seconds after activation of the operating voltage. We now compensate for the influence of self-heating and installation conditions. This brings improved precision shortly after activation of the supply voltage and in running operation.

## The nano sensors with switched output have three operating modes:

- › Single switching point
- › Two-way reflective barrier
- › Window mode

## Teach-in of a single switching point

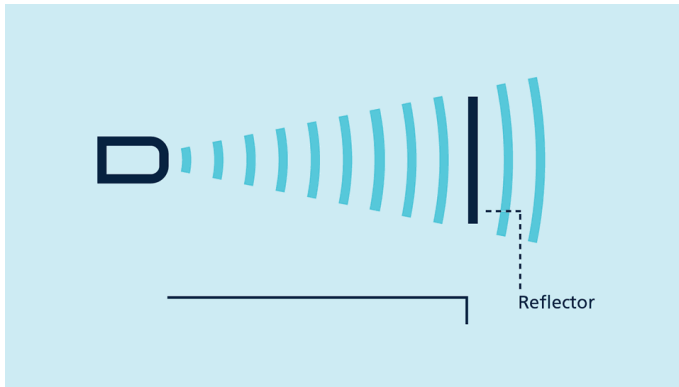
- › Place object (1) to be detected at the desired distance
- › Apply  $+U_B$  to pin 2 for about 3 seconds
- › Then apply  $+U_B$  to pin 2 again for about 1 second



### Teach-in of a two-way reflective barrier

with a fixed mounted reflector.

- › Apply  $+U_B$  to pin 2 for about 3 seconds
- › Then apply  $+U_B$  to pin 2 again for about 10 second



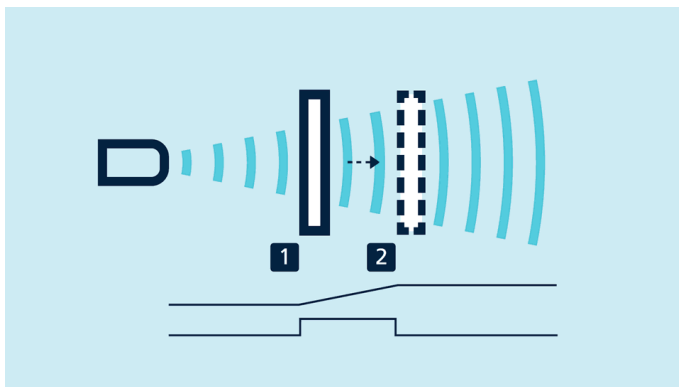
Teach-in of a two-way reflective barrier

### To set a window with two switching points

- › Place object to the sensor-close window limit (1)
- › Apply  $+U_B$  to pin 2 for about 3 seconds until both LEDs flash
- › Then move the object to the sensor-distant window limit (2)
- › Then apply  $+U_B$  to pin 2 again for about 1 second until LED2 extinguishes

### For setting an analogue output

- › initially position the object to be detected on the sensor-close window limit (1)
- › Apply  $+U_B$  to pin 2 for about 3 seconds until both LEDs flash
- › Move the object to the sensor-distant window limit (2)
- › Then apply  $+U_B$  to pin 2 again for about 1 second



Teach-in of an analogue characteristic or of a window with two switching points

### NCC/NOC

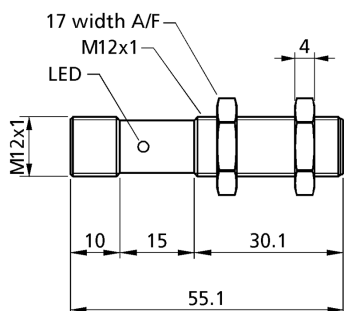
and rising/falling analog characteristic can also be set via pin 2.

### One green and one yellow LED

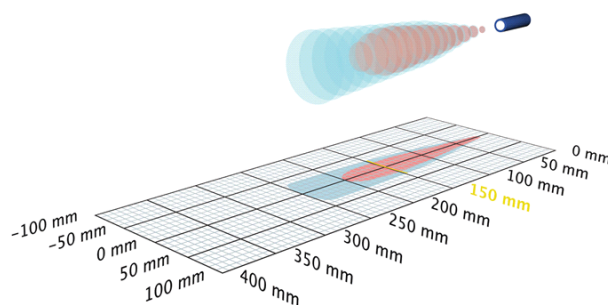
indicate the state of the output and support microsonic Teach-in.

# nano-15/CD

## scale drawing



## detection zone



1 x pnp



250 mm

|                 |   |
|-----------------|---|
| operating range | 20 - 250 mm   |
| design          | cylindrical M12   |
| operating mode  | proximity switch/reflective mode<br>reflective barrier<br>window mode |
| particularities | narrow sound field  |

## ultrasonic-specific

|                      |  |
|----------------------|--|
| means of measurement | echo propagation time measurement                    |
| transducer frequency | 380 kHz  |
| blind zone           | 20 mm  |
| operating range      | 150 mm   |
| maximum range        | 250 mm   |
| reproducibility      | $\pm 0.15\%$   |
| accuracy             | $\pm 1\%$ (temperature drift internally compensated) |

## electrical data

|                             |   |
|-----------------------------|---|
| operating voltage $U_B$     | 10 - 30 V d.c., reverse polarity protection |
| voltage ripple              | $\pm 10\%$                                  |
| no-load current consumption | $\leq 25$ mA                                |
| type of connection          | 4-pin M12 initiator plug                    |

# nano-15/CD

## outputs

|                             |   |
|-----------------------------|---|
| output 1                    | switching output<br>pnp: $I_{\max} = 200 \text{ mA}$ ( $U_B = 2\text{V}$ )<br>NOC/NCC adjustable, short-circuit-proof |
| switching hysteresis        | 2.0 mm  |
| switching frequency         | 25 Hz   |
| response time               | 24 ms   |
| delay prior to availability | < 300 ms  |

## inputs

|         |                |
|---------|----------------|
| input 1 | Teach-in input |
|---------|----------------|

## housing

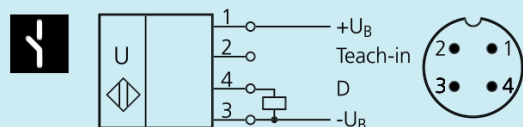
|                                 |  |
|---------------------------------|--|
| material                        | brass sleeve, nickel-plated, plastic parts, PBT    |
| ultrasonic transducer           | polyurethane foam, epoxy resin with glass contents |
| class of protection to EN 60529 | IP 67  |
| operating temperature           | -25°C to +70°C                                     |
| storage temperature             | -40°C to +85°C                                     |
| weight                          | 15 g   |

## technical features/characteristics

|                    |   |
|--------------------|---|
| scope for settings | Teach-in<br>Teach-in via com input on pin 2           |
| indicators         | 1 x LED green: working, 1 x LED yellow: switch status |
| particularities    | narrow sound field                                    |

## documentation (download)

### pin assignment

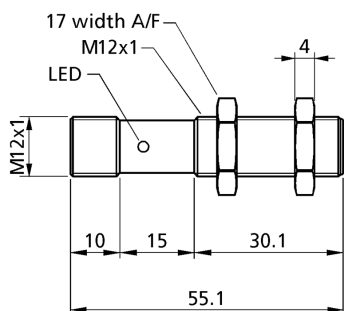


order no.

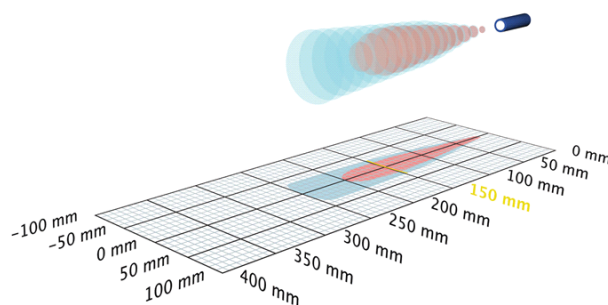
**nano-15/CD**

# nano-15/CE

## scale drawing



## detection zone



1 x npn



250 mm

|                 |   |
|-----------------|---|
| operating range | 20 - 250 mm   |
| design          | cylindrical M12   |
| operating mode  | proximity switch/reflective mode<br>reflective barrier<br>window mode |
| particularities | narrow sound field  |

## ultrasonic-specific

|                      |  |
|----------------------|--|
| means of measurement | echo propagation time measurement                    |
| transducer frequency | 380 kHz  |
| blind zone           | 20 mm  |
| operating range      | 150 mm   |
| maximum range        | 250 mm   |
| reproducibility      | $\pm 0.15\%$   |
| accuracy             | $\pm 1\%$ (temperature drift internally compensated) |

## electrical data

|                             |   |
|-----------------------------|---|
| operating voltage $U_B$     | 10 - 30 V d.c., reverse polarity protection |
| voltage ripple              | $\pm 10\%$                                  |
| no-load current consumption | $\leq 25$ mA                                |
| type of connection          | 4-pin M12 initiator plug                    |



# nano-15/CE

## outputs

|                             |   |
|-----------------------------|---|
| output 1                    | switching output<br>npn: $I_{\max} = 200 \text{ mA}$ ( $-U_B+2V$ )<br>NOC/NCC adjustable, short-circuit-proof |
| switching hysteresis        | 2.0 mm  |
| switching frequency         | 25 Hz   |
| response time               | 24 ms   |
| delay prior to availability | < 300 ms  |

## inputs

|         |                |
|---------|----------------|
| input 1 | Teach-in input |
|---------|----------------|

## housing

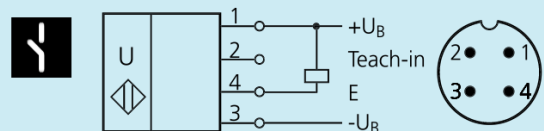
|                                 |  |
|---------------------------------|--|
| material                        | brass sleeve, nickel-plated, plastic parts, PBT    |
| ultrasonic transducer           | polyurethane foam, epoxy resin with glass contents |
| class of protection to EN 60529 | IP 67  |
| operating temperature           | -25°C to +70°C                                     |
| storage temperature             | -40°C to +85°C                                     |
| weight                          | 15 g   |

## technical features/characteristics

|                    |   |
|--------------------|---|
| scope for settings | Teach-in<br>Teach-in via com input on pin 2           |
| indicators         | 1 x LED green: working, 1 x LED yellow: switch status |
| particularities    | narrow sound field                                    |

## documentation (download)

### pin assignment

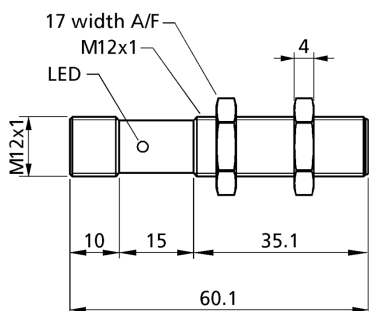


order no.

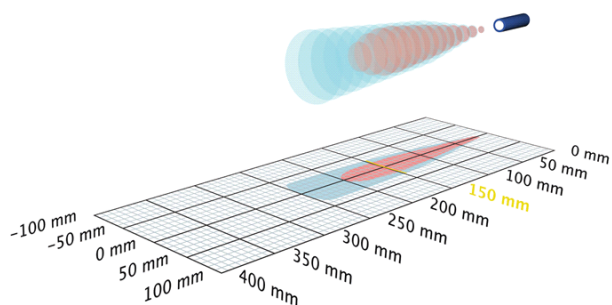
**nano-15/CE**

# nano-15/CI

## scale drawing



## detection zone



1 x analogue 4-20 mA



250 mm

|                 |                                |
|-----------------|--------------------------------|
| operating range | 20 - 250 mm                    |
| design          | cylindrical M12                |
| operating mode  | analogue distance measurements |
| particularities | narrow sound field             |

## ultrasonic-specific

|                      |  |
|----------------------|--|
| means of measurement | echo propagation time measurement                    |
| transducer frequency | 380 kHz  |
| blind zone           | 20 mm  |
| operating range      | 150 mm   |
| maximum range        | 250 mm   |
| reproducibility      | $\pm 0.15\%$   |
| accuracy             | $\pm 1\%$ (temperature drift internally compensated) |

## electrical data

|                             |   |
|-----------------------------|---|
| operating voltage $U_B$     | 10 - 30 V d.c., reverse polarity protection |
| voltage ripple              | $\pm 10\%$                                  |
| no-load current consumption | $\leq 30$ mA                                |
| type of connection          | 4-pin M12 initiator plug                    |

# nano-15/CI

## outputs

|                             |  |
|-----------------------------|--|
| output 1                    | analogue output<br>current: 4-20 mA<br>switchable rising/falling |
| response time               | 24 ms  |
| delay prior to availability | < 300 ms   |

## inputs

|         |                |
|---------|----------------|
| input 1 | Teach-in input |
|---------|----------------|

## housing

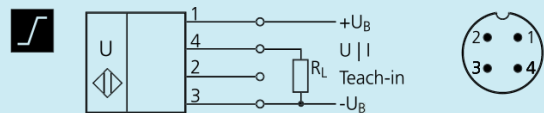
|                                 |  |
|---------------------------------|--|
| material                        | brass sleeve, nickel-plated, plastic parts, PBT    |
| ultrasonic transducer           | polyurethane foam, epoxy resin with glass contents |
| class of protection to EN 60529 | IP 67  |
| operating temperature           | -25°C to +70°C                                     |
| storage temperature             | -40°C to +85°C                                     |
| weight                          | 15 g   |

## technical features/characteristics

|                    |  |
|--------------------|--|
| scope for settings | Teach-in<br>Teach-in via com input on pin 2                  |
| indicators         | 1 x LED green: working, 1 x LED yellow: object in the window |
| particularities    | narrow sound field   |

## documentation (download)

### pin assignment

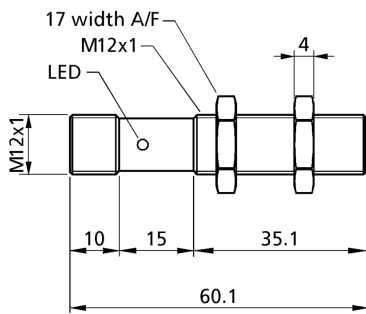


order no.

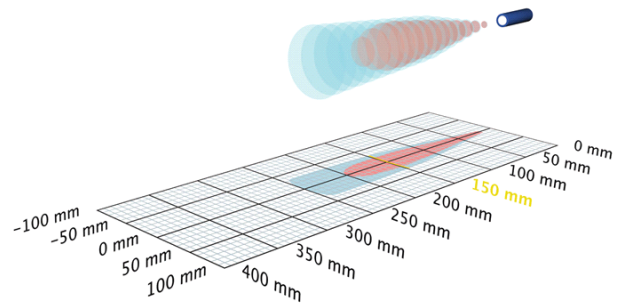
**nano-15/CI**

# nano-15/CU

## scale drawing



## detection zone



1 x analogue 0-10 V



250 mm

|                 |                                |
|-----------------|--------------------------------|
| operating range | 20 - 250 mm                    |
| design          | cylindrical M12                |
| operating mode  | analogue distance measurements |
| particularities | narrow sound field             |

## ultrasonic-specific

|                      |   |
|----------------------|---|
| means of measurement | echo propagation time measurement                     |
| transducer frequency | 380 kHz   |
| blind zone           | 20 mm   |
| operating range      | 150 mm  |
| maximum range        | 250 mm  |
| reproducibility      | $\pm 0.15 \%$   |
| accuracy             | $\pm 1 \%$ (temperature drift internally compensated) |

## electrical data

|                             |                              |
|-----------------------------|------------------------------|
| operating voltage $U_b$     | 15 V bis 30 V DC, verpolfest |
| voltage ripple              | $\pm 10 \%$                  |
| no-load current consumption | $\leq 30 \text{ mA}$         |
| type of connection          | 4-pin M12 initiator plug     |

# nano-15/CU

## outputs

|                             |   |
|-----------------------------|---|
| output 1                    | analogue output<br>voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof<br>switchable rising/falling |
| response time               | 24 ms   |
| delay prior to availability | < 300 ms  |

## inputs

|         |                |
|---------|----------------|
| input 1 | Teach-in input |
|---------|----------------|

## housing

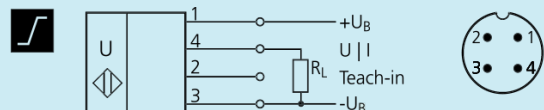
|                                 |  |
|---------------------------------|--|
| material                        | brass sleeve, nickel-plated, plastic parts, PBT    |
| ultrasonic transducer           | polyurethane foam, epoxy resin with glass contents |
| class of protection to EN 60529 | IP 67  |
| operating temperature           | -25°C to +70°C                                     |
| storage temperature             | -40°C to +85°C                                     |
| weight                          | 15 g   |

## technical features/characteristics

|                    |  |
|--------------------|--|
| scope for settings | Teach-in<br>Teach-in via com input on pin 2                  |
| indicators         | 1 x LED green: working, 1 x LED yellow: object in the window |
| particularities    | narrow sound field   |

## documentation (download)

### pin assignment

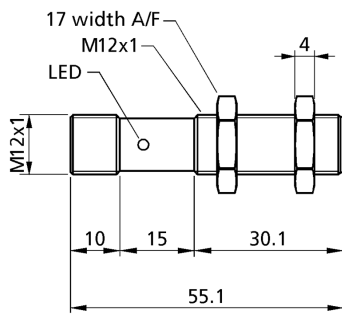


order no.

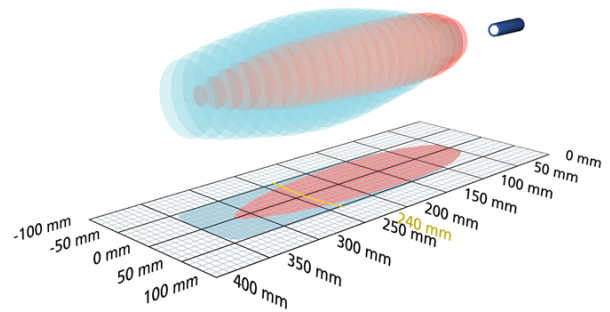
**nano-15/CU**

# nano-24/CD

## scale drawing



## detection zone



1 x pnp



350 mm

|                 |   |
|-----------------|---|
| operating range | 40 - 350 mm   |
| design          | cylindrical M12   |
| operating mode  | proximity switch/reflective mode<br>reflective barrier<br>window mode |
| particularities | narrow sound field  |

## ultrasonic-specific

|                      |  |
|----------------------|--|
| means of measurement | echo propagation time measurement                    |
| transducer frequency | 500 kHz  |
| blind zone           | 40 mm  |
| operating range      | 240 mm   |
| maximum range        | 350 mm   |
| reproducibility      | $\pm 0.15\%$   |
| accuracy             | $\pm 1\%$ (temperature drift internally compensated) |

## electrical data

|                             |   |
|-----------------------------|---|
| operating voltage $U_B$     | 10 - 30 V d.c., reverse polarity protection |
| voltage ripple              | $\pm 10\%$                                  |
| no-load current consumption | $\leq 35$ mA                                |
| type of connection          | 4-pin M12 initiator plug                    |

# nano-24/CD

## outputs

|                             |   |
|-----------------------------|---|
| output 1                    | switching output<br>pnp: $I_{\max} = 200 \text{ mA}$ ( $U_B = 2\text{V}$ )<br>NOC/NCC adjustable, short-circuit-proof |
| switching hysteresis        | 3 mm  |
| switching frequency         | 20 Hz   |
| response time               | 30 ms   |
| delay prior to availability | < 300 ms  |

## inputs

|         |                |
|---------|----------------|
| input 1 | Teach-in input |
|---------|----------------|

## housing

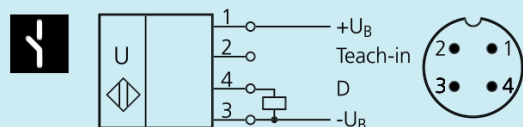
|                                 |  |
|---------------------------------|--|
| material                        | brass sleeve, nickel-plated, plastic parts, PBT    |
| ultrasonic transducer           | polyurethane foam, epoxy resin with glass contents |
| class of protection to EN 60529 | IP 67  |
| operating temperature           | -25°C to +70°C                                     |
| storage temperature             | -40°C to +85°C                                     |
| weight                          | 15 g   |

## technical features/characteristics

|                    |   |
|--------------------|---|
| scope for settings | Teach-in<br>Teach-in via com input on pin 2           |
| indicators         | 1 x LED green: working, 1 x LED yellow: switch status |
| particularities    | narrow sound field                                    |

## documentation (download)

### pin assignment

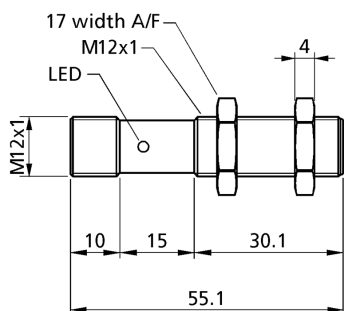


order no.

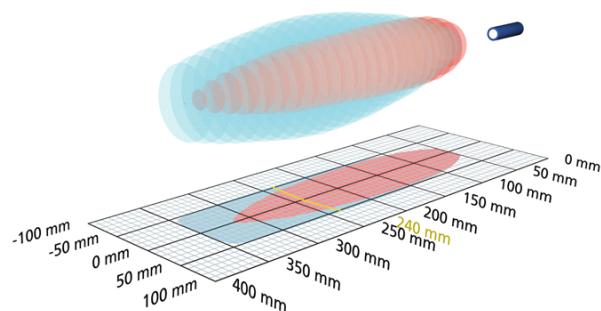
**nano-24/CD**

# nano-24/CE

## scale drawing



## detection zone



1 x npn



350 mm

|                 |   |
|-----------------|---|
| operating range | 40 - 350 mm   |
| design          | cylindrical M12   |
| operating mode  | proximity switch/reflective mode<br>reflective barrier<br>window mode |
| particularities | narrow sound field  |

## ultrasonic-specific

|                      |  |
|----------------------|--|
| means of measurement | echo propagation time measurement                    |
| transducer frequency | 500 kHz  |
| blind zone           | 40 mm  |
| operating range      | 240 mm   |
| maximum range        | 350 mm   |
| reproducibility      | $\pm 0.15\%$   |
| accuracy             | $\pm 1\%$ (temperature drift internally compensated) |

## electrical data

|                             |   |
|-----------------------------|---|
| operating voltage $U_B$     | 10 - 30 V d.c., reverse polarity protection |
| voltage ripple              | $\pm 10\%$                                  |
| no-load current consumption | $\leq 35$ mA                                |
| type of connection          | 4-pin M12 initiator plug                    |



# nano-24/CE

## outputs

|                             |   |
|-----------------------------|---|
| output 1                    | switching output<br>npn: $I_{\max} = 200 \text{ mA}$ ( $-U_B+2V$ )<br>NOC/NCC adjustable, short-circuit-proof |
| switching hysteresis        | 3 mm  |
| switching frequency         | 20 Hz   |
| response time               | 30 ms   |
| delay prior to availability | < 300 ms  |

## inputs

|         |                |
|---------|----------------|
| input 1 | Teach-in input |
|---------|----------------|

## housing

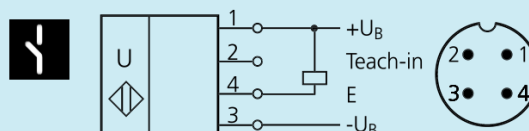
|                                 |  |
|---------------------------------|--|
| material                        | brass sleeve, nickel-plated, plastic parts, PBT    |
| ultrasonic transducer           | polyurethane foam, epoxy resin with glass contents |
| class of protection to EN 60529 | IP 67  |
| operating temperature           | -25°C to +70°C                                     |
| storage temperature             | -40°C to +85°C                                     |
| weight                          | 15 g   |

## technical features/characteristics

|                    |   |
|--------------------|---|
| scope for settings | Teach-in<br>Teach-in via com input on pin 2           |
| indicators         | 1 x LED green: working, 1 x LED yellow: switch status |
| particularities    | narrow sound field                                    |

## documentation (download)

### pin assignment

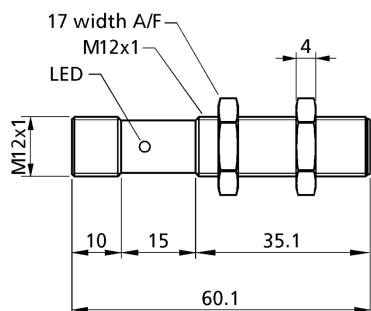


order no.

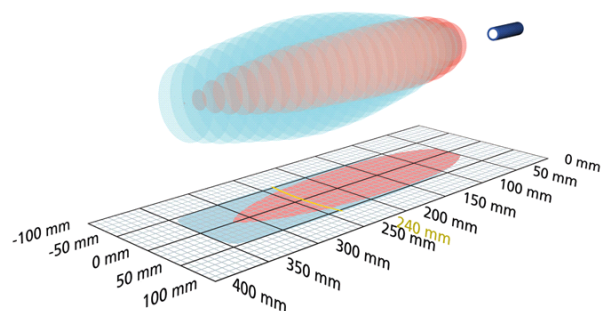
**nano-24/CE**

# nano-24/CI

## scale drawing



## detection zone



1 x analogue 4-20 mA



350 mm

|                 |                                |
|-----------------|--------------------------------|
| operating range | 40 - 350 mm                    |
| design          | cylindrical M12                |
| operating mode  | analogue distance measurements |
| particularities | narrow sound field             |

## ultrasonic-specific

|                      |  |
|----------------------|--|
| means of measurement | echo propagation time measurement                    |
| transducer frequency | 500 kHz  |
| blind zone           | 40 mm  |
| operating range      | 240 mm   |
| maximum range        | 350 mm   |
| reproducibility      | $\pm 0.15\%$   |
| accuracy             | $\pm 1\%$ (temperature drift internally compensated) |

## electrical data

|                             |   |
|-----------------------------|---|
| operating voltage $U_B$     | 10 - 30 V d.c., reverse polarity protection |
| voltage ripple              | $\pm 10\%$                                  |
| no-load current consumption | $\leq 40$ mA                                |
| type of connection          | 4-pin M12 initiator plug                    |

# nano-24/CI

## outputs

**output 1** analogue output  
current: 4-20 mA  
switchable rising/falling

**response time** 30 ms

**delay prior to availability** < 300 ms

## inputs

**input 1** Teach-in input

## housing

**material** brass sleeve, nickel-plated, plastic parts, PBT

**ultrasonic transducer** polyurethane foam, epoxy resin with glass contents

**class of protection to EN 60529** IP 67

**operating temperature** -25°C to +70°C

**storage temperature** -40°C to +85°C

**weight** 15 g

## technical features/characteristics

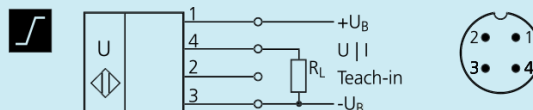
**scope for settings** Teach-in  
Teach-in via com input on pin 2

**indicators** 1 x LED green: working, 1 x LED yellow: object in the window

**particularities** narrow sound field

## documentation (download)

### pin assignment

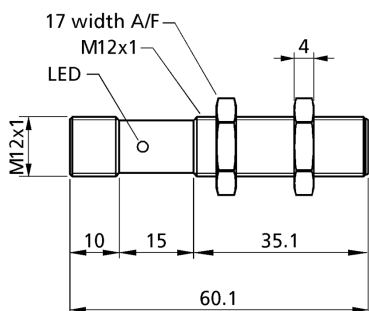


order no.

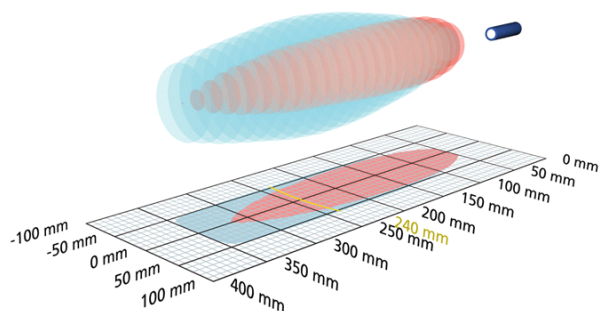
**nano-24/CI**

# nano-24/CU

## scale drawing



## detection zone



1 x analogue 0-10 V



350 mm

|                 |                                |
|-----------------|--------------------------------|
| operating range | 40 - 350 mm                    |
| design          | cylindrical M12                |
| operating mode  | analogue distance measurements |
| particularities | narrow sound field             |

## ultrasonic-specific

|                      |  |
|----------------------|--|
| means of measurement | echo propagation time measurement                    |
| transducer frequency | 500 kHz  |
| blind zone           | 40 mm  |
| operating range      | 240 mm   |
| maximum range        | 350 mm   |
| reproducibility      | $\pm 0.15\%$   |
| accuracy             | $\pm 1\%$ (temperature drift internally compensated) |

## electrical data

|                             |                              |
|-----------------------------|------------------------------|
| operating voltage $U_b$     | 15 V bis 30 V DC, verpolfest |
| voltage ripple              | $\pm 10\%$                   |
| no-load current consumption | $\leq 40$ mA                 |
| type of connection          | 4-pin M12 initiator plug     |

# nano-24/CU

## outputs

|                             |   |
|-----------------------------|---|
| output 1                    | analogue output<br>voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof<br>switchable rising/falling |
| response time               | 30 ms   |
| delay prior to availability | < 300 ms  |

## inputs

|         |                |
|---------|----------------|
| input 1 | Teach-in input |
|---------|----------------|

## housing

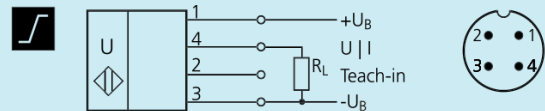
|                                 |  |
|---------------------------------|--|
| material                        | brass sleeve, nickel-plated, plastic parts, PBT    |
| ultrasonic transducer           | polyurethane foam, epoxy resin with glass contents |
| class of protection to EN 60529 | IP 67  |
| operating temperature           | -25°C to +70°C                                     |
| storage temperature             | -40°C to +85°C                                     |
| weight                          | 15 g   |

## technical features/characteristics

|                    |  |
|--------------------|--|
| scope for settings | Teach-in<br>Teach-in via com input on pin 2                  |
| indicators         | 1 x LED green: working, 1 x LED yellow: object in the window |
| particularities    | narrow sound field   |

## documentation (download)

### pin assignment



order no.

**nano-24/CU**