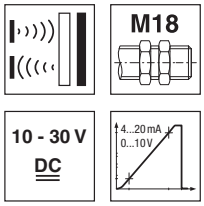
# DMU318

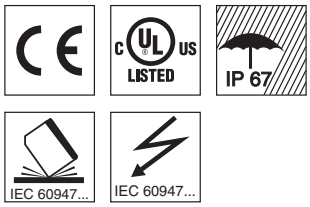
## Ultrasonic sensors with analog output

en 01-2017/02 50111303




**40 … 300 mm**
**80 … 1200 mm**

- Function largely independent of surface properties, ideal for detection of liquids, bulk materials, transparent media, …
- Small dead zone at long scanning range
- 1 analog output 0 … 10V or 4 … 20mA
- Teachable characteristic curve
- Extra short construction
- **NEW** – Stable plastic design
- **NEW** – Temperature-compensated scanning range

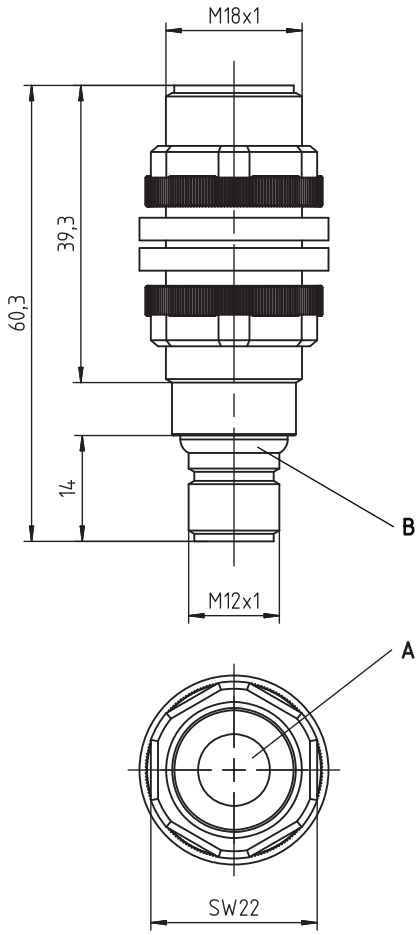



## Accessories:

**(available separately)**

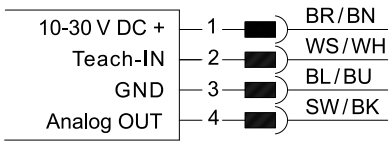
- Mounting systems
- Mounting adapter M18-M30: BTX-D18M-D30 (Part no. 50125860)
- Cables with M12 connector (KD …)
- Teach adapter PA1/XTSX-M12 (Part no. 50124709)

## Dimensioned drawing




**A** Active sensor surface
**B** Indicator diodes

## Electrical connection



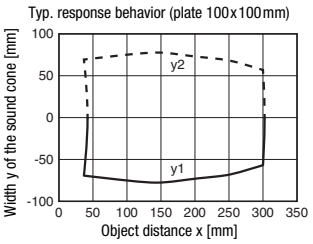
# Technical data

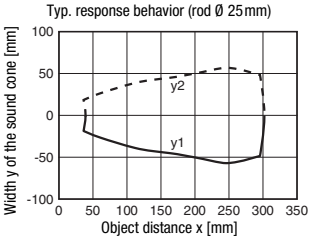
| Ultrasonic specifications | | DMU318-300/…-M12 | DMU318-1200/…-M12 |
|---|---|---|---|
| Scanning range [1] | | 40 … 300mm [2] | 80 … 1200mm [2] |
| Adjustment range | | 40 … 300mm | 80 … 1200mm |
| Ultrasonic frequency | | 300kHz | 200kHz |
| Typ. opening angle | | 7° ± 2° | 8° ± 2° |
| Resolution | | < 2mm | < 2mm |
| Direction of beam | | Axial | Axial |
| Reproducibility | | ± 0.5% [1] [3] | ± 0.5% [1] [3] |
| Switching hysteresis | | 1% [3] | 1% [3] |
| Temperature drift | | ≤ 5% [4] | ≤ 5% [4] |
| **Timing** | | | |
| Readiness delay | | < 100ms | < 100ms |
| **Electrical data** | | | |
| Operating voltage $U_B$ [5] | | 10 … 30V DC (incl. ± 5% residual ripple) | |
| Residual ripple | | ± 5% of $U_B$ | |
| Open-circuit current | | ≤ 35mA | |
| Analog output | …/C… | 1 analog output 4 … 20mA | |
| | …/V… | 1 analog output 0 … 10V | |
| Load resistance | | Current output: $R_L$ ≤ 500Ω, Voltage output: $R_L$ ≥ 2kΩ | |
| Characteristic curve adjustment | | 1-point teach: teach-in (pin 2) 2 … 7s to GND, 2-point teach: teach-in (pin 2) 7 … 12s to GND, Characteristic curve inversion: teach-in (pin 2) > 12s to GND | |
| Analog output error signal | | Distance too small: approx. 3.8mA, Distance too large: approx. 11V / approx. 21mA | |
| **Indicators** | | | |
| Yellow LED | | Analog OUT: object detected | |
| Yellow and green LEDs flash | | Teach-in / teaching error | |
| Green LED | | Object within the scanning range | |
| **Mechanical data** | | | |
| Housing | | Plastic (PBT) | |
| Active surface | | Epoxy resin, glass fiber reinforced | |
| Weight | | 65g | |
| Ultrasonic transducer | | Piezoceramic [6] | |
| Connection type | | M12 connector, 4-pin | |
| Fitting position | | Any | |
| **Environmental data** | | | |
| Ambient temp. (operation/storage) | | -20° … +70°C/-20° … +70°C | |
| Protective circuit [7] | | 1, 2, 3 | |
| VDE protection class | | III | |
| Degree of protection | | IP 67 | |
| Standards applied | | EN 60947-5-2 | |
| Certifications | | UL 508, CSA C22.2 No.14-13 [5] [8] | |

1) At 20°C
2) Target: 100mm x 100mm plate
3) From end value
4) Over the temperature range -20°C … +70°C
5) For UL applications: use is permitted exclusively in Class 2 circuits according to NEC
6) The ceramic material of the ultrasonic transducer contains lead zirconium titanate (PZT)
7) 1=short-circuit and overload protection, 2=polarity reversal protection, 3=wire break and inductive protection
8) These proximity switches shall be used with UL Listed Cable assemblies rated 30V, 0.5A min, in the field installation, or equivalent (categories: CYJV/CYJV7 or PVVA/PVVA7)

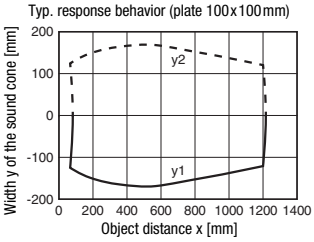
# Diagrams

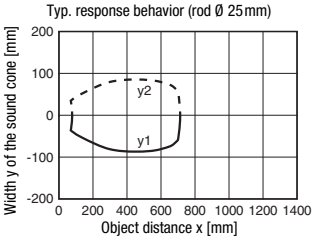
**DMU318-300/…-M12**

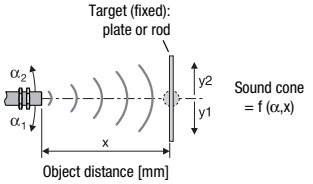



**DMU318-1200/…-M12**




# Notes

**Observe intended use!**

- This product is not a safety sensor and is not intended as personnel protection.
- The product may only be put into operation by competent persons.
- Only use the product in accordance with its intended use.

## Part number code

| D | M | U | 3 | 1 | 8 | - | 1 | 2 | 0 | 0 | . | 3 | / | C | T | - | M | 1 | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Operating principle**

| | |
|---|---|
| **HTU** | Ultrasonic sensor, scanning principle, with background suppression |
| **DMU** | Ultrasonic sensor, distance measurement |
| **RKU** | Ultrasonic sensor, retro-reflective ultrasonic sensor principle |

**Series**

| | |
|---|---|
| **318** | 318 series, cylindrical short M18 design |

**Scanning range in mm**

| | |
|---|---|
| **300** | 40 … 300 |
| **1200** | 80 … 1200 |

**Equipment (optional)**

| | |
|---|---|
| **.3** | Teach button on the sensor |

**Pin assignment of connector pin 4 / black cable wire (analog OUT/OUT1)**

| | |
|---|---|
| **4** | PNP output, NO contact preset |
| **P** | PNP output, NC contact preset |
| **2** | NPN output, NO contact preset |
| **N** | NPN output, NC contact preset |
| **C** | Analog output 4 … 20 mA |
| **V** | Analog output 0 … 10 V |

**Pin assignment of connector pin 2 / white cable wire (Teach-IN)**

| | |
|---|---|
| **T** | Teach input |

**Connection technology**

| | |
|---|---|
| **M12** | M12 connector, 4-pin |

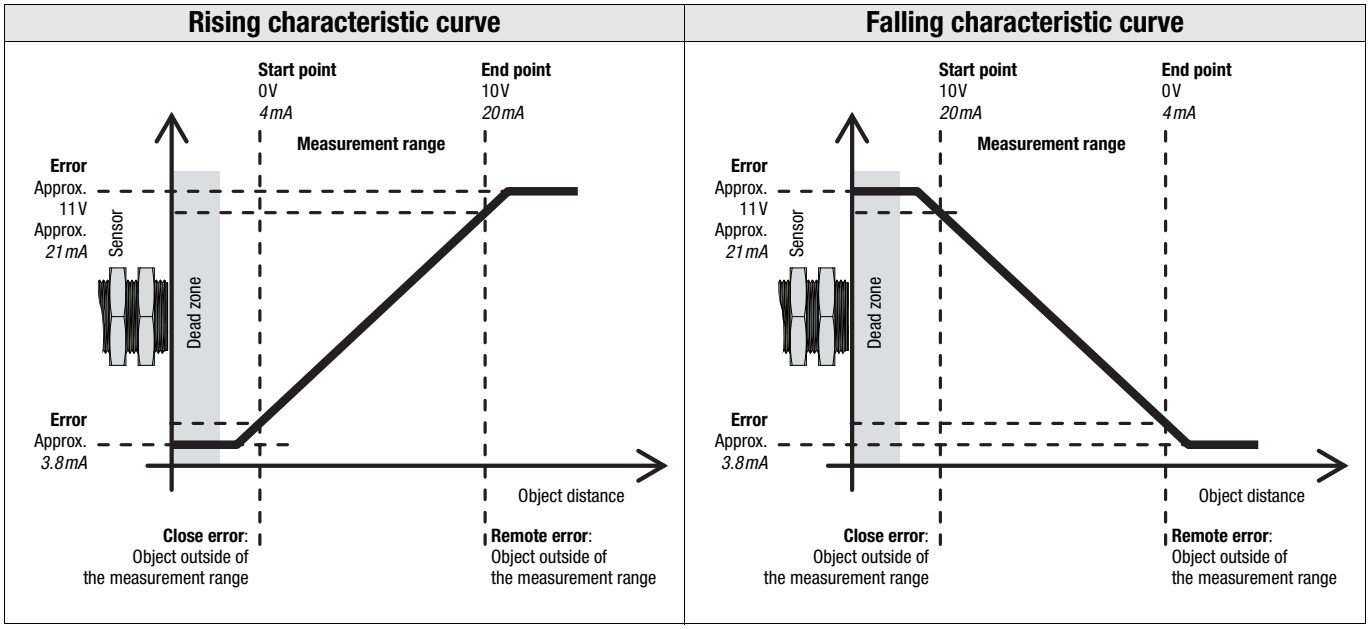
## Order guide

The sensors listed here are preferred types; current information at **www.leuze.com**.

| | Designation | Part no. |
|---|---|---|
| **Scanning range / Analog output** | | |
| 40 … 300 mm / current output 4 … 20 mA | DMU318-300/CT-M12 | 50136073 |
| 40 … 300 mm / voltage output 0 … 10 V | DMU318-300/VT-M12 | 50136072 |
| 80 … 1200 mm / current output 4 … 20 mA | DMU318-1200/CT-M12 | 50136077 |
| 80 … 1200 mm / voltage output 0 … 10 V | DMU318-1200/VT-M12 | 50136076 |

# Device functions – analog output

## Analog output Analog OUT




**Note!**
When setting the analog output (teach) via the teach input, one **rising characteristic curve** is always taught; with 2-point teach, independent of the selected object distances near/far. The characteristic output curve can be inverted, however.

## Setting the analog output (teach) via the teach input

On delivery, the characteristic output curve of the sensor is set as a rising characteristic curve with spread over the entire scanning range: 4 … 20mA or 0 … 10V corresponds to an object distance of 40 … 300mm or 80 … 1200mm, respectively.

The analog output can be set by means of 1-point teach or 2-point teach.

**Note!**
When setting the analog output (teach) via the teach input, one **rising characteristic curve** is always taught; with 2-point teach, independent of the selected object distances near/far. The characteristic output curve can be inverted, however.

### 1-point teach of the analog output

By selecting an object distance within the scanning range, the characteristic curve of the analog output can be adjusted. Leuze Teach Adapter **PA1/XTSX-M12** can be used for this purpose.

If an object is located outside of the taught measurement range, an error signal is output. A different analog signal is output here by the sensor for the errors "distance too close: object outside of the measurement range" and "distance too far: object outside of the measurement range".

| **1-point teach - rising characteristic curve** |
|---|
| **1. Place** object at desired distance for the end point of the measurement range.<br>**Note**: The **minimum object distance for the end of the measurement range** is as follows:<br>scanning range of 300mm:**70mm**<br>scanning range of 1200mm:**200mm** |
| **2.** To adjust analog output **Analog OUT**, **connect** the **teach-in** input to **GND** for **2 … 7s** until the **yellow and green LEDs flash simultaneously at 3Hz**. |
| **3.** The characteristic curve with plot rising from the start of the range (30 mm or 80 mm) to the set object distance was taught in. |
| **4.** Error-free teach: LED states acc. to "Technical data" -> "Indicators".<br>**Faulty teach: green and yellow LEDs flash at 8Hz** until an error-free teach is performed. |

### 2-point teach of the analog output

By selecting 2 object distances within the scanning range, the characteristic curve of the analog output can be adjusted. Leuze Teach Adapter **PA1/XTSX-M12** can be used for this purpose.

If an object is located outside of the taught measurement range, an error signal is output. A different analog signal is output here by the sensor for the errors "distance too close: object outside of the measurement range" and "distance too far: object outside of the measurement range".

| **2-point teach - rising characteristic curve** |
|---|
| **1. Position** the object at the first desired distance (near or far). |
| **2.** To adjust analog output **Analog OUT**, **connect** the **teach-in** input to **GND** for **7 … 12s**<br>until the **yellow and green LEDs flash alternately at 3Hz**. |
| **3.** The sensor remains in teach mode and the LEDs continue to flash. |
| **4.** Then **position** the object at the second desired distance (far or near).<br>**Note**: the **minimum object distance between the start and end point of the measurement range**<br>for a scanning range of 300mm is:**30mm**<br>for a scanning range of 1200mm is:**120mm** |
| **5.** To complete the teach event, **briefly connect**the **Teach-IN** input to **GND** again.<br>The characteristic curve with rising plot from the near to the far object distance was taught in. |
| **6.** Error-free teach: LED states acc. to "Technical data" -> "Indicators".<br>**Faulty teach: green and yellow LEDs flash at 8Hz** until an error-free teach is performed. |

### Inverting the analog output (falling/rising characteristic curve)

The characteristic curve of the analog output can be inverted, e.g., if a falling characteristic output curve is desired.
Leuze Teach Adapter **PA1/XTSX-M12** can be used for this purpose.

| Inverting the characteristic curve |
|---|
| **1.** To invert the characteristic curve of the analog output **Analog OUT**, **connect** the **teach-in** input to **GND** for **> 12s** until the **yellow and green LEDs flash alternately**. |
| **2. Disconnect** the **Teach-IN** input from **GND**. The characteristic curve plot was inverted.<br>The **yellow LED** indicates the current setting of the analog output:<br>**ON** = **rising** characteristic curve<br>**OFF** = **falling** characteristic curve |

## Resetting to factory settings

The sensor can be reset to the factory setting (rising characteristic curve with spread over the entire scanning range).
Leuze Teach Adapter **PA1/XTSX-M12** can be used for this purpose.

| Resetting to factory settings |
|---|
| **1. When switching on the power supply (during Power-On), connect** the **Teach-IN** input to **GND** for **> 5s**. |
| **2. Disconnect** the **Teach-IN** input from **GND**. The **green and yellow LEDs** flash **alternately and very quickly** for a brief time.<br>The sensor was reset to the factory setting:<br>4 … 20mA or 0 … 10V corresponds to an object distance of 40 … 300 mm or 80 … 1200 mm, respectively. |