

Ultrasound double material detection UDC-30GM-085-3E3

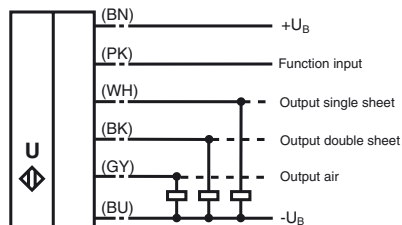


Features

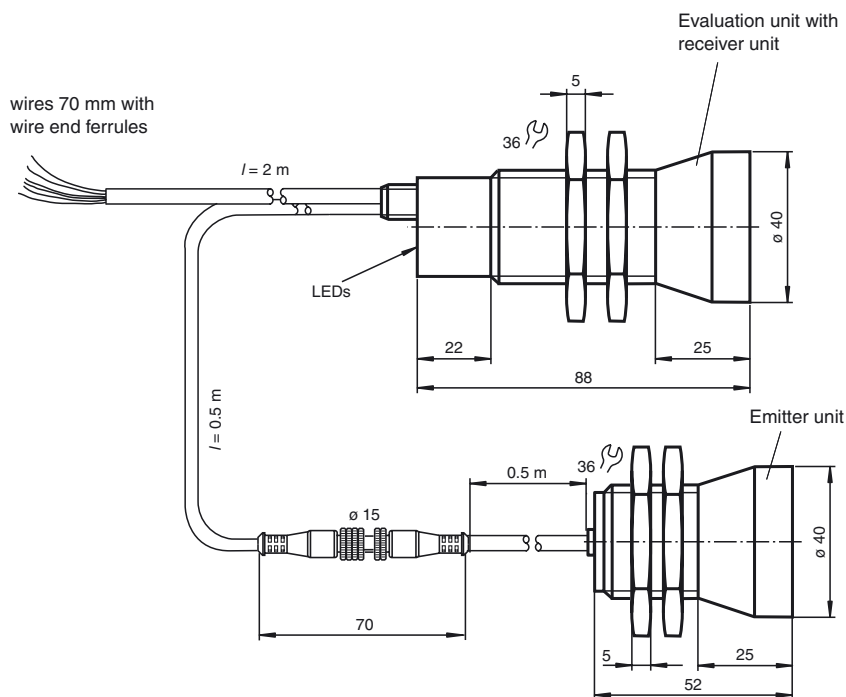
- Ultrasonic system for reliable detection of no, one, or two overlapping sheet materials
- No TEACH-IN required
- Insensitive to printing, colours and shining surfaces

Electrical connection

Standard symbol/Connection:
Double sheet control



Dimensions



Technical data



General specifications

Sensing range 50 ... 150 mm , optimal distance: 80 mm
Transducer frequency 85 kHz

Indicators/operating means

LED green Display: single-layer material detected
LED yellow Display: no material (air)
LED red Display: 2-layer or multi-layer material detected

Electrical specifications

Operating voltage 18 ... 30 V DC , ripple 10 %_{SS}
No-load supply current I₀ < 200 mA

Input

Input type Function input
0 level: -UB ... -UB + 1V
Pulse length ≥ 100 ms
Function in normal operation mode, the function input has to be connected with UB+ or UB-
Impedance ≥ 4 kΩ

Output

Output type 3 Switch outputs pnp, normally-closed
Rated operational current I_e 3 x 100 mA , short-circuit/overload protected
Voltage drop U_d ≤ 3 V
Switch-on delay t_{on} approx. 30 ms
Switch-off delay t_{off} approx. 30 ms

Ambient conditions

Ambient temperature 0 ... 50 °C (273 ... 323 K)
Storage temperature -40 ... 70 °C (233 ... 343 K)

Mechanical specifications

Protection degree IP65
Connection 2 m, PVC cable 0.14 mm²
Material
Housing brass, nickel-plated, plastic components PBT
Transducer epoxy resin/hollow glass sphere mixture; polyurethane foam
Mass 300 g

Description of sensor functions

The ultrasonic double material monitor is used in all situations in which the automatic distinction between double-layer and single-layer plane materials is required in order to protect machines or avoid waste production. The double material monitor is based on the ultrasonic through-beam principle. The following can be detected:

- No material, i.e. air,
- single-layer material
- Double or multi-layer material

A microprocessor system evaluates the signals. The appropriate switch outputs are set as a result of the evaluation. Changes in ambient conditions such as temperature and humidity are compensated for automatically. The interface electronics is integrated into a compact M30 metal housing together with a sensor head.

Switching on

The sensor is equipped with 6 connections. The functionality of the connections is described in the following table. The function input (PK) is used to assign parameters to the sensor. (See Output pulse extension, Alignment aid and Program selection). During normal operation, the function input must always be securely connected with $+U_B$ or $-U_B$, to avoid possible interference or improper functionality.

Colour	Switching on	Comments
BN	$+U_B$	
WH	Switch output for single-layer material	Pulse width corresponds to the event
BK	Switch output for double-layer material	Pulse width corresponds to the event
GY	Switch output for air	Pulse width corresponds to the event
PK	$-U_B/+U_B$	Function input for parameter assignment/pulse prolongation
BU	$-U_B$	

Normal mode

The sensor is working in normal mode if the function input (PK) is applied to $-U_B$ or $+U_B$ when the power source (Power-On) is supplied, as shown in the output pulse extension table (see below).

Displays:

- LED yellow: Detection of air
- LED green: Detection of single-layer material
- LED red: Detection of double-layer material

Switch outputs:

The switch outputs are only active in normal operation!

- White: WH Single-layer material output
- Black: BK Double-layer material output
- Gray: GY Air output

Output pulse extension

Switching the function input (PK) on to $-U_B$ or $+U_B$ makes it possible to select a minimum pulse width of 120 ms for all output pulses of the three switch outputs.

Switching on (PK)	Operating behaviour (after Power-On)
$-U_B$	No output pulse extension for switch outputs
$+U_B$	Output pulse extension of all switch outputs to at least 120 ms

Please note:

This can result in a condition in which more than one switch output is switched through!

Display Mode

The selected parameter assignment of the sensor can be displayed by switching the function input (PK) to voltage-free during normal operation. The green LED displays the program number (the number of flashing pulses (1 ... 4) = the program number). The outputs are inactive during this time.

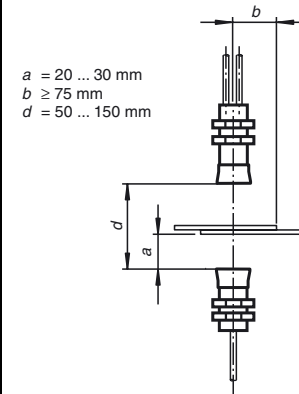
If the function input (PK) is switched to voltage-free when power is supplied (Power-On), the sensor will also work in display mode.

If the unit is switched to voltage-free while the function input (PK) is in operation due to an error (broken cable, coming loose because of vibration), display mode acts as a fault display.

UDC-30GM-085-3E3

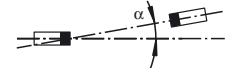
Mounting/Adjustment

Recommended distances



Thin foil detection

$\alpha < +/- 1^\circ$



$s < +/- 1 \text{ mm}$



Parameter assignment

The sensor is equipped with 4 programs for different ranges of application. This makes it possible to work with a wide range of material. The user can select the program best suited for a specific application.

The default setting, Program 1, is designed so that no change in the setting is required for most applications.

Programs

Program number	Notes:
1	Standard setting. Covers a wide spectrum of material
2	Thick, heavy materials
3	Thin materials
4	Extremely thin materials or foils

The usage of the programs 1 ... 4, mentioned above, shall give only a rough benchmark to the user. For each particular application the best suitable program has to be found out empirically, beginning with the standard program 1.

Procedure for assigning parameters

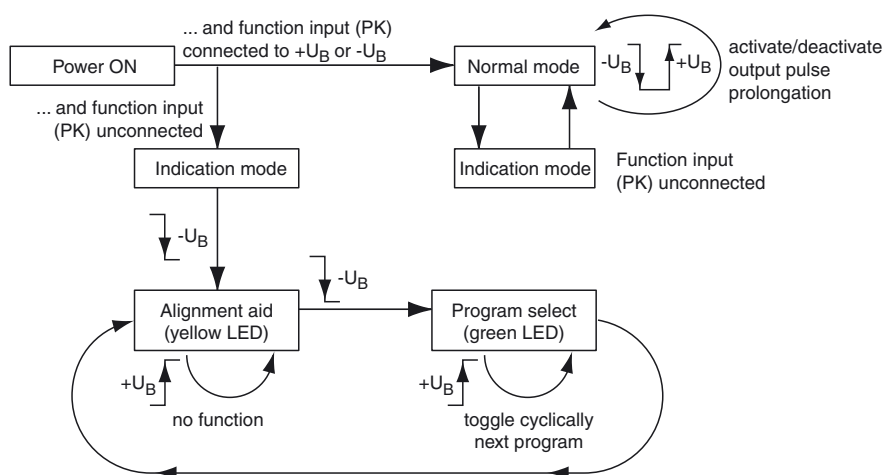
It is possible to switch to additional parameter assignment modes from the display mode:

- Alignment mode -->
- Program selection mode -->
- Alignment aid mode --> (for checking)

When the function input (PK) is applied to $-U_B$ (for > 500 ms), the mode changes. When the "Program selection" mode is active, switching on function input (PK) on to $+U_B$ (for > 500 ms) selects the next program level.

Disconnecting the power supply causes the system to exit the current mode with the selected program change.

The switch outputs are not active while parameters are being assigned to the sensor!



Modes

Alignment aid

During installation, the UDC can provide an adjustment aid for optimal alignment of the emitter to the receiver. This is not a replacement for an optimal mechanical alignment and a proper installation, as described in the instruction manual.

If the sensor detects an area of air (yellow LED is lit) the UDC will begin to display the intensity of the measured amplitude signal:

- If the signal is weak, the yellow LED will flash at a slow rate
- As the intensity of the signal increases, the rate at which the LED flashes becomes faster
- At optimal alignment (maximum signal intensity), the yellow LED is continuously lit.

The single-layer material function (green LED) and double-layer material function (red LED) continues to be active. This makes it possible to check for correct functionality of the double material monitor.

Program selection

In the program selection mode, the current program is displayed by the green LED (number of flashing pulses = program number). Applying the adjustment input (PK) to $+U_B$ (for > 500 ms) causes the next program to be selected in cyclic sequence (program 1 follows through to program 4).

Notes:

A complete device consists of an ultrasonic emitter and an evaluation unit with an ultrasonic emitter. The sensor heads are optimally adjusted to each other when they leave the factory. Therefore, they must not be used separately or exchanged with other devices of the same type. The plug connector on the emitter/receiver connection cable is only intended to be used for easier mounting, not to replace units.

If two or more double material monitors UDC are used in the immediate vicinity of each other, there may be mutual interference between them, which can result in improper functionality of the devices. Mutual interference can be prevented by introducing suitable countermeasures when planning systems.