

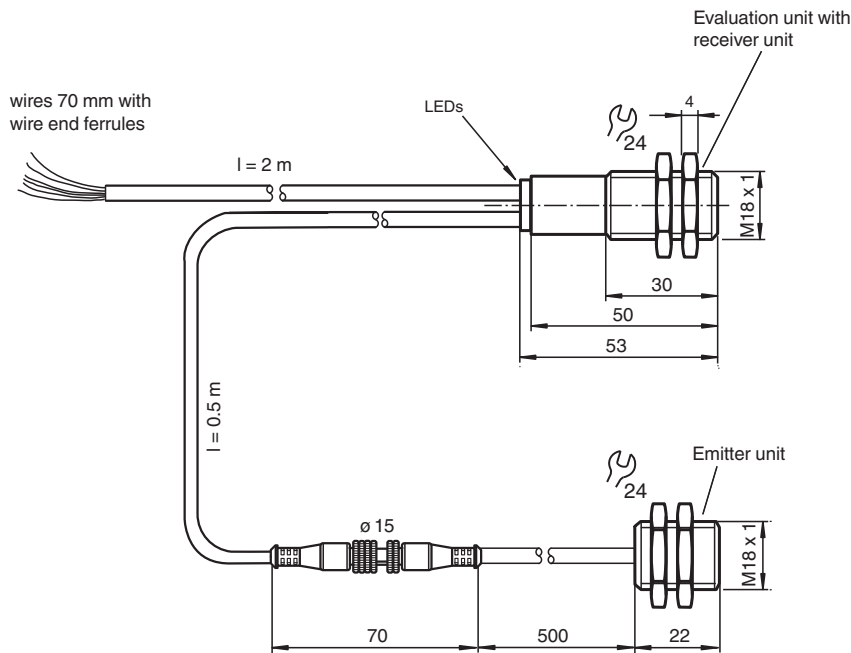


Double sheet sensor UDC-18GM50-255-3E3

- Ultrasonic system for reliable detection of no, one, or two overlapping sheet materials, preferably papers
- Short version
- No teach-in required
- Function indicators visible from all directions
- Insensitive to printing, colors, and shining surfaces
- Material weight from 10 g/m² up to over 2000 g/m²
- Very wide material spectrum, finest papers up to thin sheet metals as well as plastic- and metal foils
- Perpendicular or inclined sensor mounting relative to the sheet plane possible
- Programmable



Dimensions



Technical Data

General specifications

Sensing range	20 ... 60 mm , optimal distance: 45 mm
Transducer frequency	255 kHz

Indicators/operating means

LED green	indication: single sheet detected
LED yellow	indication: no sheet detected (Air)
LED red	indication: double sheet detected

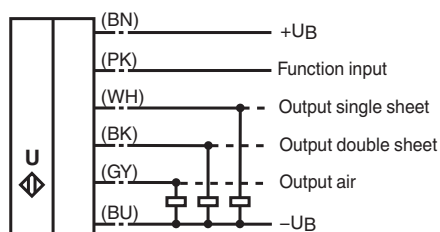
Electrical specifications

Technical Data

Operating voltage	U_B	18 ... 30 V DC , ripple 10 % _{SS}
No-load supply current	I_0	< 50 mA
Time delay before availability	t_v	< 500 ms
Input		
Input type		Function input 0-level: $-U_B \dots -U_B + 1V$ 1-level: $+U_B - 1V \dots +U_B$
Pulse length		≥ 100 ms
Impedance		≥ 4 k Ω
Output		
Output type		3 switch outputs PNP, NC
Rated operating current	I_e	3 x 100 mA , short-circuit/overload protected
Voltage drop	U_d	≤ 2 V
Switch-on delay	t_{on}	approx. 15 ms (shorter response time on request)
Switch-off delay	t_{off}	approx. 15 ms (shorter response time on request)
Pulse extension		min. 120 ms programmable
Compliance with standards and directives		
Standard conformity		
Standards		EN IEC 60947-5-2:2020 IEC 60947-5-2:2019
Approvals and certificates		
UL approval		cULus Listed, General Purpose, Class 2 Power Source
CCC approval		CCC approval / marking not required for products rated ≤ 36 V
Ambient conditions		
Ambient temperature		0 ... 60 °C (32 ... 140 °F)
Storage temperature		-40 ... 85 °C (-40 ... 185 °F)
Mechanical specifications		
Connection type		cable PVC , 2 m
Core cross section		0.14 mm ²
Degree of protection		IP67
Material		
Housing		nickel plated brass; plastic components: PBT
Transducer		epoxy resin/hollow glass sphere mixture; polyurethane foam
Mass		135 g
Dimensions		
Length		50 mm
Diameter		18 mm
General information		
Supplementary information		Switch settings of the external programming adapter: "output load": pull-down "output logic": inv

Connection Assignment

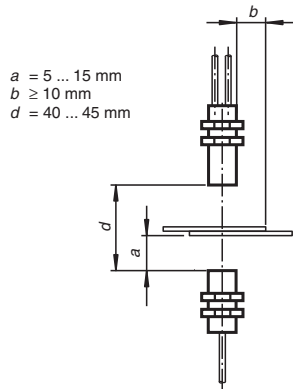
Standard symbol/Connection:
Double sheet control



Mounting

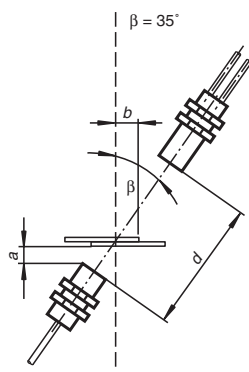
Mounting/Adjustment

Recommended distances



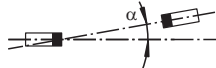
Mounting/Adjustment

(for very thick papers)



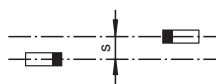
Angular misalignment

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



Sensor offset

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



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Additional Information

Description of sensor functions

The ultrasonic double-sheet sensor for the detection of double sheets is used in any situation, where it is essential that a means be provided for the automatic distinction between double and single sheets, in order to protect machinery and/or to avoid waste. The double-sheet sensor is based on the ultrasonic single pass principle. The following situations can be detected:

- No sheet, i.e. air
- Single sheet
- Double sheet

The evaluation of the signal is carried out with a microprocessor system. As a consequence of the evaluation the corresponding switch outputs are set. Changing ambient conditions, such as temperature and humidity, are automatically compensated. The evaluation electronics system is built into an evaluation unit, together with a sensor head, and contained in a compact M18 metal housing.

Interface

The sensor has 6 connections. The function of the connections is shown in the following table. The function input (PK) is used to parameterize the sensor. (see Output pulse expansion, alignment aids and program select). During operation, the function input must always be permanently connected to +U_B or -U_B to prevent possible faults or malfunctions.

Color	Interface	Note
BN	+U _B	
WH	Switching output, single sheet	Pulse width corresponding to the event
BK	Switching output, double sheet	Pulse width corresponding to the event
GY	Switching output air	Pulse width corresponding to the event
PK	-U _B /+U _B	Function input (PK) for parameterization/pulse extension.
BU	-UB	

Normal mode

The sensor operates in normal mode if the function input (PK) is set to -U_B or +U_B when the supply voltage is applied (power on) as specified in the output pulse expansion table (see below).

Display:

- Yellow LED: Air detection
- Green LED: Single sheet detection
- Red LED: Double sheet detection

Switching outputs:

The switching outputs are only active in normal mode!

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

Output pulse expansion

A minimum pulse width of 120 ms can be selected for all the output pulses of the three switching outputs by connecting the function input (PK) to +U_B.

Interface (PK)	Switching behavior (after power on)
-U _B	No output pulse expansion of switching outputs
+U _B	Output pulse expansion of all switching outputs to a minimum of 120 ms

Caution!

This can lead to a situation where more than one switching output is switched through!

Programs

The sensor has 4 programs for different application areas which allow the detection of a wide range of materials. The user can select the program most suited to the relevant application.

The default setting program 1 is selected so that the settings of the majority of applications do not need modifying.

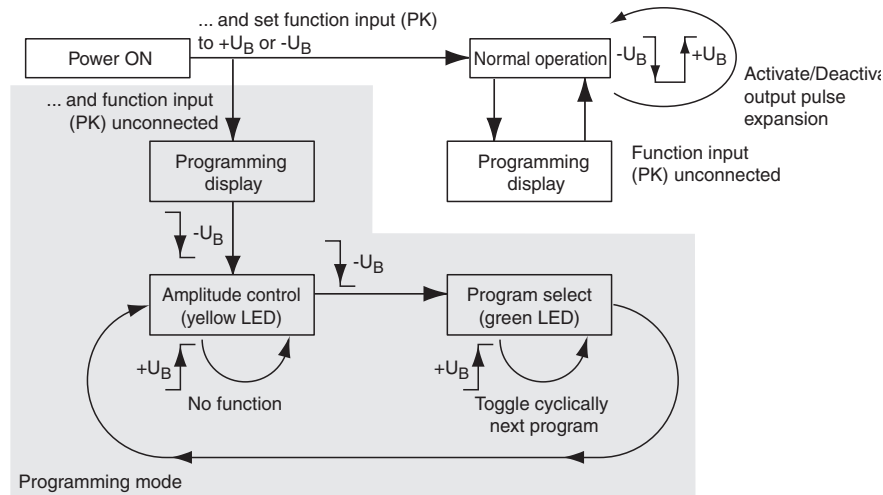
Program numbers	Notes*	Material spectrum
1	Default setting standard papers	100 - 2000 g/m ²
2	Thick papers, cardboard packaging, fine corrugated cardboard (DIN 55 468-1) and thin metal sheeting**	> 300 g/m ²
3	Thin papers	50 - 350 g/m ²
4	Extra fine papers	< 100 g/m ²

*) Measurements were taken under the following conditions: d = 45 mm, a = 10 mm, β = 0°
 **) Measurements were taken under the following conditions: d = 45 mm, a = 10 mm, β = 35°

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Adjustment options using the function input

The diagram below shows the adjustment options using the function input.



Program display

The preset sensor program can be displayed by disconnecting the function input (PK) from the power supply during normal operation.

The green LED indicates the program number (number of flashing pulses (1...4) = program number).

The outputs are inactive during this time.

If the function input (PK) is disconnected from the power during operation due to a fault (cable break, vibrations), the program display also serves as a fault display. Switching to programming mode is not possible.

Programming mode

To activate programming mode,

the function input (PK) must be disconnected from the power when the supply voltage is applied (power on). The flashing green LED connected to the sensor indicates the preset program first (number of flashing pulses (1...4) = program number).

By briefly setting the function input (PK) to $-U_B$ (>500ms), the system is able to toggle cyclically between the amplitude control and the program select.

When you disconnect the supply voltage, you exit programming mode and the current selected program setting is applied.

The switching outputs are deactivated while the sensor is parameterized!

Amplitude control

During installation, the amplitude control can be used to check whether the ultrasonic amplitude at the receiver is sufficient.

If the transmitter is not aligned properly in relation to the receiver, maximum sound energy is not transmitted to the receiver, which may result in the incorrect detection of materials.

If the sensor detects the air section (yellow LED lights up), the UDC begins to display the strength of the measured amplitude signal:

- if the signal is weak, the yellow LED flashes infrequently
- the flashing frequency increases in line with the signal strength
- the yellow LED lights up continuously when the signal strength is sufficient.

The single-sheet (green LED) and double-sheet (red LED) functions remain active so that the function of the double sheet control can be checked.

Program select

In program select mode, briefly setting the (PK) to $+U_B$ (>500ms) selects the next program cyclically (number of flashing pulses from the green LED = program number). Program changes do not interrupt flashing sequences that have already started.

Note:

A complete device consists of one ultrasonic sensor and one evaluation unit with the ultrasonic receiver. The sensor heads are optimally matched to each other in the ex-works condition and should therefore not be used separately. The connector disconnection point on the transmitter/receiver connection cable is merely provided to simplify assembly.

Very light papers (e.g. tissues) and paper with perforations are never suitable for double sheet detection for physical reasons.

On installation, care should be taken, that the ultrasonic signal cannot pass around the material to be detected due to multiple reflections. This can happen if, for example, there are large surfaces capable of reflecting the sound at right angles to the direction of propagation of the sound. This can be the case when unsuitable clamping devices are used, or may be due to plant components with large surfaces. In the case of reflecting plant components, these must either be clad with sound-absorbing material, or an alternative mounting location found for the sensor.

If a number of double sheet sensors are used in close proximity to each other, mutual interference may occur, leading to device malfunction. Mutual interference can be avoided by suitable countermeasures implemented when planning the system.

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Parameterization

Parameterization using *PACTware* ^{DTM}

The double sheet sensor can be connected using a V15S-G-0.3M-PUR-WAGO terminal adapter.



Connect the sensor to the terminal adapter according to the table below.

Terminal adapter wire color	Sensor cable wire color
Brown	Brown
Blue	Blue
Black	Black
Gray	Pink

The sensor features a time lock. If no communication request occurs, the time lock blocks parameterization of the sensor 30 seconds after the supply voltage is connected. Start *PACTware* before switching on the sensor so that the communication request can be made in time.

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