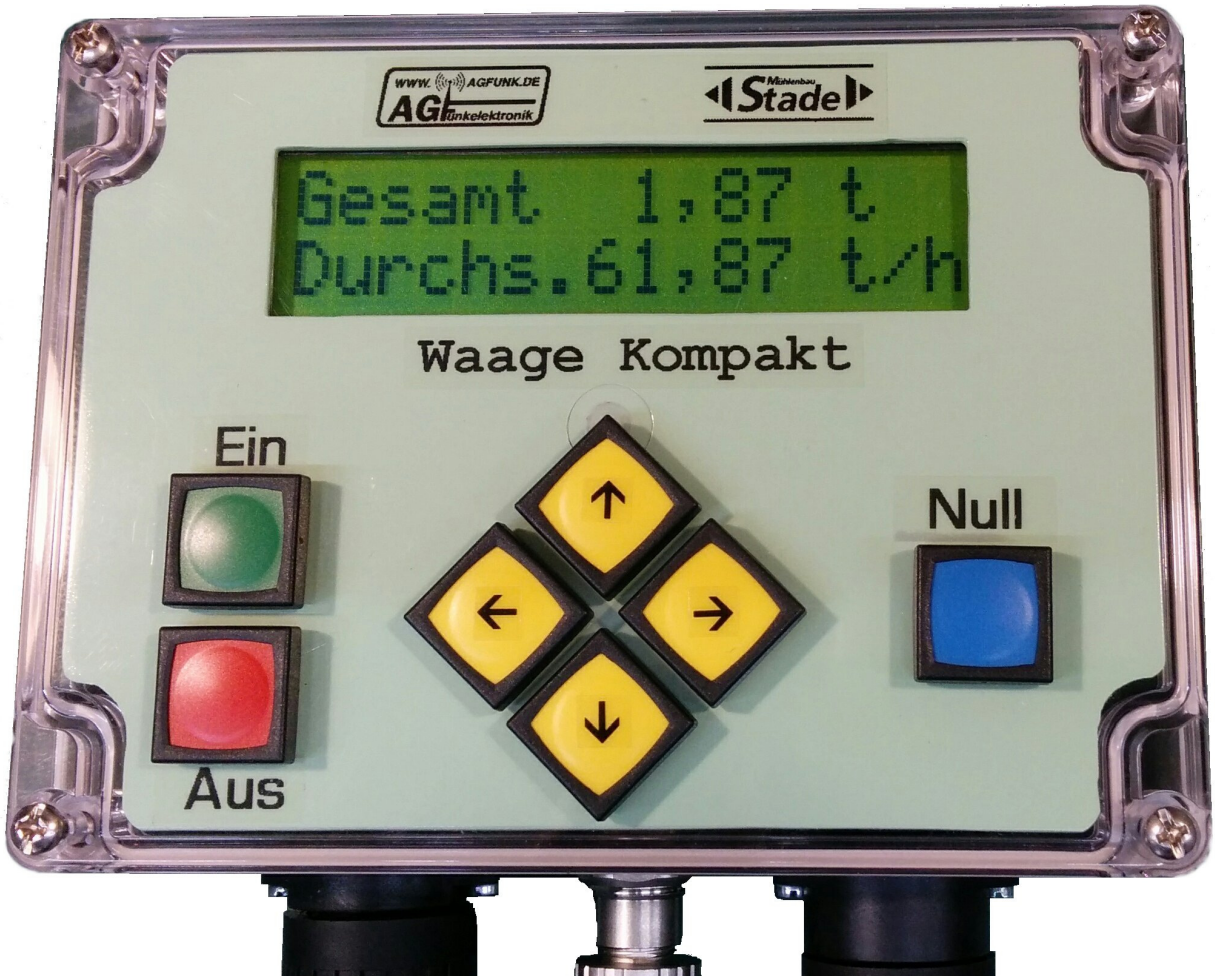
User Manual



Waage Kompakt V1.0

(Scale Compact V1.0)

HW 0.3 SW 1.0 Last updated 18.03.2019

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Waage Kompaktversion (compact scales) has been developed on the basis of our *Waageinterface* (scales interface) and our *Waageterminal* (scales terminal). The two devices have now been put together in a single casing. The advantage is that, with the exception of the load cell, all the electronic components are inside the cabin and are consequently not exposed to vibrations or external influences.

1. Components and principle of operation of the weighing device

The weighing device consists of a measuring chamber located at the end of the dosing screw, in which a sensor plate is connected by an arm with the weighing cell outside the measuring chamber. Optionally, the rotational speed of the dosing screw can be measured by a proximity sensor, located at the hydraulic motor of the dosing screw.
The data of the weighing cell are lead to the display unit by a special shielded twisted pair wire.

View inside measure chamber

Weighing cell

Proximity sensor

The grist falls into the measure chamber, where it exerts pressure on the sensor plate. This in turn activates the weighing cell outside the measure chamber.
The data from the weighing cell and the RPM sensor are digitized in the control panel and converted by a special software algorithm to the throughput and total weight results.

2. Securityadvises

The control panel of the weighing device may only be opened by an experienced electronic engineer. Fuses may only be replaced with the prescribed values and types.
Mounting of the control panel may be done only through the existing holes in the base of the case.
Do not drill any further holes in the case !
We decline liability for units which have been damaged as a result of incorrect handling.
Although the case is in protection class IP65,
it must not be cleaned with water jets, or splash water.
The control panel should only be cleaned with a soft damp cloth.
Do not use any liquids containing solvents. Only mild soap should be employed.
Do not place any objects on the unit. These could scratch the front panel.
Do not expose the load cell to water jets.
Do not apply excessive pressure (>10kg) or tilting or shearing force to the weighing plate or load cell.

3. Scope of application

The Compact scale is used to display the grinding material throughput and the ground quantity in mobile mills.
The scale is not calibrated and must not be used for billing purposes.
Previous installations have shown by reference weighing that measurement errors of less than 10% can be achieved with good calibration and maintenance.
When operating under extended temperature-conditions (< 0 °C or > 30 °C), the accuracy may be limited.
If there are significant changes in the properties of the regrind, recalibration may be necessary.

4. Operation

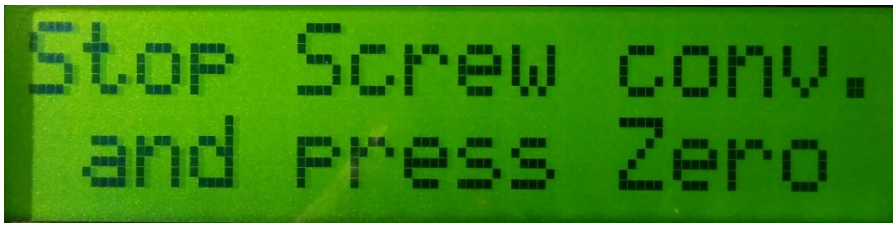
4.1 Switch On an Off

To switch the device on, briefly press the green button **[Ein]**.
The start message appears in the display for two seconds.

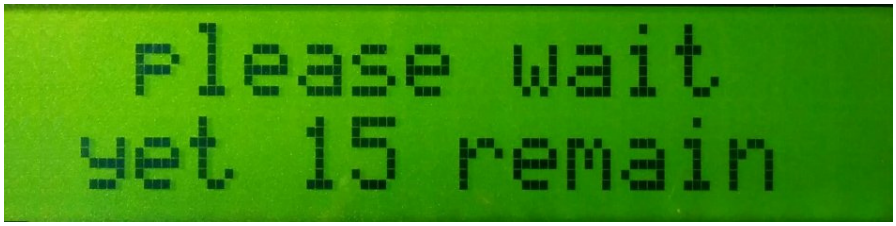
To switch the device off, briefly press the red button **[Aus]**.

4.2 Zero calibration

Each time the scale is turned on, it performs a zero calibration.
This is a very important step for the further accuracy.
Deviations in the measuring chamber, the load cell and the analog-to-digital converter are compensated.
To do this, the measuring chamber must be empty and clean and the screw conveyor must be stationary. In addition, the mill should not move.
If it is cold (below approx. 10 °C), wait 1 minute after switching on the mill before pressing the blue **[Null]** key.



Now briefly press the blue **[Null]** key.
Then 32 empty measurements are carried out and the average zero value is calculated.

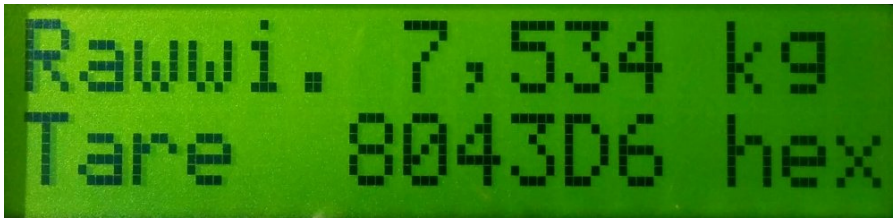


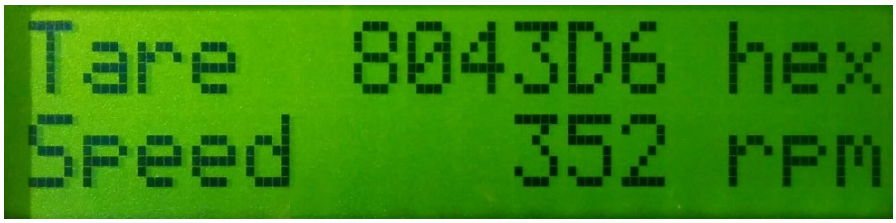
When the zeroing is complete, the display changes to display mode for total weight and throughput.

The last total weight generated and the current throughput are displayed.
The total weight can be reset to zero at any time by pressing the blue **[Null]** key.

4.3 Milling

Once the mill has been started, the throughput in tons per hour is automatically displayed and the total weight in tons since the last zero setting is added up further. By briefly pressing the **[🡅]** or **[🡇]** keys, you can switch between different display windows.





The following information can be displayed :
1. the total weight of the ground material ground since the last zero setting
2. the current throughput of the mill
3. the actual weight of the ground material measured at the load cell
4. the tare value of the weighing equipment (hexadecimal value of the zeroing)
5. the current rotational speed of the screw conveyor.

Each time the grinding operation is interrupted and the speed of the screw conveyor drops to zero, the total quantity is stored in an EEPROM so that it is available again even after the scale has been switched off or after a power failure.
However, it is important to switch off the balance only after the screw conveyor has come to a standstill.

The total sum can be set to 0 at any time by pressing the blue **[Null]** key.

5. Maintenance

5.1 Control panel

The control panel of the scale does not require any special maintenance.
Clean the control panel only with a clean, **soft**, damp cloth.
Do not use any liquids containing solvents other than mild soap.
Do not place any objects on the device. These might scratch the front panel.

5.2 Measure chamber and weight cell

The measuring chamber is located at the upper end of the dosing screw and is accessible via a flap.
The correct operation of the measuring chamber and load cell is very important for the accuracy of the scale.
There must be no buildup of ground material on the weighing plate and the sealing flaps must not be kinked, jammed or stuck. They should lie loosely on the weighing plate. Always keep the measuring chamber clean.
No great pressure or shearing force may be exerted on the weighing plate.
The same applies to the weighing cell. Always keep it clean.
When cleaning the mill, the weight cell may not be hit by water jets.

5.3 Proximity sensor (RPM sensor)

The proximity sensor is located on the hydraulic motor of the dosing screw.
For proper operation, it is important that the speed sensor is at the correct distance from the cam and that the sensor surface is free of chips and dirt.
(see Troubleshooting for further information)

6. Language setting (available as of software 1.0)

Attention! Only change the language setting !
Do not change any other values ! This can impair the function considerably.

If necessary, switch off the scale.

Press and hold the blue **[Null]** key while briefly pressing the green **[Ein]** key and then releasing the blue **[Null]** key.
You will now reach the menu for the scale settings.
Press the **[➔]** key once.
The language selection screen appears.
Use the **[🡅]** or **[🡇]** buttons to change them.
Currently implemented languages are :
De = German, En = English, Fr = French, Nl = Dutch

Briefly press the green **[Ein]** button.
The new language setting is saved permanently and the scale restarts.

7. Troubleshooting

7.1 Internal LEDs

On the electronic PCB inside the control panel, there are some LEDs which can be helpful for troubleshooting.
They can be observed from the side through the clear slots of the front cover.
They have the following meaning :
LED green = device on, pause
LED yellow = weight and speed are measured
LED red = dosing screw stationary
LED blue = pulses from speed sensor
Usual behaviour in StandBy mode :
green and yellow flashes alternately, red is on, blue is on or off
Usual behaviour in grinding mode :
green and yellow flashes alternately, red is off, blue flashes

7.2 Total failure

The display shows nothing, there is no backlight, no LED is on.
Check the power supply and the pre fuse.
At the power plug (big black plug left) must be 12 V between Pin 1 + (brown wire) and Ground (green-yellow wire).
If this is the case, and still no function is available, it could be possible, that the internal fuse is blown.
This fuse should only be replaced by experienced electronics technicians.
It is a 5x20 2A slow blow fuse.
The cause of a defective fuse can be, among other things, a damaged point in the wiring or a defective speed sensor.

7.3 Button failure

If only one key is affected, the key itself is probably defective.
Please contact our service department.
If several keys are affected, the internal connector to the key board may have come loose.

7.4 Display failure

The display is blank, and / or no backlight is on, but internal LEDs are lit.
The internal connector to the display may have come loose.
If this is not the case, please contact our service department.

7.5 Backlight failure

The LCD - display shows everything, but the backlight is off.
The internal connector to the display may have come loose.
If this is not the case, please contact our service department.
The LCD module must be replaced.

7.6 Display error

The LCD display shows nothing or nonsensical characters.
Turn the scale off and on again briefly.
If this does not correct the error, please contact our service department.
The LCD module is probably defective.
The internal connector to the display may have come loose.

7.7 No throughput during grinding

Check the speed display. If it shows zero even though the auger is rotating, see 6.8 (No or incorrect rotational speed indication).
If the speed is displayed correctly, check the raw weight display.
This should display a few kilograms depending on the throughput.
If this is not the case, check the load cell, its wiring and the measuring chamber.
You can also check the tare value. See 6.9 (Checking the tare value).

7.8 No or incorrect rotational speed display

Check the proximity (RPM) sensor and it's cabling. It is located on the hydraulic motor of the dosing screw.
The speed sensor must be clean and free of chips and should be 3 mm from the cam.
There is a small blue LED in the control panel on the circuit board which indicates the pulses of the speed sensor. This LED can be seen through the clear slits in the front cover if you look at the control panel from the side.
Depending on whether there is metal in front of the sensor or not, the blue LED goes on or off.

7.9 Check Tare value

After the scale is switched on, the tare value is generated by an average of the 32 empty measurements. It should be between 80 and 85 in the first two digits.
If this is not the case, an error has occurred during the empty measurements (e.g. weighing plate jammed or blocked), or there is an error in the weighing cell.

7.10 Error message " Weigh cell error "

If the display shows the error message "Err.Weight cell", the control unit at the weighing cell connection gets incorrect values.
The most common error is a defect in the weighing cell itself. However, there may also be a fault in the cable or the connectors to the weighing cell.
This fault can only be fixed by our service personnel.
However, if you have a bit of electronic knowledge, you can check the weighing cell yourself, as described under 7.13 and 7.14.

7.11 Error message „A/D Wandler Fehler“

If the display shows the error message "A/D converter error", the digitized values of the weighing cell are illogical.
This can have two causes. Either the A/D converter in the control unit is defective, or the weighing cell delivers illogical values.
This fault can only be fixed by our service personnel.
However, if you have a bit of electronic knowledge, you can check the weighing cell yourself, as described under 7.13 and 7.14.

7.12 Error message "Memory error", "defaults loaded", " –> = continue"

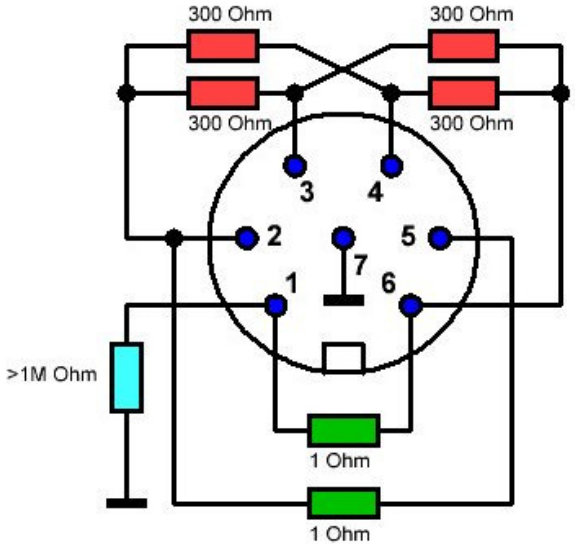
If the above error message appears on the display, the software has detected an error in the saved settings.
The factory settings have been loaded and all calibration data have been overwritten.

Now only inaccurate emergency operation is possible.
Please contact our service department immediately.

7.13 Checking the weight cell

The weight cell can be roughly tested with commercially available means.
For this you need a simple digital multimeter with ohmmeter range and minimal electronic knowledge.
The measurement can be made either at the control unit plug or at the connector plug near the load cell, depending on whether you want to test with or without connecting cable.
Disconnect the plug from the coupling or the control unit.
Switch the digital multimeter to the ohm range and measure the resistances according to the following circuit diagram.

1 – 6 ca. 1 Ohm
2 – 5 ca. 1 Ohm
2 – 3 ca. 300 Ohm
4 – 6 ca. 300 Ohm
3 – 6 ca. 300 Ohm
2 – 4 ca. 300 Ohm
1 – 7 > 1 M Ohm

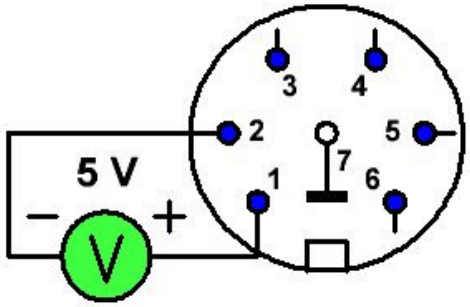


The absolute value of the resistors is less decisive and can be between 1 and 3 ohms for the 1 ohm values and between 200 and 500 ohms for the 300 ohms values, depending on the weighing cell type.
It is much more important that the 300 Ohm resistance values are absolutely the same, e.g. 4 times 321 Ohm can be measured.
Deviations from single ohms are still acceptable.
A good insulation resistance between pin 7 and all other pins is also important.
It should be clearly larger than 1 M Ohm, e.g. 10 M Ohm and more.
A lower insulation resistance indicates moisture or corrosion in the connectors or the load cell.

7.14 Checking the weighing cells Power supply

The power supply of the weighing cell can be tested with commercially available means.
For this you need a simple digital multimeter with voltage measuring range and minimal electronic knowledge.
The measurement can be made either at the control unit plug or at the connector plug of the load cell, depending on whether you want to test with or without connecting cable.
Disconnect the plug from the coupling or the control unit.
Switch the digital multimeter to the voltage range and measure the voltage on the control panel side according to the following circuit diagram :

The multimeter must show a voltage between 4,9 – 5,1 Volt

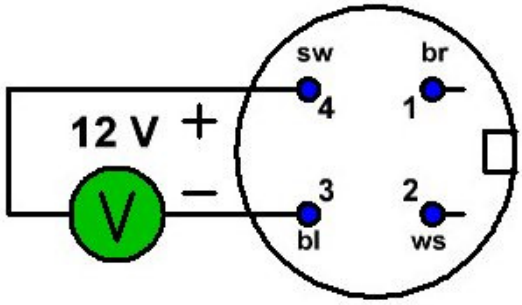


If this is not the case, please contact our service department.

7.15 Checking of the speed sensor supply

The power supply of the speed sensor can be tested with commercially available means.
For this you need a simple digital multimeter with voltage measuring range and minimal electronic knowledge.
The measurement can be made either at the control unit plug or at the connection plug of the speed sensor, depending on whether you want to test with or without connection cable.
Disconnect the plug from the speed sensor or control panel.
Switch the digital multimeter to the volt range and measure the voltage on the control panel side according to the following circuit diagram:

The multimeter must show a voltage between 12 - 14 Volt

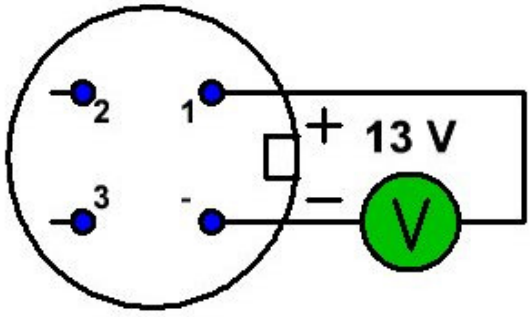


If this is not the case, please contact our service department.

7.16 Checking the main power supply

The main power supply can be tested with commercially available means.
For this you need a simple digital multimeter with voltage measuring range and minimal electronic knowledge.
The measurement is carried out at the control unit plug.
Disconnect the plug from the control unit.
Switch the digital multimeter to the voltage range and measure the voltage on the plug side according to the following circuit diagram:

The multimeter must show a voltage between 12 - 14 Volt



If this is not the case, check the pre fuse and the wire.

8. Recalibration

The installation and setup of the scale must be carried out by our service technicians, as the relationships between measuring chamber, load cell, control unit electronics and software are very complex.
However, the final fine tuning can only be achieved by multiple reference weighing. This is usually not possible during installation and setup.
For this reason, we have included in the software the option of recalibrating the measurement result in % steps. To do this it is necessary to carry out several grinding processes in the vicinity of a calibrated reference scale.
You should proceed as follows:

8.1 Determination of measurement error

Grind an exactly known quantity of ground material.
Make a note of the reference quantity and the grinding quantity displayed.
Repeat this procedure several times. The more reference weighings there are, the more accurately the deviation is recognized.
Add all reference quantities together and add all mill quantities together.
Now multiply the reference quantity by 100, divide the result by the grinding quantity and subtract 100 from it.

Error percentage value = (reference quantity * 100 / displayed quantity) - 100

Example :

1. reference quantity = 12,37 t	1. displayed quantity = 11,75 t
2. reference quantity = 11,55 t	2. displayed quantity = 10,97 t
3. reference quantity = 9,12 t	3. displayed quantity = 8,66 t
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reference sum = 33,04 t	displayed sum = 31,38 t

Error percentage value = (33,04 * 100 / 31,38) – 100 = 5,28 %

Since only integer percentage steps can be modified,
the nearest number would be 5%.
If the result is positive, the value must be added to the existing correction factor, and if the result is negative, it must be subtracted.

Correction factor new = correction factor old +/- error percent value

8.2 Change the correction factor

Attention! Change only and exclusively the correction factor !
Do not change any other values ! This can impair the function considerably.

If necessary, switch off the scale.

Press and hold the blue **[Null]** key while briefly pressing the green **[Ein]** key and then releasing the blue **[Null]**] key.
You will now reach the menu for the balance settings.
Press the **[➔]** key once.
The correction factor display appears.
Change it with the **[🡅]** or **[🡇]** keys until the value of the calculated "correction factor new" is displayed.

Example :
The calculated error percentage was + 5%
The old correction factor was 100%
Press the **[🡅]** key 5 times
The new correction factor is now 105%

Briefly press the green **[Ein]** button.
The new correction factor is stored permanently and the scale restarts.

Now carry out further reference weighing to check the new correction factor.

If necessary, you can repeat the entire calibration process as often as you want.

The maximum range for the correction factor is 50% - 150%.
If this range is not sufficient, search for an error in the system.
If everything is correct there, please contact our service department.
It could be that other settings are faulty or have to be adjusted.

9. Technical data

9.1 Control panel

Dimensions	H120 x W160 x D78 mm	without plug and holder
Weight	614 g	without plug and holder
Ambient temperature	0 – + 30 °C	for <10% error
Ambient temperature	- 10 – + 40 °C	maximum
Ambient humidity	max 80% rh non-condensing	permanent outdoor installation only with additional housing
Protection class	IP 65	
Powersupply	12 – 14 V DC	with pre-fuse, max 5A
Current consumption	approx. 130 mA	at 13,8V
Max. throughput	655 t/h	as of software 0.3
Max. total amount	6553 t	as of software 0.3
Display languages	German, English, French, Dutch	availabl. as of software 1.0

9.2 Weight cell

Dimensions	H63 x W188 x D63 mm	
Weight	1650 g	without cable
Maximum load	50 kg	
Ambient temperature	- 10 – + 40 °C	maximum
Ambient humidity	max 90% rh	non condensing
Protection class	IP 66	no water jets !
Powersupply	5 V DC	max. 10 V
Output signal	2 mV / V	at maximum load

9.3 Speed sensor

Dimensions	M12x1 L 50 mm	without plug
Ambient temperature	- 25 – + 70 °C	maximum
Protection class	IP 68	
Detection range	0 – 5,7 mm	
Powersupply	12 V DC	max. 30 V
Min current	2 mA	
Max current	100 mA	
Max. frequency	700 Hz	