REXPO
CUTTING & BLASTING SOLUTIONS

Operating and maintenance instruction

Abrasive Feeder 2.0

Operating and maintenance instruction

Scope of application

This installation and maintenance manual is valid for the following abrasive feeder

- 951400
- FP-951400
- TE-951400
- WO-951400

The descriptions are shown with all options. Function and execution without mounted options are carried out in the same way.

Adapter plates for most common motors are available on request. Please simply send a request with details of the exact motor type to sales@allfi.om

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Appendix A – Technical drawing and parts list (shipped with the product)

1 General

1.1 Information on use of the operation and maintenance instruction

This operation and maintenance instruction is a key part of the product. The information in this manual is mandatory and must be read and understood by all the persons before operating with the pneumatic valve 2.0. The manual must be stored in distance as well as always accessible to the persons, working with the abrasive feeder 2.0.

Should you have any questions regarding the content of the manual, please contact the manufacturer directly.

1.2 Scope of delivery

The individual parts contained in the shipment can be gathered from the set list in the appendix A (technical drawing and part list). Upon receipt, the shipment has to be checked of integrity. Possible detected defectives must be reported immediately to the manufacturer.

1.3 Warranty claim

The ALLFI AG grants warranty for the shipped parts as followed:

- Material and manufacturer faults of 12 months from date of delivery or
- Defects within the first 2’000 hours of operation

Following spare parts are excluded from the warranty:

- Belt
- Geared Motor
- Ball bearings
- Sensors
- Seals / O-Rings

1.4 Disclaimer

ALLFI AG refuses any claims of liability (material damages, physical injury, as well as disruption of operation), that are a result of disregarding this operating and maintenance instruction.

For example the damage as a consequence of:

- Inadmissible application of the abrasive feeder 2.0
- Defective maintenance
- The disregard of operation instructions
- Chemical and electrolytical influences
- Use of parts, spare parts or accessory from a third-party manufacturer
- Arbitrary modifications
- Not or insufficiently trained staff

The disregard of all these instructions happens on exclusive risk and exclusive responsibility of the client. The ALLFI AG is not liable for any production downtimes.

2 Security

2.1 Declaration of symbols

This operating and maintenance instruction manual contains important notes and symbols, which are to be considered and followed. These include:

DANGER

Danger emphasizes operating and service procedures that if not avoided, may lead to death or serious personal injuries.

WARNING

Warnings emphasize operating or service procedures, or conditions that can result in serious personal injury or death.

CAUTION

Cautions emphasize operating or service procedures, or conditions that can result in equipment damage or impairment of system operation. If not avoided, light or medium body injuries could be the consequence.

NOTE

Notes provide additional information that can expedite or improve operating or service procedures.

Danger symbol without key word: Additional notes

2.2 Intended use

The abrasive dosing is used for dosing sand for abrasive water jet cutting. Sand quantity 50 to 1000g/min. Filling must be carried out with a abrasive hopper which conveys the sand into the intermediate container without pressure. The dosing unit may only be used completely assembled and must be permanently mounted on the machine. All hoses must be connected. Only dry sand mesh from 60 to 250 may be used as abrasive.

2.3 Inadmissible usage

The inadmissible usege of the dosage includes, but is not limited to, the following:

- Use of any abrasive other than sand
- Any admixture of additives to the sand

- Excessive strain of the dosage
- Exceeding the permissible limit values
- Any modifications of the feeder
- Operation of the dosing in dismantled or disabled technical protective devices (e.g. the plexi-glass disc)

The uses listed below are also considered inadmissible if there are no suitable technical protective measures to protect the operator, other groups of persons, the machine components themselves or the environment:

- Cutting materials whose processing releases harmful, aggressive or explosive substances in the form of dust, microparticles or gas.

Likewise, all other uses of abrasive dosing that deviate from the intended use are considered inadmissible. If you have any questions or concerns, please contact the manufacturer directly.

2.4 Residual risks

The manufacturer and/or operator of the machine where the abrasive feeder 2.0 is built in, has taken every precautionary measure possible to reduce residual risks, as far as possible reasonably practicably.

Operation phase	Damage	Danger	Reason	(possible) measures
Operation	Physical injuries	Liquids or sand leaking under high pressure	Back-flow or sand jam due to clogged cutting head	Operate abrasive feeder only completely assembled
				Keep a safe distance
				Protective walls as a technical protective measure
			Vent closed or blocked	Never close the vent
				Only use hose with inner diameter adapted to the connection piece.
				Do not bend the hose
				Protective walls as a technical protective measure
		Intrusion of limbs into the rotating belt	Missing protective glass	Operate abrasive feeder only completely assembled

2.5 Safety installations

The manufacturer or the operator of the full machine, which the arbrasive feeser 2.0 is built in, has ensured the following safety arrangements:

- Protective devices against leaking liquid or sand
- Emergency stoppage to immediately shut down the operating machine.
- ➔ Active: Manually triggered by operator
- ➔ Passive: Automatically triggered by:
  - Non-return or sand accumulation (option 951401)

Danger for the operator will arise if safety protections are not functionally, not followed or evaded anytime. The operator has to ensure the functionality of the safety protections anytime.

2.6 Personal protection equipment

The operator must offer his staff following protection equipment while he's working:

Ear protector against:
- Noise emissions

Wear protection glasses against:
- Fluids and dust particles
- Flying fragments

Hand guards against:
- Sharp edges of components
- Intrusion of micro particles into the skin

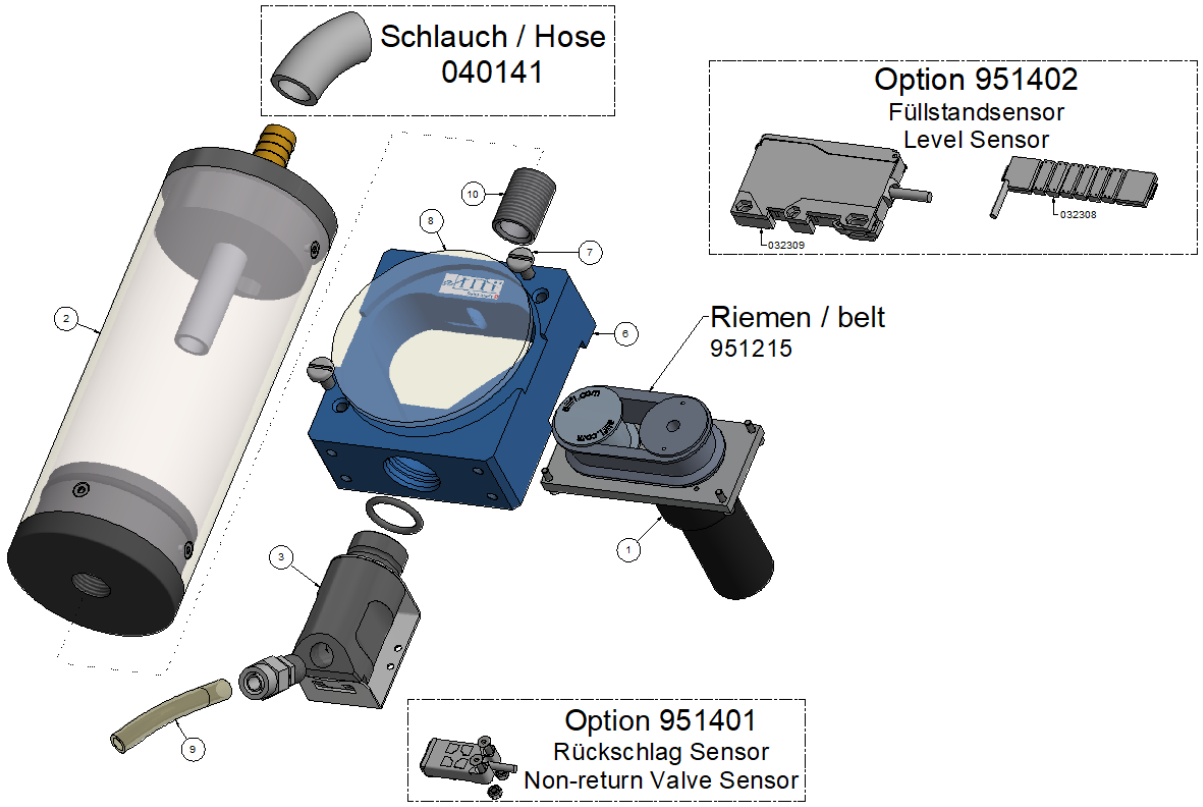
Inhalation protection against:
- Dust particles, micro particles and spray mist

2.7 Qualification of the staff

The abrasive feeder 2.0 may only be operated and maintained by certified, trained staff.

3 Structure and function of the abrasive feeder

3.1 Structure



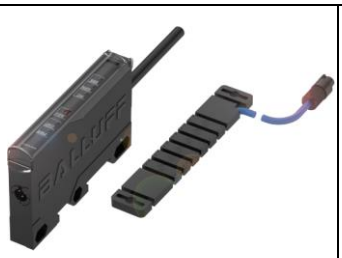
Item	Qty	Description	Part-Number	Comments	Weight
1	1	Motor plate Maxon	951405		374.5 g
2	1	Sand container 2.0	951404		694.4 g
3	1	Back Flow Preventer	951407		99.5 g
4	1	Linear Servo Controller	951217	Not shown	
5	1	Connector for Engine Connection	951226	Not shown	
6	1	Case Feeder 2.0	951451		527.7 g
7	2	Screw	040032		0.6 g
8	1	Viewing windows	951460		33 g
9	1	Hose	040025	2,5m	3.2 g
10	1	Inlet pipe case	951456		34.6 g

3.2 Function

The abrasive feeder 2.0 is used for dosing sand for abrasive water jet cutting. Sand is transported from the abrasive hopper into the container via a hose with the use of compressed air. The transported air escapes via the vent. This must always be open, otherwise the container may burst. If required, a hose can be connected to the venting nozzle. The dosage is performed by means a of special belt. The quantity is controlled by the motor speed and is almost linear to the belt speed. The standard direction of rotation is clockwise. This allows sand quantities of up to approx. 650 g/min to be achieved. With the direction of rotation to the left, sand quantities of up to approx. 1000g/min are possible. In the event of a sand backflow, the backflow preventer prevents the water-sand mixture from entering the dosing housing. Without tools, the backflow preventer can be separated from the housing and cleaned and dried with compressed air.

As an option, a sensor is available which detects a backflow as well as a sand jam. Another option is the level sensor. This detects a too low sand level in the container. Both sensors can be used for a warning message and or machine stop.

3.3 Accessories

			
Article:	Back-flow sensor	Level Sensor	Hose Electrically conductive
Article no:	951401	951402	040141
Function:	Signals a water-sand back-flow or a sand jam	Signals a level too low in the sand container	For feeding sand from the abrasive hopper

4 General technical data

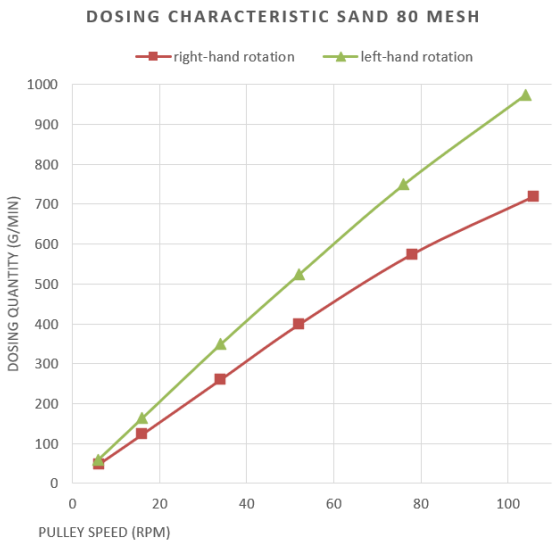
Height:	410mm
Width:	94mm
Depth:	144mm (depending on motor)
Empty weight:	approx. 2 kg; without linear servo controller (LSC)
Usable sand volume:	400 ml
Dosing quantity:	clockwise rotation: 50 - 650g/min
	counterclockwise rotation: 80 - 1000g/min
Connection sand inlet:	Hose connector Outer Ø 16mm
Connection Ventilation Hose:	Hose connector Outer Ø 16.7mm
Hose Sand outlet	Inner-Ø 6,4mm, Outer-Ø 9,6mm (2.5m included)
Max. motor speed	6300min^{-1}
Gear ratio	60:1
Max. Pulley speed	105min^{-1}

Further technical data such as connection dimensions can be found in the technical drawing in Appendix A.

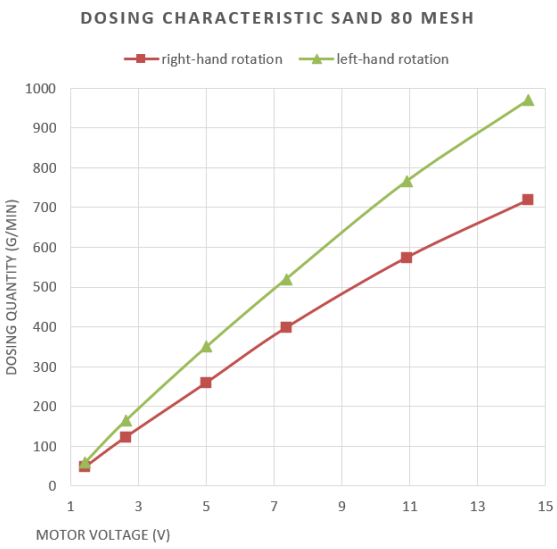
Data sheets for sensors & linear servo controller see chapter 11.

4.1 Delivery rate sand 80 mesh

General characteristic curve



Only valid for Maxon motor



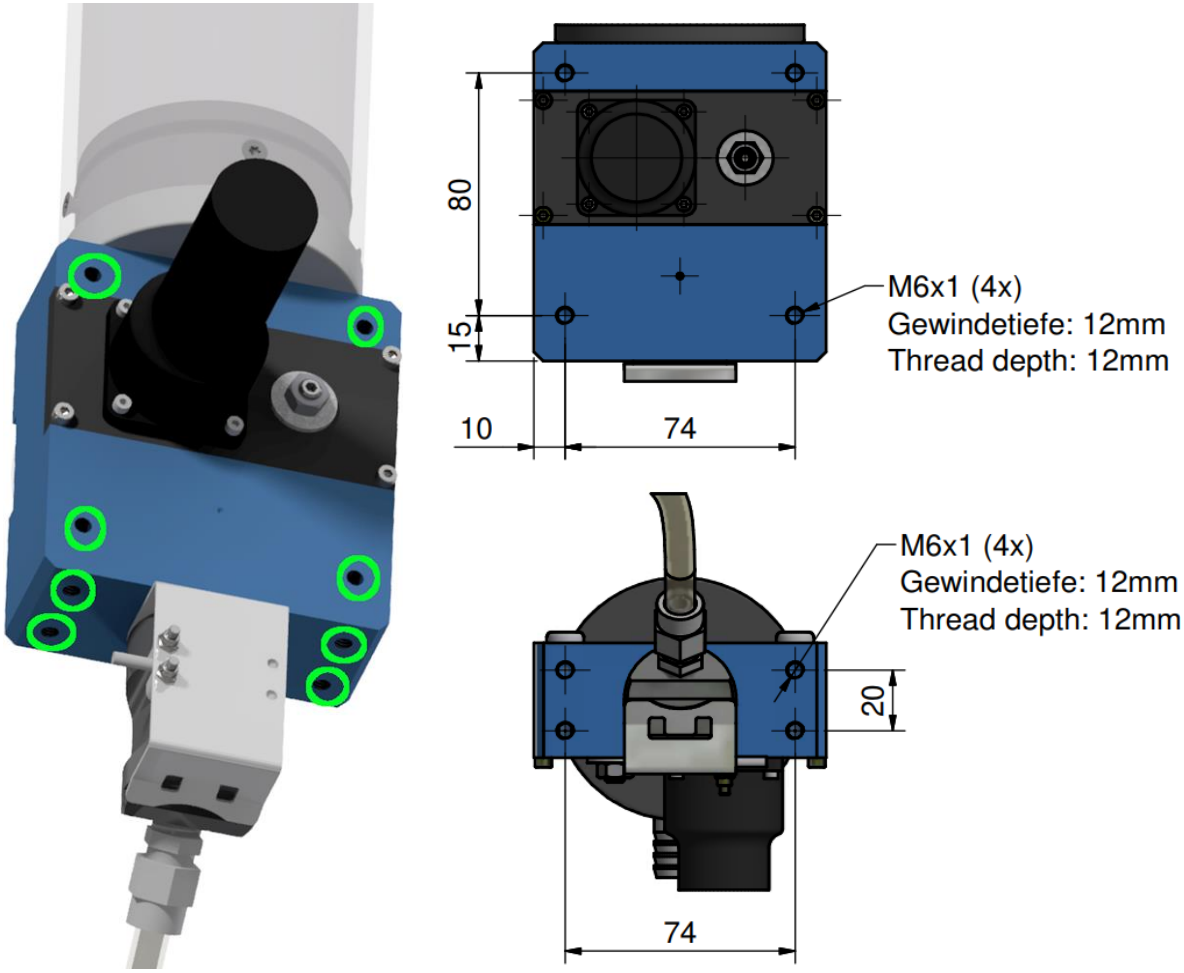
5 Installation and commissioning

General installation tip:

- For an first installation, follow the corresponding subchapters step by step
- Only operate the dosing unit completely assembled
- Electrical components may only be connected by qualified personnel

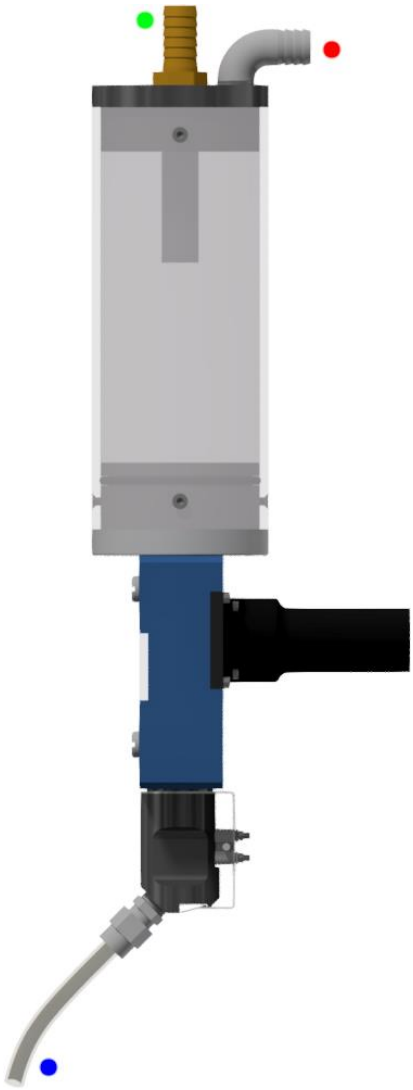
5.1 Installing the abrasive dosing system

The four M6 threads marked green at the bottom or on the back can be used to mount the dosage on the cutting system.



For mounting the servo controller see chapter 11.1 and separate operating instructions.

5.2 Connecting hoses



- Green dot:

Connection for the sand inlet from the Abrasive Hopper.

Secure the hose with a clamp.

- Red dot:

Connection for venting.
In the event of a malfunction of the abrasive hopper, an air-sand mixture can escape.
Install a hose that is adapted to the size of the connection, sloping down and kink-free so that no jamming can occur.

The connection must not be closed, otherwise the vessel may burst.

- Blue dot:

Connection to the abrasive cutting head for the dosed sand. Install the supplied hose in a sloping position and as short as possible in order to avoid a jam. The direction of the connection can be selected by turning the black non-return valve.

5.3 Electrical connection

The connection of the Maxon motor module is pre-installed, the counterpart is connected as explained in chapter 5.3.1.

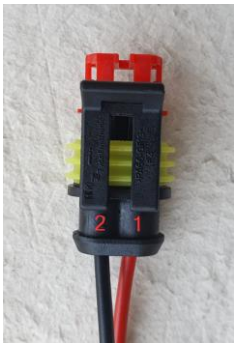
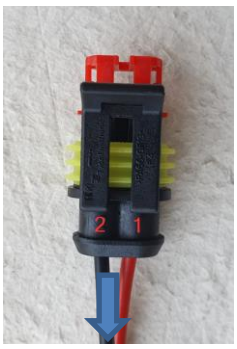
For the connection of the Linear Servo Controller and the connection with the motor see chapter 11.

The direction of rotation of the motor can be selected with the corresponding polarity.

Clockwise rotation: sand quantities from 50 - 650 g/min

Left turning: sand quantities from 80 - 1000g/min

5.3.1 Mounting the connector housing

1		Strip 3 mm of insulation from both cable ends and twist both copper ends. Insert the socket contact including the yellow seal with the " ERGOCRIMP" pliers crimping, with die for Ergo basic hand pliers use. Operate the pliers as far as they will go. Use 1.0 mm crimping position! Observe alignment of motor and connector housing during crimping!
2		Mount the socket housing, red cable + at terminal 1 and black cable - at terminal 2 Retract until it clicks.
3		Check that the cables are firmly seated by pulling on them gently.

6 Uninstalling

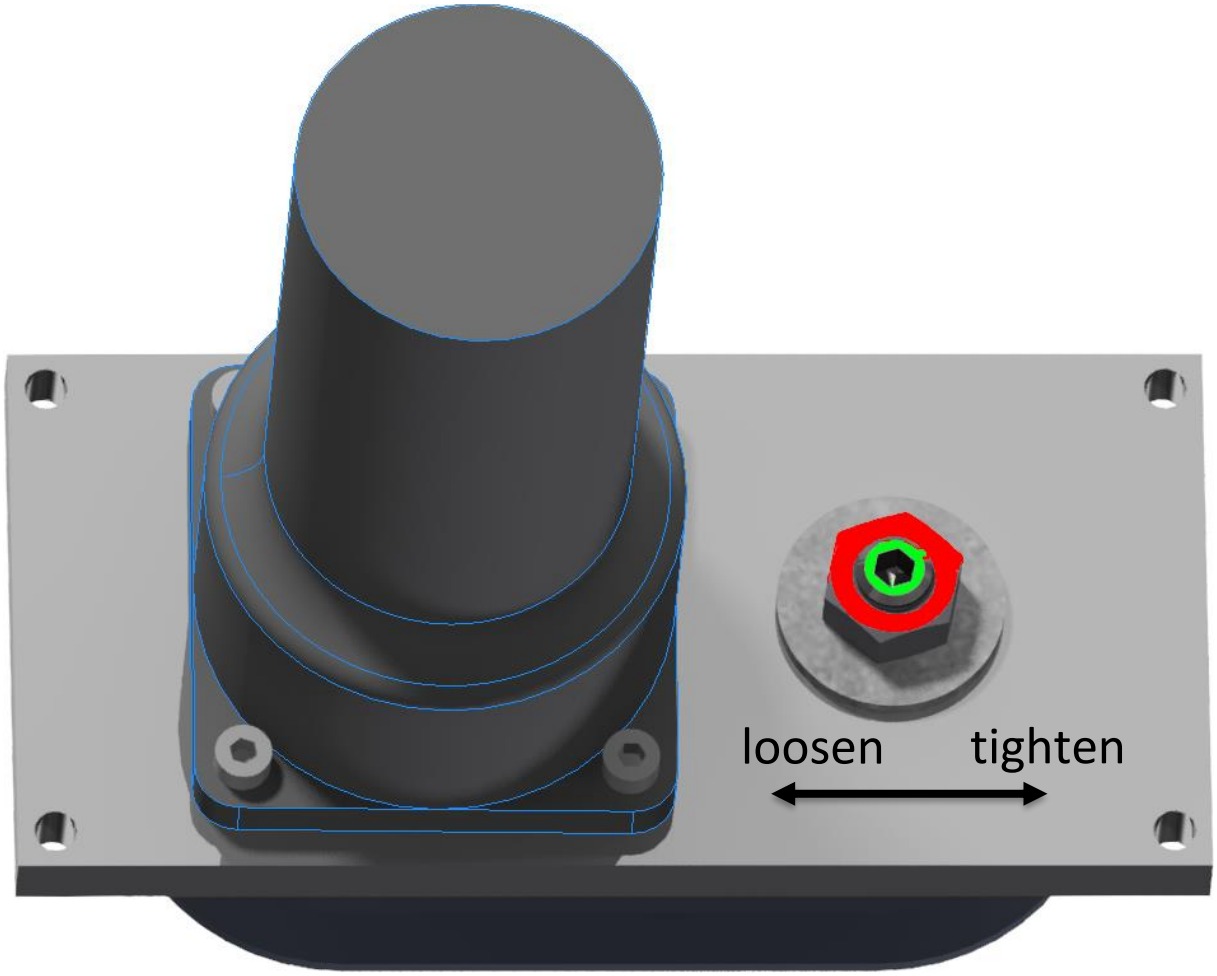
- - Switching off the abrasive hopper
- - Remove hose from abrasive cutting head
- - Empty the container completely by switching on the dosing system
- - Remove remaining hoses and electrical connection.
- - Disconnect any existing sensors as well.
- - Unscrew the dosing unit, do not damage the sand container.

7 Maintenance

7.1 Belt replacement

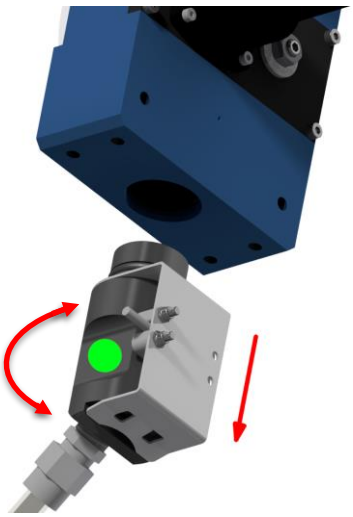
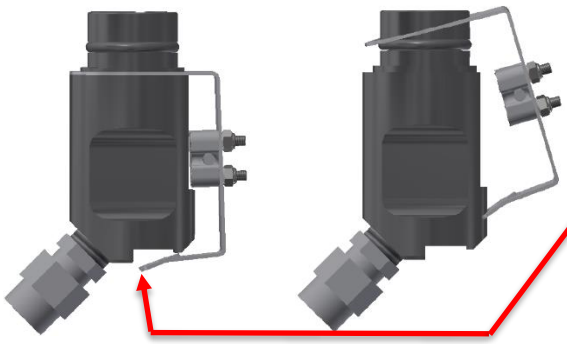
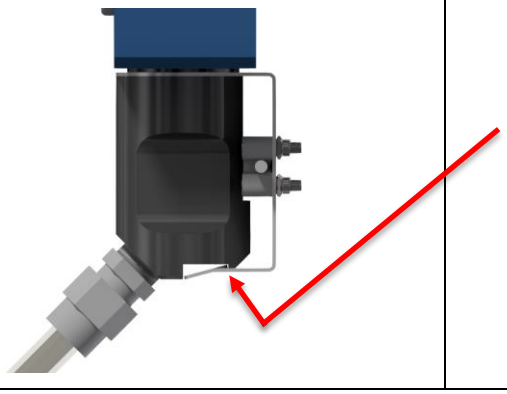
A good belt condition is a prerequisite for correct operation of the feeder system. In case of slippage, damage (cracks) or after 2000 operating hours, it is recommended to replace the belt.

- Remove the motor assembly (pos. 4) from the housing.
- Loosen nut (marked red) two turns while simultaneously holding the hexagon socket screw (green).
- Sliding the unit in the direction of release
- The belt is now slackened and can be changed.
- Push the unit up to the stop and tighten in direction
- Tighten the lock nut (marked red) while holding the hexagon socket screw (green).
- Install the motor assembly (pos. 4) in the housing.



7.2 Cleaning after backflow recoil or sand accumulation

If a jam on the abrasive cutting head has caused a backflow or sand build-up, the backflow preventer must be cleaned with compressed air and dried.

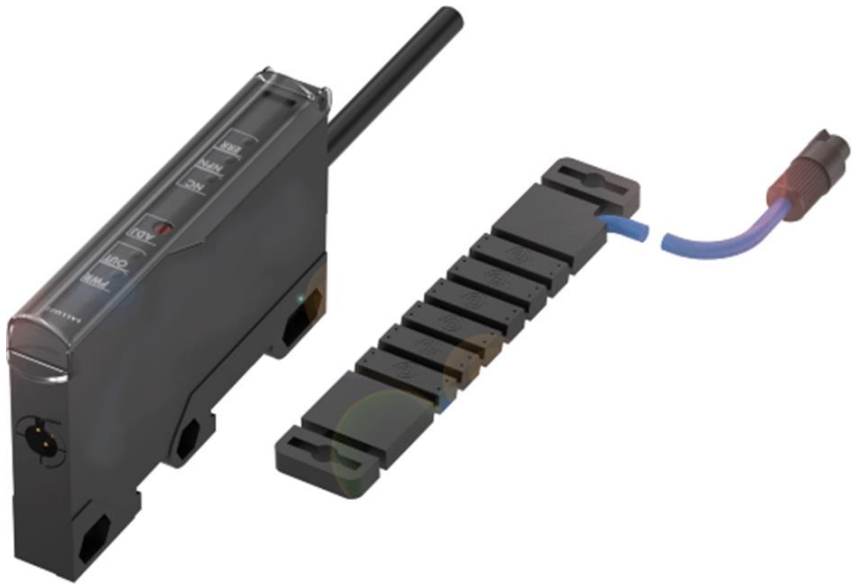
	• Stop machine (high pressure pump & abrasive hopper) • If necessary, prepare a container to collect the sand. • Remove the hose from the abrasive cutting head. • Hold the black backflow-preventer valve with your fingers at the green dot and pull it out of the aluminium housing with simultaneous turning and pulling movements (red arrow). • If necessary, collect sand with container
	• Detach the drip tray using a screwdriver. • and extend upwards
	• Blow out and dry Backflow-preventer valve • Also check if the aluminium housing is dry and not clogged. If necessary, clean and dry here as well.
	• Assemble everything in reverse order as follows • Check whether the sheet is clicked in correctly

8 Options

8.1 Level Sensor

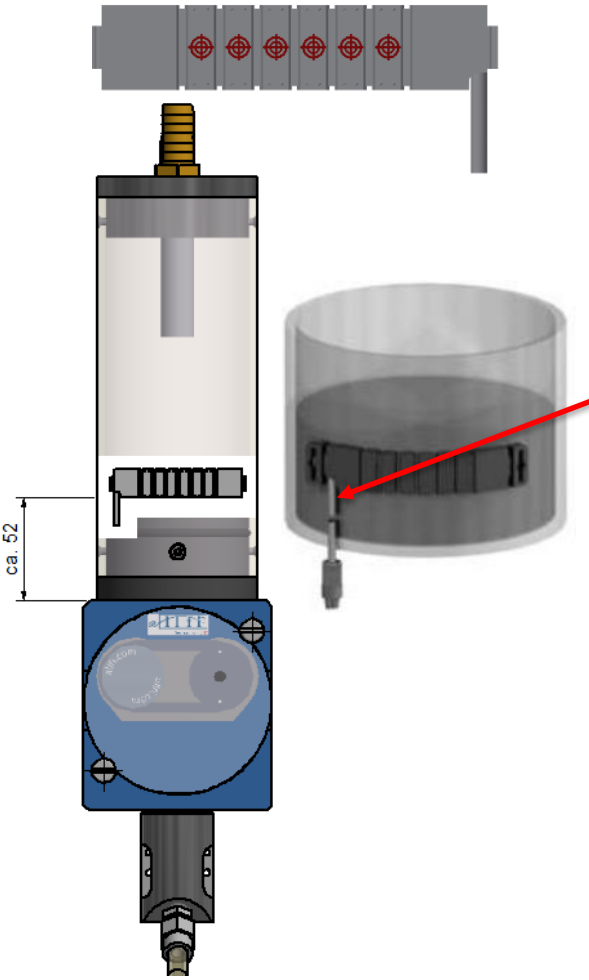
The level sensor signals a too low level in the sand container. The signal can be used for a warning message and or machine stop.

The sensor is attached to the container with the supplied double-sided adhesive tape and is connected to the Control Unit. After installation, the sensor sensitivity must be set on the Control unit of the abrasive dosing system (Picture left).



HINT
Damage to property due to incorrect assembly The power amplifier is IP40 certified. It is not protected against water in any form. See also data sheets chapter 11. **Therefore:** Place this component in a place protected from water & steam. Alternatively, it can be mounted in a waterproof box.

HINT
Install cables properly Lead the sensor cable to the sensor in an arc without tension. Also make sure that the cable to the control cabinet is long enough in all positions.

1		1. Cut off the side tabs from the sensor.
2		2. Glue double-sided adhesive tape onto the container at the point where the sensor is to be fixed. Height see picture left 3. Press the sensor onto the adhesive tape The connection cable must be on the left side and pointing downwards so that the crosses, marked red in the top left picture, are in contact with the adhesive tape 4. Connect the sensor to the Control unit (plug) 5. Connect the control unit to the cutting system (see operating instructions supplied) 6. Adjust the sensitivity on the Control unit (see operating instructions supplied)

8.2 Check Valve Sensor

The Check Valve sensor signals a water sand non-return or a sand jam. The signal can be used for a warning message and or machine stop.

In addition to the sensor, the scope of delivery includes the screws for fixing to the drip tray as well as the cable for potential equalization.

HINT
Do not set the sensor to teach mode The sensor was already configured for the application before delivery. If the sensor is incorrectly set to teach mode, smooth operation can no longer be guaranteed. If it is unintentionally taught, contact Allfi Service.

HINT

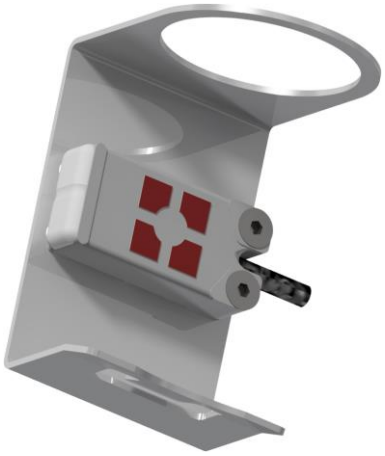
Install cables properly

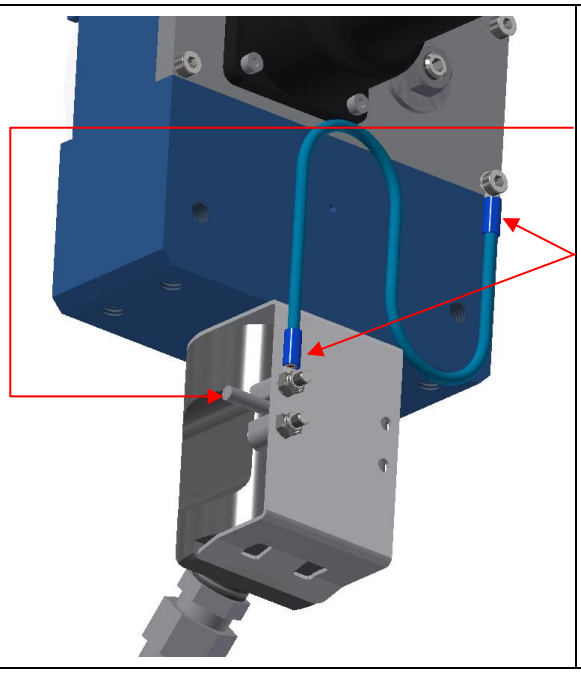
Lead the sensor cable in an arc to the sensor so that sufficient cable length is available when removing the non-return unit. Also make sure that the cable to the switch cabinet is long enough in all positions.

HINT

Mounting the sensor in the correct position

When mounting, the crosshairs on the sensor must point in the direction of the black backflow preventer, otherwise the sensor will not function.

Correct assembly	Wrong assembly
	



The sensor cable can be guided to the left or right.

The drip tray must be electrically connected to the motor plate using the cable supplied.

For screw torque and electrical connection, refer to the operating instructions supplied.

9 Faults and Troubleshooting

Depressurize high-pressure, water and compressed air lines before any trouble-shooting.

Fault	Possible causes	Correction
Dosage tank does not fill with abrasive sand	Sponsor does not support adequately or not at all	Switching on or adjusting the conveyor
	Connection line between conveyor & dosing blocked or interrupted	Clean or check the connecting hose.
Air pressure in supply line for dosing too high (max. 3 bar)	Incorrect air pressure setting on maintenance unit	Set the air pressure at the maintenance unit to max. 3 bar.
Water/sand mixture repels or accumulates in backflow preventer	Focusing tube, nozzle, mixing chamber, hose and / or backflow preventer blocked.	Clean the focusing tube, nozzle, mixing chamber, hose and non-return valve.
The dosage container is overfilled. Sand outlet at venting from	Too high air pressure at the abrasive conveyor	Adjusting the air pressure on the abrasive conveyor correctly
	Refill device on abrasive conveyor does not fill properly	Check abrasive conveyor
	Container of abrasive conveyor is almost empty	Filling sand
Overpressure in abrasive container	Vent blocked at expansion tank	Expose vent
	Power supply for drive interrupted	power supply ensure
	Drive motor defective	Replace drive motor
	Servo controller defective	Linear Replace servo controller
Dosage does not promote abrasive agent	Control loop failed	Control loop from potentiometer or CNC

10 Recycling

The Abrasive feeder 2.0 is made of metal and plastic. All the metal parts can be recycled. The electronic- & plasticparts are to be professionally recycled as per local specifications.

11 Data sheets

11.1 Linearer Servo Controller

Electrical Data

Continuous output power	max. 50 W
Operating voltage range V_{cc}	12 - 30 VDC
Motor operating voltage	± 6 ... ± 24 VDC
Motor current limit adjustable	0 ... 2 A

Input

Set value input U_{Soll} (Diff. voltage) ..... configurable by jumper	-10 ... +10 VDC -3.9 ... +3.9 VDC
DC tacho input voltage U_{Tacho}	approx. min. ± 2.6 to max. ± 50 VDC
Disable feature with switch having floating terminals	activ/low (Switch closed = output stage Disabled)
additional for encoder operation:	
Encoder ..... channel A, channel B, „home“ Impuls, max. 100 kHz	

Output

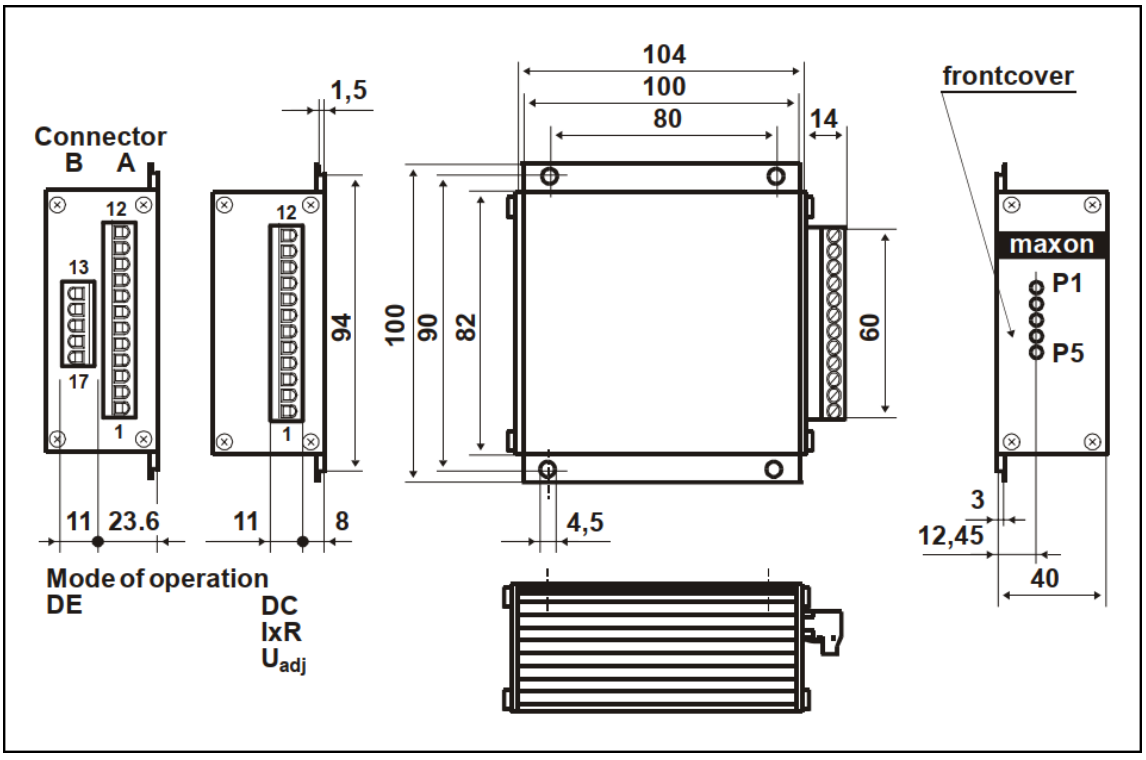
Reference voltage for external potentiometer	± 3.9 V, max. 2 mA (preferably 47 kOhm)
Supply voltage for encoder	5 V, max. 60 mA

Ambient temperature- / Humidity range

Operation	-10 ... +45°C
Overtemperature protection ..... Shut down when housing reaches approx. 80°C	
Storage	-40 ... +85°C
noncondensating	20 ... 80 %

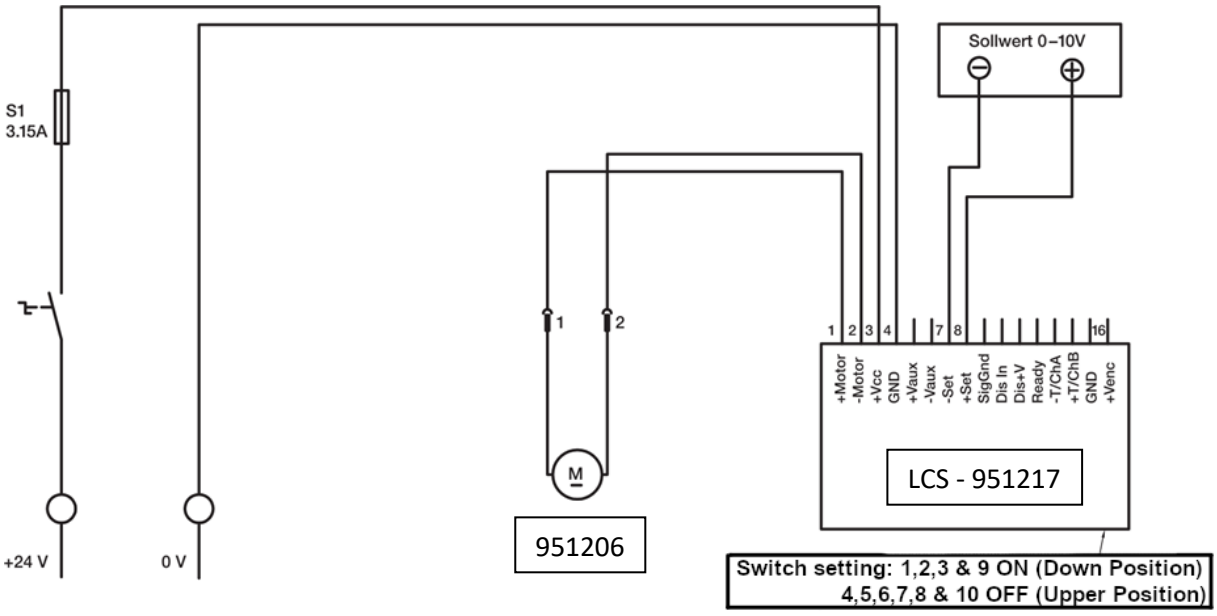
Mechanical data

Weight	330 g
Dimensions (W x H x D)	120 x 100 x 40 [mm]
Mounting plate	for M4 screws
Distance between threads	80 x 90 [mm]

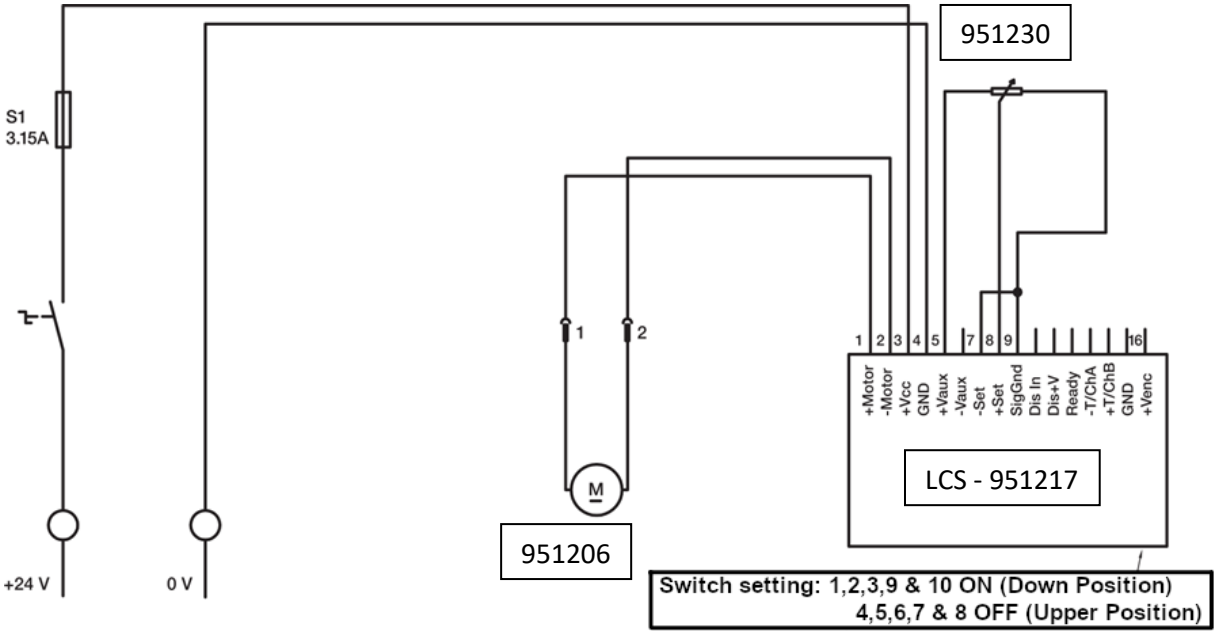


11.2 Linearer Servo Controller connection diagram

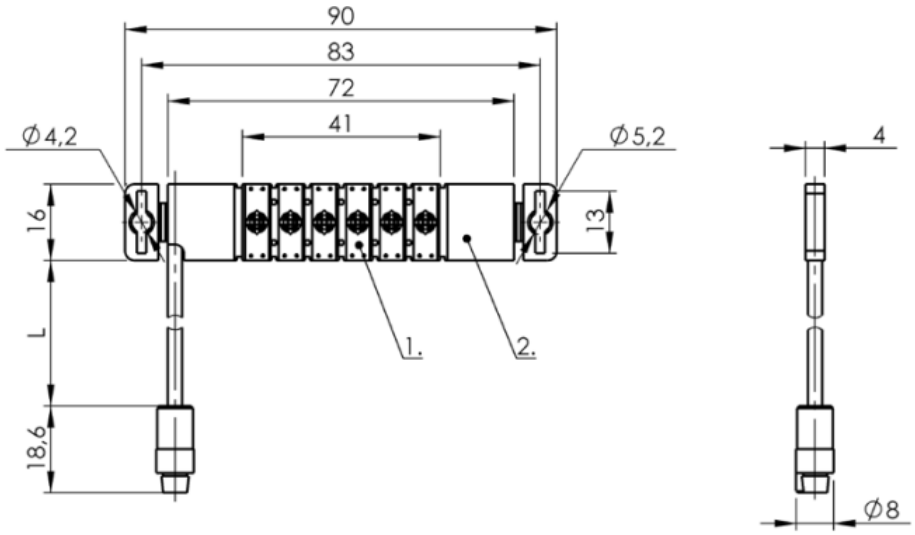
11.2.1 Control with 0 - 10V voltage (standard)



11.2.2 Control with potentiometer (optional)



11.3 Level Sensor



1) aktive Fläche / sensing surface 2) Gehäuse / Housing

Electrical data:

Rated insulation voltage (Ui)	75 DC V
Utilization category	DC 13
Supply voltage range UB	4...8 V
Housing/Thread Size	16x90x4
Electrical type	DC
Operating frequency (f)	100 Hz
Connection type	2m / 3x 0,14mm2 / PUR
Ripple of power supply	10 %
Connection	cable with connector

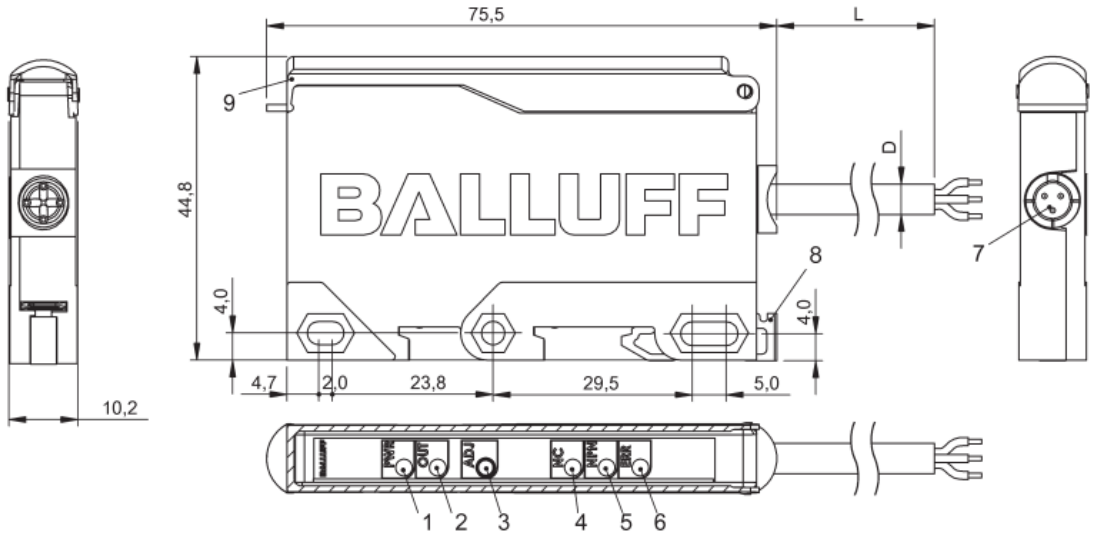
General data:

Approval	CE
Degree of protection IP	IP 60
Additional text 1	Requires amplifier

Mechanical data:

Operating temperature range	0...60 °C
Effective operating distance (Sr)	2...10 mm
Mounting	flush mountable
Rated operating distance (Sn)	10 mm
Sensing face material	PUR
Housing material	PC/PUR
Repeat accuracy (R)	2% of Sr
Assured Operating Distance max (Sa)	10 mm
Assured Operating Distance min (Sa)	0 mm

11.4 Control Unit



1) LED Power 2) LED function indicator 3) Sn 4) LED NC function active 5) LED Switch. step NPN active 6) LED Error 7) Plug connection sensor 8) Top hat rail mounting 35 mm 9) Damper

- **Signal amplifier**
- **For BCS w/out switch.power amp**
- **BCS-Types BCS ……-XXS…-**
- **PBT**

c UL us LISTED IND. CONT. EQ. 81U2 for use in the secondary of a class 2 source of supply

General attributes

Adjuster	Trimmer potentiometer
Application	BCS-Types BCS ……-XXS…-
Approvals / Conformity	CE
	cULus
Basic standard	IEC 60947-5-2
Enclosure Type per IEC 60529	IP40
Function indicator	Yes
Indicator	Output function - LED YE
	Power - LED GN
	NC active LED OR
	Status NPN active - LED OR
	Error LED RD
Polarity reversal protected	Yes
Power indicator	Yes
Setting	Sensitivity (Sn)
Short circuit protected	Yes
Short description	For BCS w/out switch.power amp
MTTF	405 a

Electrical attributes

Connection of sensor	Special connector 3-pole
Connection type	Cable
Eff. operating current Ie	50 mA
Eff. operating voltage Ue DC	24.0 V
Electrical version	DC, direct current
Operating voltage UB max. DC [V]	30.0 V
Operating voltage UB min. DC [V]	12.0 V
Switching freq. f max. (at Ue)	100 Hz
Switching function	NO/NC programmable
Switching output	PNP/NPN programmable
Voltage drop Ud max. (at Ie)	2.0 V

Mechanical attributes

Ambient temperature Ta max.	70 °C
Ambient temperature Ta min.	-10 °C
Cable diameter D	4.5 mm
Cable jacket material	PUR
Cable length	2.00 m
Conductor cross-section	0.25 mm²
Cover material	PBT
Front panel material	PA
Housing material	PBT
Length 1	10.5 mm
Length 2	75.5 mm
Length 3	45.0 mm
Mounting type	Screw M3
	DIN EN-50022 rail 35 mm
	DIN EN 50045 rail 15 mm
Number of conductors	4
Protective flap material	PA
Storage temperature max.	+85 °C
Storage temperature min.	-25 °C

Remarks

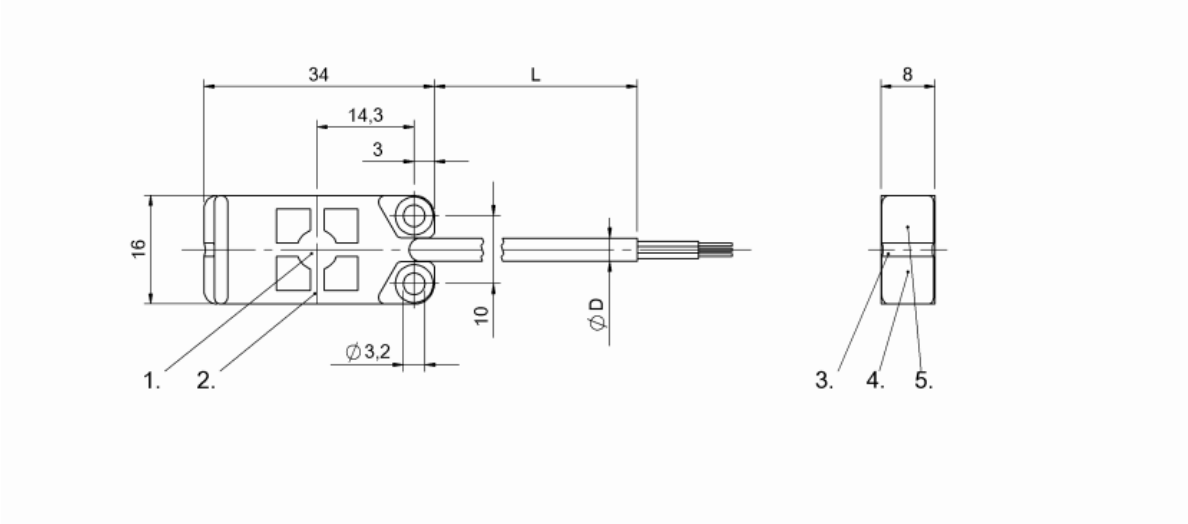
Please pay attention to an EMC-compatible cable laying. All measured and standard values specified in the technical data sheet refer to the2 m connecting cable.
max. load current: 50 mA with UL approval,> 50 to 100mA possible,

but without UL approval

For further information on MTTF/B10d, please refer to the MTTF / B10d Certificate.

Specification of the MTTF value and the B10d value do not represent any binding quality and/or life expectancy guarantees.

11.5 Back-flow Sensor



1) Active surface 2) Housing 3) Top cover 4) Power indicator green 5) Function indicator yellow

- **PNP**
- **Normally open (NO)**
- **Flush (shielded)**
- **Cable, PUR, 2.00 m**
- **switching distance teachable**

General attributes

Approvals / Conformity	CE
	UL Listed
Basic standard	IEC 60947-5-2
Enclosure Type per IEC 60529	IP67
Function indicator	Yes
Polarity reversal protected	Yes
Power indicator	Yes
Scope of delivery	1 installation guide
	1 holder
Setting	teachable
Short circuit protected	Yes
Trademark	GLOBAL
MTTF	98 a

Electrical attributes

Connection type	Cable
Eff. operating current Ie	50 mA
Eff. operating voltage Ue DC	24.0 V
Electrical version	DC, direct current
Load capacitance max. (at Ue)	0.330 µF
Operating voltage UB max. DC [V]	30.0 V
Operating voltage UB min. DC [V]	12.0 V
Rated insulation voltage Ui	75 V DC
Ripple max. (% of Ue)	10 %
Sensitivity	switching distance teachable
Switching freq. f max. (at Ue)	50 Hz
Switching function	Normally open (NO)
Switching output	PNP
Voltage drop static max.	1.5 V

Mechanical attributes

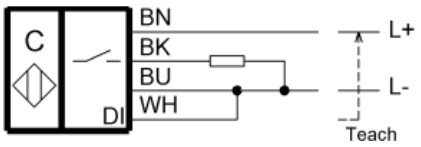
Ambient temperature Ta max.	70 °C
Ambient temperature Ta min.	-25 °C
Cable diameter D max.	3.4 mm
Cable jacket material	PUR
Cable length L [m]	2.00 m
Conductor cross-section	0.14 mm²
Depth	8.0 mm
Eff. operating distance Sr	8.0 mm
Height (small side)	16.0 mm
Housing material	PP
Mech. installation condition	Flush (shielded)
Number of conductors	4
Sensing face material	PP
Storage temperature max.	+85 °C
Storage temperature min.	-25 °C
Tightening torque	0.2 Nm

Remarks

For full-Teach connect Input DI for 2..7 seconds to L+. Connect inputDI for 7..12 seconds to L+ for Empty-Teach.
Input DI can be used for teaching of the switchpoint. For normal operation connect input DI permanently to L-.

For further information on MTTF/B10d, please refer to the MTTF / B10d Certificate.

Specification of the MTTF value and the B10d value do not represent any binding quality and/or life expectancy guarantees.



Modifications to this manual

17.02.2021	Switch Setting of LSC corrected
04.08.2021	Incorrectly labeled diagram corrected
28.09.2021	Option hose: new electrically conductive Option level sensor: crosshairs directed against container, pictures and text adapted accordingly
22.11.2021	Check Valve sensor: Equipotential bonding for drip tray
20.05.2022	Mounting the connector housing, Supplemented