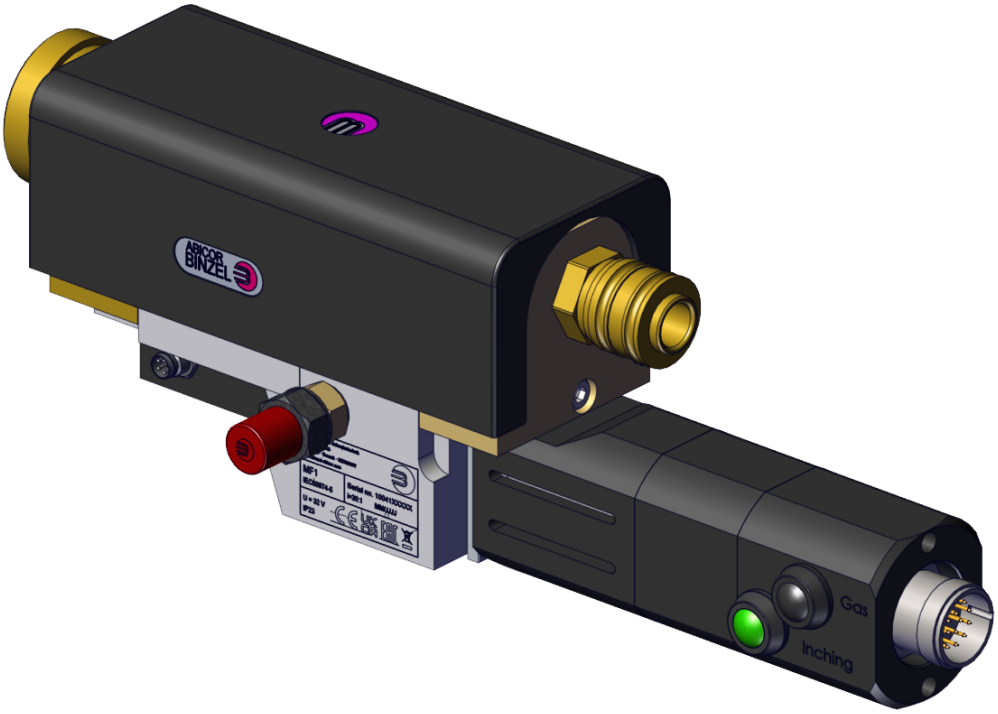
DE **Betriebsanleitung** / EN **Operating instruction**
FR **Mode d´emploi** / ES **Instructivo de servicio**



MF1

DE **Masterantrieb mit Drahtistwertgeber**
EN **Masterfeeder provided with wire actual value encoder**
FR **Entraînement maître avec transmetteur de valeur réelle**
ES **Devanadora o alimentador con indicador del valor actual del hilo**

ABICOR BINZEL® ROBOTIC SYSTEMS

www.binzel-abicor.com

EN English Translation of the original operating instructions

Our latest product documents as well as all contact details for the **ABICOR BINZEL** national subsidiaries and partners worldwide can be found on our website at www.binzel-abicor.com

1 Identification

The **MF1** is part of the **MFS-V3** wire feeder system and is used in industry and the trade for the delivery of welding wire or solder for laser applications.

The **MF1** is a 4-roll wire drive that is solely used as a master feeder.

All other media (coolant, shielding gas, welding current or blast air) required for the joining process can be supplied separately.

These operating instructions only describe the **MF1** master feeder. The **MF1** must only be operated using original **ABICOR BINZEL** spare parts.

1.1 Marking

This product fulfills the requirements that apply to the market to which it has been introduced. A corresponding marking has been affixed to the product, if required.

2 Safety

The attached safety instructions must be observed.

2.1 Designated use

- The device described in these instructions may be used only for the purpose and in the manner described in these instructions. In doing so, observe the operating, maintenance and servicing conditions.
- Any other use is considered improper.
- Unauthorized modifications or changes to increase the performance are not permitted.

2.2 Obligations of the operator

- Keep the operating instructions within easy reach at the device for reference and enclose the operating instructions when handing over the product.
- Putting into operation, operating and maintenance work may only be carried out by qualified personnel. Qualified personnel are persons who, based on their special training, knowledge, experience and due to their knowledge of the relevant standards, are able to assess the tasks assigned to them and identify possible dangers (in Germany see TRBS 1203).
- Keep other persons out of the work area.
- Please observe the accident prevention regulations of the country in question.
- Ensure good lighting of the work area and keep the work area clean.
- Occupational health and safety regulations of the country in question. For example, Germany: Protection Law and the Company Safety Ordinance
- Regulations on occupational safety and accident prevention.

2.3 Personal protective equipment (PPE)

To avoid danger to the user, these instructions recommend the use of personal protective equipment (PPE).

- This consists of protective clothing, safety goggles, a class P3 respiratory mask, protective gloves and safety shoes.

2.4 Classification of the warnings

The warnings used in the operating instructions are divided into four different categories and appear prior to potentially dangerous work steps. Arranged in descending order of importance, they have the following meanings:

⚠ DANGER

Describes an imminent threatening danger. If not avoided, this will result in fatal or extremely critical injuries.

⚠ WARNING

Describes a potentially dangerous situation. If not avoided, this may result in serious injuries.

⚠ CAUTION

Describes a potentially harmful situation. If not avoided, this may result in slight or minor injuries.

NOTICE

Describes the risk of impairing work results or potential material damage to the equipment.

2.5 Warning and notice signs

The following warning and notice signs can be found on the product:

Symbol	Meaning
	Crushing of fingers!

These markings must always be legible. They may not be covered, obscured, painted over or removed.

2.6 Emergency information

In the event of an emergency, immediately disconnect the following supplies:

- Electrical power supply
- Coolant
- Gas

Further measures can be found in the operating instructions for the power source or the documentation of further peripheral devices.

3 Product description

⚠ WARNING

Hazards caused by improper use

If improperly used, the device can present risks to persons, animals and material property.

- Use the device according to its designated use only.
- Do not convert or modify the device to enhance its performance without authorization.
- The device may only be used by qualified personnel (in Germany, see TRBS 1203).

3.1 Technical data

Ambient temperature	-10°C to +40°C
Relative humidity	Up to 90% at 20°C

Tab. 1 Ambient conditions during operation

Storage in a closed environment, ambient temperature	-10°C to +40°C
Ambient temperature for shipment	-25°C to +55°C
Relative humidity	Up to 90% at 20°C

Tab. 2 Ambient conditions for transport and storage

Supply voltage	⇨ Tab. 4 on page EN-5; Tab. 5 on page EN-5; Tab. 6 on page EN-6
Max. welding current	Max. 500 A at 100% duty cycle
Max. gas pressure	0.5 MPa (5 bar)
Wire feed rate	i= 15/1 v= 1-20 m/min, i= 30/1 v= 1-10 m/min*
Standard roll diameter	20 mm
Drive	Four rollers
Protection type	IP23
Weight	Approx. 2.9 kg
* The tolerances depend on the selected speed and the activation selected in each case.	

Tab. 3 General

Nominal voltage	32 V
Idle speed	5900 rpm
Starting torque	756 mNm (107 oz-in)
Average idle current	80 mA

Tab. 4 Measured motor values

Max. continuous current	2.3 A
Max. continuous three-phase current	115 mNm (16.3 oz-in)
Max. angular acceleration	64 10^3rad/s^2

Tab. 5 Max. recommended motor values

Negative EMF	5.40 V/1000 rpm
Torque constant	52 mNm/A (7.3 oz-in)
Terminal resistance	2.20 ohm
Motor regulation R/k²	0.83 10^3/Nms
Terminal inductance	0.40 mH
Rotor moment of inertia	71.4 kgm² x 10^{-7}
Mechanical time constant	6 ms

Tab. 6 Motor-specific parameters

Pulses per revolution	300		
Current consumption	Typically 10 mA	Max. 20 mA	Stand-by 50 µA
Outputs	Compatible		
Electric phase shift A/B	90 ± 20 degrees		
Duty factor	50 ± 10%		
Max. frequency	200 kHz		
Operating temperature at 90% humidity	-40 °C to +85 °C		
Moment of inertia of the disc	0.12 10^{-7} x kgm²		
Supply voltage Vcc	5 V ± 10%		

Tab. 7 Encoder motor data

Values at a temperature of +25 °C:	
Number of pulses	1024
Z pulse or minus pulse	(Z) 1 per revolution
Output	Push-pull (totem pole)
Supply voltage	Min. 4.5 V to max. 30 V*
Idle current	35 mA
Max. load	20 mA per output (short-circuit-proof)*
V out low	Max. 500 mV @ I=10 mA
Working temperature	-40 °C to +85 °C
Storage temperature	-40 °C to +85 °C
Max. pulse frequency	200 kHz*
(Vin)	Reverse polarity protection
V out high	Min. (Vin -0.6) @ I= -10 mA / Min. (Vin -1.3) @ I= -25 mA
Connecting cable	5 (0.14 mm²) or 8-wire (0.05mm²) shielded
Output signal	Standard
* = applying the max. values of all 3 parameters is not recommended	

Tab. 8 Encoder wire actual value data

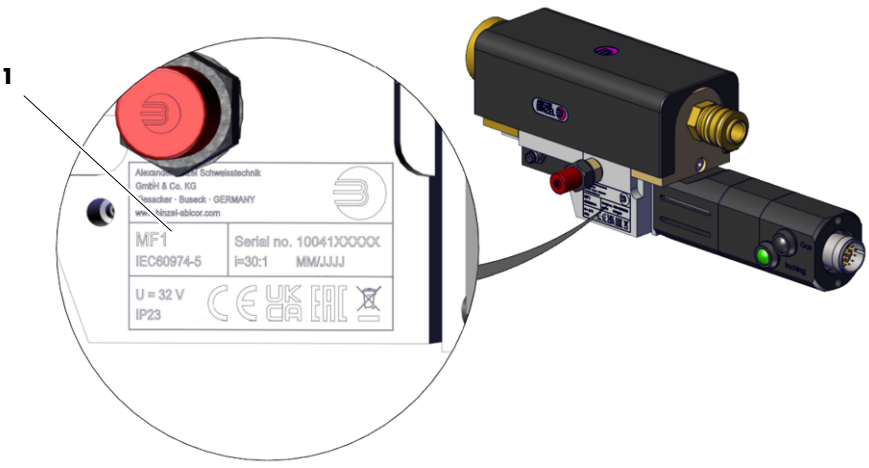
3.2 Abbreviations

ABIROB® W	Interface of different process torches
MFS	Master feeder system
MF1	Drive unit (master) size 1 = roll diameter 20 mm
ROBO WH	Interface of different process torches

Tab. 9 Abbreviations and term definitions

3.3 Nameplate

The **MF1** master feeder is labelled with a nameplate as follows:



1 Nameplate

Fig. 1 Nameplate

When making inquiries, note the following information:

- Device type, ID number, serial number, year of construction

3.4 Signs and symbols used

The following signs and symbols are used in the operating instructions:

Symbol	Description
•	Bullet symbol for instructions and lists
⇨	Cross-reference symbol refers to detailed, supplementary or further information
1	Step(s) described in the text to be carried out in succession

4 Scope of delivery

• Assembly **MF1**	• Operating instructions

Tab. 10 Scope of delivery

• Interfaces WH, **ABIROB® W**	• Quick coupling
• Robot mount	

Tab. 11 Options

• Feed rollers	• Wire guides
• Drive gears	

Tab. 12 Wear parts

The **MF1** master feeder forms part of the complete system.

Order the equipment parts and wear parts separately.
The order data and ID numbers for the equipment parts and wear parts can be found in the current product catalog. Contact details for support and placing orders can be found online at *www.binzel-abicor.com*.

4.1 Transport

Although the items delivered are carefully checked and packaged, it is not possible to fully exclude the risk of damage during transport.

Goods-in inspection	Use the delivery note to check that everything has been delivered. Check the delivery for damage (visual inspection).
In case of complaints	If the delivery has been damaged during transport, contact the last carrier immediately. Retain the packaging for potential inspection by the carrier.
Packaging for returns	Where possible, use the original packaging and the original packaging material. If you have any questions concerning the packaging and/or how to secure an item during shipment, please consult your supplier.

Tab. 13 Transport

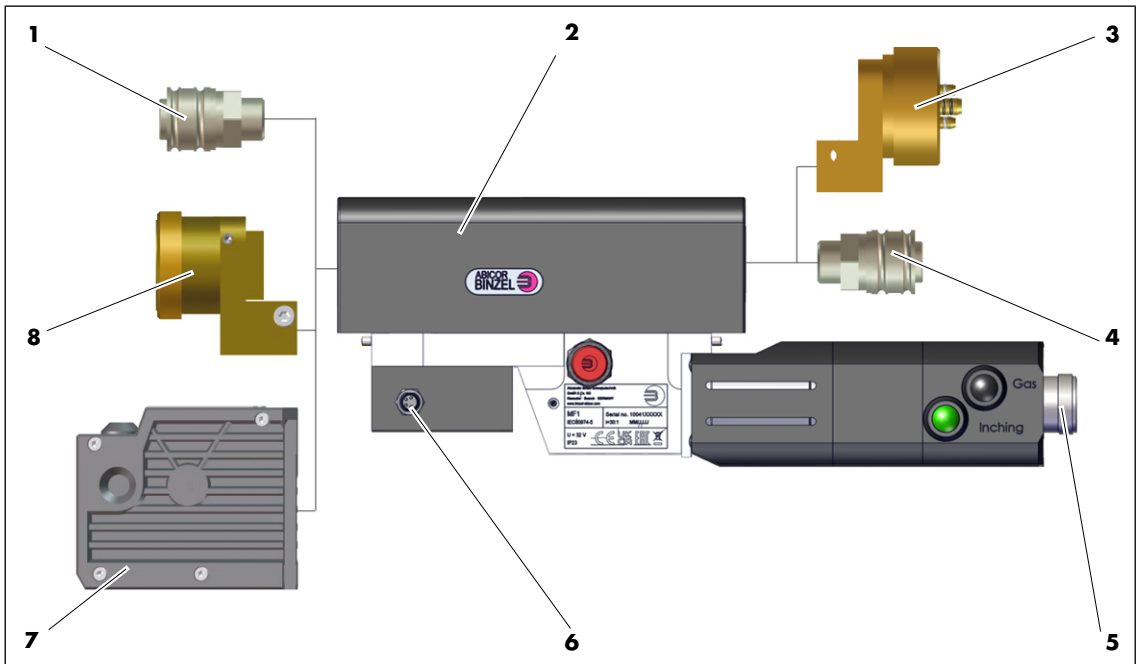
4.2 Storage

Physical storage conditions in a closed environment:

⇨ Tab. 2 Ambient conditions for transport and storage on page EN-5

5 Functional description

The media required for the welding process (welding current, shielding gas, coolant and blast air) are passed through the **MF1** master feeder and fed to the torch. The interfaces with the torch and the cable assembly are adapted to the application-specific requirements. The **MF1** master feeder is fastened to the robot or the safety cut-out by means of a robot mount. The four-roll drive feeds the wire at a constant wire feed. The master feeder takes over the "Push" function here. The wire can be fed directly by means of a **MasterLiner** or by means of a second slave drive that is tuned exactly to the master feeder. This slave drive is integrated, for example, into the **M-Drive**, **MF1-Rear** or a power source.



1	Quick coupling interface	**4**	Quick coupling	**7**	Interface WH
2	**MF1** master feeder with wire actual value encoder	**5**	16-pin motor control lead port	**8**	Interface **ABIROB® W**
3	Cable assembly clutch	**6**	4-pin wire actual value encoder control lead port		

Fig. 2 Functional description

6 Commissioning

DANGER

Risk of injury due to unexpected start-up

The following instructions must be followed during all maintenance, servicing, assembly, disassembly, and repair work:

- Switch off the power source.
- Close off the gas and coolant supply.
- Close off the compressed air supply.
- Switch off the entire welding system.
- Disconnect all electrical connections.

WARNING

Risk of crushing

Hands can be pulled in and crushed by moving wheels.

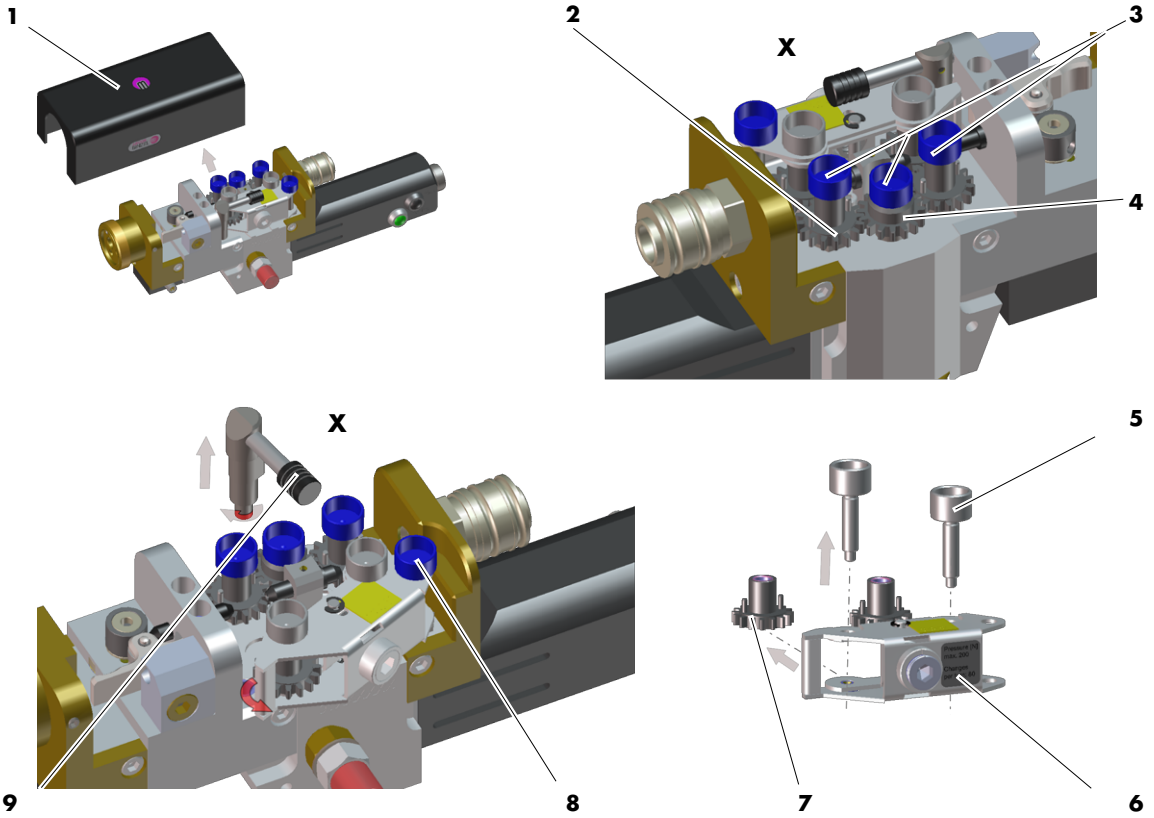
- Do not reach into moving wheels.

NOTICE

- Please take note of the following instructions:

  ⇨ 3 Product description on page EN-5

- The system may be installed and commissioned only by qualified personnel (in Germany, see TRBS 1203).
- When supplied with a CAT robot mount, isolation is required. If an alternative mounting device is used, the housing must be attached to this in an isolated manner.



1	Protection cap	**4**	Drive gear with groove	**7**	Drive gears (2 pcs.')
2	Drive gears (2 pcs.)	**5**	Toothed wheel axles (2 pcs.)	**8**	Knurled screw
3	Knurled screws for drive rollers	**6**	Rocker arm	**9**	Eccentric bolt

Fig. 3 Putting into operation

X : View

6.1 Mounting the feed rollers

NOTICE

- Ensure that the knurled screws are correctly installed. Use these for drive rollers and pressure rollers. Ensure that the feed rollers are correctly installed; use them for drive rollers and pressure rollers.
- The feed rollers come with anti-corrosion protection. Prior to mounting, lubricate the feed rollers and always replace or reverse them in pairs.
- Observe the groove geometry and the wire diameter.
- Only use smooth feed rollers (e.g. for feeding CuSi, steel or stainless steel) as pressure rollers.

All grooved feed rollers have two guide grooves. Should a guide groove be worn out, then the feed roller can be reversed once and used again.

6.1.1 Pressure rollers

⇨ Fig. 3 Putting into operation on page EN-10

1 Lift off the protection cap **(1)**.

2 Rotate the eccentric bolt **(9)** and remove it upwards.

3 Open the rocker arm **(6)**.

4 Unscrew the toothed wheel axles **(5)** and remove them upwards.

5 Remove the drive gears **(7)**.

6 Remount all components in the reverse order.

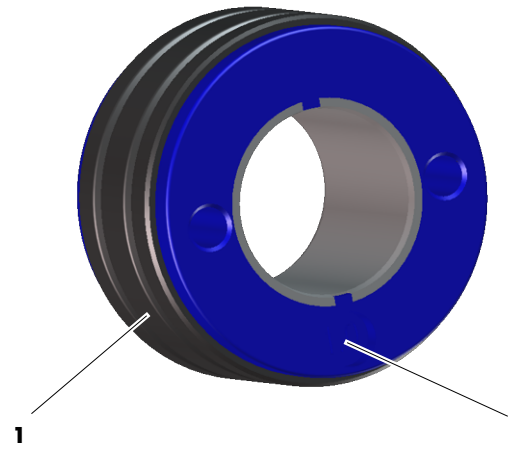
6.1.2 Drive rollers

⇨ Fig. 3 Putting into operation on page EN-10

NOTICE

- Red drive rollers = V-groove / blue drive rollers = U-groove / green drive rollers = knurled V-groove.
- An engraved number indicates the wire diameter to be used.

  ⇨ Fig. 6 Feeding in the wire on page EN-12



1 Wire feed roll **2** Engraved number for the wire diameter

Fig. 4 Wire feed roll knurled V-groove

⇨ Fig. 3 Putting into operation on page EN-10

1 Unscrew the drive roller knurled screws **(3)**.

2 Place the feed drive rollers on drive gears **(2)**.

3 Remount the drive roller knurled screws **(3)**.

6.1.3 Replacing the rocker arm

⇨ Fig. 3 Putting into operation on page EN-10

1 Lift off the protection cap **(1)**.

2 Rotate the eccentric bolt **(9)** and remove it upwards.

3 Open the rocker arm **(6)**.

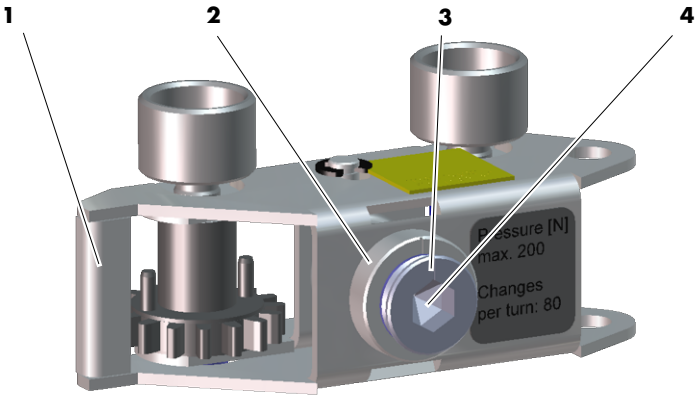
4 Unscrew the knurled screw **(8)**.

5 Remove the rocker arm **(6)** upwards.

6 Place the new rocker arm **(6)** on the rotation axis and secure it with the knurled screw **(8)**.

6.1.4 Setting the contact pressure

The contact pressure has a defined start and end point.



1	Rocker arm	**3**	Mark
2	Sleeve	**4**	Screw

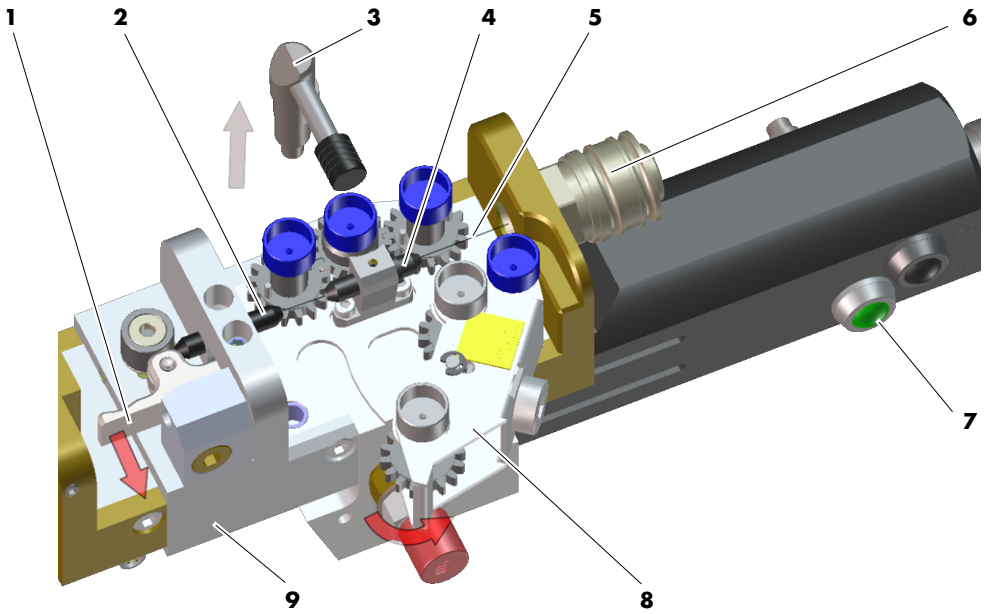
Fig. 5 Setting the contact pressure

NOTICE
• One rotation of the screw **(4)** corresponds to 80 N.

If the screw **(4)** is fully tightened, this corresponds to a force of 200 N. The mark **(3)** on the screw **(4)** points upwards and coincides with the mark on the sleeve **(2)**.

The screw can be turned a maximum of 2.5 rotations.

6.2 Feeding in the wire



1	Pressure lever	**4**	Wire guide	**7**	Inching trigger (green)
2	Wire guide speed sensor	**5**	Wire	**8**	Rocker arm
3	Eccentric bolt	**6**	Cable assembly interface	**9**	Wire actual value encoder (AVT)

Fig. 6 Feeding in the wire

⚠ CAUTION

Risk of injury

Physical injury caused by the start of the wire.

- Keep the process-side drive away from the body.

1 Connect the cable assembly to the interface **(6)** and lift off the protection cap. Connect the control leads to the master feeder **MF1**.

2 Rotate the eccentric bolt **(3)** and remove it upwards.

3 Open the rocker arm **(8)**.

4 Press the inching trigger **(7)** until wire **(5)** becomes visible. Introduce the wire **(5)** into the wire guide speed sensor **(2)** (and on retraction into the torch).

5 Feed it through the wire guide speed sensor **(2)** using the inching trigger **(7)**. When doing so, open the pressure lever **(1)** for the wire actual value encoder **(9)**.

The contact pressure of the wire actual value encoder **(9)** is pre-set for wires from 0.8 to 1.0 mm.

6 Close the rocker arm **(8)** and insert the eccentric bolt **(3)**.

7 Press the inching trigger **(7)** until wire **(5)** emerges from the torch neck.

6.3 Control lead pin assignment

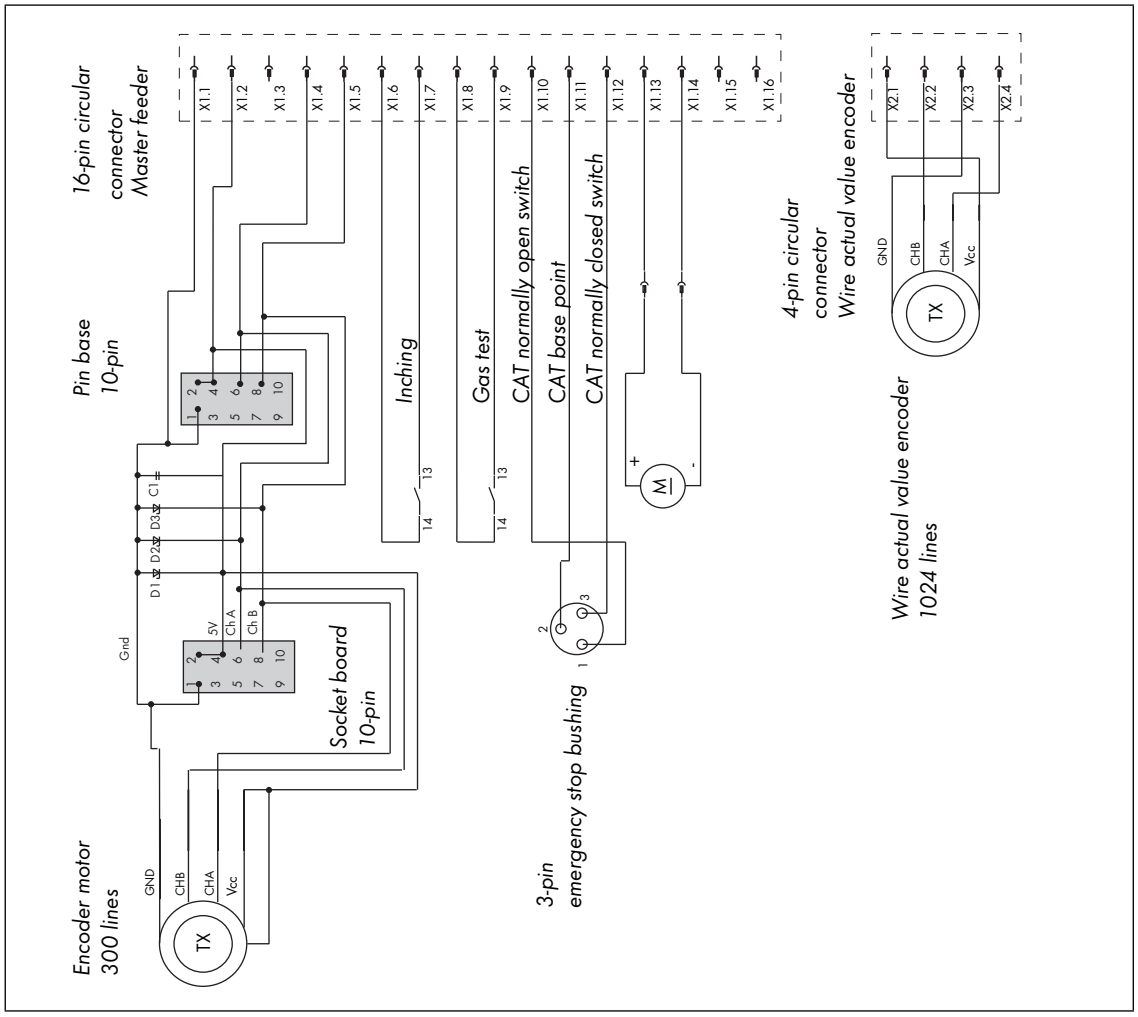
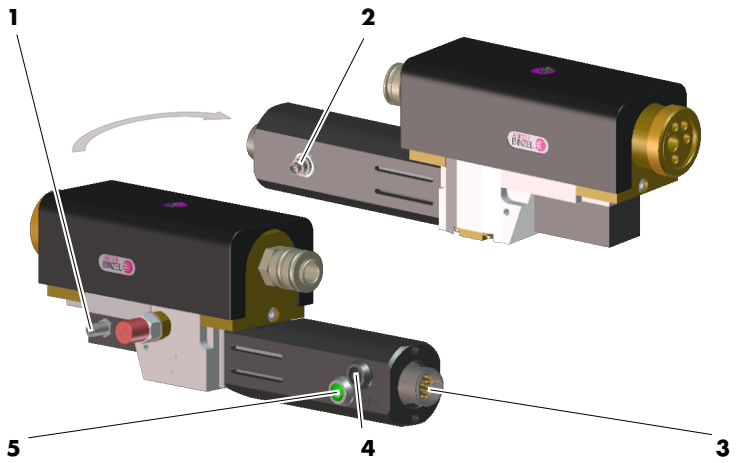


Fig. 7 Control lead pin assignment

7 Operation

NOTICE
• The system may only be operated by qualified personnel (in Germany see TRBS 1203). • Before connecting the cable assembly to the wire feeder, check whether the proper wire guide (liner or PA liner) in accordance with the wire diameter and wire type has been inserted.

7.1 Control elements



1 4-pin wire actual value encoder control lead port
2 CAT socket
3 16-pin motor control lead port
4 Gas test trigger (black)
5 Inching trigger (green)

Fig. 8 Control elements

Symbol	Name
	Inching trigger (green) **(5)**. Press trigger once, wire is fed.
	Gas test trigger (black) **(4)**. Press trigger for gas flow.
	Connect the CAT socket **(2)**, to the helix cable of the CAT emergency stop safety cut-out. The integrated control lead will transmit the signal to peripheral devices.
	Motor control lead port **(3)**. Connect the cable assembly connection plug to the motor control lead port **(3)** to establish signal transmission for the motor, incl. gas and CAT signal.
	4-pin wire actual value encoder control lead port **(1)**. Connect the cable assembly connection plug to the motor control lead port **(3)** to establish signal transmission.

8 Decommissioning

NOTICE
• As the **MF1** master feeder is integrated into a welding system, the process for putting it out of operation depends on the robot control system. Please make sure that the shutdown procedures for all components integrated in the welding system are strictly observed.

1 Switch off the robot control.

9 Maintenance and cleaning

Scheduled maintenance and cleaning are prerequisites for a long service life and trouble-free operation.

⚠ DANGER

Risk of injury due to unexpected start-up

The following instructions must be followed during all maintenance, servicing, assembly, disassembly, and repair work:

- Switch off the power source.
- Close off the gas and coolant supply.
- Close the compressed air supply.
- Switch off the entire welding system.
- Disconnect all electrical connections.

⚠ DANGER

Electric shock

Dangerous voltage due to defective cables.

- Check all live cables and connections for proper installation and damage.
- Replace any damaged, deformed or worn parts.

⚠ WARNING

Risk of crushing

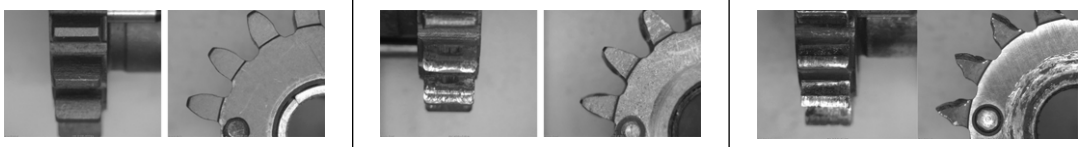
Hands can be pulled in and crushed by moving wheels.

- Do not reach into moving wheels.

NOTICE

- Maintenance and cleaning work may be carried out only by qualified personnel (in Germany see TRBS 1203).
- Always wear your personal protective equipment when performing maintenance and cleaning work.

9.1 Wear to the toothed wheels



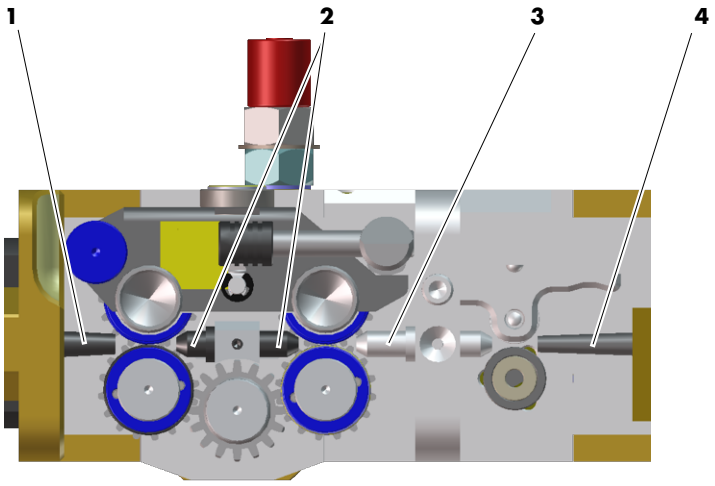
1 Condition ex works

2 Used but still okay

3 Used – replacement essential

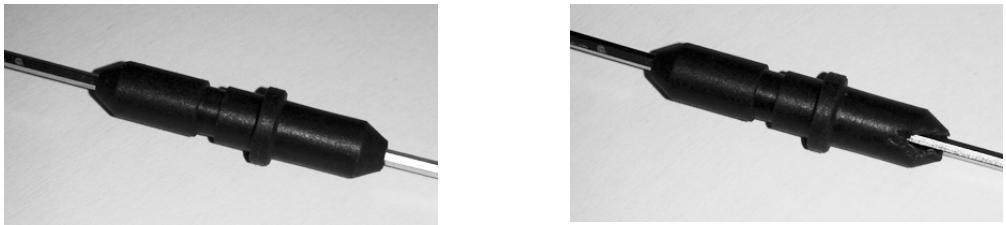
Fig. 9 Wear to the toothed wheels

9.2 Inspecting the wire guide nipple



1 Wire guide at the **MasterLiner** wire inlet
2 Wire guide nipple between the drive wheels
3 Wire guide speed sensor
4 Wire guide at wire outlet (e.g. for flex supply)

Fig. 10 Wire guide nipple **MF1**



1 Wire guide nipple okay
2 Wire guide nipple not okay – replace

Fig. 11 Wear to the wire guide nipple

9.3 Maintenance intervals

NOTICE
• The specified maintenance intervals are standard values and refer to single-shift operation. • Visually inspect the toothed wheels once a week. • The higher the rocker arm force, the greater the wear to the toothed wheels.

When using arc welding equipment, always observe the provisions of EN 60974-4 Inspection and testing, as well as any national laws and regulations.

Check the following:

Weekly	**Monthly**
• The basic cleaning is recommended, and necessary in case of extreme working conditions.	• Oil all moving parts and roll bearings with suitable lubricating oil.
• Blow compressed air through the wire conduit and check for wear.	
• Visual inspection for abrasion or damage to the gears. ⇨ 9.1 Wear to the toothed wheels on page EN-15	
• Visual inspection of the wire guide nipple. ⇨ 9.2 Inspecting the wire guide nipple on page EN-16	

Tab. 14 Maintenance intervals

10 Troubleshooting

⚠ DANGER

Risk of injury and machine damage when handled by unauthorized persons

Incorrect repair work and changes of the product may lead to significant injuries and damage to the device. The product warranty will be rendered invalid if work is carried out on the product by unauthorized persons.

- Operating, maintenance, cleaning and repair work may be carried out only by qualified personnel (in Germany see TRBS 1203).

Please observe the attached document 'Warranty'. Please consult your retailer or the manufacturer in case of any doubts and/or problems.

NOTICE

- Please also consult the operating instructions for the welding components, such as the power source, welding torch system, re-circulating cooling unit etc.

Fault	Cause	Solution
Unit is not ready for operation	• Control system or component defective	• Check by specialized personnel
Wire is not fed	• Motor defective (master or slave)	• Switch unit to currentless state!
		• Replace motor, press RESET trigger
		• Replace motor control card
	• Motor control card fault. Fault cannot be eliminated by pressing the RESET trigger	• Replace the feed motor or motor control card
	• When the wire feed trigger is pressed again, the motor control card shows again a fault	• Wire fault in cable assembly or master drive Eliminate fault

Tab. 15 Troubleshooting

11 Disassembly

⚠ DANGER

Risk of injury due to unexpected start-up

The following instructions must be followed during all maintenance, servicing, assembly, disassembly, and repair work:

- Switch off the power source.
- Close off the gas and coolant supply.
- Close the compressed air supply.
- Switch off the entire welding system.
- Disconnect all electrical connections

NOTICE

- Disassembly may be carried out only by qualified personnel (in Germany see TRBS 1203).
- Observe the information provided in the following section:

⇨ 8 Decommissioning on page EN-14

1 Disconnect the cable assembly from the wire feeder.

2 Remove the parts to be disconnected.

3 Dismounting the master feeder **MF1** from the torch side fastener.

12 Disposal

When disposing of the system, local regulations, laws, provisions, standards and guidelines must be observed. Observe the regulations on the disposal of electronic scrap and dispose of it at your local waste disposal site (e. g. recycling centre).

To correctly dispose of the product, it must first be disassembled. Please note the following information:

⇨ 11 Disassembly on page EN-18

12.1 Materials

This product is mainly made of metallic materials, which can be melted in steel and iron works and are, thus, almost infinitely recyclable. The plastic materials used are labeled in preparation for their sorting and separation for later recycling.

12.2 Consumables

Oil, greases and cleaning agents may not contaminate the ground or enter the sewage system. These materials must be stored, transported and disposed of in suitable containers. Observe the relevant local regulations and disposal instructions of the safety data sheets specified by the manufacturer of the consumables. Contaminated cleaning tools (brushes, rags, etc.) must also be disposed of in accordance with the information provided by the consumables' manufacturer.

12.3 Packaging

ABICOR BINZEL has reduced the transport packaging to the necessary minimum. The ability to recycle packaging materials is always considered during their selection.