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The Operation Manual is intended for user safety.  
Before using the equipment, the user is required to read and understand the Manual.  
Failure to comply with the Manual relieves the manufacturer of any liability.  
Please save the Manual for future reference.

## 1 PORTABLE RESIDUAL CURRENT DEVICE CIRCUIT BREAKERS

**CAUTION:** please read the user manual carefully before use

### 1. Technical equipment

1. *Red indicator:* Protection active
2. *Reset:* Activates the protection
3. *T:* Activate the test function

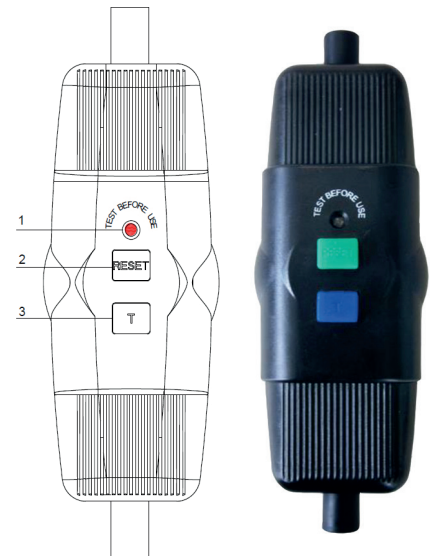
### 2. Test before use

Warning:

1. Seek wiring rule in user manual.
2. Connect to the power supply properly.
3. Press “RESET” button: indicator should be “ON”.
4. Press “T” button: indicator should be “OFF”.
5. Press “RESET” button for use. Do not use if test failed.

### 3. Advice

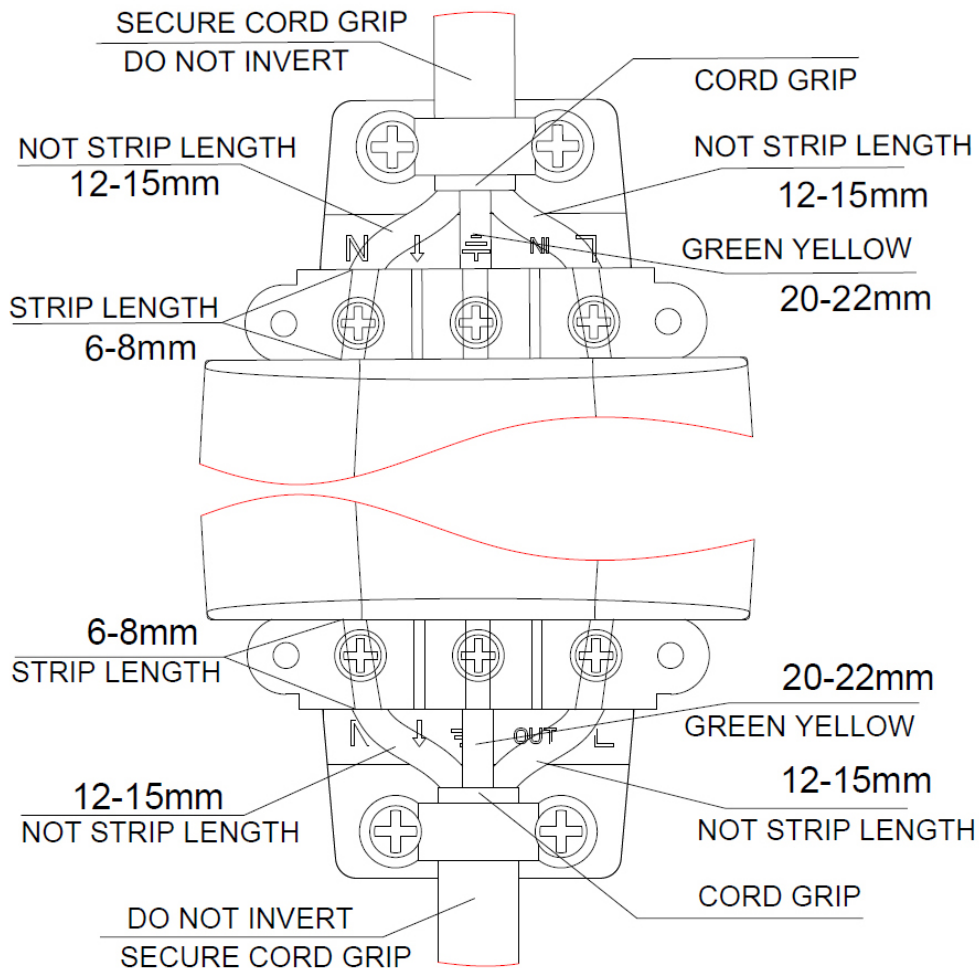
- The ambient temperature is between - 25 °C to 40 °C
- Altitude: not exceeding 2 000 m.
- Relative humidity (maximum value at 40 °C): 50 %.
- Frequency: reference value is in  $\pm 5$  % (230 V~ 50 Hz).
- External magnetic field: not exceeding five times the earth’s magnetic field in any direction. It also means the device should not be used in the proximity of a strong magnetic field.
- Sinusoidal wave distortion: not exceeding 5 %.
- After the item 1)-5), the device is ready for use. The device shall not be used if it fails to operate correctly in accordance with the test sequence listed above. In this case please unplug the device to outlet.
- Please make sure the device can work normally by conducting the above operation sequence at first to protect against unexpected electric leakage hazard before use. Don’t misuse such as dropping, immersion, etc.
- In case of electric leakage, the device will automatically shut off the power supply and prevent electricity reaching human bodies.
- Seek advice from manufacturer or responsible vendor or a competent electrician for solution if the device repeatedly trips with an appliance connected or if it fails to pass the test sequence listed above.
- Misuse of electricity can be dangerous, the use of a PRCD cannot be regarded as substitute for basic electrical safety, please unplug the PRCD to achieve isolation.
- The PRCD does not guard against electric shock resulting from contact with both circuit conductors.



Technical data	
Power supply	230 V ~ 50 HZ
Rated current	16 A
Rated output	3600 W
Trip leakage current	30 mA
Trip time	< 30 mS
Type of protection	IP 5 4

**WIRING RULE**

Fit with flexible cord of DIN VDE 0281 or DIN VDE 0282  
 Maximum cross section of conductor: 3G1.5 mm<sup>2</sup>  
 Minimum cross section of conductor: 3G0.75 mm<sup>2</sup>



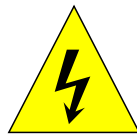
This marking indicates that this product should not be disposed with other household wastes throughout the EU. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. To return your used device, please use the return and collection systems or contact the retailer where the product was purchased. They can take this product for environmental safe recycling.

## 1 EQUIPMENT SAFETY

This chapter contains important information on equipment safety. Failure to comply with the safety instructions can result in injury or death.

### 1.1 Safety-related symbols

Symbols are used throughout this manual to draw the reader's attention to possible risks.



Danger, high voltage.  
Risk of injury or death.  
Follow the instructions!



Danger, risk of injury.  
Follow the instructions!



Danger, risk of injury due to moving parts.  
Follow the instructions!



Danger, do not touch. Risk of injury.  
Follow the instructions!

## 1.2 Personal protective equipment

Always use the specified personal protective equipment (PPE) when using the product. If you notice any problems with PPE, stop working immediately. Always wear appropriate safety clothing (overalls or trousers and shirt), safety shoes, and the PPE listed below:



### **Safety goggles**

Always wear safety goggles to protect your eyes from splashes and dust.



### **Hearing protectors**

Always use hearing protectors to prevent hearing damage.



### **Protective gloves**

Always use protective gloves suiting the purpose. The items handled may become hot or contain epoxy residues or sewer waste. Always choose appropriate gloves protecting against these dangers.



### **Respiratory protection**

Always use respiratory protection. Respiratory protection protects the user against potentially generated dust (e.g. epoxy dust, iron dust).

Symbols are used throughout this Operation Manual to draw attention to possible risks.

**Never forget:**



The dust resulting from the use of this equipment can be hazardous to health, flammable or explosive.

In order to prevent the formation of potentially hazardous or explosive sewage gases in the pipe machined, make sure it is open and well-ventilated.

Prior to assembly, maintenance, tool removal, or parts replacement, remove the machine's power plug from the electrical outlet.

1.3 Important safety instructions for use

**Failure to comply can result in injury or death.**



1. Always use safety goggles and hearing protectors, as well as protective gloves and safety clothing. In case of dust-generating works, use respiratory protection as well. Note that dust can be generated even if water is added to the pipe machined while using the equipment.
2. Make sure the pipe to be machined is open and well-ventilated to prevent formation of sewage gases in it. Tools used with the equipment can cause sparks in the pipe. To prevent static electricity, the pipe must also be properly grounded.
3. Prior to inspecting or servicing the equipment, or before mounting any tools, always make sure the equipment is switched off and the power plug disconnected from the electrical outlet. When installing tools, follow the applicable instructions.
4. Before each use, visually check that all machine parts are in order and intact. Any damaged parts or components must be replaced before using the machine. Pay special attention to the ends of the flexible shaft. The shaft ends must be intact, unwinding of the ends is not allowed. If the end of the flexible shaft is worn, it must be shortened by at least 50mm from the damaged area in the undamaged direction.
5. Never leave the equipment unattended. If the equipment is connected to power supply, the user must remain sufficiently close in order to disconnect the power supply in case of an emergency.
6. While the equipment is in use, hold on to the flexible shaft's protection jacket with both hands.



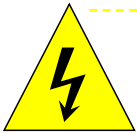
7. Do not touch any tools attached to the flexible shaft immediately after use. They can be hot and cause burns.
8. Make sure the electrical outlet that supplies the equipment with power is connected to a residual current device.
9. Make sure the unit is operated in an environment that is properly ventilated. The equipment heats up during operation and is air-cooled. When working in dusty environments, make sure that the device components do not become excessively dusty. If necessary, clean the equipment using a vacuum cleaner (do not use water). Before cleaning, disconnect the equipment from power supply.

10. Do not use the equipment on materials containing asbestos.



11. Do not touch moving parts.
12. Do not stand on the equipment.
13. Use the foot pedal only with your foot. Never use any heavy objects for keeping the pedal down or operate the pedal with your hand.
14. Do not modify or touch the equipment's electrical connections or frequency converter settings.
15. The flexible shaft can be extended by one joint. Only use Boldan cable extension for the joint.

## 2 INSTRUCTIONS FOR USE



Make sure the equipment is switched off and the power plug disconnected from the electrical outlet before installing any tools (pipe cleaners, grinding tools, etc.) to the end of the flexible shaft.

- Always round the end of the flexible shaft to avoid cuts and to facilitate mounting of the tools onto the shaft.
- Check that the flexible shaft extends out of its jacket only to the length required for tool mounting. Check that the retaining screws on the tool to be mounted have been loosened enough to facilitate tool mounting. Push the flexible shaft as deep into the tool as possible. Tighten all screws. Check the user manual of the tool to be mounted for possible more detailed installation instructions!
- Always check that the mounted tool's direction of rotation is set as required. The natural and common direction of rotation is clockwise (forward), due to the direction of the braiding of the flexible shaft. In case of clockwise rotation, the torque resistance of the flexible shaft is optimal.
- Counter-clockwise (reverse) rotation is intended for temporary use only. Counter-clockwise rotation may cause breaking of the shaft.



**When the equipment is in use:**

When operating the equipment, always use a special vacuum cleaner in the machined pipe in order to remove potentially generated dust.

## 2.1 Preparations and use

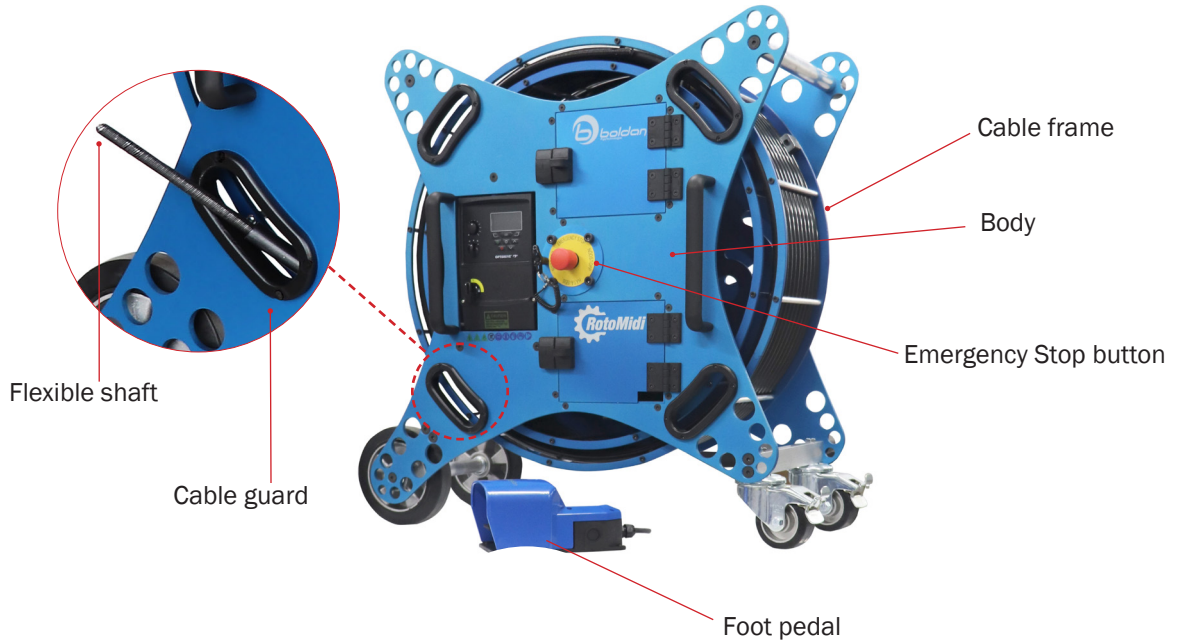
**Warning! This section contains important safety instructions. Failure to comply can be dangerous for the user.**



Check the direction of rotation and RPM of the equipment. Check the direction of rotation setting on the equipment's control panel (forward / reverse). RPM is also controlled from the control panel, using the dedicated rotary switch. To increase RPM, turn the switch clockwise.

1. Insert the tool mounted onto the flexible shaft fully inside the pipe to be machined.
2. If the red Emergency Stop button is depressed, release it.
3. Switch on the equipment's power supply.
4. To start the equipment, press down the foot pedal using your foot. Always hold on to the flexible shaft's protection jacket with both hands while pressing the pedal.
5. Starting the machine facilitates pushing the tool deeper into the pipe. Note that depending on the pipe machined, if the machine is needlessly used at locations other than the exactly required location, the pipe can be damaged.
6. In order to convey optimal force, reel out at least 10m of the flexible shaft from the machine.
7. The machine is equipped with a manual operating switch. If the foot pedal is released, the machine stops. The machine can also be stopped by pushing the red Emergency Stop button, by turning the power switch on the control panel to the "0" position, or by unplugging the machine's power cord.
8. The service life of the flexible shaft's protection jacket can be prolonged by using Boldan cable sleeves on its ends.

2.2 Equipment overview



Control unit information display



When the flexible shaft moves, the equipment's cable frame rotates. Do not touch the cable frame while it is rotating!

### 2.3 Technical specifications

Equipment dimensions (mm)	height 880 mm, depth 480 mm, width 900 mm
Flexible shaft used (mm)	12
Length of flexible shaft (m)	23
Compatible pipe sizes (mm)	DN100-DN300
Rotation speed (rpm)	max. 1,500
Voltage / power (V / kW)	230V / 1.5 kW
Frequency converter	Electronic
Weight (kg, without/with flexible shaft)	56 kg / 78 kg
IP rating	IP44

### 2.4 Applications

The equipment is intended for the following applications:

1. Sewer cleaning and maintenance by milling with suitable tools.
2. Drilling open and grinding of blank resurfaced branch points by suitable tools.
3. Removal of deformed or collapsed liner by suitable tools.
4. Removal of internal pipe deformities (roots, residues, notches, etc.).

When using tools mountable onto the flexible shaft, always comply with the respective instructions of their manufacturers!

### 2.5 Power supply

Make sure the power supply is correct. The electrical current must be suitable for the equipment.

The equipment may only be connected to 230 V mains connected to a 16 A residual current device. The equipment is protected in accordance with the EU standards. The power supply must be grounded. In case of incompatible voltages, the unit's frequency converter may switch off. If this happens repeatedly, use another power supply.

## 2.6 Emergency stop button

The equipment is provided with an Emergency Stop button. Depressing the Emergency Stop button interrupts the power supply to the motor. Prior to replacing flexible shaft tools or servicing the equipment, always make sure the Emergency Stop button is depressed or the power plug disconnected from the electrical outlet.

**ATTENTION!** The Emergency Stop switch does not de-energize the equipment!

## 2.7 Electronic torque switch



The equipment is equipped with an electronic torque limiter that cuts off power supply to the motor if the flexible shaft is subjected to an excessive torque (for example, due to tool getting stuck). This will cause the unit to stop.

If this happens, proceed as follows:

- Remove your foot from the foot pedal.
- While holding the flexible shaft's protection jacket, move the shaft back and forth in the pipe to make sure that the tool at the end of the shaft has not become stuck.
- Depress the foot pedal again.
- If the problem recurs, use a sewer camera to identify the possible cause of the problem inside the sewer.

## 2.8 Foot pedal

The equipment is provided with a foot pedal. The equipment can only be started using the pedal. Depress the foot pedal to start the equipment and release the pedal to stop it.

### 3 TROUBLESHOOTING

The frequency converter used for motor control is provided with a display for monitoring equipment operation. If the power is on and the equipment is in standby mode, “Stop” is displayed.

After starting the equipment, the display shows motor operation-related parameters, namely:

- output frequency (Hz)
- motor current (Amp)
- motor power (kW)
- rotation speed (rpm)


While equipment is in use, the parameters can be scrolled by pressing the navigation button repeatedly (<1s).


#### Navigation button



NOTE! Do not press any other buttons than those specified in this Manual. Pressing other buttons can change equipment parameters and damage the equipment.

The most common fault codes are explained in the table. If any other code is displayed and the equipment cannot be operated, write the code down and contact your dealer.

Fault code	Description	Remedy
no-Flt	No Fault	No action required.
O1-b	Brake channel over current	Check the condition and connections of external brake resistor (not in use).
OL-br	Brake resistor overload	Frequency converter has prevented brake resistor damage.
O-1	Output over current	A sudden voltage peak at frequency converter output. The motor is overloaded. NOTE: The fault cannot be reset immediately, since the frequency converter is equipped with a guard timer. Wait for a while and attempt resetting the frequency converter by depressing the “Reset” button. 
1_t-trP	Motor thermal overload	The frequency converter has stopped the motor because the current supplied to the motor has exceeded the parametrized limit value. This protects the motor. Wait for a while and check that the motor is not overloaded.
PS-trP	Power stage trip	Check the motor and the connection cable for short circuit.
O-volt	Over voltage on DC bus	Make sure the supply voltage is within the frequency converter’s limits (200 - 240 V).

U-volt	Under voltage on DC bus	The equipment's input current is too low. The fault code is displayed every time the equipment is disconnected from the power supply. If the fault occurs during use, make sure that the supply voltage is within the established limits (200 - 240 V) and check the components used for power supply.
O-t	Heatsink over temperature	The frequency converter is too hot. Check that the unit is not used at excessive temperatures; if necessary, enhance cooling of the surrounding area.
U-t	Under temperature	The fault occurs if the equipment is below -10°C. For the equipment to start, the ambient temperature must be higher than -10°C.
P-dEF	Factory Default parameters loaded	The frequency converter's parameters have been reset to factory settings. Contact your dealer. <b>DO NOT USE THE EQUIPMENT! OTHERWISE THE MOTOR OR FREQUENCY CONVERTER MAY BE DESTROYED!</b>
E-triP	External trip	A normally closed contact is open. If the motor is provided with thermal protection, check that the motor is not overheated.
SC-ObS	Optibus comms loss	Not in use.
FLt-dc	DC bus ripple too high	Check input current phases.
P-LOSS	Input phase loss trip	Check power supply phases.
h 0-1	Output over current	Check motor and connection cable connections for short circuit. NOTE: The fault cannot be reset immediately, since the frequency converter is equipped with a guard timer. Wait for a while and attempt resetting the frequency converter by depressing the "Reset" button. 
th-Flt	Faulty thermistor on heatsink	Contact your dealer.
dAtA-F	Internal memory fault	Push the Stop button. If the fault is not cleared, contact your dealer.
4-20 F	4-20mA Signal lost	Check analogue input connections.
dAtA-E	Internal memory fault	Push the Stop button. If the fault is not cleared, contact your dealer.
F-Ptc	Motor PTC thermistor trip	Overheating of connected motor thermal protection. Check cables and connections.
O-hEAT	Drive internal temperature too high	The frequency converter is too hot. Check that the unit is not used at excessive temperatures; if necessary, enhance cooling of the surrounding area.
OuT-F	Output Fault	A motor phase may be lost. Check the motor and cables.

Fault matrix	
The equipment's control unit does not light up or the equipment cannot be switched on.	Check that the Emergency Stop button is not pressed down and that the electrical outlet to which the equipment is connected is energized. In case of equipment power failure during use, the equipment must be reset by pressing the Emergency Stop button down and lifting it up. Reset the equipment as follows: 1. Release the foot pedal. 2. Turn the power switch to "1". 3. Set the direction of rotation selector to the middle position. 4. Depress and release the Emergency Stop button.
The control panel lights up, but the equipment does not start.	Make sure "FWD" or "REV" has been set as the direction of rotation. The "PWR" switch must be in the "ON" position and the RPM control set approximately to the 9 o'clock position. Also, check possible fault codes from the table on page 12.
The above steps have been taken but the equipment does not start.	Make sure that the equipment's flexible shaft or the tool at its end are not stuck in a pipe rupture, for example, and that about 10m of the flexible shaft have been reeled out of the equipment.
The control panel lights up and the motor starts, but the flexible shaft does not rotate.	Check flexible shaft attachment to the cable fastener.
The flexible shaft rotates, but the tool at its end does not.	Check tool attachment to the flexible shaft.
The flexible shaft's jacket heats up intensively.	Replace the flexible shaft. The reason is lack of lubricating oil between the flexible shaft and its protection jacket.
The flexible shaft rotates only for a moment and stops.	Fully extract the flexible shaft from the pipe and make sure that nothing in the pipe prevents the shaft or the tool at its end from rotating. The equipment's control unit is equipped with an electronic protection switch preventing shaft rotation in case of excessive resistance. This is to protect the shaft from breaking down.
The equipment does not operate despite the above mentioned steps.	Contact your local dealer.

**EY-VAATIMUSTENMUKAISUUSVAKUUTUS**

**EC DECLARATION OF CONFORMITY**



Valmistajan toiminimi ja osoite:

**Boldan Oy**  
**Matkuntie 3**  
**FI-05200 Rajamäki**

Name and address of the manufacturer:

Henkilön nimi ja osoite, joka on valtuutettu kokoamaan teknisen eritelmän:

**Joni Tukiainen**  
**Boldan Oy**  
**Matkuntie 3**  
**FI-05200 Rajamäki**

Name and address of the person authorized to compile the technical file :

Vakuutamme, että tuote:

**Grinding Machine RotoMidi**  
**20XX-XXX**

We declare that product:

täyttää seuraavien direktiivien vaatimukset:

<b>Machinery Directive</b>	<b>2006/42/EC</b>
<b>EMC Directive</b>	<b>2014/30/EU</b>
<b>Eco-Design Directive</b>	<b>2009/125/EC</b>
<b>RoHS Directive</b>	<b>2011/65/ EU</b>

meets the provisions for the following directives:

Ja lisäksi vakuutamme, että seuraavia eurooppalaisia yhdenmukaistettuja standardeja on sovellettu:

**SFS-EN ISO 12100:1010, SFS-EN 60204-1:2006/AC:1010**  
**EN 60947-5-1:2004+A1 :2009+AC:2004+AC:1005/2017**  
**EN 61800-5-1:2007, EN 61800-3:2004+A1:2012, EN 60034-1,-2-1,-5 ... -9,-11,-12,-14,-30**  
**EN 61000-6-3:2001+A1:2011, EN 61000-3-2:2014, EN 61000-3-3:2013, EN 61000-6-1:2007**

And furthermore, we declare that the following European harmonized standards have been used:

Aika ja paikka:

**Rajamäki**

Place and date:

Allekirjoitus:

**Boldan Oy 1.6.2022**

Signature:



**Saira Kallio, CEO**