JEI DRILLING AND CUTTING SOLUTIONS

# OPERATOR'S MANUAL

# Rail Bull

## WELDING CARRIAGE

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# Contents

# 1. GENERAL INFORMATION

## 1.1. Application

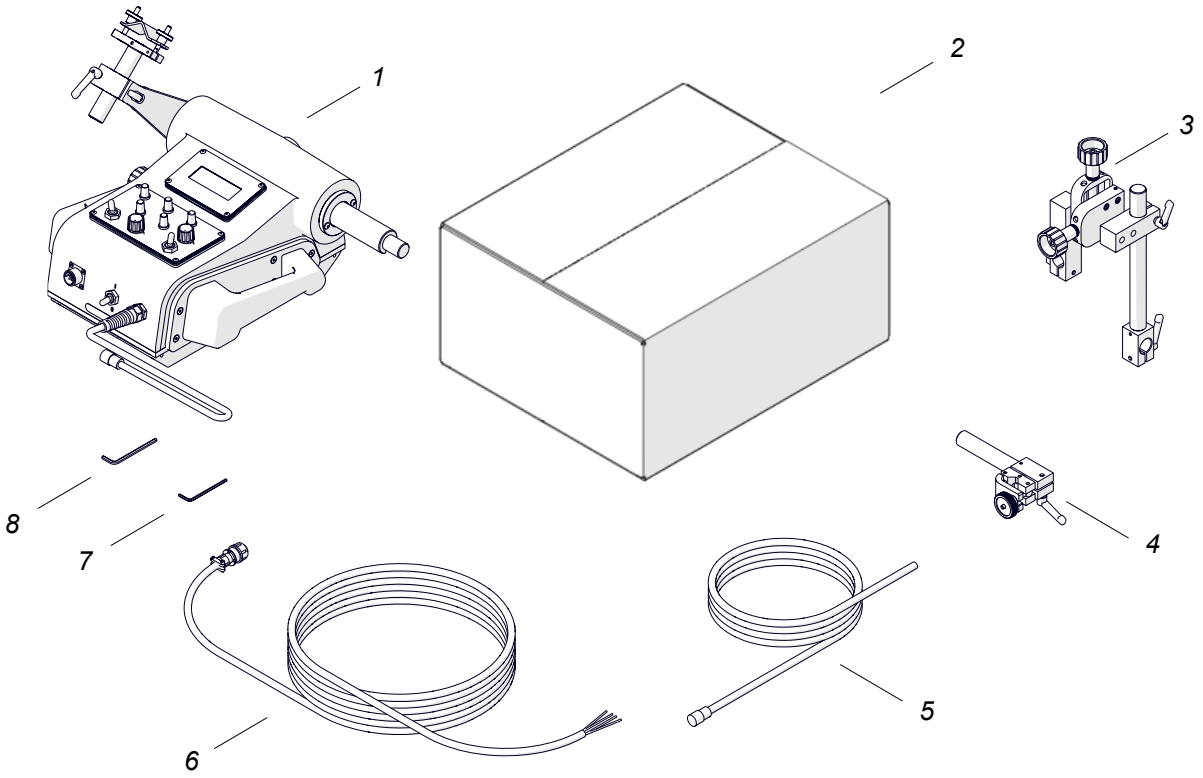
The Rail Bull carriage is designed to weld butt and fillet joints with or without oscillation by using MIG/MAG torches. The track is fixed by using magnetic units to ferromagnetic surfaces that are flat or curved.

Accessories allow using torches with a larger diameter and guiding the carriage on a semi-flex or rigid track. Using a vacuum track system allows the track to be clamped to surfaces that are non-ferromagnetic.

## 1.2. Technical data

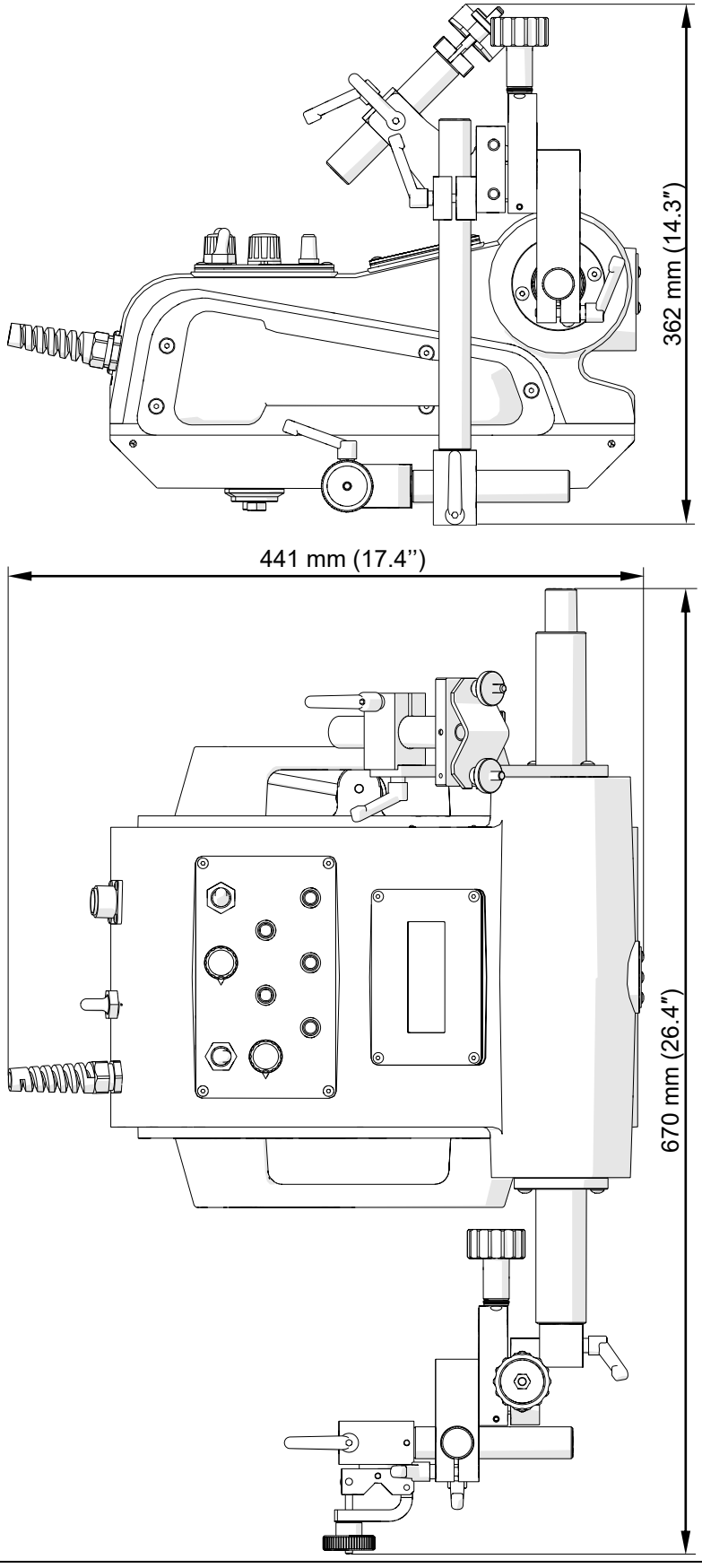
| | | |
|---|---|---|
| Voltage | | 1~ 115–230 V, 50–60 Hz<br>1~ 42 V, 50–60 Hz (60 V DC) |
| Power | | 100 W |
| Welding position (according to EN ISO 6947 and AWS/ASME) | Horizontal | PA/1F/1G<br>PB/2F<br>PC/2G<br>PD/4F<br>PE/4G |
| | Vertical | PF/3G<br>PG/3F (contact your dealer)<br>PG/3G |
| Minimum curve radius of a semi-flex track | | 5 m (16 ft) |
| Torch type | | MIG/MAG |
| Torch diameter | | 16–22 mm (0.63–0.87″) |
| Minimum workpiece thickness for magnetic clamping | | 5 mm (0.2″) |
| Horizontal pulling force | | 350 N |
| Vertical pulling force | | 150 N |
| Cross slide adjustment range | | 0–35 mm (0–1.38″, up-down, left-right) |
| Horizontal speed | | 0–120 cm/min (0–47.2 in/min) |
| Vertical speed | | 0–110 cm/min (0–43.3 in/min) |
| Oscillation type | | Linear |
| Oscillation path | | Trapezoid, straight line |
| Oscillator arm stroke | | 0–100 mm (0–3.9″) |
| Oscillation width | | 0–50 mm (0–1.9″) |
| Oscillation speed | | 0–1500 mm/min (0–59 in/min) |
| Oscillation dwell time at center and on ends | | 0–5 s |
| Maximum oscillator pulling force | | 100 N |
| Maximum allowed ambient temperature | | 50°C (122°F) |
| Maximum allowed ambient humidity | | 85% |
| Weight | | 20 kg (44 lbs) |

## 1.3. Equipment included

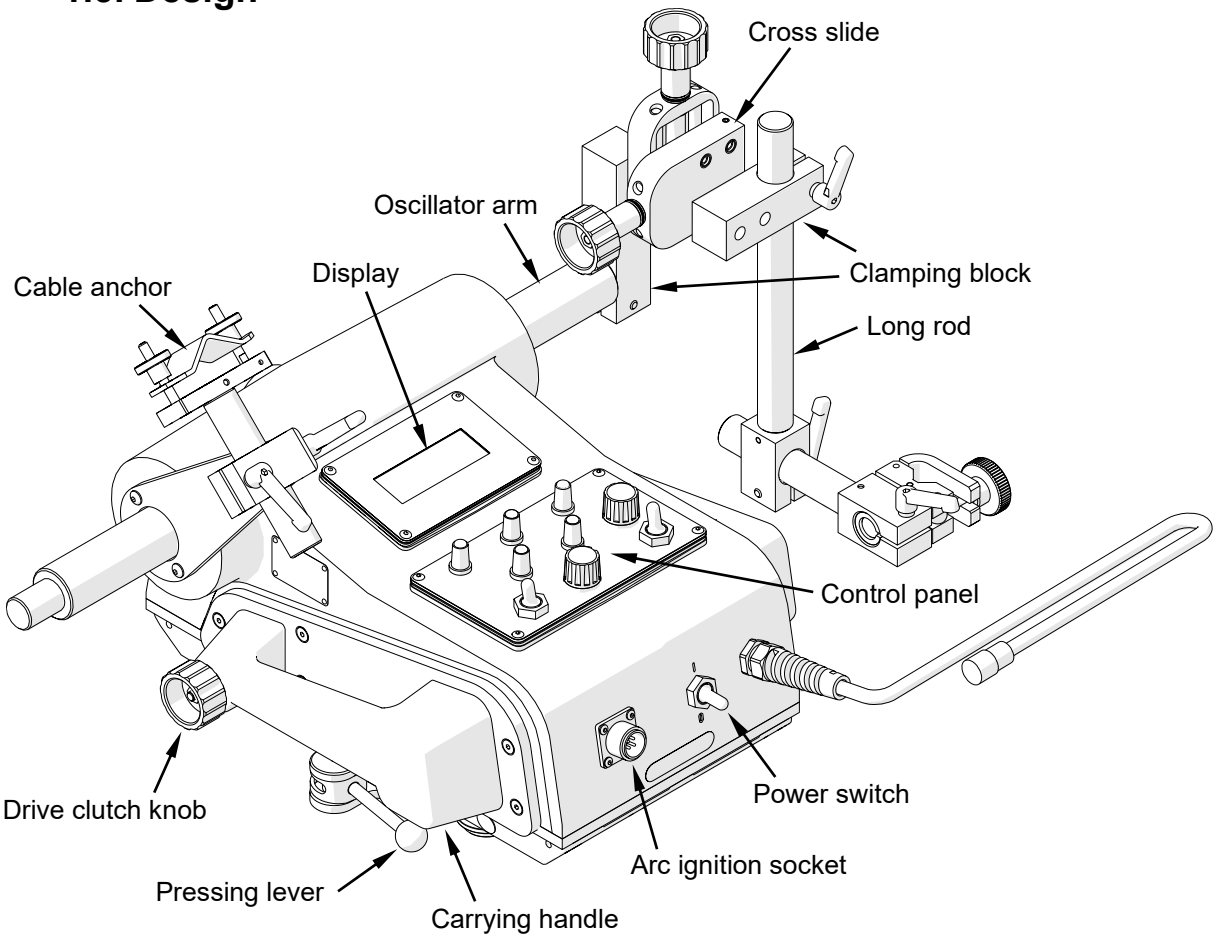


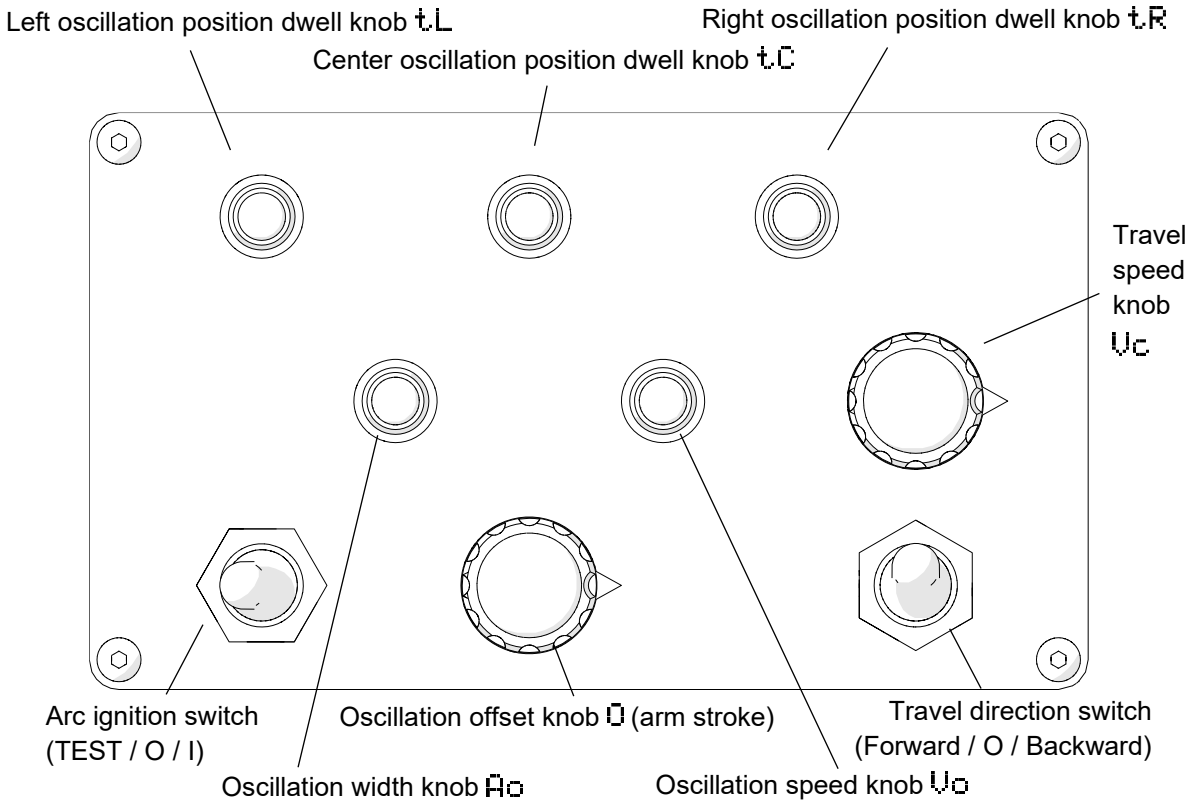

| | | |
|---|---|---|
| 1 | Carriage | 1 unit |
| 2 | Carton box | 1 unit |
| 3 | Cross slide assembly | 1 unit |
| 4 | Short rod torch holder with clamp | 1 unit |
| 5 | 3 m (10 ft) power cord | 1 unit |
| 6 | 6.5 m (21 ft) arc ignition cable | 1 unit |
| 7 | 3 mm hex wrench | 1 unit |
| 8 | 4 mm hex wrench | 1 unit |
| – | Operator’s Manual | 1 unit |

## 1.4. Dimensions



## 1.5. Design



# 2. SAFETY PRECAUTIONS

1. Before use read this Operator's Manual and complete training in occupational safety and health.
2. Use only in applications specified in this Operator's Manual.
3. Make sure that the carriage has all parts and they are genuine and not damaged.
4. Make sure that the specifications of the power source are the same as those specified on the rating plate.
5. Connect the carriage to a correctly grounded power source.
6. Do not carry the carriage by the cables and do not pull them. This can cause damage and electric shock.
7. Keep untrained bystanders away from the carriage.
8. Before each use, ensure the correct condition of the carriage, power source, cables, plugs, control panel, rollers, and gear.
9. Before each use, make sure that no part is cracked or loose. Make sure to maintain correct conditions that can have an effect on the operation of the carriage.
10. Keep the carriage dry. Do not expose the carriage to rain, snow, or frost.
11. Keep the work area well lit, clean, and free of obstacles.
12. Do not use near flammable materials, or in explosive environments.
13. Transport and position the carriage by using the carrying handles.
14. Install the carriage only on the supplied track.
15. Make sure that the gear and rollers are clean.
16. Connect the cables only after you set the power switch to 'O'.
17. Keep the sockets clean. Do not use high pressure during cleaning.
18. Install only torches whose diameter matches the diameter of the torch holder.
19. Hang the cables to decrease the load applied on the carriage.
20. Do not bend the semi-flex track to a radius less than 5 m (16 ft).
21. Use the rigid track only on flat surfaces.
22. At heights, protect the carriage and the track from falling. To do this, use chains (not included) to attach the leftmost and the rightmost magnetic unit of the track to a stable structure. To protect the carriage, attach a chain to a carrying handle. Make sure that the chains are not loose.
23. Do not stay below the carriage or the track that is put at heights.

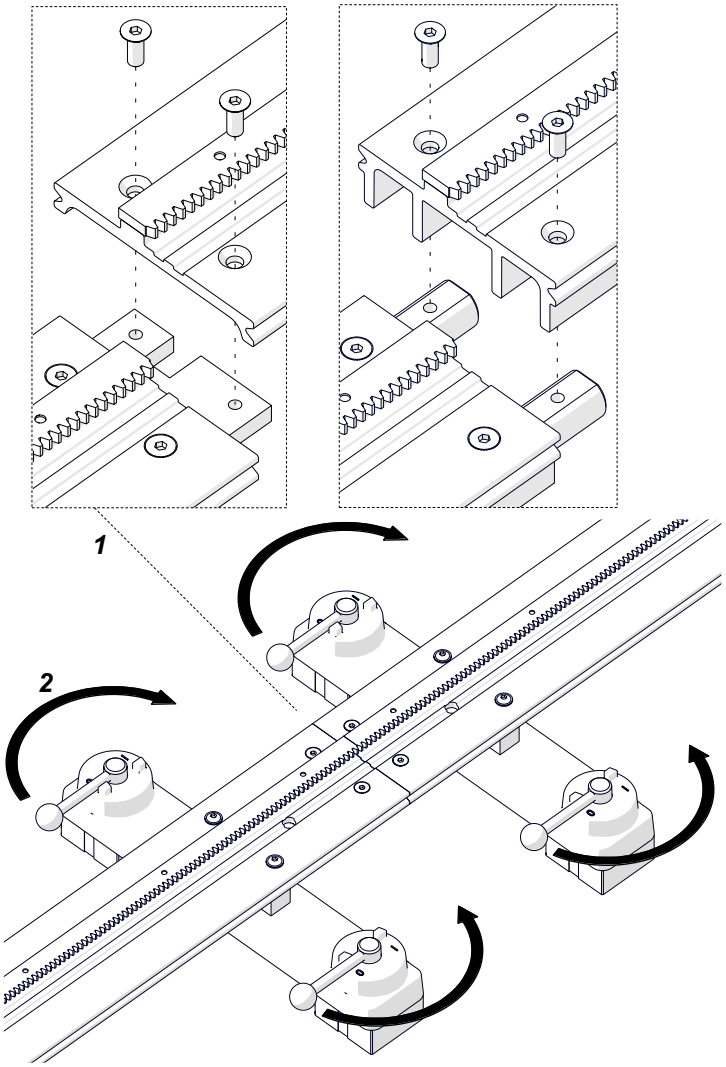
24. Use eye protection (helmet, shield, and screen), ear protection, gloves, and protective clothing. Do not wear loose clothing.
25. Do not stop the carriage by hand. To stop, set the travel direction switch to ‘O’.
26. Do the maintenance only after you unplug the carriage from the power source.
27. Repair only in a service center appointed by the seller.
28. If the carriage falls, is wet, or has any damage, stop the work and immediately send the carriage to the service center for check and repair.
29. Do not leave the carriage unattended during work.
30. If you are not going to use the carriage, remove it from the work area and keep in a safe and dry place.

# 3. STARTUP AND OPERATION

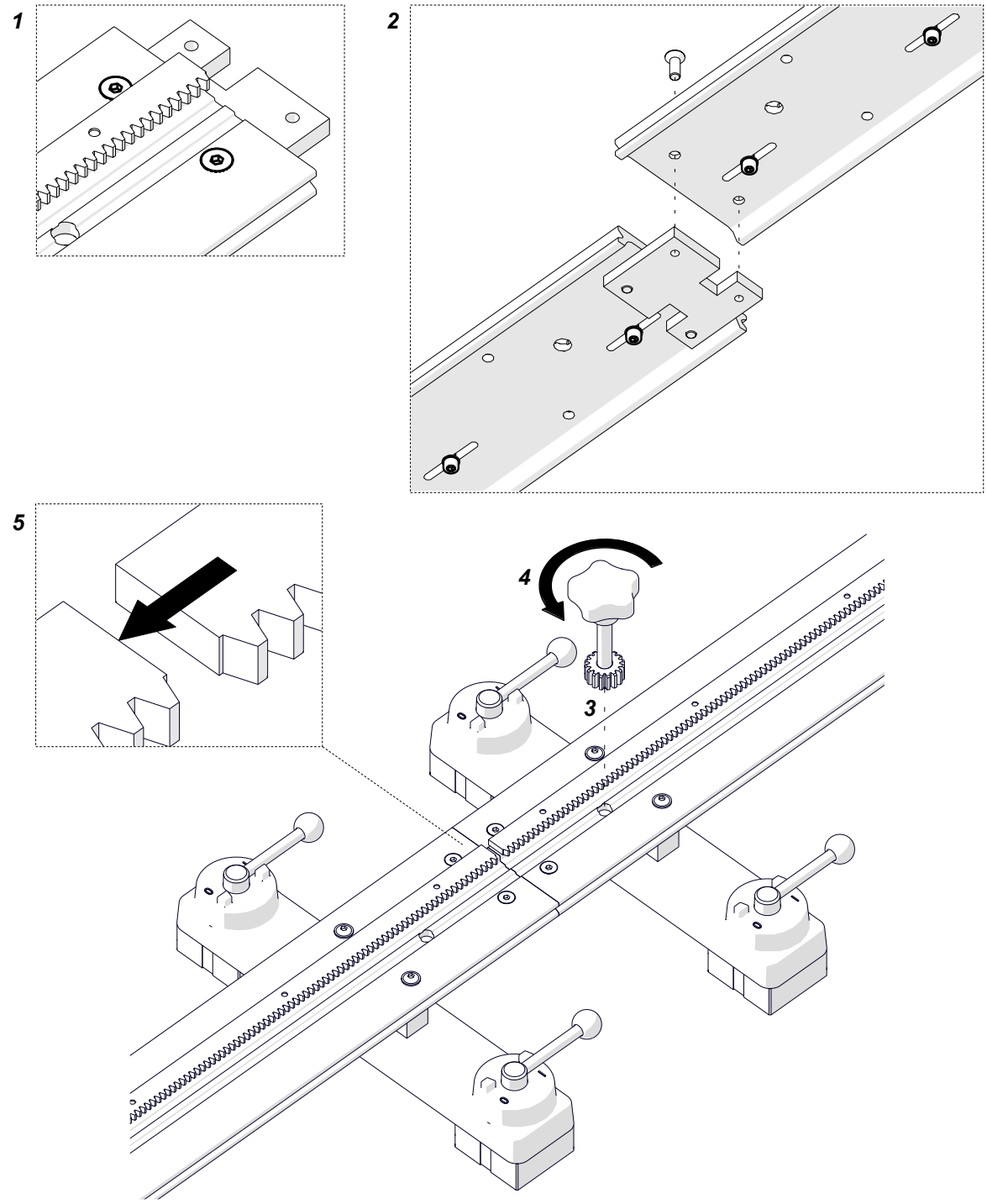
## 3.1. Assembling the track

Attach magnetic units to the rail and put it on the workpiece. Use the 4 mm hex wrench to attach more rails (*1*). Then, set the levers of the magnetic units to 'I' (*2*). This will clamp the rails to the surface.

When working in PC/2G welding position, put the rails so that the teeth of the racks point down.

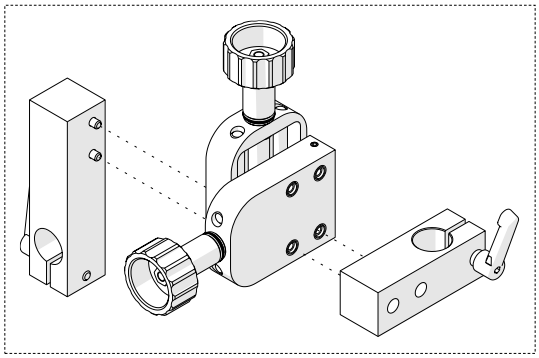


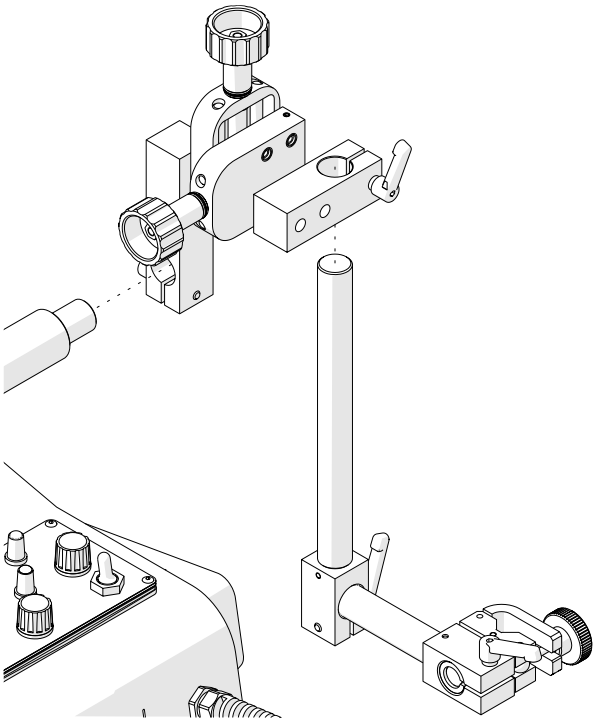

If a semi-flex rail is put on a curve, before you attach more rails use the 4 mm hex wrench to loosen the screws of the connecting plates (*1*) and of the racks (*2*). Next, attach the rails, clamp them with levers, and then tighten the connecting plates. Put the rack adjustment tool (not included) into the hole (*3*) and turn the tool to the left (*4*) to remove the gap (*5*) between the racks. Then, tighten the leftmost screw and the rightmost screw of each rack (*2*).



## 3.2. Assembling the holder

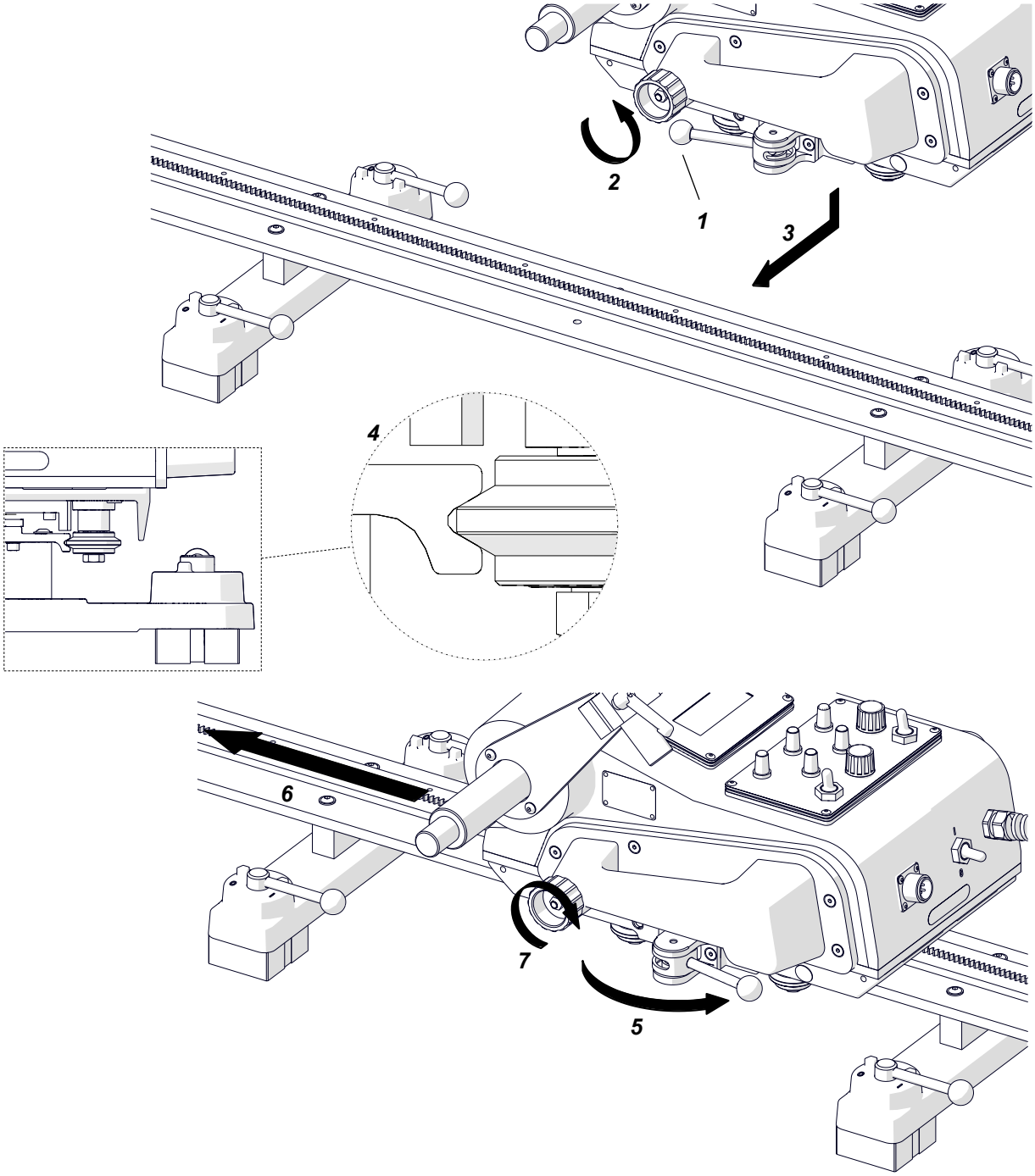
Use the 4 mm hex wrench to attach the clamping blocks to the cross slide with four M5x20 screws as shown. The parts shown can be assembled in many ways to form different configurations. However, note that the oscillator moves in and out during startup. Thus, to allow correct startup, install the torch holder and the cross slide so that they will not collide with the carriage side or obstacles.





## 3.3. Positioning

Set the power switch, arc ignition switch, and travel direction switch to ‘O’. Next, set the lever to OFF (*1*), and then loosen the knob (*2*) fully. Then, put the carriage onto the track (*3*) so that the back rollers are in the groove (*4*).



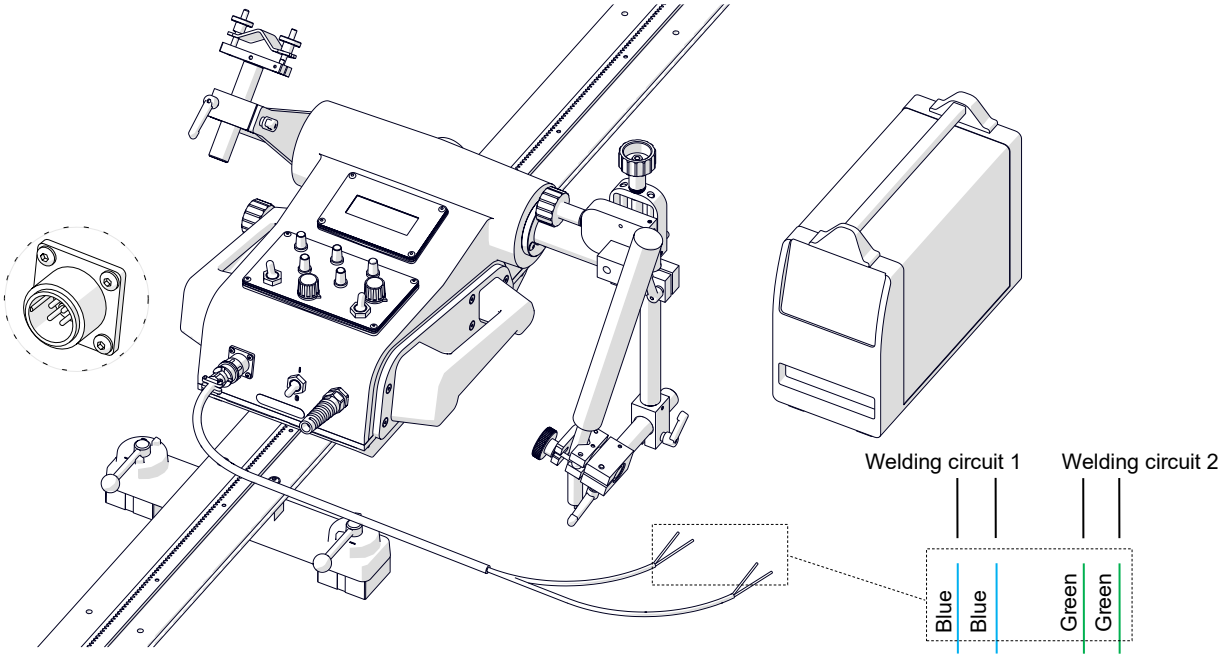
Set the lever to ON (*5*) to press the front rollers to the track. Move the carriage to the required position (*6*) and fully tighten the knob (*7*) to engage the gear of the carriage with the rack of the rail. Then, loosen the knob by 1/4 rotation.

At heights, protect the carriage and the track from falling. To do this, use chains (not included) to attach the leftmost and the rightmost magnetic unit of the semi-flex or rigid track to a stable structure. To protect the carriage, attach a chain to a carrying handle. Make sure that the chains are not loose.

Connect the carriage to the power source. Then, put the torch and torch cables into the holders.

## 3.4. Connecting to the welding circuits

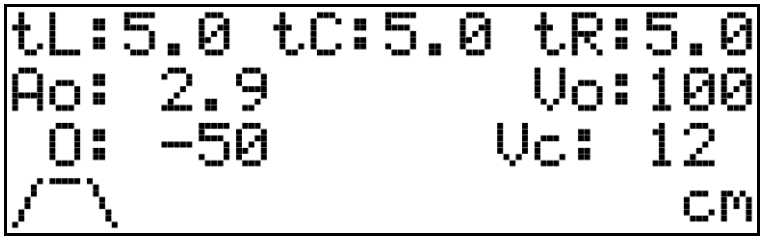
The carriage can control two torches by using the arc ignition cable plugged into the arc ignition socket. To do this, refer to the diagram and connect one blue-jacketed wire to one terminal of the welding circuit. Then, connect the other blue-jacketed wire to the other terminal of the same circuit. To control the second torch, connect the green-jacketed wires to the terminals of the second welding circuit.




Make sure that the arc ignition cable is connected correctly. To do this, turn on the power of the carriage, and then set the arc ignition switch to TEST. This should enable the arc for a while.

## 3.5. Operating

Set the power switch to ‘I’ to turn on the carriage. If ERROR #1 shows on the display, set the travel direction switch to ‘O’. Then, use the knobs on the control panel to set the required process parameters (Tab. 1). Right rotation increases the value of the parameter. Left rotation decreases the value.




| Parameter | Value | Description |
|---|---|---|
| tL | 0–5 s<br>[step: 0.1] | Dwell time in left position of the oscillation. |
| tC | 0–5 s<br>[step: 0.1] | Dwell time in center position of the oscillation. |
| tR | 0–5 s<br>[step: 0.1] | Dwell time in right position of the oscillation. |
| Ao | 0–5 cm<br>0–2 in<br>[step: 0.1 cm/0.02 in] | Oscillation width. Set 0 to weld without oscillation. |
| Vo | 0–100%<br>[step: 1%] | Relative oscillation speed. |
| O | –100% to 100%<br>[step 1%] | Oscillation offset. If Ao exceeds the value of the parameter O, the parameter O is calculated again automatically. |
| Vc | 0<br>5–140 cm/min<br>2–55 in/min | Carriage speed. Setting to 0 during travel stops the main motor. Then, the oscillator goes into the test mode to allow for correct selection of the width and speed of the oscillation (Ao, Vo). |
| Welding path | (trapezoid)<br>(straight line) | Trapezoid is default. To weld along a straight line, set Ao to 0. |
| Unit | cm<br>in | Unit set by the jumper cap (point 3.6). |

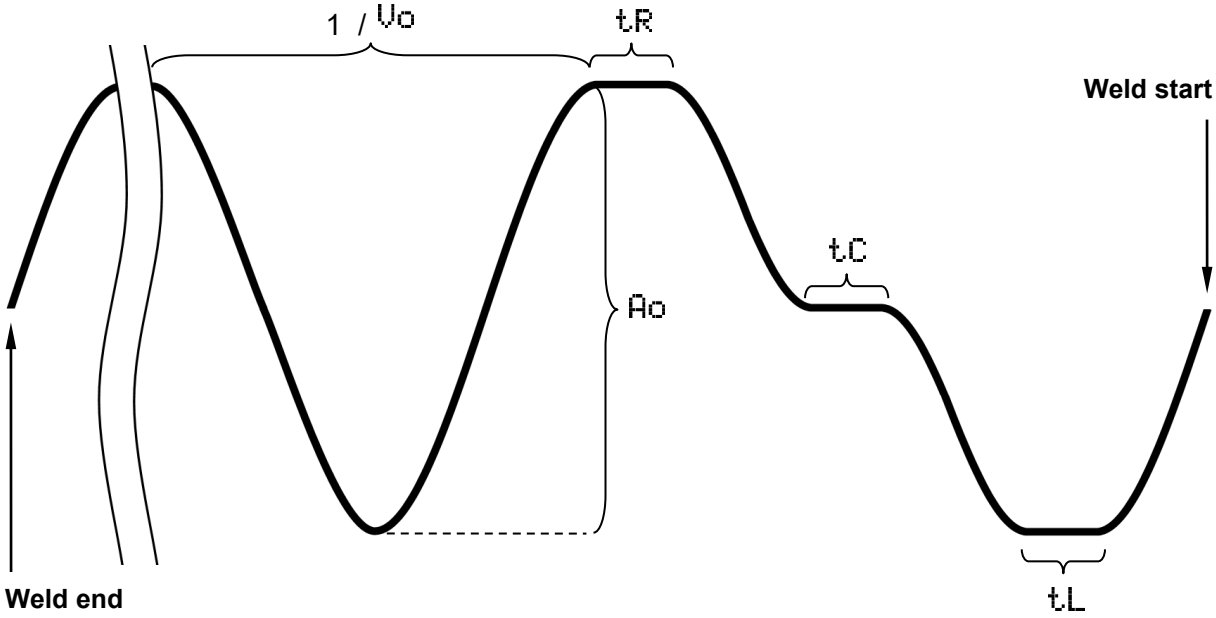
**Tab. 1.** Configuration parameters

To control the torch through the carriage, set the arc ignition switch to ‘I’.

**If the arc ignition switch is set to ‘I’, the torch starts welding immediately after you select a travel direction.**

Use the travel direction switch to select the direction of travel. Then, the travel starts with the parameters shown on the display. You can adjust the parameters with the knobs at any time.

The produced welds have a shape similar to that shown in the figure.

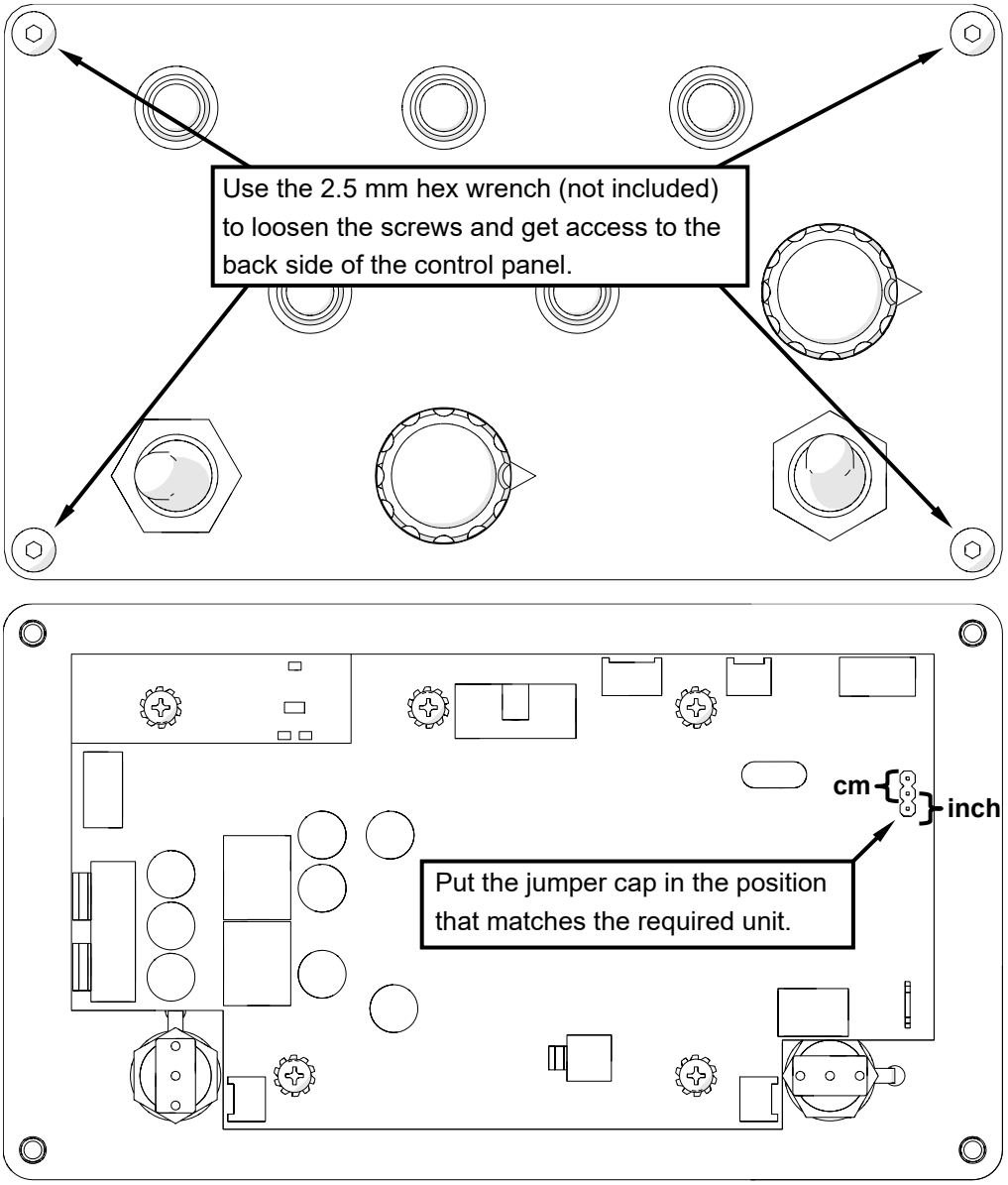



To stop the travel and save the values shown on the display, set the travel direction switch to ‘O’.

After the work is finished, use the power switch to turn off the carriage. Then, unplug the carriage from the power source.

## 3.6. Changing the unit of measure

To change the unit of measure between centimeters and inches, unplug the carriage from the power source and follow the steps shown in the figure.




When the jumper cap connects the top and center pin, the measurement system will be metric after restart. When the jumper cap connects the center and bottom pin, the system will be imperial.

## 3.7. Troubleshooting

| Message | Problem | Solution |
|---|---|---|
| ERROR #1 | Travel direction switch not set to ‘O’ when powering. | Set the travel direction switch to ‘O’. |
| ERROR #2 | Malfunction of the direction switch wire set or the controller. | Contact service center for check and repair. |
| ERROR #3 | Power not supplied to the main motor or malfunction of the main motor encoder. | Contact service center for check and repair. |
| ERROR #4 | Oscillator move blocked or power not supplied to the oscillator motor. | Remove obstacles that block the oscillator. If this message still shows, contact service center for check and repair. |
| ERROR #5 | Malfunction of the oscillator motor encoder or the controller. | Contact service center for check and repair. |
| ERROR #6 | Malfunction of the oscillator sensor. | Contact service center for check and repair. |
| ERROR #7 | Malfunction of the encoder board. | Contact service center for check and repair. |

# 4. MAINTENANCE

**Each day:**

1. Clean the gear of the carriage and the rack of each rail.
2. Clean the rollers. Make sure that the rollers turn freely.
3. Clean the torch nozzle and replace if damaged.

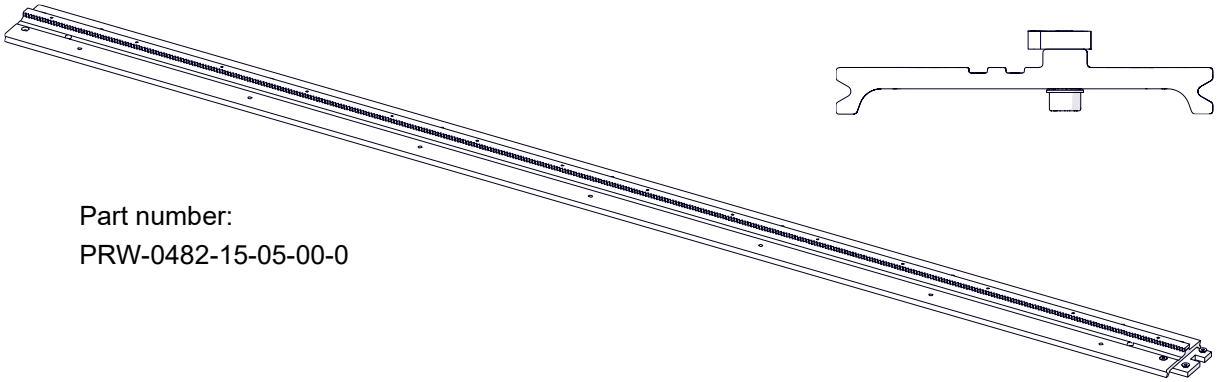
**Each month:**

1. Make sure that the knobs and the switches work as intended. Replace if they are loose or damaged.
2. Examine cables and replace if damaged.
3. Tighten screws if loose.

# 5. ACCESSORIES

## 5.1. Semi-flex track

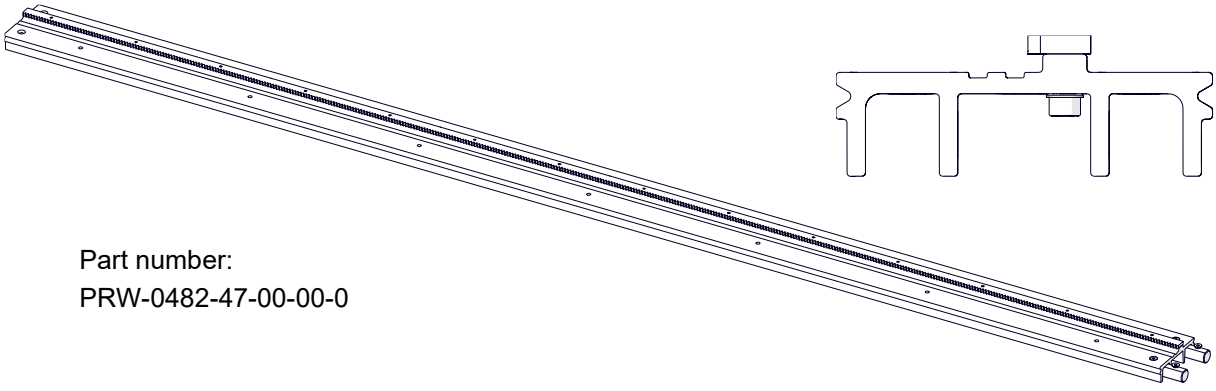
Allows guiding the carriage along a curve. The length of a single rail is 2 m (6.5 ft). The minimum bend radius is 5 m (16.5 ft).



Part number:
PRW-0482-15-05-00-0

## 5.2. Rigid track

Allows guiding the carriage along a straight line. The length of a single rail is 2 m (6.5 ft).

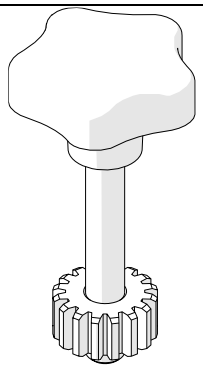


Part number:
PRW-0482-47-00-00-0

## 5.3. Rack adjustment tool

Removes the clearance between the racks of two semi-flex rails that are put on a curve.

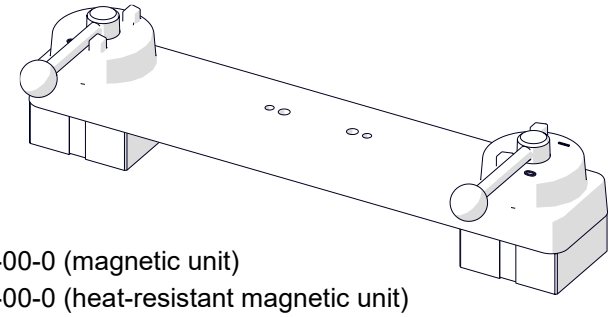
Part number:
PKT-0341-13-00-00-0



## 5.4. Magnetic units

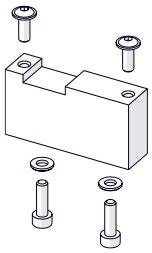
### 5.4.1. Magnetic unit

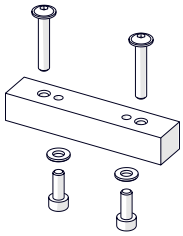
Allows clamping a semi-flex or rigid track to ferromagnetic surfaces.



Part number:
ZSP-0475-92-00-00-0 (magnetic unit)
ZSP-0475-93-00-00-0 (heat-resistant magnetic unit)

Part number (bracket for semi-flex track):
DYS-0482-19-00-00-0

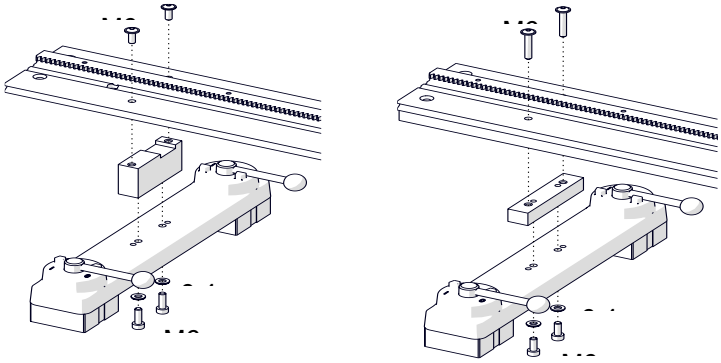




Part number (bracket for rigid track):
DYS-0482-21-00-00-0

| Holding force on a 5 mm (0.2″) thick surface | Temperature | |
|---|---|---|
| | Magnetic unit | Heat-resistant magnetic unit |
| 100% (1200 N) | 20°C (68°F) | 20°C (68°F) |
| 75% (900 N) | 80°C (176°F) | 160°C (320°F) |
| 50% (600 N) | 120°C (248°F) | 200°C (392°F) |

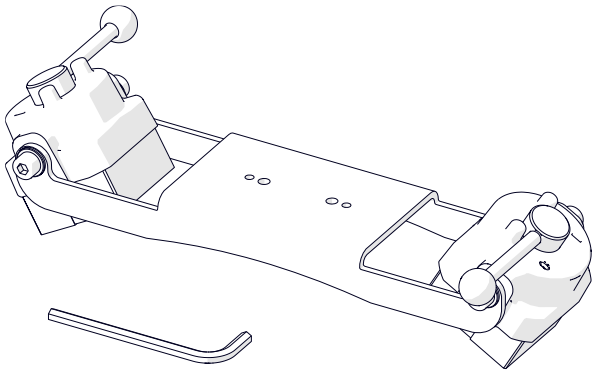
Use the 4 mm hex wrench to attach the unit to the tracks as shown.



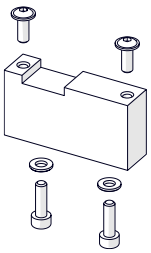
### 5.4.2. Pivoting magnetic unit

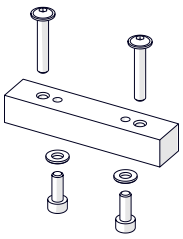
Allows clamping a semi-flex or rigid track to ferromagnetic surfaces that are concave or convex, to pipes with outer diameters of at least 800 mm (31.5″), and to surfaces that differ in height up to 80 mm (3.1″).

Part number:
ZSP-0475-85-00-00-0

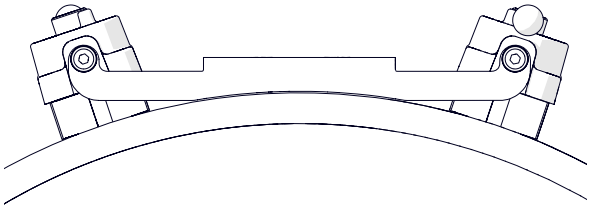


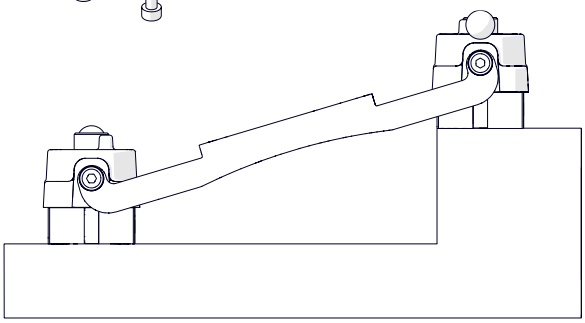
Part number (bracket for semi-flex track):
DYS-0482-19-00-00-0





Part number (bracket for rigid track):
DYS-0482-21-00-00-0





| Holding force on a 5 mm (0.2″) thick surface | Temperature |
|---|---|
| 100% (1200 N) | 20°C (68°F) |
| 75% (900 N) | 80°C (176°F) |

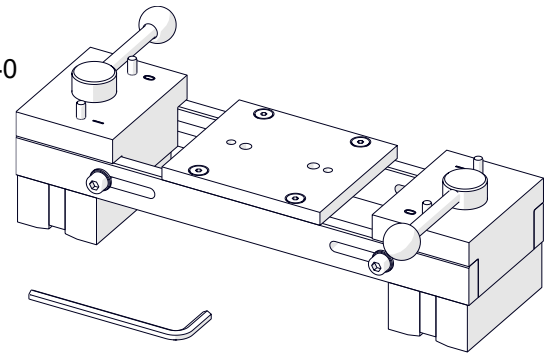
| | |
|---|---|
| 50% (600 N) | 120°C (248°F) |

Install the unit in the same way as the magnetic unit is installed. To adjust the angle, use the 6 mm hex wrench and loosen four side screws.

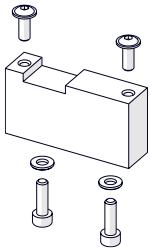
### 5.4.3. Spacing-adjustable magnetic unit

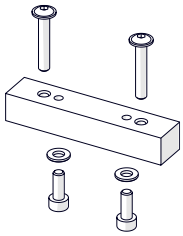
Allows clamping a semi-flex track or rigid track to two ferromagnetic pipes with diameters of 25–230 mm (1–9″) and with distance between pipe axes of 170–230 mm (6.7–9.1″).

Part number:
ZSP-0523-19-00-00-0

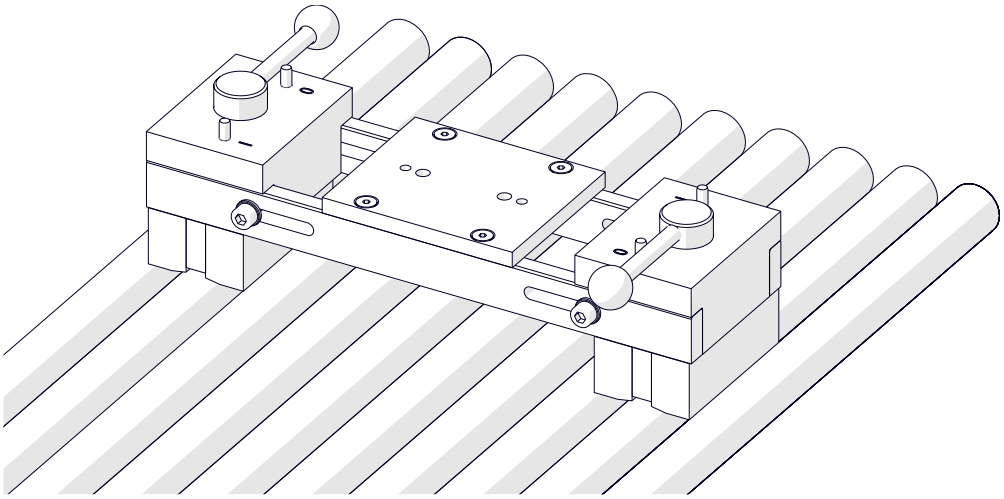


Part number (bracket for semi-flex track):
DYS-0482-19-00-00-0





Part number (bracket for rigid track):
DYS-0482-21-00-00-0



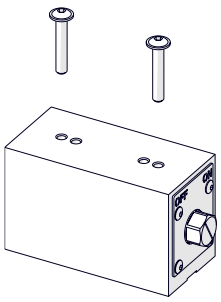
| Holding force on a 5 mm (0.2″) thick surface | Temperature |
|---|---|
| 100% (1200 N) | 20°C (68°F) |
| 75% (900 N) | 80°C (176°F) |
| 50% (600 N) | 120°C (248°F) |

Install the unit in the same way as the magnetic unit is installed. To adjust the spacing, use the 5 mm hex wrench and loosen four side screws.

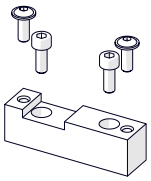
### 5.4.4. Narrow magnetic unit

Allows clamping a semi-flex track or rigid track to ferromagnetic surfaces.

Part number:
PDS-0582-10-00-02-0

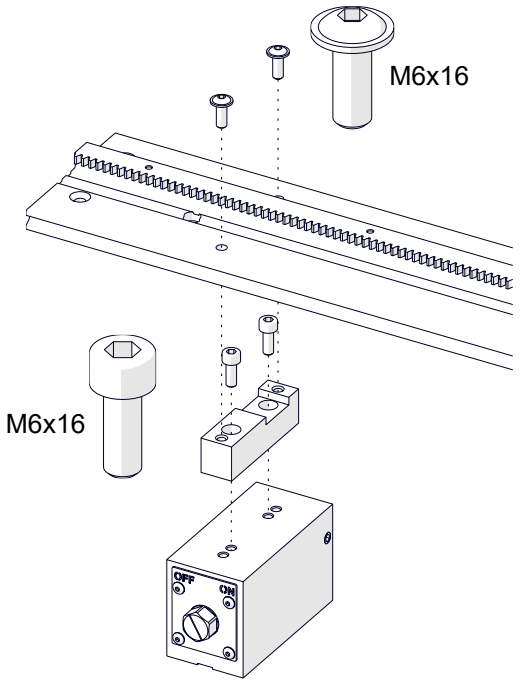


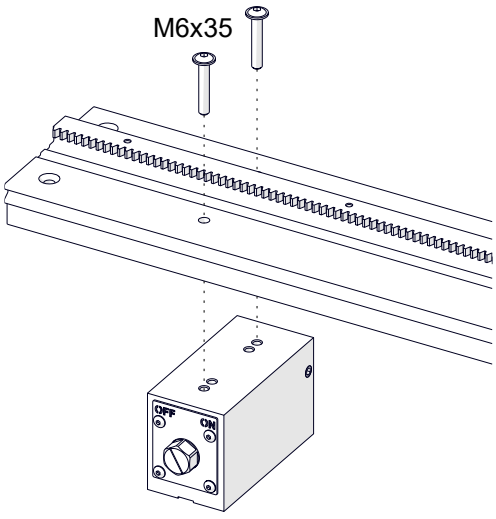

Part number
(bracket for semi-flex track):
DYS-0582-10-00-00-0



| Holding force on a 5 mm (0.2″) thick surface | Temperature |
|---|---|
| 100% (1000 N) | 20°C (68°F) |
| 75% (750 N) | 80°C (176°F) |
| 50% (500 N) | 120°C (248°F) |

Use the 4 mm hex wrench to attach the unit to the tracks as shown.



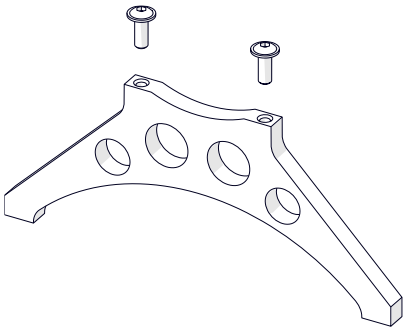



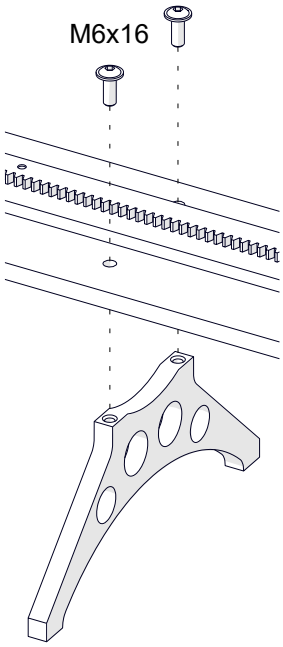

To clamp the unit to the surface, use the 17 mm flat wrench (not included) and set the side screw to ON.

## 5.1. Semi-flex track support

Allows supporting a semi-flex track by using the support instead of a magnetic unit or narrow magnetic unit. Use the 4 mm hex wrench to attach the support.

Part number:
WSP-0523-12-01-00-1

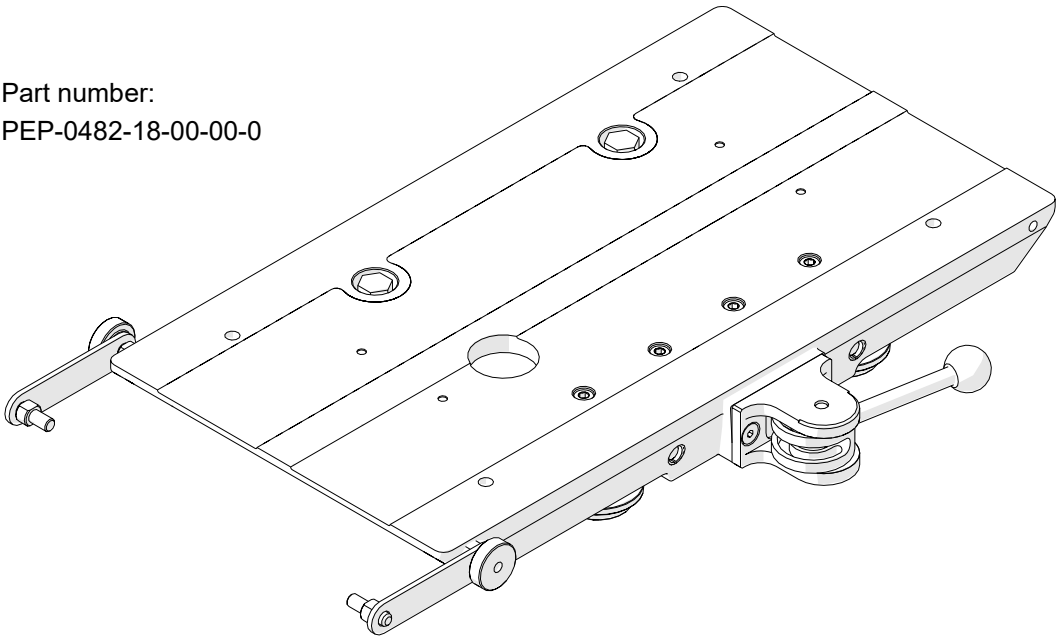





## 5.2. Transport attachment

Allows transporting the wire feeder.

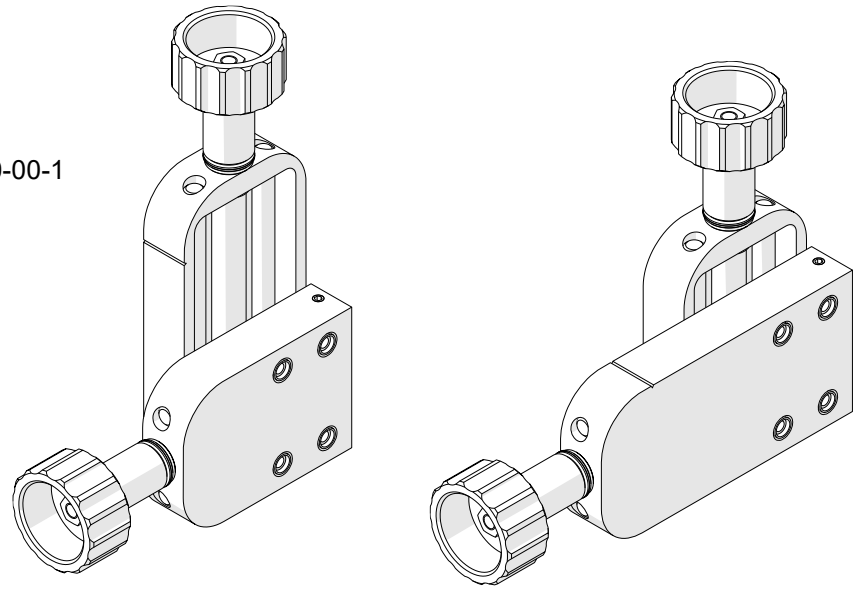
Part number:
PEP-0482-18-00-00-0



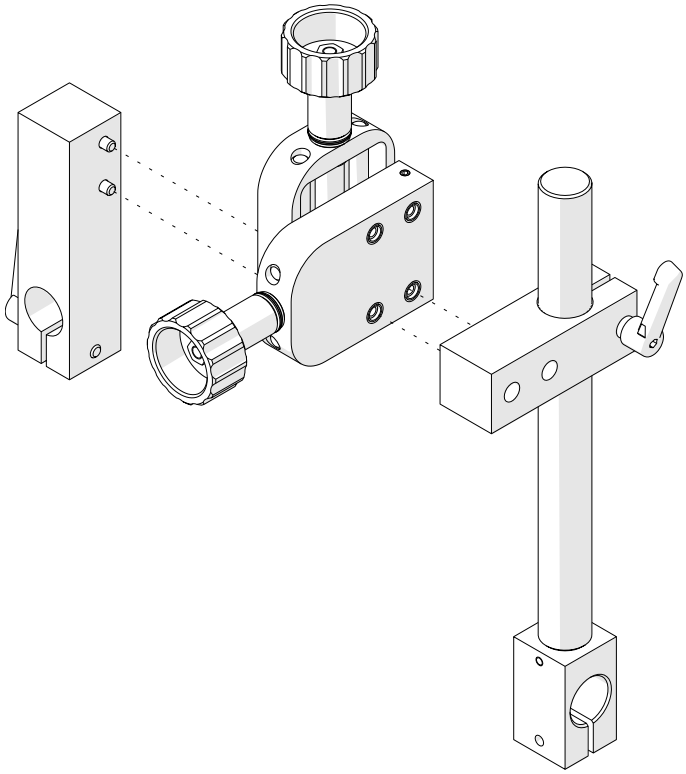
## 5.3. 76 mm cross slide

Increases up-down or left-right adjustment range from 0–35 mm (0–1.38″) to 0–76 mm (0–3″).

Part number:
ZSP-0466-46-00-00-1

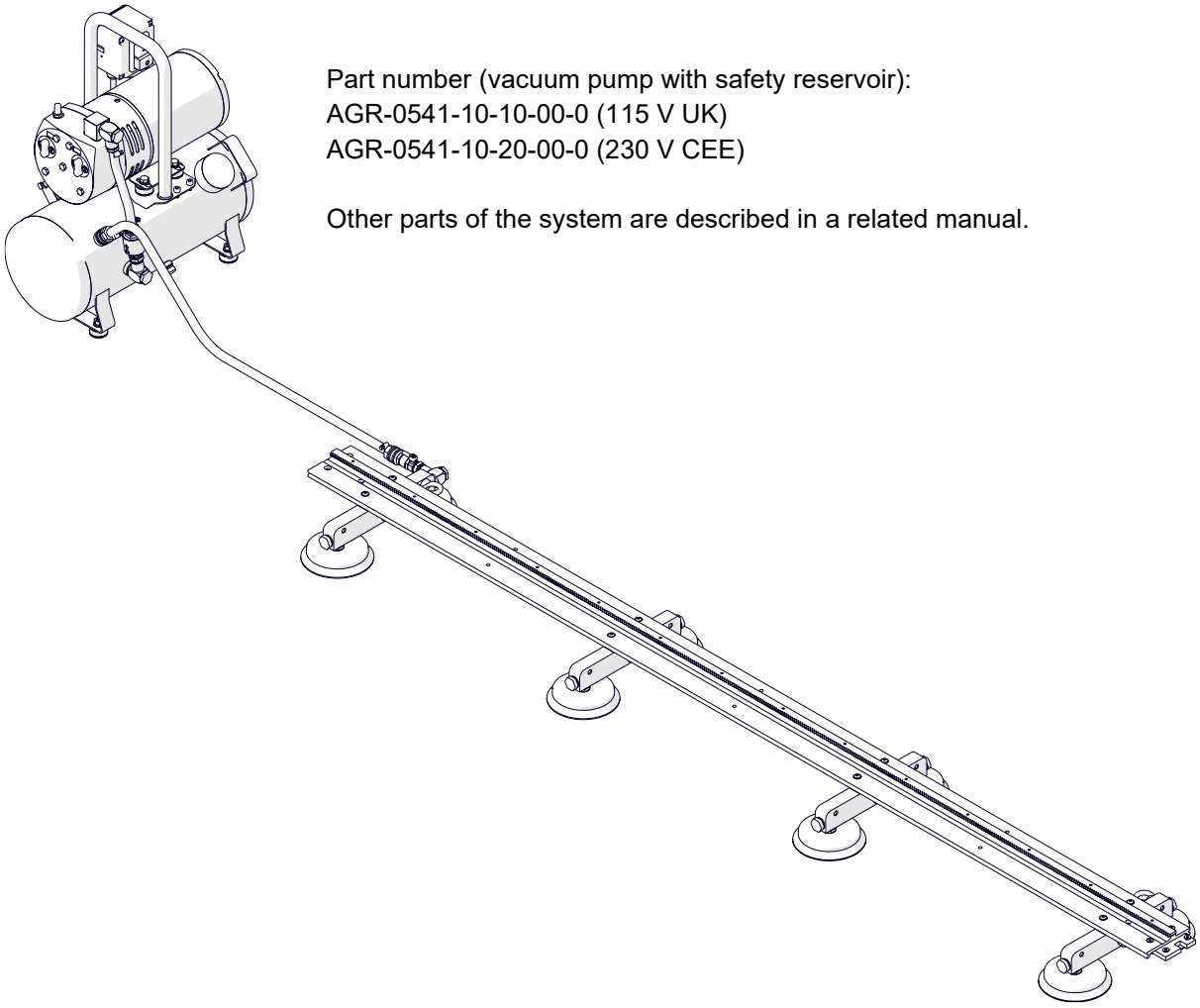


Install in place of the standard cross slide after removing four screws with the 4 mm hex wrench.



## 5.4. Vacuum track system

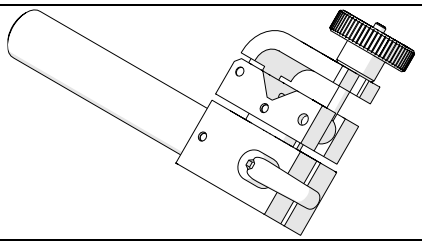
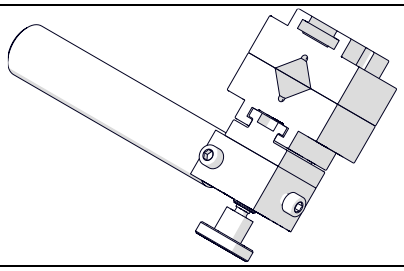
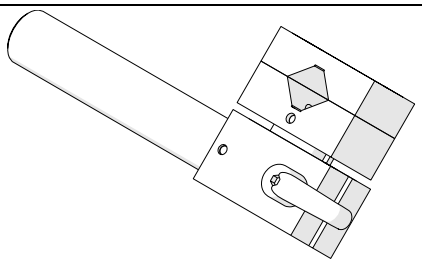
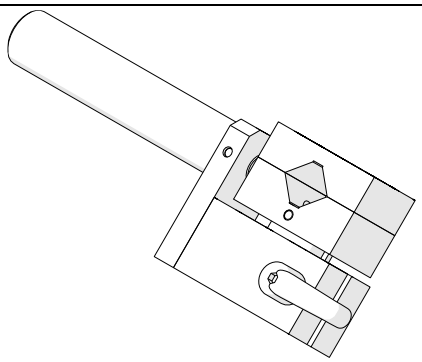
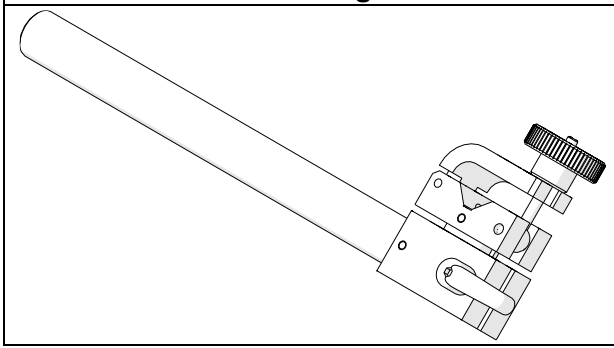
Allows clamping the track to non-ferromagnetic surfaces.

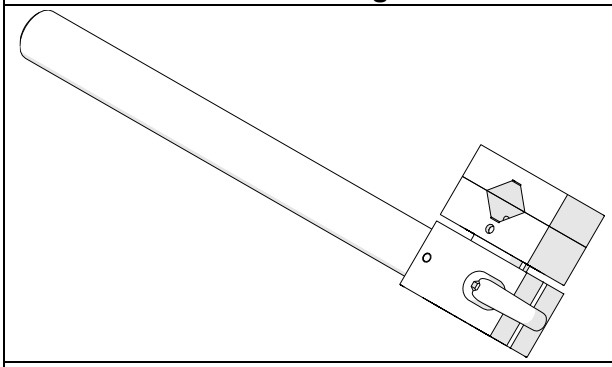
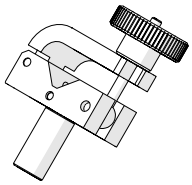
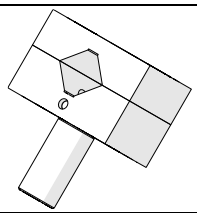
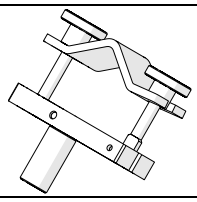
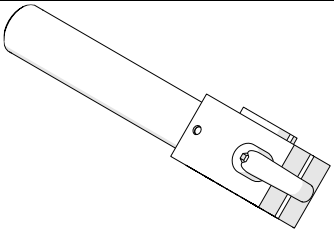
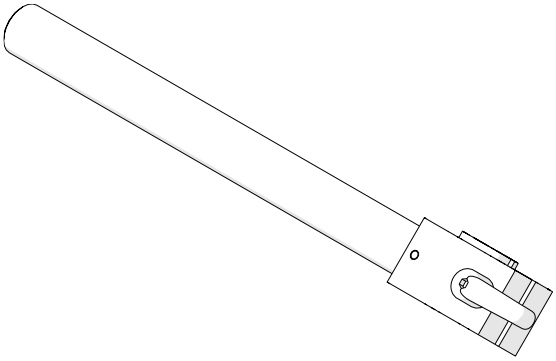


Part number (vacuum pump with safety reservoir):
AGR-0541-10-10-00-0 (115 V UK)
AGR-0541-10-20-00-0 (230 V CEE)

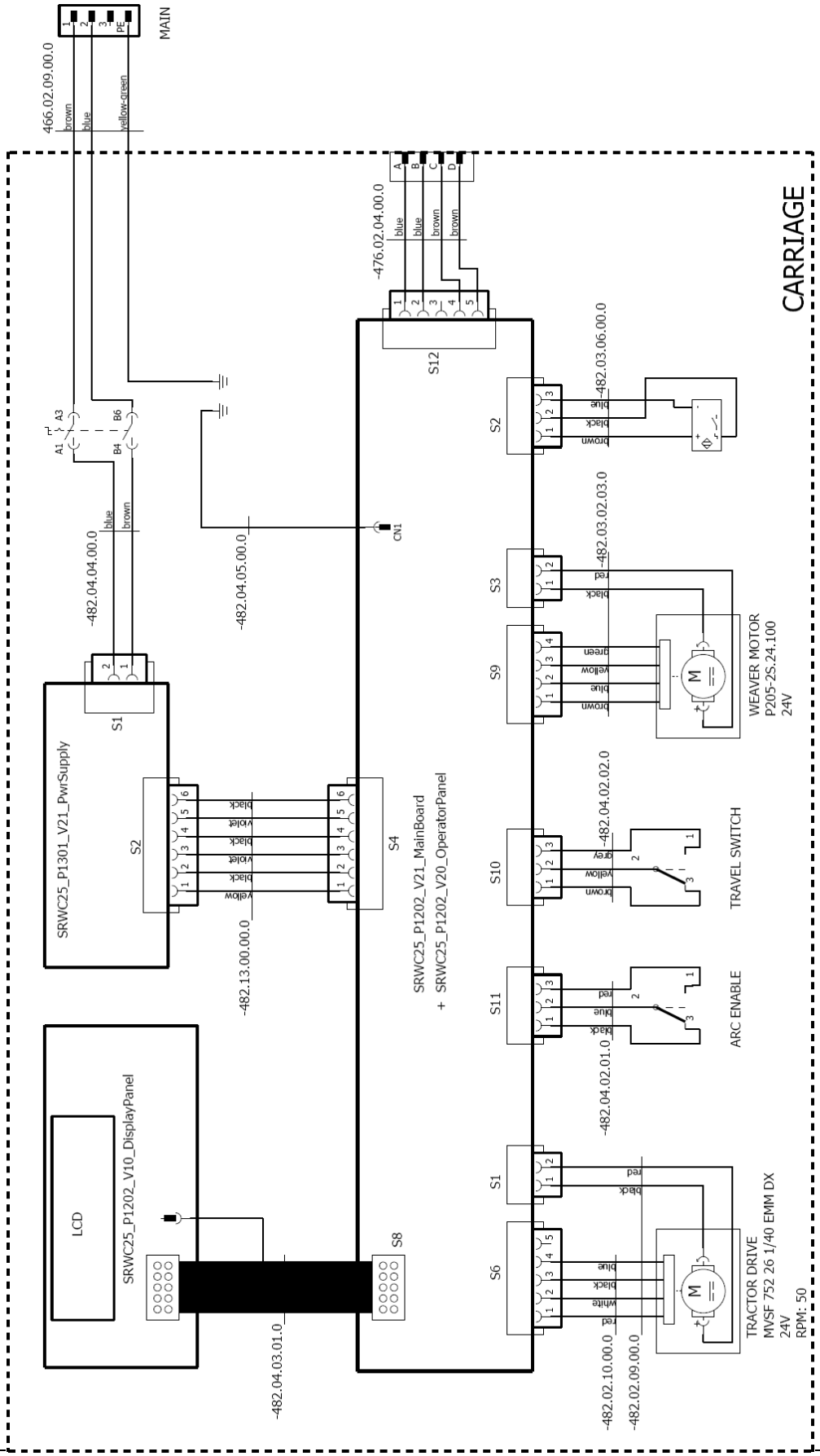
Other parts of the system are described in a related manual.

## 5.5. Torch holders, clamps, and rods

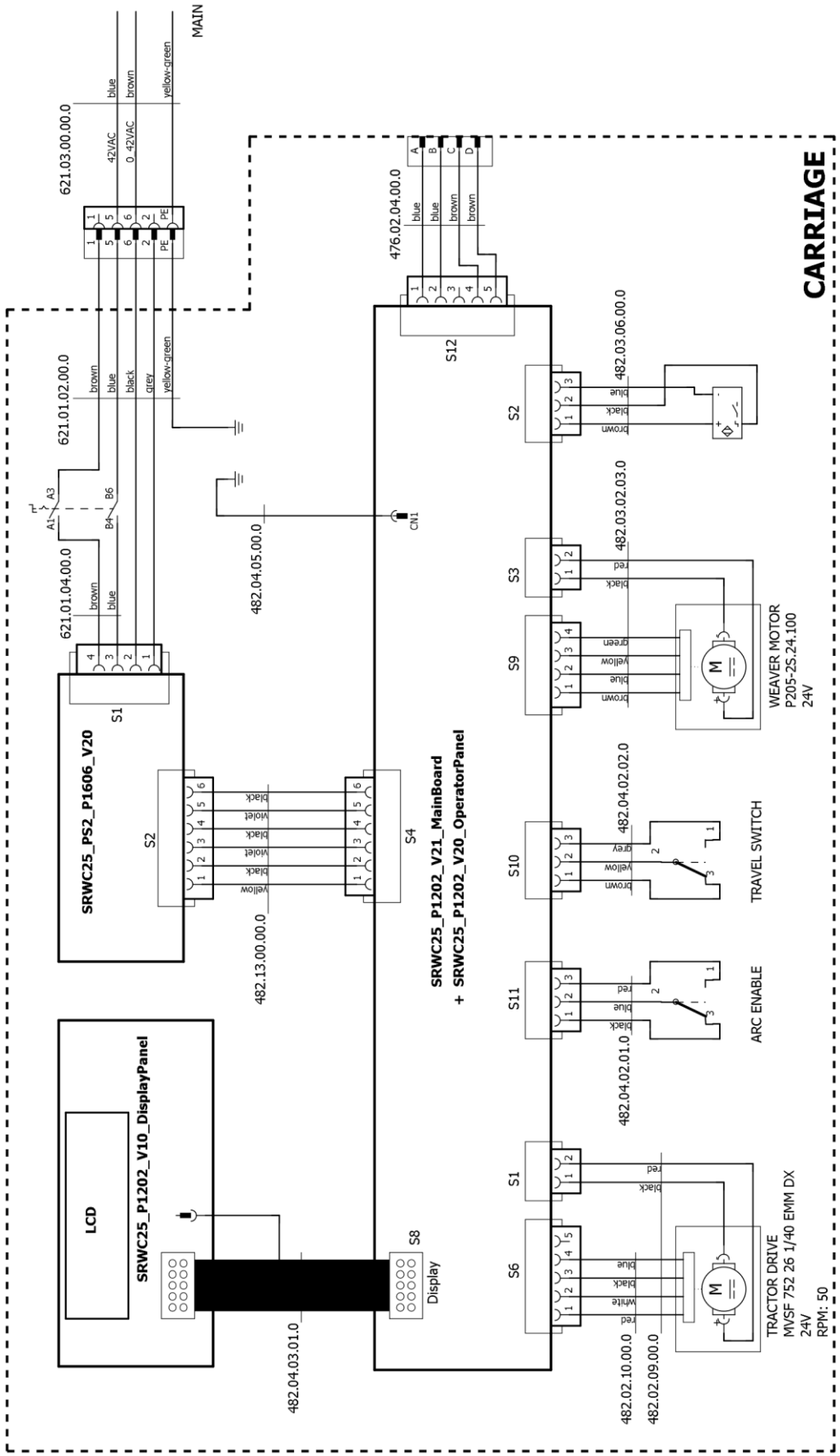
| Short rod torch holder with clamp 16–22 mm | |
|---|---|
|  | Part number:<br>UCW-0476-20-00-00-0 |
| **Quick-release short rod torch holder with clip 16–22 mm** | |
|  | Part number:<br>UCW-0523-84-00-00-0 |
| **Short rod torch holder with clip 16–22 mm** | |
|  | Part number:<br>UCW-0476-27-00-00-0 |
| **Short low rod torch holder with clip 16–22 mm** | |
|  | Part number:<br>UCW-0476-06-00-00-0 |
| **Long rod torch holder with clamp 16–22 mm** | |
|  | Part number:<br>UCW-0466-04-00-00-0 |

| Long rod torch holder with clip 16–22 mm | |
|---|---|
|  | Part number:<br>UCW-0466-22-00-00-0 |
| **Torch clamp 16–22 mm** | |
|  | Part number:<br>ZRZ-0466-04-01-00-0 |
| **Torch clip 16–22 mm** | |
|  | Part number:<br>ZCS-0476-06-01-00-0 |
| **Torch clamp 22–35 mm** | |
|  | Part number:<br>ZRZ-0466-19-00-00-0 |
| **Short rod** | |
|  | Part number:<br>WLK-0476-20-01-00-0 |
| **Long rod** | |
|  | Part number:<br>WLK-0466-04-10-00-0 |

# 6. 115–230 V WIRING DIAGRAM



# 7. 42 V WIRING DIAGRAM



# 8. DECLARATION OF CONFORMITY

## *Declaration of Conformity*

***JEI Drilling & Cutting Solutions Ltd***
***Unit 21 Empire Business Park***
***Enterprise Way, Burnley***
***UK, BB12 6LT***

We declare with full responsibility that:

## Rail Bull Welding Carriage

is manufactured in accordance with the following standards:

- EN 50144-1
- EN 60974-10

and satisfies regulations of the guidelines: 2004/108/EC, 2006/95/EC, 2006/42/EC.

Person authorized to compile the technical file:
David McFadden, Burnley, Lancashire, UK

Burnley, 21 January 2013

David McFadden
Managing Director

# 9. WARRANTY CARD

## WARRANTY CARD No.....

..... in the name of Manufacturer warrants the Rail Bull Welding Carriage to be free of defects in material and workmanship under normal use for a period of 12 months from the date of sale.

This warranty does not cover rollers as well as damage or wear that arise from misuse, accident, tampering, or any other causes not related to defects in workmanship or material.

Serial number .....

Date of sale .....

Signature and stamp of the seller .....

**2.21 / 09 February 2023**

***WE RESERVE THE RIGHT TO MAKE CHANGES IN THIS MANUAL WITHOUT NOTICE***