

Operating instructions

Automatic Wedge Welder Wedge It PLUS

Serien-Nr.:	Typenschild klein
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Introduction

Wedge It Plus, manufactured by MUNSCH Kunststoff-Schweißtechnik GmbH, is a self-propelled, heat/pressure fusion machine, used for the seaming of thermoplastic geomembranes and related materials.

Although this unit was designed for use in the field, it can be used in-house as well.

CAUTION

This machine is an electro-mechanical device with moving parts capable of exerting powerful force. Care should be taken to prevent the accidental engagement of clothing, hair or personal extremities with any moving parts.

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Note: These operating instructions must always be available to the machine operators.
 Make sure to read them carefully before placing the unit in service.

Very important!

Switch off the heating wedge whenever the unit is out of service for prolonged periods.
 This will prevent heating up of the machine due to radiating heat. Otherwise some machine
 components may develop high surface temperatures.
 Additional cooling of the heating wedge is not allowed
 (water, chilling agents or similar)

Technical data:

Voltage	V	110/220
Frequency	HZ	50/60
Capacity	W	2000
Temperature	°C	Max. 450, infinitely variable
Max. travel speed	m/min	6.5, infinitely variable
Dimensions LxWxH	mm	406x279x267
Weight	kg	38.5
Materials		PE-HD (20-120), PP, Hypalon, PVC (with stainless steel wedge), ...
Material thicknesses	mm	0.5-2.5

Safety

	Danger to life when opening the unit due to exposure to live components. Disconnect the power supply (all poles) before opening the unit. A damaged connecting cable may cause fatal electrical shock. The rated voltage indicated on the unit type tag must match the mains voltage. If required, check with your electric utility.
	Improper use of the welding unit poses a fire and explosion hazard, especially when working in the vicinity of flammable materials and explosive gases. Not suitable for use in explosion hazard areas!!!
	Risk of burns!!! Do not touch the heating wedge when hot. Always allow unit to cool down.
	Protection Class I equipment Connect the unit only to power outlets equipped with a protective conductor. Each interruption of the protective conductor presents a hazard. Only use extension cables with the correct conductor cross-section and a protective conductor.
FI	FI switch required for personal protection.
	Unit may only be operated under observation. Heat may propagate to flammable materials outside the range of vision.
	Protect the unit from moisture and direct rainfall!

Identification

Key electrical controls

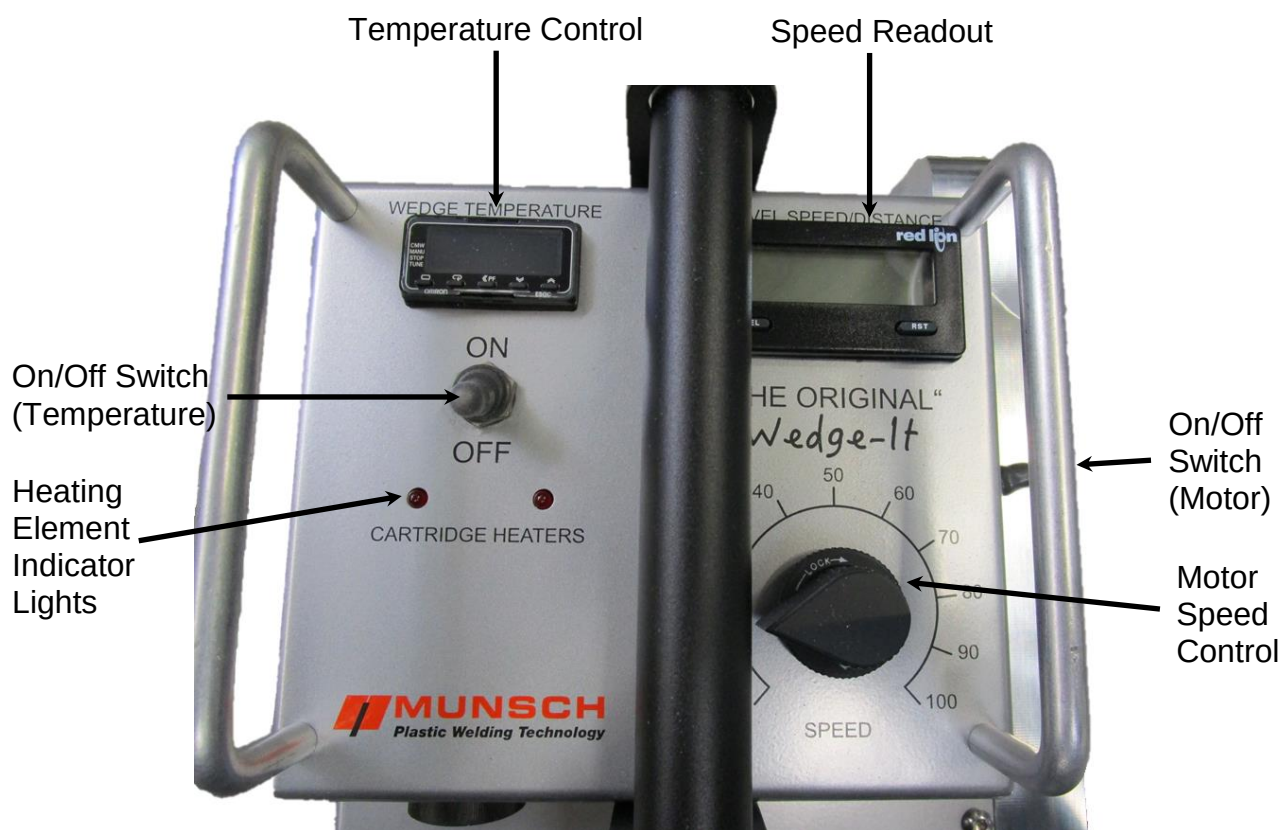


Fig.1

Key mechanical components and functions

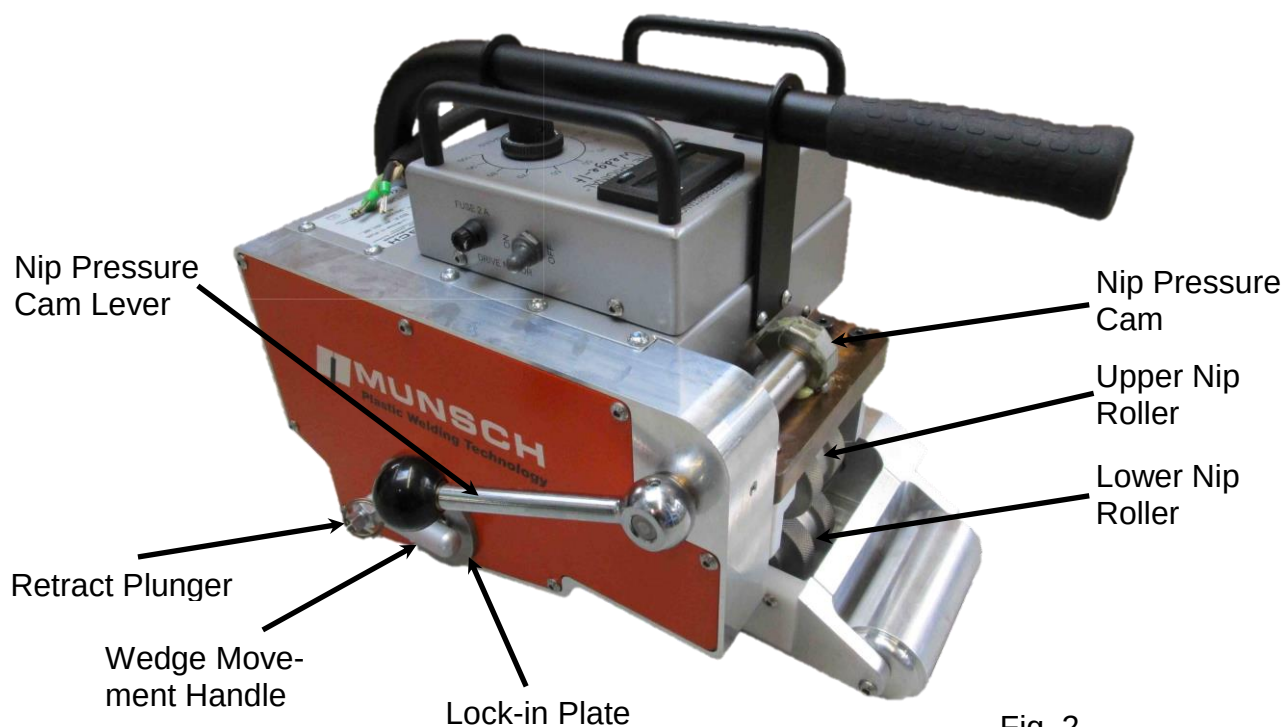


Fig. 2

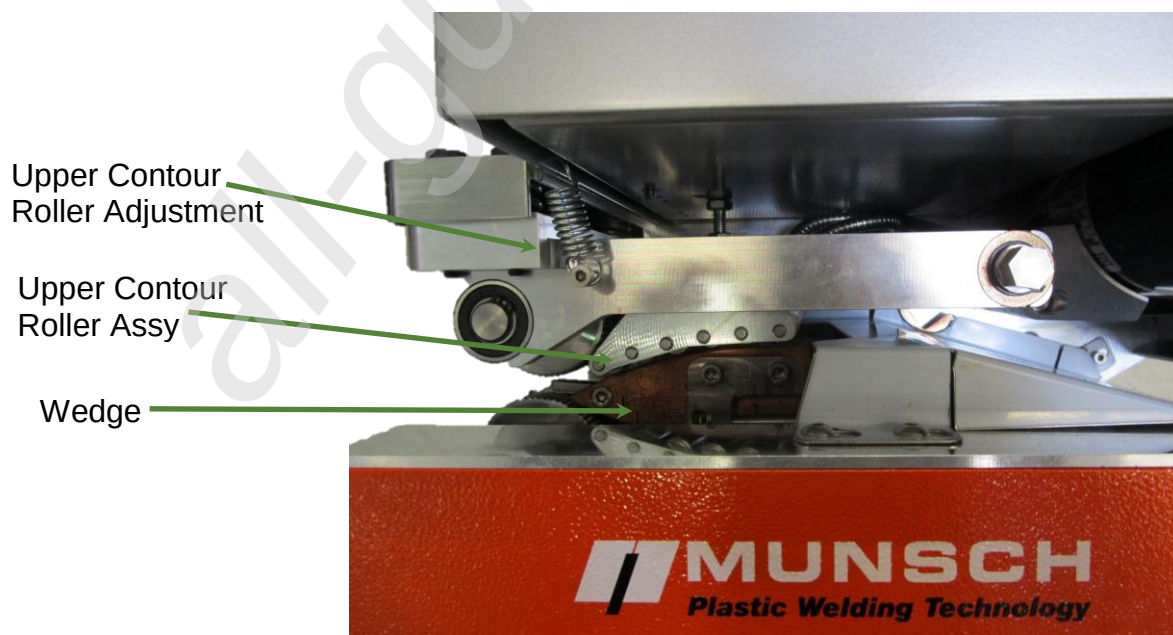
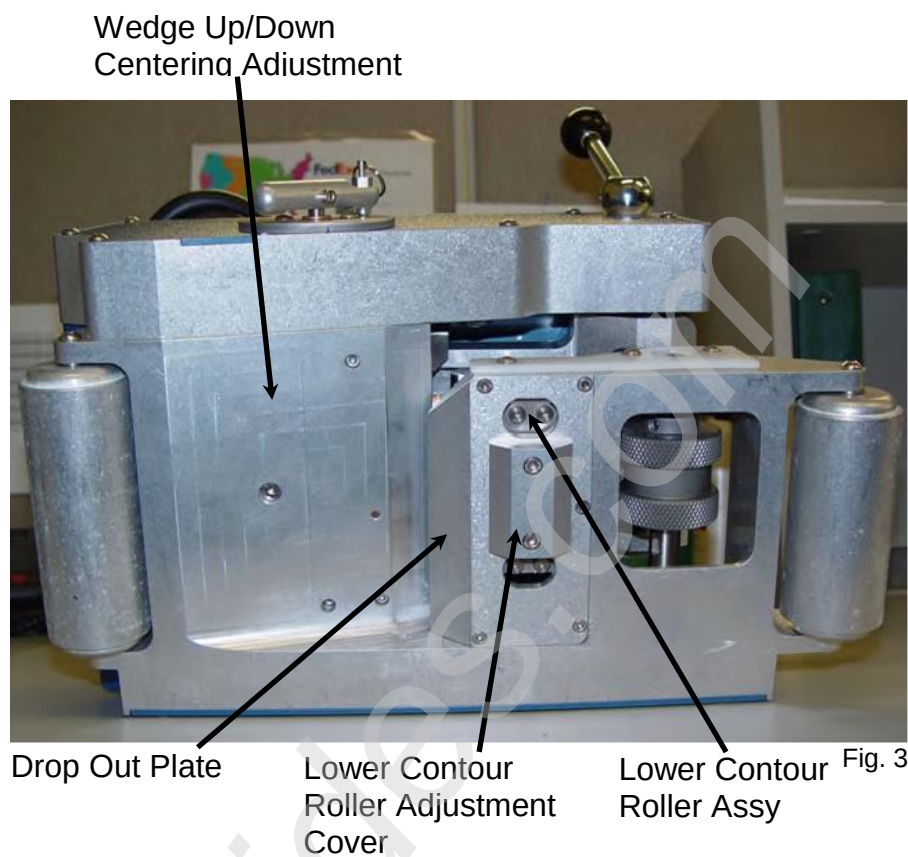


Fig. 4

Set-Up Procedure

Initial Set-up – Various mil thickness tolerances:

The initial set-up of the Wedge-It is by far the most critical aspect of not only quality welding results, but also wear and tear on the unit itself.

Adjusting the Wedge-It too tightly can result in excessive wear on drive-train parts, such as gears, chains and sprockets, etc.

The recommended Set-Up Procedure before heating up the unit is as follows:

From the same mil thickness material as that to be welded, cut 2 pieces app. 4x18" (ca. 100 x 450mm) and 2 smaller pieces app. ½ x 2" (ca. 13 x 50mm). These 4 pieces of material will be used as „gauges“, for setting the 3 adjustments.

Adjustment 1: Wedge Centering

Place the two smaller pieces of material, each folded in half, between the two nip rollers (figure 2). This is to simulate 2 layers of material between the rollers. Be sure these pieces do not extend past the Nip Rollers into the machine. Rotate the Nip Pressure Cam to do first positioning by rotating the Nip Pressure Cam Lever clockwise, until reaching the mark showing the thickness of your welding sheet.

Move the wedge (figure 4) to the engaged position by rotating the wedge movement handle (figure 2) counterclockwise. Adjust the wedge with a 5mm hex wrench by turning the centering adjustment, so that the wedge gets into the centered between upper and lower nip roller.

Adjustment 2: Wedge forward travel

This adjustment determines how close the wedge is to the nip rollers when it is in the engaged or welding position.

To set clearance, pull out the wedge retract plunger on the wedge movement handle (figure 2), rotate the handle to a central position between the hold down screws (figure 2), loosen the screws and rotate the handle counterclockwise until the retract plunger drops into the lock-in hole.

NOTE: The distance from the upper tip of the wedge to the upper nip roller should be the same distance as between the two nip rollers. This same clearance should also be maintained between the lower tip of the wedge and the lower nip roller.

To lock down the setting, hold down the wedge lock-in plate, pull the retract plunger out, and rotate the handle to central location between hold-down screws (figure 2). Tighten hold-down screws and move lock-in plunger back to lock-in hole.

Adjustment 3: Upper and lower contour rollers

Remove the lower contour roller adjustment cover, to expose the adjustment. With a 10mm box end wrench, loosen the lock-nut. With ad 3mm hex wrench, back off the adjustment until it bottoms out.

With a 10mm wrench, loosen the lock-nut on the upper contour roller adjustment (figure 4). Turn the adjustment counter-clockwise, raising the upper contour roller assembly out of the way.

With the wedge locked into the engaged position, and the ½ x 2" pieces of material still between the nip rollers, you are ready to make adjustments.

Insert one of the 4" x 18" pieces of material between the lower contour roller assembly and the wedge. This piece should extend out of the front of the machine (opposite end from the nip rollers).

Adjust the lower contour rollers up, clockwise, until the wedge begins to move up slightly. Now insert the other 4" x 18" piece of material between upper contour assembly and wedge (figure 4). Adjust the upper contour rollers down, clockwise, to obtain the desired tolerance.

NOTE: This hold be a “snug fit”. To check, hold onto the upper piece of material at the front end of the machine and move it forward and backward. Check the lower adjustment the same way. Now, make sure the tip of the wedge is still centered between the nip rollers.

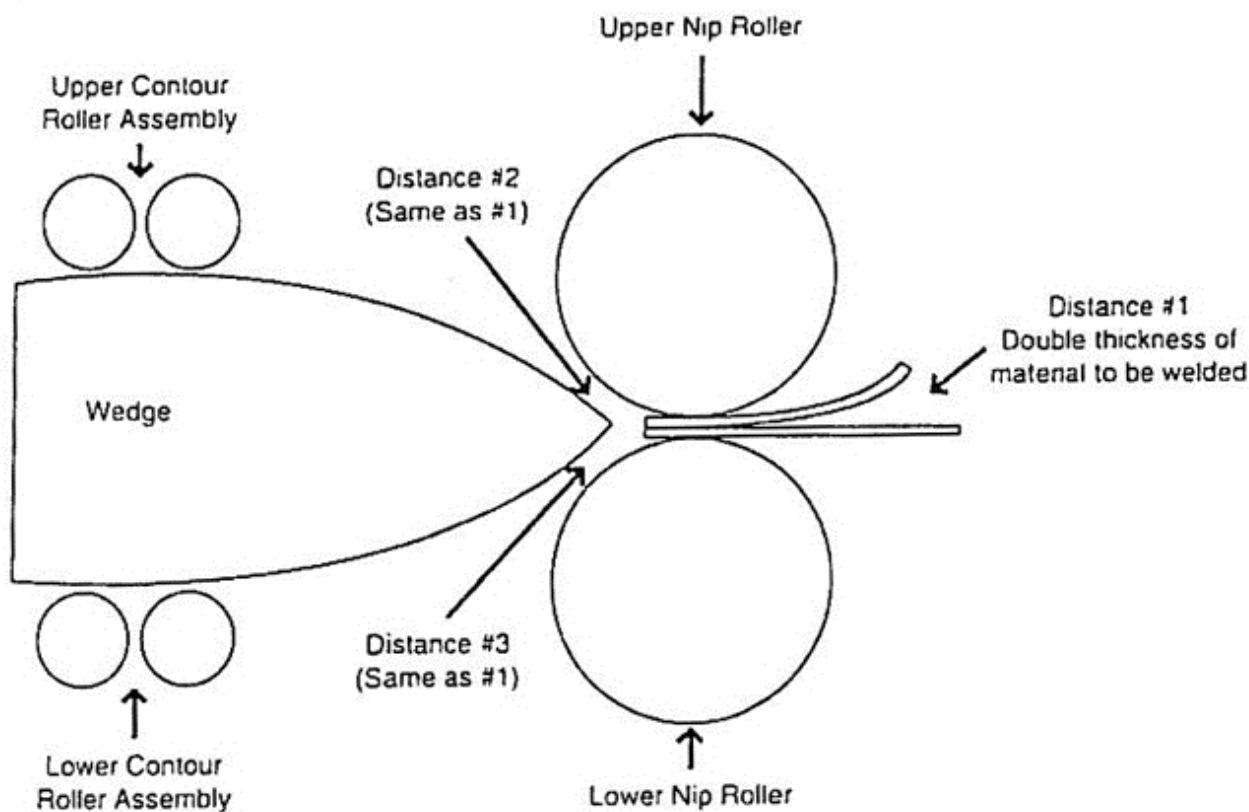
Once the desired tolerance is set, tighten both the upper and lower lock-nuts, being careful not to tighten them too much.

Replace lower contour roller adjustment cover.

Remove all pieces of material.

NOTE: Although this procedure may appear time consuming at first, with a little practice, the entire set-up should only take a few minutes.

Suggested set-up for HDPE material



NOTE: Distances #1, 2 & 3 should be the same for the HDPE set-up. For PVC set-up, distance #2 & 3 should be approximately $\frac{1}{2}$ the distance of #1 and contour roller adjustments should be backed off completely or removed.

Basic welding operation

Heating up the wedge:

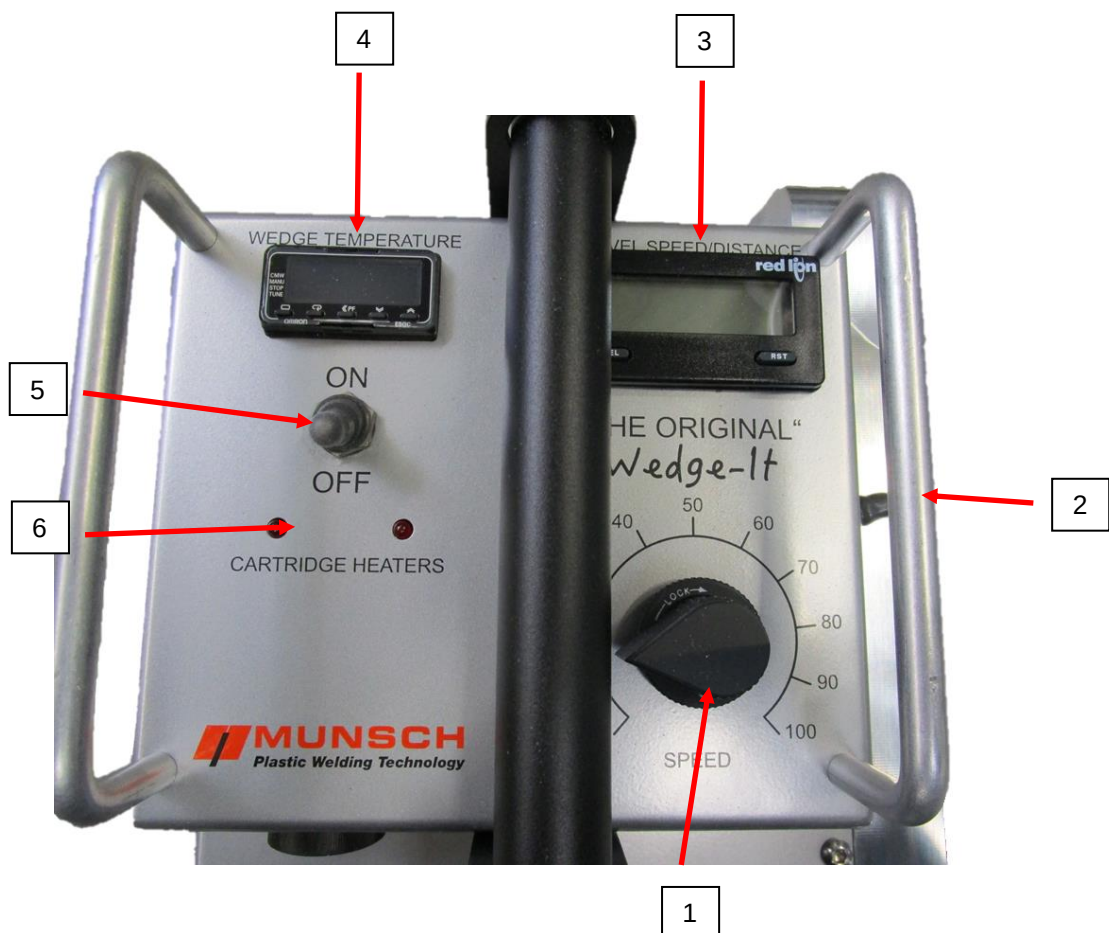
Please plug the power cord to the Power supply (110V or 220V, depending on the configuration of Wedge It).
 Turn on the switch for temperature (5). Temperature will now show actual temperature (4) and alarm will sound, if the motor is switched on.
 Set the desired temperature and wait until the machine reaches the set point.
 Turn on the motor.
 If you want, you can now reset the passed distance.

NOTE: Temperature display is in degrees FAHRENHEIT, unless otherwise specified. Recommended temperature settings can be found on page 13 of this manual.

Whether you are welding small sample pieces, or large sheets, the loading of the material will be the same with the nip rollers and wedge in the disengaged position and motor switch off.

Position the Wedge-It in the seam, inserting first the bottom sheet of material under the wedge and between the nip rollers, and then the top sheet of material over the wedge and between the nip rollers. Sheet overlap should be approximately 5 to 6 inches.

NOTE: Once the bottom sheet of material has been loaded, you may need to manually roll the welder forward and backward as you are loading the top sheet to prevent a "burn out" at the beginning of the weld.



Executing a weld

Please engage the welding pressure by rotating the nip pressure cam lever (9) clockwise to the desired pressure setting for the thickness of the material that is going to be welded.

The following nip pressure cam positions (15) will help you in achieving the desired pressure:

First position (click)	=	100 mil setting
Second position (click)	=	80 mil setting
Third position (click)	=	60 mil setting
Fourth position (click)	=	40 mil setting
Fifth position (click)	=	20 & 30 mil setting

Now turn on the switch of the motor (2) and rotate the motor speed control (1) to achieve the desired travel speed (table on page 11). Speed readout (3) should be displaying the current travel speed.

NOTE: The speed at which the Wedge-It must travel to produce a quality weld will vary according to the mil thickness of the material being welded, the temperature of the wedge, the ambient temperature, the temperature of the welding material, etc. All of these variables must be taken into consideration when choosing a speed setting.

As soon as the Wedge-It begins to travel, rotate the wedge movement handle (12) counter clockwise until the wedge retract plunger drops into the lock-in plate hole. This should take little or no effort on the part of the operator. If it does, the wedge has been set too close to the nip rollers and has to be re-adjusted (see page 6).

Removing the Wedge-It at the end of the seam

As soon as the nip rollers have reached the end of the seam, extract the Wedge-It in the following order:

1. Disengage nip rollers pressure
2. Turn the motor switch off
3. Disengage the wedge by pulling out the ring on the wedge retract plunger (10) and by rotating the wedge movement handle (12) clockwise.

Welding procedure summary

Starting the weld

1. Turn the motor switch on
2. Engage the welding pressure
3. Engage the wedge

Ending the weld

1. Disengage the welding pressure
2. Turn the motor switch off
3. Disengage the wedge

REMEMBER: Always engage the wedge **LAST** when starting a weld and disengage the wedge **LAST** at the end of the weld.

Welding parameters – HDPE and LLDPE

NOTE: The parameters listed below are only suggested starting points to be used when making a “prequalifying” sample weld. As ambient conditions and other variables change (i.e. dirt, moisture, etc.), the welding parameters must be adjusted by the field technician or by the operator.

MUNSCH Kunststoff-Schweißtechnik GmbH assumes no liability for weld quality or lack thereof, when using a Wedge-It Hot Wedge Welder.

Imperial Parameters:

Material		Wedge Temperature		Speed	Pressure setting	
					Nurled steel nip rollers	Silicon rubber nip rollers
HDPE	20mil	660°F	350°C	18 ft/min	---	20, 30, 40 mil
	30mil	660°F	350°C	16.5 ft/min	20, 30, 40 mil	20, 30, 40 mil
	40mil	660°F	350°C	13.5 ft/min	40, 60 mil	40, 60 mil
	60mil	700°F	370°C	10.5 ft/min	60 mil	---
	80mil	700°F	370°C	7.5 ft/min	80 mil	---
	100mil	700°F	370°C	4.5-6 ft/min	80, 100 mil	---
	120mil	700°F	370°C	3-4.5 ft/min	80, 100 mil	---
LLDPE	20mil	620°F	326°C	18 ft/min	---	40, 60 mil
	30mil	620°F	326°C	16.5 ft/min	---	40, 60 mil
	40mil	640°F	337°C	13.5 ft/min	---	40 mil
	60mil	660°F	350°C	7.5 ft/min	80 mil	80 mil
PVC, Hypalon, XR5, Polypro, etc.		625°F	285°C	9 ft/min	---	40, 60 mil

All parameters above are specified for use with a split wedge (with air channel) and split steel or rubber Nip Rollers.

Metric Parameters:

Material	Welding Temp	Welding Speed	Steel Rollers	Rubber Rollers
HDPE 0,5mm	400 C	3 to 4,5 m/min	Yes	
HDPE 0,75mm	400 C	3 to 4m/min	Yes	
HDPE 1,0mm	450 C	2,4 to 3,6 m/min	Yes	
LLDPE 0,5mm	380 C	3,6 to 5,4 m/min		Yes
LLDPE 0,75mm	380 C	3,6 to 4,8 m/min		Yes
LLDPE 1,0mm	400 C	3 to 4,2 m/min	Yes	
PE/LDPE Coated Fabric 0,3mm	350 C	6 to 9m/min		Yes
PE/LDPE Coated Fabric 0,5mm	380 C	4,5 to 7,5m/min		Yes
PE/LDPE Coated Fabric 0,75mm	380 C	3,6 to 6m/min	Yes	
Non-Supported PVC 0,3mm	400 C	3 to 4,8m/min		Yes
Non-Supported PVC 0,5mm	400 C	2,4 to 4,2 m/min		Yes
Non-Supported PVC 0,75mm	450 C	2,4 to 3,6m/min	Yes	
PVC Coated Fabric 0,3mm	380 C	6 to 10,5m/min		Yes
PVC Coated Fabric 0,5mm	400 C	6 to 9,6 m/min		Yes
PVC Coated Fabric 0,75mm	450 C	5,4 to 9 m/min	Yes	
RPP(Reinforced Polypropylene) 0,9mm	400 C	2,4 to 4,2 m/min	Yes	
RPP(Reinforced Polypropylene) 1,2mm	450 C	2,4 to 3,6m/min	Yes	

Maintenance

(Only for qualified personnel)

This section presents maintenance information for the Wedge-It, including preventive maintenance tips, troubleshooting, and other general information.

WARNING

These service instructions are for use by qualified personnel only. To avoid personal harm, or damage to the machine, do not perform any procedures in this section unless you are qualified to do so.

REMEMBER

In any cases you need help, please call us: +49-2623-898-80 or your dealer.

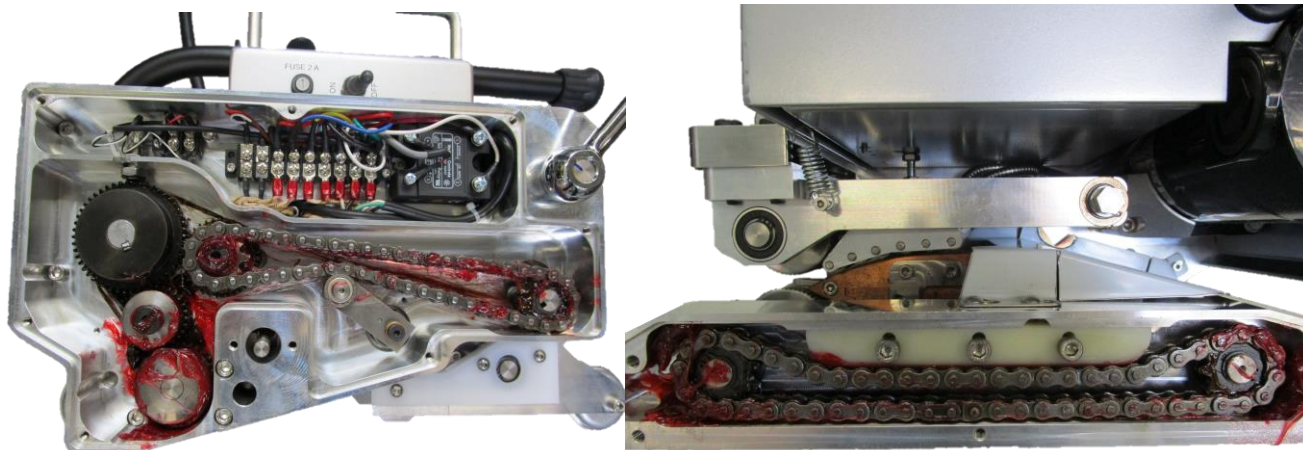
Preventive maintenance tips

Keeping your Wedge-It clean is the most important factor in prolonging the life of the unit. Simple cleaning practices, such as brushing off the hot wedge and removing small rocks and dirt or mud from lower contour roller area, should be performed after each seam is completed.

More involved maintenance practices should be performed on a daily or weekly basis, depending on how much welding you are doing. Part 1 of this section will explain how to accomplish these tasks.

Lubricating gears, sprockets and chains

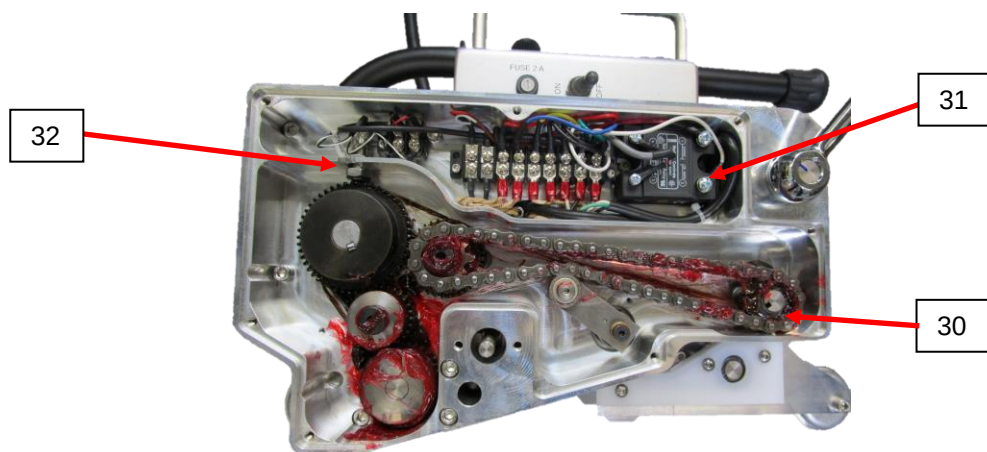
WARNING: To prevent electronic shock and other bodily harm, make sure unit is unplugged.



- Remove the drive-side cover to expose main drive mechanism and main wiring terminal (left figure). The wedge movement handle and adjustment plate will need to be removed for this. Also remove the lower drive chain cover on opposite side to expose lower drive chain (right figure).
- Clean all gears, sprockets and chains with brake cleaner or cleaning solvent of your choice and a parts brush. Wipe with a clean rag, or preferably, blow dry with compressed air. Make sure all components are clear of dirt and sand, etc. Lightly lubricate all gears, sprockets and chains.

NOTE: MUNSCH Kunststoff-Schweißtechnik GmbH recommends using spray on white lithium grease which is available at any hardware store or auto parts store.

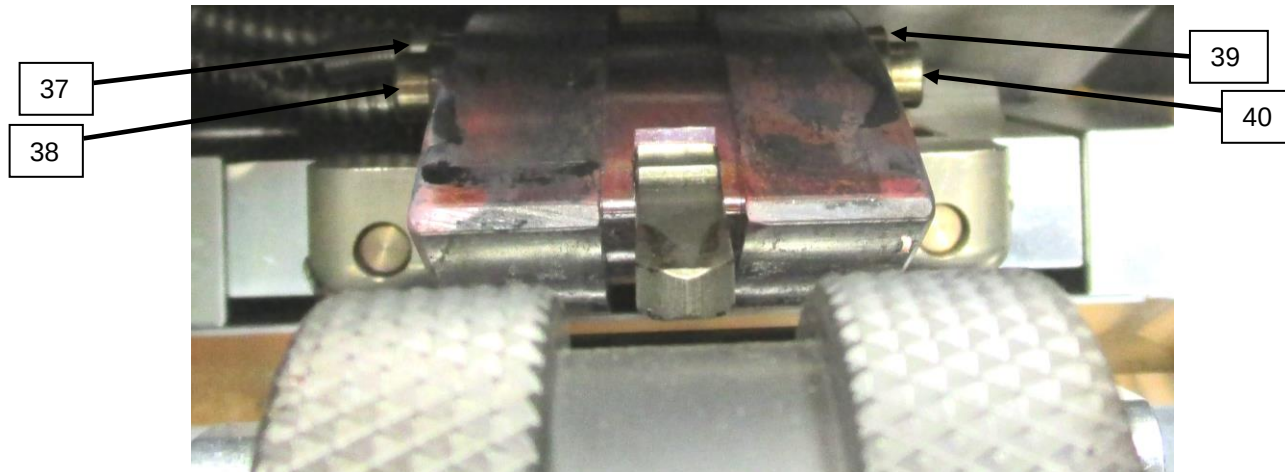
- Check chains for proper adjustment and all shoulder bolts, set screws and retaining rings for tightness, including wiring terminal screws.
- Replace both side covers and wipe down the rest of the unit with a clean rag. Check all other screws and retaining rings on the machine for tightness.



30. Upper Nip Sprocket Snap Ring
 31. Solid State Relais
 32. Magnetic Pick-up



- 33. Nip arm
- 34. Nip arm spring
- 35. Upper material guide
- 36. Nip pivot shaft snap ring



- 37. Wedge mount set screw
- 38. Linear shaft
- 39. Wedge mount set screw
- 40. Linear shaft

Removing and reinstalling hot wedge assembly

(to replace burnt heating cartridges, thermocouple, etc.)

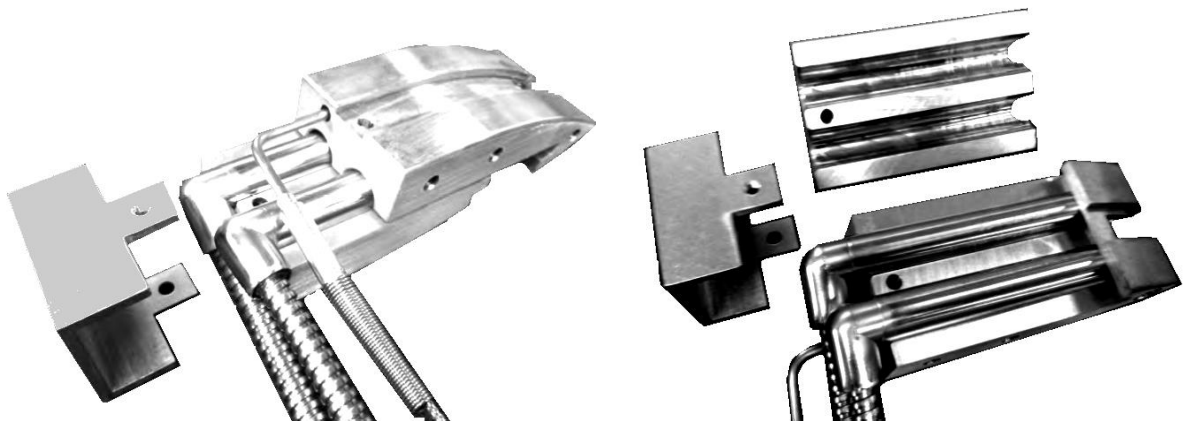
- a. Remove the wedge movement handle, the lock-in plate, and the side cover, to expose the main drive mechanism and the main wiring terminal (see page 12).
- b. Disconnect the thermocouple and the heating cartridge wires from the terminal block.

NOTE: The main terminal block is numbered 1-9, starting from the left side. The thermocouple is connected to terminal 1 & 2, the heating cartridge wires are connected to terminals 3 to 6.

- c. Remove the upper nip sprocket snap ring (30) and slide the sprocket off the shaft.
- d. Proceed to the other side of the welder. Please disconnect the nip arm spring (34) from the nip arm and remove the nip pivot shaft snap ring (36).
- e. Now remove the nip arm (33) from the welder by sliding it off the nip pivot shaft. You can now inspect and clean the upper contour roller assembly.
- f. Please remove the upper material guide (35) to further expose the hot wedge assembly.
- g. Remove the wedge mount set screws (37 & 39) and tap the linear shafts (38 & 40) back through the wedge mount.
- h. After gently guiding the heater and the thermocouple wires through the side frame hole, extract the wedge assembly by carefully lifting up and out over lower nip roller.

(Now the wedge assembly is ready for cleaning, servicing, replacement, etc.)

- i. To replace the wedge assembly, follow steps a-h in reverse order. Make sure the heating cartridge and the thermocouple wires are tucked neatly between the upper material guide and the side frame. Also, make sure that there is enough slack in these wires to allow free fore and aft movement of the wedge.
- j. Split copper wedge makes changing the heaters simple.



Re-Setting timing of rack & pinion wedge movement

Often when removing and reinstalling hot wedge assembly, the relationship of the lock-in plate / wedge movement handle to the for / aft position of the wedge itself will be off slightly. This can be corrected by proceeding with the following steps.

- A. With lock-in plate hold down screws loose, rotate wedge movement handle counter-clockwise moving wedge back as close to nip rollers as possible.
- B. Insert screwdriver through access slot at the front of the welder between the upper material guide and the front travel roller. Gently press downwards on the end of the rack gear. This will release mesh between rack gear and pinion gear.
- C. With roller gear still depressed, rotate the wedge movement handle until it is as close to horizontal as possible and so that the lock-in plunger is in the lock-in hole.
- D. Remove the screwdriver and check the wedge movement to make sure the rack and the pinion gears are meshing properly.
- E. Re-set the welding tolerances (see set-up section of this manual).

Temperature alignment

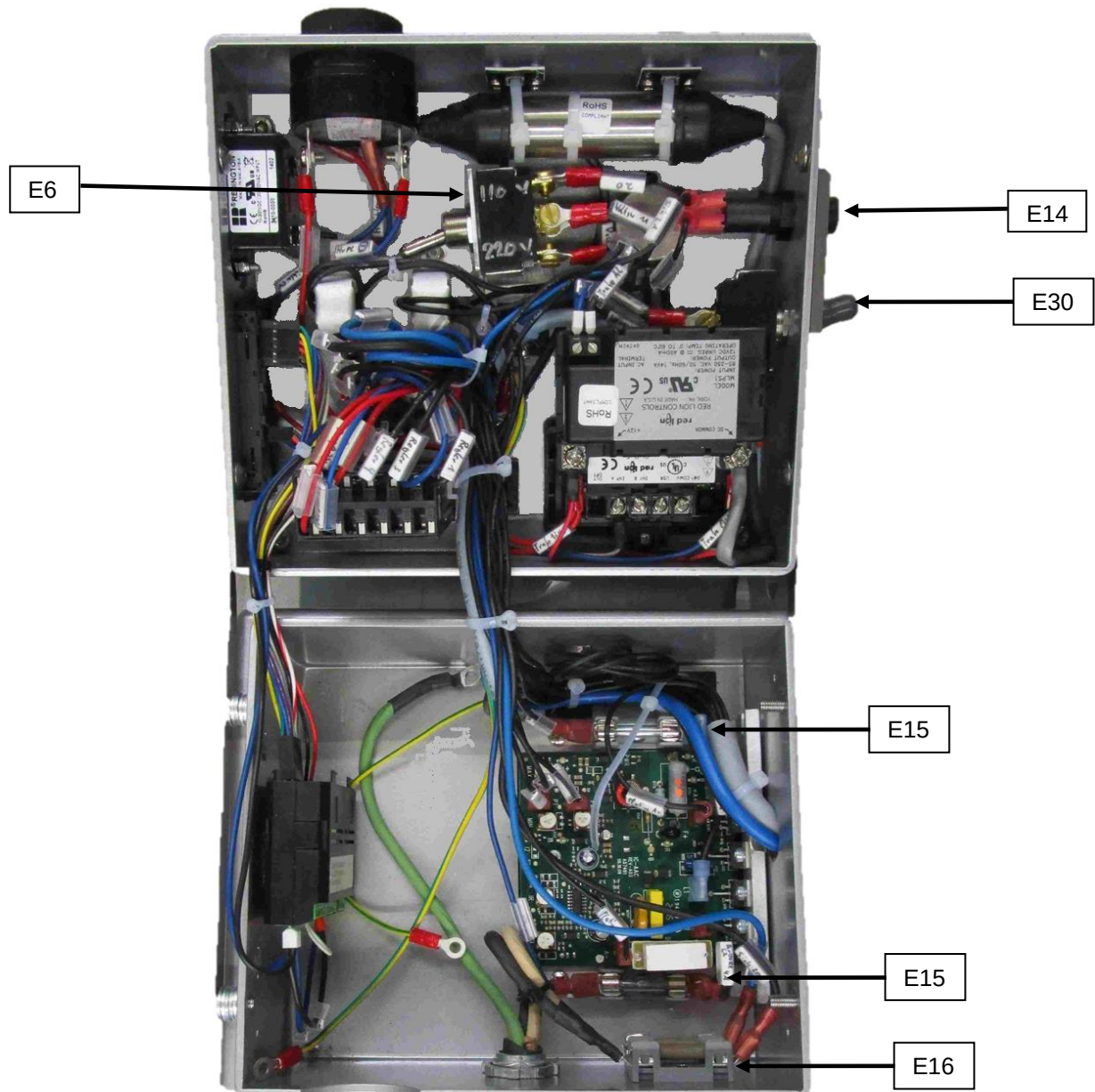
Please follow the mentioned steps carefully!
Not following the instructions may harm the machine!

1. Set the desired temperature
2. Unlock the controller:
 - a. Keep  and  pushed until oATP appears.
 - b. Set it to „0“
 - c. Push  1 x: iCPt appears
 - d. Set it to „0“
 - e. Keep  and  pushed until the screen changes.
3. Evaluate the difference between set temperature and real temperature, using a probe.
4. Shortly push  : L.Adj appears
5. Push  2 x: iN-S appears
6. Set the difference. If the wedge is hotter than set, higher the value by the evaluated difference. If it is cooler, lower the value.
7. Shortly push 
8. Restart at number 3 and repeat steps 4 and following, until temperature is within a 3°C tolerance.
9. Lock the controller:
 - a. Keep  and  pushed until oATP appears.
 - b. Set it to „2“
 - c. Push  1 x: iCPt appears
 - d. Set it to „2“
 - e. Keep  and  pushed until the screen changes.

In case of any questions, please call your sales office or dial MUNSCH at: +49 2623-898-80

General information

Key internal electronic components



- E6 – Main operating Voltage Selection Switch
- E14 – Motor Current Fuse (2A)
- E15 – Motor Board Fuses (4A, 2 pieces)
- E16 – Main Line Fuses (20A, 2 pieces)
- E30 – Speed Readout Voltage Selection Switch (Motor power switch)

NOTE: To access key electronic components shown above, the top handle, handle brackets and lid screws have to be removed.

Main spare part list

Description	Munsch ordering code
Temperature controller	K02187
Heating cartidge 800W	K02878
Heating cartridge 1000W	K06893
Heating cartridge 5/8" 1000W	K07011
Thermocouple	K02879
Solid State relais	K06462
Hot wedge	K06355
Motor control board	K06549
Plug in horse power resistor	K06477
Chain main frame	K06424
Chain side frame	K06509
Contour roller small (PLUS)	K07013
Bearing for contour roller (PLUS)	K07012
Contour roller large (series 2000)	K02993
Bearing for contour roller (series 2000)	K02994
Split steel nip roller	K02865
Steel nip roller	K06363
Split rubber roller (Outrigger needed)	K06364
Split rubber roller PVC (Outrigger needed)	K06367
Rubber roller (Outrigger needed)	K05844
Outrigger for fixing rubber roller	K06236
Teflon skid	K05260
Magnetic pick-up	K06479
Speed read out	K06482
Power supply	K06460
Hour meter	K06474
Voltmeter	K06476
Speed potentiometer	K06478
Speed knob	K06471
Speed knob locker	K06472
Voltage selection switch 110V-220V	K06470
Motor / Temperature switch	K06468
Amplifier	K06481
Sone alert	K06473
Heating LED	K06457

Changing operating voltage of Wedge-It

In cases we do not know voltage of your country, we deliver Wedge It with configuration 220V. Otherwise we will set it to the Country's voltage (110V or 220V).

To change the preset voltage, please proceed as follows:

1. Access the electronic box. Therefore demount big handle and the two handle brackets.
2. Open the electronic box and switch main operating voltage selection switch (E6) to the desired voltage (110V or 220V).
3. Remount all demounted items.

CAUTION!

**Do not plug Wedge it to 220V when set to 110V!!!
This will cause serious damage on the machine!**

Troubleshooting chart

Symptom	Problem and / or remedy
No power supplied to the wedge	Check power cord and power supply Check main fuses (E16)
Wedge will not heat up	Check temperature setting If setting is correct, please contact us
Wedge does not stop heating (runaway temperature)	Turn power of wedge off before reaching 900°F (482°C) to avoid damage to the wedge or other elements. Possibly solid state relays or temperature control are damaged.
Temperature drops down during weld and does not catch up	Heating elements or relays or temperature control are defective.
Nip rollers do not rotate	Check motor on/off switch. Check motor speed setting. Check motor fuses (E14, E15)
Upper nip rollers rotate, lower nip rollers don't rotate	Check both nip roller set screws for tightness Check drive chains & sprockets.

NOTE:

Parts list is not included to this instruction manual.
If you need item numbers, prices and delivery times, please contact your distributor.

EG-Konformitätserklärung des Herstellers

nach der EG-Maschinenrichtlinie 2006/42/EG Anhang II, Nr. 1 A



EC-Declaration of Conformity by the Manufacturer

as defined by machinery directive 2006/42/EC, Annex II, No. 1 A

MUNSCH Kunststoff-Schweißtechnik GmbH
 Im Staudchen
 D-56235 Ransbach-Baumbach
 Germany

Mr. Johann Dausenau,
 Kunststoffschweißtechnik GmbH,
 is authorised to compile the technical documentation.

We hereby declare that the wedge welders

Machine type:	Wedge welder	Wedge welder	Wedge welder	Wedge welder
Type designation:	WEDGE-IT-MICRO	WEDGE-IT-PLUS	WEDGE-IT-LE	WEDGE-IT-MULTI WEDGE-IT-ECO

are in accordance with all relevant provisions of the EC Machinery Directive.

The following harmonised standards (or parts of these standards) were applied:

☒ EU Machinery Directive 2006/42/EC	☒ DIN EN 13732-1: 2008
☒ DIN EN ISO 12100: 2010	☐

The wedge welders are in accordance with the following EC-directives:

☒ EU Low-Voltage Directive 73/23/EC	☒ EU EMC Directive 89/336/EC
☒ EN 60204-1 (VDE 0113 Part 1): 2011	☒ DIN EN 55014-1: 2012
☒ EN 61029-1 (VDE 0740 Part 500): 2010	☒ DIN EN 55014-2: 2009
☒ DIN EN 62638	☒ EN 61000-4-11:2004
☐	☐

This industrial tool complies with the aforesaid standards insofar as it is used at the contractually agreed conditions. The operator is responsible for this.

In the event of any modifications to the machine/unit or use not as intended, this declaration becomes invalid unless the manufacturer's prior written approval has expressly been given.



Ransbach-Baumbach, 21.11.2014

Dipl.-Ing. Stefan Munsch
 Managing Director