

ENGLISH

WIL-KEY

EXTRUSION WELDER

MODEL WK-EX 670



Operation and Maintenance Manual



- Operation Guide
- Maintenance Guide
- Trouble Shooting
- Exploded Diagrams
- Recommended Spare Parts



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1. EXTRUSION WELDER POWER REQUIREMENTS

1.1 GENERATOR REQUIREMENTS

220 – 240 Volt Extruders
Voltage Minimum 220 Volts
Voltage Maximum 250 Volts
50 – 60 Hertz
5 KVA Minimum

One 5 KVA generator (min) allows the simultaneous use of the extruder and grinder or hot air blower.

Note that generator output ratings are based on output at sea level with normal air temperatures. At high elevations or in extremely high air temperatures, generator output can be reduced significantly.

It is advisable when working in these conditions to use a generator rated at an output 15% - 50% more than would be required normally.

Check the voltage at the end of the extension cord with the machine running to ensure there is not an excessive loss of voltage.

Use the splitter cable to check the voltage at the machine.

1.2 EXTENSION CABLES

Extension cables must have three conductors of copper wire with cross sectional area a minimum of 2.5 sq. mm.

Extension cables should not exceed 75 meters in length.

Failure to use proper sized extension cables will cause excessive voltage loss during machine operation, resulting in poor performance and machine damage.

2. EXTRUSION WELDER SET-UP INSTRUCTIONS

2.1 EXTRUSION WELDER WELDING SPEED

MEMBRANE THICKNESS (mm)	0.75	1.0	1.5	2.0	2.5
HDPE SMOOTH (meter / minute)	3.50	3.00	2.50	2.50	2.00
HDPE TEXTURE (meter / minute)	3.00	3.00	2.00	2.00	1.80
VFPE SMOOTH & TEXTURE (meter / minute)	3.80	3.20	2.80	2.80	2.30

2.2 TEMPERATURE CONTROL SETTING

MEMBRANE THICKNESS (mm)	0.75	1.0	1.5	2	2.5	3
Temperature Controller Setting for HDPE SMOOTH (°C)	250	250	260	270	280	290
Temperature Controller Setting for HDPE TEXTURE (°C)	260	260	270	275	285	295
Temperature Controller Setting for VFPE SMOOTH(°C)	230	240	250	260	270	---
Extruder Temperature Setting For VFPE TEXTURE (°C)	240	250	260	265	275	---

NOTE :

1. Above figures are to be used as a guide only.
2. Wind and ambient temperature at the place of welding can affect the speed of welding and temperature setting.
3. Trial welding is very important and should be carried out each time when the machine is started.

TEMPERATURE CONTROLLER SETTING INSTRUCTIONS FOR EXTRUSION WELDER

- Turn machine on as explained in basic operation instruction.
- Red light indicates actual temperature and yellow light indicates setting temperature. Then press the increase or decrease switches to achieve the desired setting on the digital display (Refer to Fig. 1)
- Press controller mode key until AL-1 (alarm) is illuminated. This setting should always remain at 200 C. (Refer to Fig. 1)
- The drive motor cannot start until the temperature reaches the alarm setting. After checking the alarm setting, press the controller mode key twice. The controller will now display the actual temperatures. (Refer to Fig. 1)
- Refer to Extrusion Welder Setting Requirements for temperature settings for various material thickness. These temperatures are approximate and may need to be increased or decreased depending on the ambient conditions. Trial welds should be used to verify that the temperature settings are correct.

2.3 TRIMMING TEFLON SHOES

Install new Teflon shoes when the extruder is heated to operating temperature.

Using a razor knife, carefully trim the Teflon shoes until it formed a nice and smooth concave shape.

The surface of the shoes should be smooth and level after trimming.

2.4 OTHERS

During welding operations, ensure that the welding rod remains clean and dry.

When stopping, turn the extruder drive motor off and immediately remove the machine from the liner to prevent the nozzle from melting the liner.

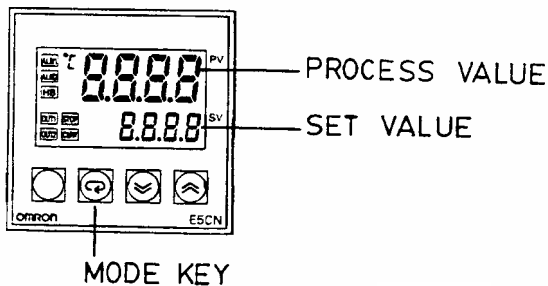


Fig 1

3 EXTRUSION WELDER START-UP AND BASIC OPERATION

- Check the machine for loose bolts, damaged parts, frayed wires, etc.
- Check voltage before connecting the machine to the power supply.
- For 220/240 volt machine min volts 220/max volts 250
- For 120 volt machine min volts 120/max volts 130
- Check that the drive motor switch is in the off position.
- Connect the machine to the power source and depress the circuit breaker to the “on” position.
- The machine should now be “on” check the temperature controller for a digital display. Do not start the drive motor until the extruder temperatures have reached at least 200°C.
- Check that the nozzle is clean and pull out the unwanted extruder that left at the Teflon by using a pair of sharp nose pliers.
- Check that the Teflon shoes are not worn and are trimmed properly.
- When the extruder temperatures reach their set points start the drive motor and check the voltage at the machine while the motor is running.
- With the drive motor running insert the welding rod into the feed block.

4. TRIAL WELD SAMPLES

A trial weld should be welded each day prior to welding operations to ensure that the extruder is functioning properly and the machine is properly set up for the ambient conditions.

- Trial welds should be at least 1 meter in length and should be made of the same material to be welded during welding operations. They should also be welded in the same ambient conditions that will be experienced during welding operations.
- Trial welds should be welded according to the methods described in the welding instructions.
- After welding allow the seam to cool, then cut two (2) test strips 10-15 mm wide and hand test in peel. The weld should not peel and there should be a film tearing bond.
- Check that the weld is centered on the seam.
- If the initial trial weld fails testing. Check the temperature settings and ensure the ambient conditions are acceptable for welding. Then produce another trial weld and retest.
- Do not begin welding operation until a passing trial weld has been produced

5. EXTRUSION WELDING OPERATIONS

- Start and check the machine as detailed in the basic operations and daily check list section.
- Before beginning welding operations check that the seaming area is clean and free of Moisture. Also check that the subgrade under the liner is smooth and level.
- Overlap the liner by a minimum of 10 cm and tack with hot air. When tacking ensure that the liner surface remains smooth and flat. Do not allow the material to become molten and deformed.
- When welding liner materials 1.5mm or thicker chamfer the edge of the top sheet by approximately 45 degree prior to tacking.
- Using a 10,000 rpm 4 ½ angle grinder fitted with an 80 grit aluminum oxide disc, grind the surface of the liner material a maximum of 15mm on each side of the seam. The orientation of the grinding marks should be perpendicular to the seam rather than parallel.
- Take care not to grind an excessively wide path or to grind too deep.
- Check that the grinding disc is not worn and that the grit is not clogged with plastic.
- Ensure that the length of the seam is ground completely as the weld will not bond in any areas that are not ground properly.

- Grinding must take place immediately prior to welding, any areas left unwelded for extended periods after grinding must be reground before welding can be resumed.
- After grinding ensure that the seam remains clean and dry. If an area of seam becomes dirty after grinding do not attempt to clean it with rags or hands, this can deposit additional dirt into the grind. The area should be reground.
- Prior to welding, start the extruder drive and purge the machine of old extruder, then with a wire brush remove excess extruder from the nozzle.
- Place the machine onto the seam and immediately start the drive motor and begin moving the machine forward.
- Note the step in the nozzle which corresponds to the step created by the overlap of Liner material. This determines the welding direction.
- The extruder should always be held perpendicular to the liner surface.
- Leaning the extruder forward will cause the Nozzle to dig into or drag on the liner surface.
- Leaning extruder backward will cause the weld to be too thin.

6. SPECIAL WELDING TECHNIQUES

CONTINUATION OF A PREVIOUS WELD

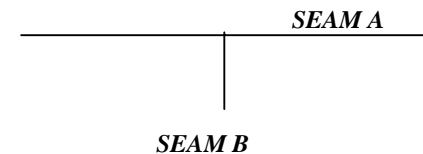
When a weld is re-started, care is needed to avoid capillary leaks where the new weld overlaps the end of the old weld. The same technique is used for sealing to the end of an old weld.

Grind off the end of the old weld by a minimum 5 cm with an angle grinder, taking care not to grind through the membrane.

Brush the area free from grindings.

Weld slowly down the ground edge onto the welded overlap.

WELDING T – JOINTS



Weld seam “A” through the intersection.

Grind weld “A” at the area of intersection removing all flashing.

Weld seam “B” up to the intersection.

WELDING PATCHES

Patches are required:

- a. To repair physical damage (e.g. pinholes)
 - b. Where a sample membrane or weld has been removed.
 - c. To repair pinholes.
- Cut an oval patch which will extend beyond the edges of the hole by at least 10cm in all directions.
 - If welds have to be crossed, grind a dished segment down to the level of the membrane at the crossing points.
 - When patching over wedge welded seams the flap must be removed from the wedge weld in the area of intersection prior to placing the patch.
 - Using hot air tack weld the patch to the liner.
 - Clean and grind the joint as for a normal weld.
 - Weld half of the patch down, starting on one straight edge and finishing on the other. Allow the weld to cool.
 - Grind both start and finish of the weld and complete the patching.

WELDING OVER PINHOLES

Prepare the membrane as for normal welding by wiping the area, then grinding and brushing it clean. Run a weld over the pinhole.

ADDITIONAL NOTES

- Always round corners. Do not try to weld through a 90° turn.
- Never run 2 welds side by side when the first weld is still hot. The sliding shoes cut through the first weld causing small pin holes. Always allow the first weld to cool, then grind it before running the weld next to it.
- Never attempt to “X” or cross a hot weld at T – Joints, as this cuts in and causes pinhole leaks.
- Do not weld-over-weld-over-weld, etc. The area should be patched.
- When the nozzle starts cutting into the weld, change shoes immediately.
- A board or plank should be used to support the edges of the sheet which have to be welded before placing in the anchor trench.
- Do not weld over small fishmouths. They must be cut, flattened, and patched.

EXTRUSION WELDER TROUBLESHOOTING GUIDE

<u>PROBLEM</u>	<u>CHECK</u>	<u>TROUBLE SHOOTIN</u>
1. No lights on control box	Power source	Refer to 1
2. No read out on temperature	Switches on control box	Refer to 1
3. Controllers read out on temperatures Error	Thermocouple	Refer to 2
4. Read out on temperature --- no heat on heater	Heater band Control box	Refer to 3
5. Read out on temperature --- heater is hot	Thermocouple Control box	Refer to 4
6. Temperature indicator above set temperature	Thermocouple Control box	Refer to 4
7. Drive motor does not run	Welder not up to temperature 200 degrees C.+ Motor switch Motor brushes Wire open Control box	Refer to 5
8. Drive motor runs but feed block do not turn	Broken gear box	Refer to 6
9. Drive motor runs but feed block does not turn	Loose feed block Broken gear	Refer to 7

<u>PROBLEM</u>	<u>CHECK</u>	<u>TROUBLE SHOOTING</u>
10. Feed block turns but rod does not feed	Improper tension on feed block upper section Rod jammed in feed block or feed tube Old rod melted at extruder screw	Adjust roper Clean Out Clean Out
11. Welder runs ext. temperature drops below 200 degrees C. and does not recover to near set point	Heater band	change heater
12. Welder runs but motor sounds like it is under heavy load, temperature on extruder climbs and stays above set point while running.	Damp welding rod	Use dry rod

7. EXTRUSION WELDER TROUBLESHOOTING GUIDE REFERENCE

Check that the breaker switch is in the on position.

Check that the breaker on the generator / power source is closed. Check voltage at receptacle you are plugging controller into with a multi meter set on the proper A.C. scale.

If 1A checks o.k. and you have no lights on controller, replace controller.

- Unplug the thermocouple for the readout showing S.Err. Using multi meter, read the two wire the thermocouple for resistance. If the thermocouple reads open or infinity, replace thermocouple. Check the wiring input from thermocouple to controller. If readout remains S.Err replace controller.
- Unplug affected heater. Using multi meter, read the two pins on the heater plug for resistance. If the heater reads open or infinity, replace heater. If the heater reads 80 Ohm replace controller.
- There is no fool-proof field test to determine the exact problem. First, replace the affected zone thermocouple. If no change, replace the controller.
- Check that extruder and nozzle temperatures are 200 degrees C. minimum.

- Check drive motor brushes. Replace if necessary.
- Unplug motor from controller. With a volt meter set to proper A.C. scale, check voltage on controller receptacle. If voltage is "o" replace controller.
- If 5.A. check O.K., disconnect drive motor plug from controller. With a volt meter set on proper A.C. scale, check voltage on controller. If you read proper voltage, replace drive motor.
- Remove drive motor and check that the key is in place between drive motor coupling and extruder screw. If key is in place and not broken, replace drive motor.
- Check that feed block assembly is tight to bearing housing. If feed block assembly is not loose remove feed block assembly and visually check. Replace with new assembly or check to see if new components are necessary.

EXTRUSION WELDER PART LIST

Part #	Description
* 4	Adaptor
5	Key – Main Drive
6	Retainer Ring (Rear) – Thrust Bag
7	Bushing (Rear) – Ext. Shaft
8	Spacer Ext. Shaft Cooper
9	Trust Bearing – Ext. Shaft
10	Spacer Washer – Ext. Shaft
11	Retainer Ring Front – Thrust Bag
12	Worm – Ext.
14	Grub Screw 5 x 6mm
15	Bearing Housing – Ext.
16	Drive Pins – Ext.
17	Rod Feed Tube
18	Barrel – Ext.
20	Socket Head Cap Screw 4 x 16mm
21	Nozzle
* 32	Teflon Shoe
33	Grub Screw 6 x 10mm
* 36	Heater Band
37	Socket Head Cap Screw 5 x 25mm
39	Spring – Tension Screw 5 x 30mm
40	Socket Head Cap Screw 5 x 35mm
41	Housing – Upper Feed Roll
42	Bearing – Upper Feed Roll
43	Bushing – Upper Feed Roll
44	Shaft – Upper Feed Roll
45	Socket Head Cap Screw 5 x 45mm
46	Rod Feed Housing
47	Lower Feed Roll
48	Key – Lower Feed Roll
51	Bushing (Large) – Lower Feed Roll
52	Bushing (Small) – Lower Feed Roll
53	Drive Gear – Lower Feed Roll
55	Retainer Ring – Lower Feed Roll
* 57	Thermocouple

Note: * Common ware and tear spare parts.

