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OPERATING MANUAL

A5 TIG Orbital System

75

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1. INTRODUCTION

1.1 General

Congratulations on choosing A5 TIG Orbital System 75 welding equipment. Used correctly, Kemppi products can significantly increase the productivity of your welding and provide years of economical service.

This operating manual contains important information on the use, maintenance and safety of your Kemppi product. The technical specifications of the equipment can be found at the end of the manual.

Please read the operating manual and the safety instructions booklet carefully before using the equipment for the first time. For your own safety and that of your working environment, pay particular attention to the safety instructions in the manual.


For more information on Kemppi products, contact Kemppi Oy, consult an authorized Kemppi dealer, or visit the Kemppi website at www.kemppi.com.


The specifications presented in this manual are subject to change without prior notice.

Important notes

Items in the manual that require particular attention in order to minimise damage and harm are indicated with below symbols. Read these sections carefully and follow their instructions.

 *Note: Gives the user a useful piece of information.*

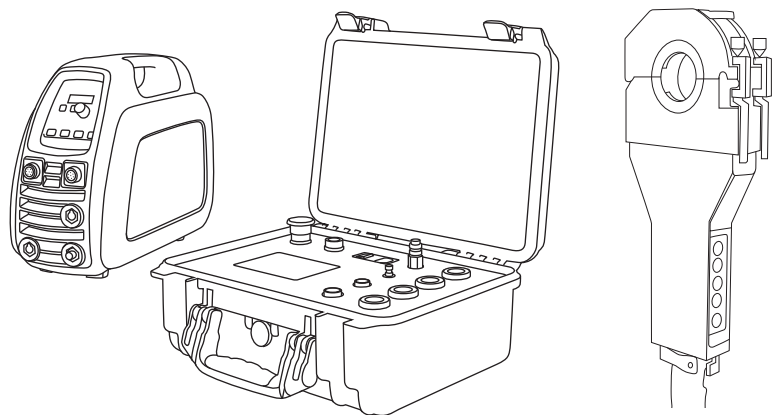
 *Caution: Describes a situation that may result in damage to the equipment or system.*

 *Warning: Describes a potentially dangerous situation. If not avoided, it will result in personal damage or fatal injury.*

Disclaimer

While every effort has been made to ensure that the information contained in this guide is accurate and complete, no liability can be accepted for any errors or omissions. Kemppi reserves the right to change the specification of the product described at any time without prior notice. Do not copy, record, reproduce or transmit the contents of this guide without prior permission from Kemppi.

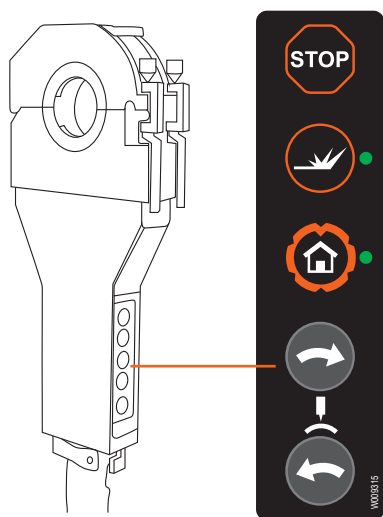
1.2 About the product



TIG orbital welding is a semi-automatic welding method where the arc moves automatically and without interruption 360° around tubes or fitting components. Its pulse technology produces consistently high-quality welding seam.

With this method, it is easy to produce high-quality joints even with low-level knowledge of welding. A5 TIG Orbital System 75 consists of a weld head, a controller unit, and an external TIG power source.

1.3 Weld head

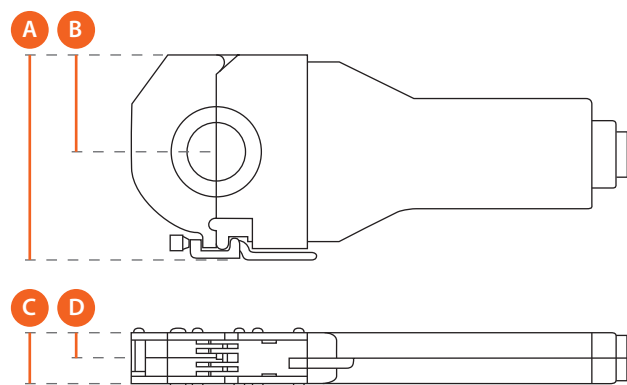


The weld head contains a U-shaped rotor gear that moves the tungsten electrode orbiting the non-moving tube. The head totally encloses the weld joint and allows the interior of the head to be flooded with shielding gas. The system includes water cooling for heavy duty cycles.

Control panel is in the handle, and assembly to the controller is provided by a 7.5-metre hose (longer cables are available).

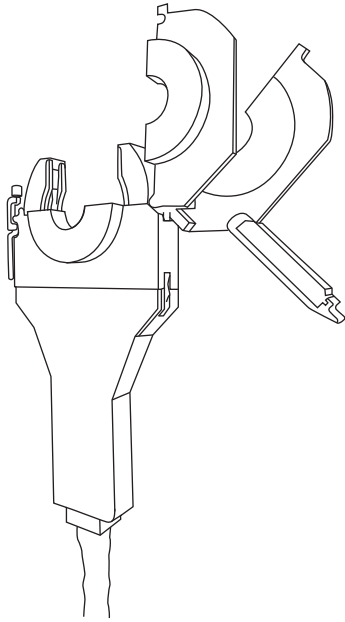
The weld head is clamped on tubes by changeable collets. It includes a chamber for shielding gas. Interchangeable collets are used for specific outer diameters (OD).

1.3.1 Tube diameters and weld head outline dimensions



| | 15010 | 15080 | 15030 | 15040 | 15060 |
|--------------------|-------|-------|-------|--------|----------|
| Weight (kg) | 3.2 | 5.0 | 6.4 | 8.2 | 10.0 |
| Tube Diameter (mm) | 3–25 | 6–51 | 9–75 | 12–102 | 50–152.4 |
| A (mm) | 124 | 175 | 202 | 231 | 297 |
| B (mm) | 62 | 83 | 96 | 110 | 144 |
| C (mm) | 43 | 43 | 43 | 43 | 43 |
| D (mm) | 19 | 19 | 19 | 19 | 19 |

1.3.2 Collets



Collets are used for clamping the weld head on the tube or fitting to be welded. Collets always come in pairs, and they are mounted on the hinged collet frame with screws.

Collets are specified by:

- Weld head model
- Outer diameter (OD) of the tube or pipe.

Two types of collets are available: flush and extended.

1.3.3 Collet frame and collets

The collets mount in the weld head and are used to clamp the head on to the tube or fittings to be welded.

- The collet frame swings open on a hinge and is held closed using two latches on either side of the head.
- Both sides of the collet frame open and close independently.
- This allows one tube (or fitting) to be clamped in place and the second tube (or fitting) to be butted tightly to the first clamped tube before it is clamped.

i Above function is solely to keep the head from moving during welding, and it should not be used as a substitute for external alignment fixtures, clamps, or tack welding to hold the workpieces aligned.

Each collet pair consists of two half-circle pieces that are mounted on both sides of the hinged collet frame using screws (see images below).

The collet frame and collets are connected to the work (+) lead of the torch cable, and a separate return lead is not needed.

i Collet sets must be ordered separately. One weld head requires two pairs of collets (1 set = two pairs).

1.3.4 Flush collets

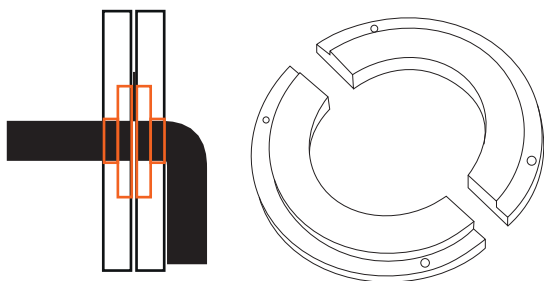


Figure: A pair of flush collets

The outer surface of the collet pair is flush with the outer face of the collet frame. Flush collets are used for joints where there is very little straight length between the joint and an obstruction.

Advantages:

- Enables welding in tight places where there is not much room for clamping, for example when welding fittings on a tube or pipe.
- Allows the minimum distance between the tungsten electrode and an obstruction. For example, if a fitting must be welded there is frequently only a minimal straight length on the fitting available for clamping.

Disadvantages:

- Less stable and less capability for holding both welded pieces aligned with each other.
- The thicker or wider the collet, the greater alignment capability it has to hold the tube or fitting so that both ends of the tubes to be welded are squarely aligned. Therefore, flush collets have minimal width alignment of tube ends.

1.3.5 Extended collets / combination

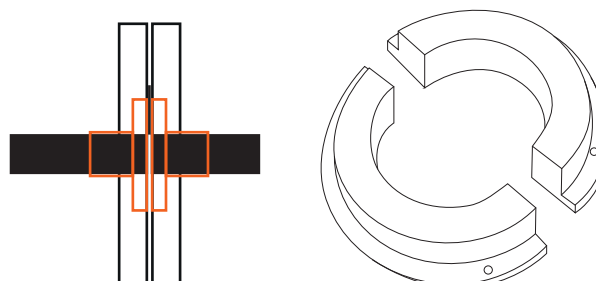


Figure: A pair of extended collets

Extended collet is thicker than flush collet, and it extends wider from the collet frame. Wider or thicker collets can be made where the extra collet length is extending outward from the face of the collet frame. The amount of extension is 18 mm on each side where extended collets are used.

Advantages:

- More stable and more capability for holding both welded pieces aligned with each other.
- Greater alignment capability due to longer length.

Disadvantages:

- Takes more space, and may not allow welding in tight places for example in certain fitting-to-tube welds, depending upon fitting type.
- Requires a certain straight length of tube on which to clamp.

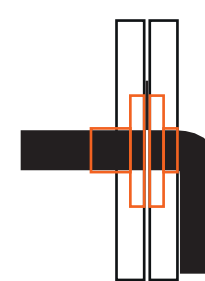
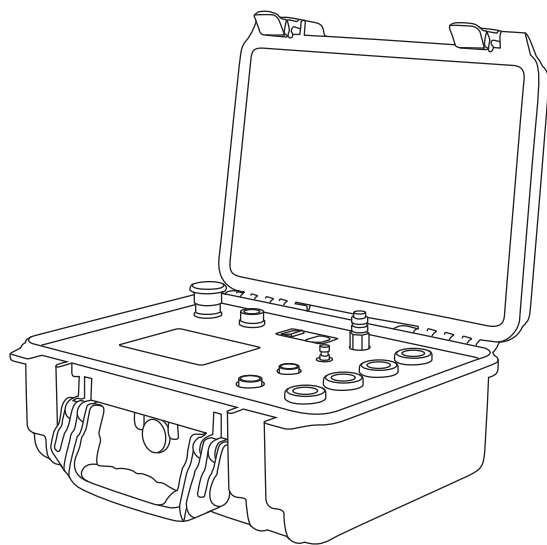


Figure: A combination of collets

Combination:

- Combination of extended and flush collet pair can be used for tube-to-fitting welding, for example.
- If your application consists of tube-to-fitting welding but you need greater alignment capability when mounting on the tube side, use an extended collet pair on one side of the head and a flush collet pair on the other

1.4 Controller unit



A5 TIG Orbital System 75 controller unit is enclosed in a durable plastic case to operate, store and transport. The unit includes an intuitive graphical user interface with touch screen controls. Its software allows auto programming for automatic calculation of welding parameters. The unit also includes a USB port for storing downloaded software updates or standard parameters on a memory stick.

1.5 TIG power source

A5 TIG Orbital System 75 uses an external TIG power source. This allows using the same power source for tack welds.

i *With Kemppi Master MLS 2300 AC/DC power source, Microtack® function allows easy and fast tacking. This is usually possible without root-side purging because the tack weld is so small that there is no oxidation.*

The A5 TIG Orbital System 75 controller unit is inherently compatible with several different power source models. The system is compatible with the following welding equipment:

Kemppi power sources

- Kemppi MinarcTig Evo 200
- Kemppi MasterTig MLS 2300 ACDC

Other brands

- Lincoln Invertec V160
- Miller Maxstar 150 STH
- Miller Maxstar 200 DX
- Miller Dynasty 200 DX
- Telwin TIG 185
- Telwin TIG 222
- Thermal arc Arcmaster 200 ACDC

i *The controller unit also includes a general-purpose power source. You may be able to use other models by adjusting the remote-signal scale of the controller's GP power source settings*

1.6 Tube preparation

For successful autogenous welding, ensure that the tube ends (or fittings) are machined square relative to their axes. The two ends are butt tightly together.

There should be no gap between the tube ends resulting from lack of squareness or burrs left from the machining process. Use appropriate tube-squaring equipment to machine both tube and fitting ends.

Once the tube end is faced off, check for burrs. Any burrs must be carefully removed with a hand de-burring tool. Do not chamfer the tube ends.

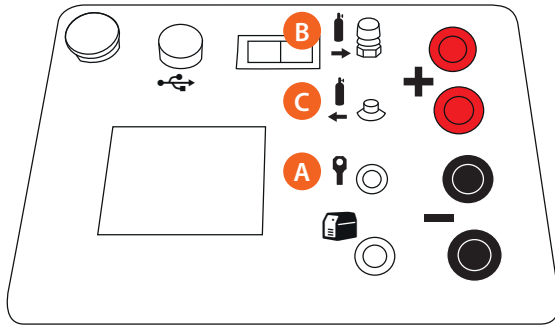
Cleaning the tube

After machining the tube, clean it properly using the following procedure:

1. Wipe the tube end with a lint-free towel dipped in a solvent such as acetone or denatured alcohol.
2. Immediately dry with a second clean cloth before the solvent has a chance to dry.
3. Use an abrasive cloth to remove any surface oxides or contaminants.
4. Clean the tube end back to approximately 12 mm (0.5").
5. Repeat the solvent cleaning operation.
6. Clean the tube ID in the same way.

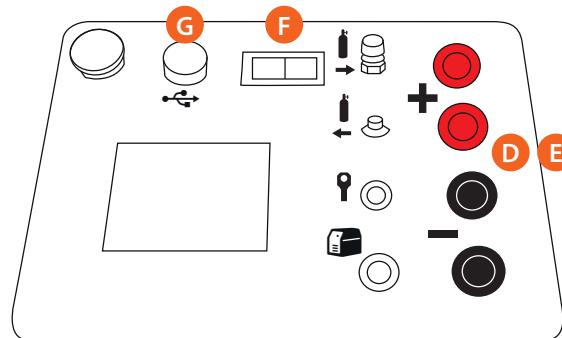
2. INSTALLATION

2.1 Connecting the weld head



All connections are located on the controller unit:

- A. Connect the weld head's control cable to the connector marked with the weld head symbol.
- B. Connect the weld head's gas hose to the **Gas Out** connector.
- C. Connect the hose from gas cylinder to the **Gas In** connector



- D. Connect the weld head current cables to the positive (red) and negative (black) connector.
- E. Connect the power source current cables to the positive (red) and negative (black) connectors.
- F. Connect the power source remote control cable to the connector marked with the power source symbol.
- G. Connect the IEC mains cable to the **IEC** connector.

i *The weld head contains cooling hoses for applications where water cooling is used. The water cooler must be included in the power source or it must be external. Without water cooling, the weld head duty cycle may become slightly smaller compared to water cooling. The weld head is protected against over-heating.*

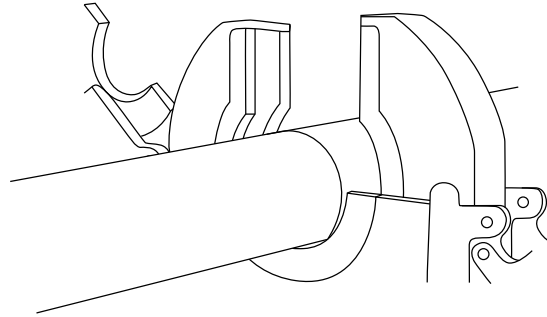
2.2 Installing collets on the weld head

The collets are designed to clamp firmly on the outside diameter (OD) of the tubing or fittings to be welded. The interior diameter (ID) of standard collets is oversized relative to the tube to be welded by .075 mm to allow for standard dimensional tolerances. The collet halves that make a pair are identical. They are engraved to show the tube OD or tube fitting ODs and type.

1. Install the two (2) pairs of appropriate collets on either side of the weld head collet frame using button head screws. The collet inserts are threaded to eliminate stripped threads in the collet frame, which is more expensive to repair or replace.
2. Accomplish firm clamping by slight over-closure of the collet frame. Compliance and preload are provided by the collet frame adjustable latch mechanism.

⚠ *The latch lever provides very high clamping loads with minimal effort. After adjusting the thumbscrew on the latch mechanism, the toggle action of the lever should require no more than light pressure of one finger to close. Over-tightening can result in damage to the collet frame or tubing.*

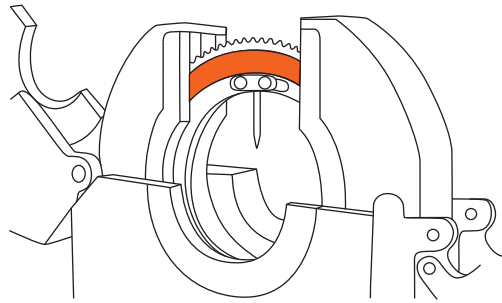
2.3 Mounting the weld head



1. Install suitable collets on the weld head.
2. Install suitable electrode in the holder.
3. Mount the weld head on the tube and align with the welding joint.
4. Close one side of the welding head and lock it against the tube with the latch.
5. Place the other tube very tightly against the first tube already clamped.
6. Close the other side of the weld head and lock with the latch.
7. Look through the hole on top of the weld head to ensure that the alignment is right.
8. Close the hole cover.

3. OPERATION

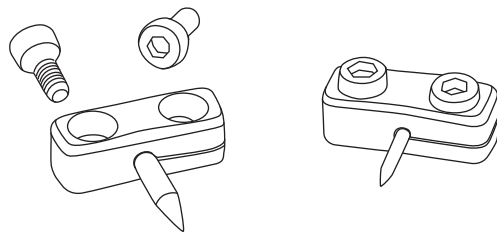
3.1 Rotor gear



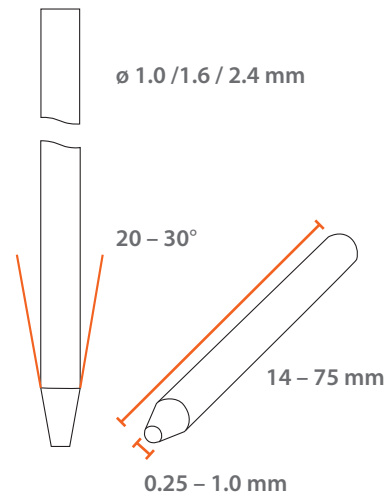
Weld head contains a rotor gear that drives the electrode around the tube. Rotor gear is U-shaped to allow easy placement of the weld head on and off the tube. Electrode is fastened on the rotor gear with an easily replaceable electrode holder. The holder prevents the rotor gear from damage.

Electrodes and holders are available in the following diameters:

- 1 mm (.040")
- 1.6 mm (.062"), default
- 2.4 mm (.094")



3.2 Tungsten electrode



Electrode diameter, tip geometry, and arc gap are important factors in repetitive precision welding. Inserted into the holder and carefully bottomed, the electrode forms exactly the correct arc gap. The electrode must be exactly the correct length with a maximum tolerance of 0.1 mm. Pre-grinded and cut-to-length electrodes are available.

3.2.1 Tungsten electrode diameter and length

You can use multiple tungsten electrode sizes in each weld head by changing the tungsten electrode holder. Tungsten electrodes and tungsten electrode holders are available in the following sizes:

- 1.0 mm
- 1.6 mm
- 2.4 mm

Order the tungsten electrodes or cut them to a precise length yourself. When the tungsten is inserted into the holder and bottomed, it will create the desired tip-to-work distance without the need for adjustment.

i To determine the correct tungsten length, use the 75 series controller's Tungsten Length Calculator. If the controller is not available, use the following formula to calculate cut-length or visit Kemppi Automation website.

| Model | Tungsten length |
|-------|------------------------------------|
| 7530 | 54.6 mm – radius of tube – arc gap |
| 7540 | 66.8 mm – radius of tube – arc gap |

The electrode must be precisely the correct length with a maximum tolerance of 0.1 mm. Correct electrode length depends on the weld head size, electrode diameter, and tube diameter. See correct tungsten electrode lengths under Ordering Information.

3.2.2 Installing the tungsten electrode and holder

To install the tungsten electrode and holder, do the following:

1. Turn the controller power switch ON.
2. Using the +/- rotation jog on the weld head handle, rotate the rotor to the open throat area of the weld head.
3. Using 3 mm x 6 mm cap screws, install the block and tungsten electrode into desired position. The tungsten electrode mount block is a split block.
4. Leave screws loose and push tungsten against the back-up wall on the rotor.
5. Tighten screws, solid side first, then split side.

i The standard position of tungsten electrode as viewed from the side along the tube centerline is a 5° down from 3 o'clock. This is to avoid breaking of tungsten when installing on pre-tacked tube. You can use alternative tapped holes in rotor (8 or 6 o'clock position) e.g. in case of stripped threads in rotor.

3.2.3 Tungsten electrode geometry guidelines

Tungsten electrode diameter

Use the smallest diameter tungsten electrode suitable for the weld current range for positive arc ignition and a stable arc. Thicker diameters handle high currents and have a greater life at the expense of arc starting. Recommended Tungsten electrode diameters for different tube wall thicknesses.

| Tube wall thickness | Tungsten electrode diameter |
|---------------------|-----------------------------|
| Up to 1.0 mm | 1.0 mm |
| 1.0–2.4 mm | 1.6 mm (.062") |
| 2.4–4.0 mm | 2.4 mm (0.094") |

Arc gap

The tungsten electrode tip-to-work distance, or arc length when kept to a minimum, produces a more stable arc and deeper penetration. For general tube welding, the arc gap should be adjusted between 0.75 mm and 1.8mm. Table below is presented recommended tip-to-work distance.

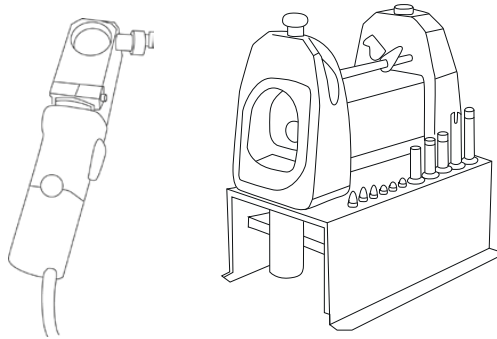
| Tube wall thickness | Recommended arc length |
|---------------------|------------------------|
| 0.5–1.0 mm | 0.75 mm |
| 1.0–2.0 mm | 1.3 mm |
| 2.0–4.0 mm | 1.8 mm |

Tungsten electrode tip angle and flat diameter

Tungsten electrode angles (inclination angle) between 15° to 30° enable the most automated welding. Kemppi recommends 20° for autogenous welding in the general current range used with the 150 series weld heads.

| Electrode Diameter mm | Flat diameter mm | Included Angle (deg) | Constant current Range (amp) | Pulsed current Range (amp) |
|-----------------------|------------------|----------------------|------------------------------|----------------------------|
| 1.0 mm | 0.25 mm | 20° | 1 | |
| 1.6 mm | 0.5 mm | 20° | 8–50 | 8–100 |
| 1.6 mm | 0.75 mm | 20° | 10–70 | 10–140 |
| 2.4 mm | 0.75 mm | 30° | 12–90 | 12–180 |
| 2.4 mm | 1.0 mm | 30° | 15–150 | 15–250 |
| 3.2 mm | 1.0 mm | 30° | 20–200 | 20–300 |

3.3 Electrode sharpeners



NEUTRIX

Ultima - TIG - cut

Use sharpener to sharpen the electrodes, to cut them to correct length, and to help gather and recycle welding dust.

Desktop model (recommended) allows more precise lengths. It recycles dust into liquid instead of air. You can also use a hand-held model. You can also use a hand-held model. Only sharpening is possible with the hand-held model, not accurately cutting to length.

You can obtain a faster and more uniform grinding result compared to manual grinding with an optional auto-grind device.

! *Tungsten is the most suitable material for welding electrodes but it is hazardous as waste and when breathed.*

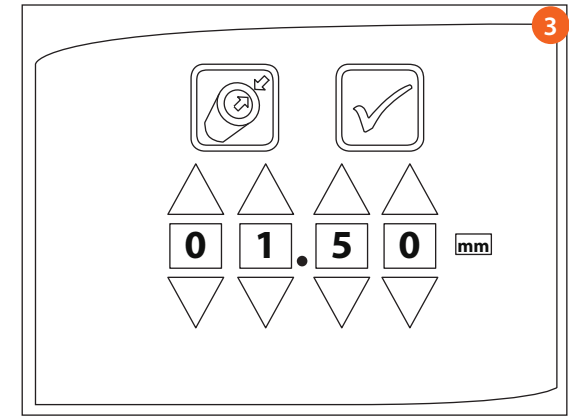
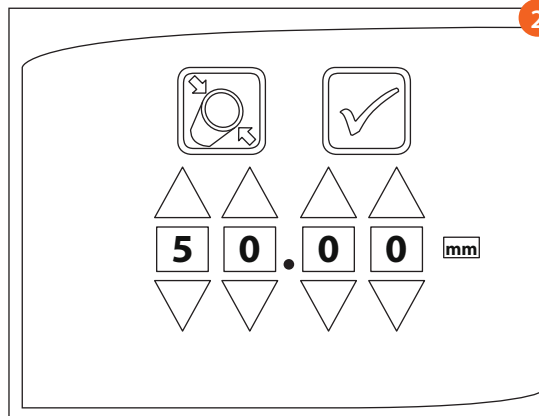
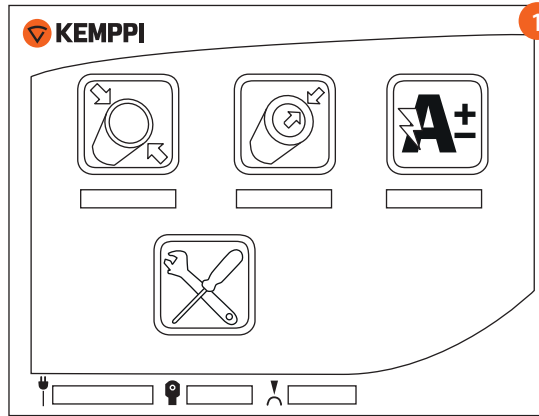
3.4 Weld head control panel



- A. Stop: immediately terminate the weld cycle and all functions of the weld head.
- B. Start Weld: initiate the weld program. LED light beside the button is lit during the weld cycle. This is also a soft way to stop welding.
- C. Home position: welding can be started only when the rotor gear is in its home position. It also allows easy installation and removal of the workpiece.
 1. Press the Home button to move the rotor gear to the home position.
 2. A red LED ignites next to this button, when the rotor gear reaches its home position.
- D. Rotation forward or reverse: with these buttons you can move the rotor gear to either direction when welding arc is not on. This is useful when mounting or replacing the electrode or checking its condition.

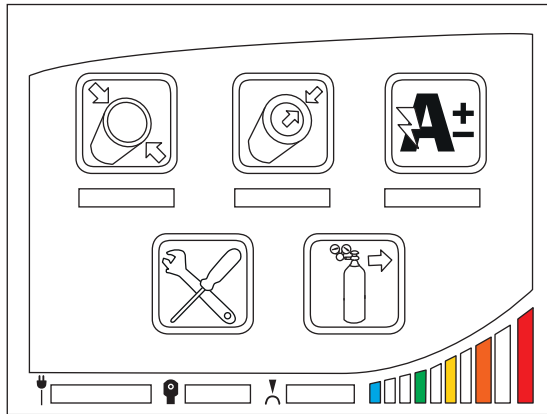
3.5 Controller unit control panel

3.5.1 Quick guide to start welding



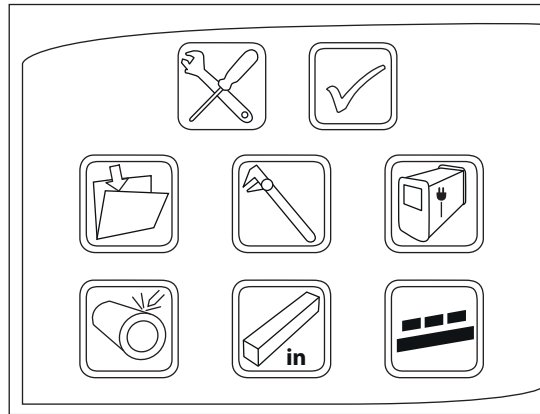
1. Start from initial screen.
2. Set the tube's OD size.
3. Set the tube's wall thickness.
4. Press **Start Weld** button

3.5.2 Main/Home screen



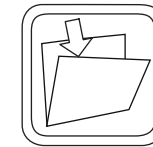
1. Tube outer diameter
2. Tube wall thickness
3. Amperage corrections/fine tuning
4. Tool box
5. Gas purge
6. Power supply
7. Weld head
8. Electrode length
9. Weld head temperature

3.5.3 Initial setup screen

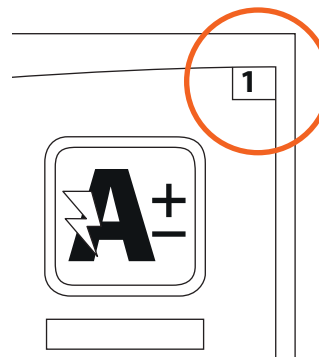
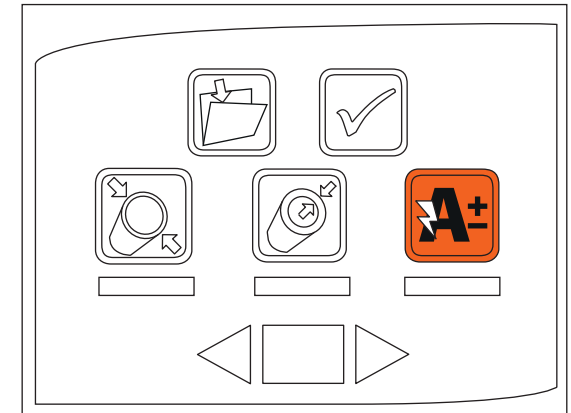


1. Press the toolbox icon.
2. Select metric or inches.

3.5.4 Program storage (Library)



The A5 TIG Orbital System 75 controller unit stores the last ten (10) programs that have been created. These ten programs can be called up by using the Tool Box.



3.5.5 Weld Programs – selecting a weld program 1–10

Selected welding programs show on the top right corner of the screen.

i If a program is modified (for example, Program 2), it can run in modified state without changing the stored Program 2. As soon as the power is turned off, it stores the screen parameters and overwrites the original Program 2. When the same program is loaded from the memory (after unsaved modifications), the original saved program is restored.

When controller unit's power is turned on, it always displays the last program run before power was turned off.

i You can store programs on a memory stick using the USB port and extend your number of stored programs.

3.5.6 Calibrating weld head or power source output

1. On the Tool Box screen, press **Calibration**.
2. This screen indicates that you need to read the manual before calibration. Continue by pressing the check mark to display below screen.
3. Two modes are available:
 - Checking Weld Head Rotation Speed
 - Calibrating Weld Current Output
4. Check head rotation speed.
5. Connect the weld head to the controller and load a program, or call up a stored program.
6. Press Head Rotation Speed Check

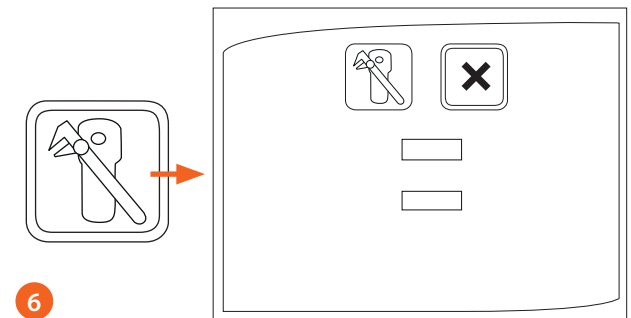
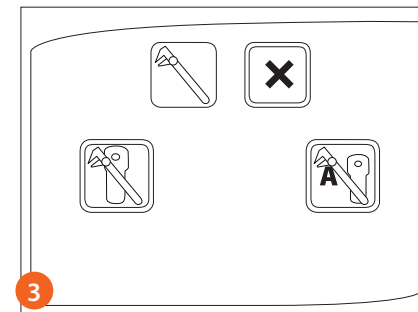
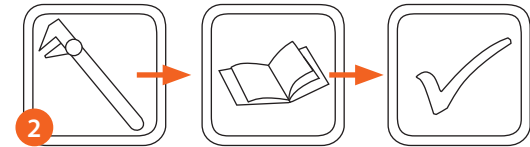
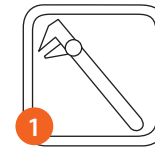
! Pressing the **Head Rotation Speed Check** button starts the rotor in the weld head to rotate without an arc. Keep your hands clear from the rotor.

Previously selected program autogenerates a certain rpm that is also shown as time in seconds for one revolution.

- Use a stopwatch or watch to check the actual rotation time.

The rotor starts at Home position, travels 360°, and stops when pressing **Home**. Actual rotation time should match the calibrated time. The rotation motor is factory calibrated and should not need recalibration.

- Contact Kemppi if the weld head has lost its calibration.

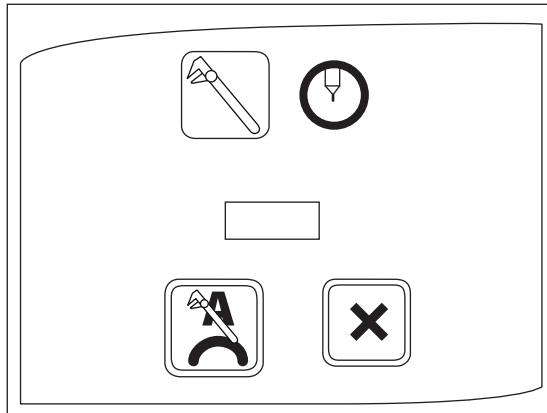


3.5.7 Calibrating weld power source current output

Once a power source has been selected, the expected current output is reasonably accurate and small variations can be corrected by amperage override control.

Calibration is used to correct manufacturing variations between different power sources.


1. On the Home screen, select a program or create a new program by entering correct tube O.D. and wall thickness.
2. Go to Tool Box, and press **Calibration**.
3. Press **Amperage Calibration**. The following screen appears.



The **Start Weld** symbol blinks.

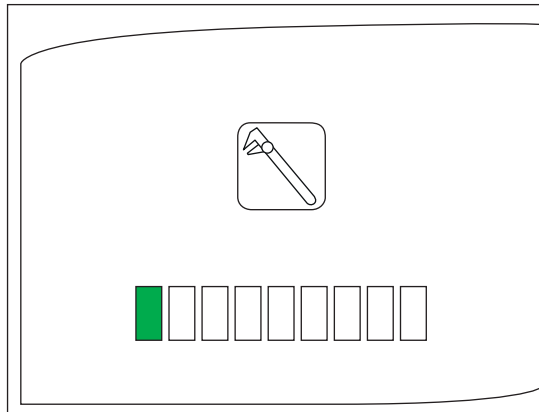
4. Install a tube in the weld head and close the collets.
5. Follow the procedure that would be used during welding, including tube cleaning and I.D. purging.
6. On the weld head's panel, press **Start Weld**.

 **Arc ignites and welding occurs during calibration.**

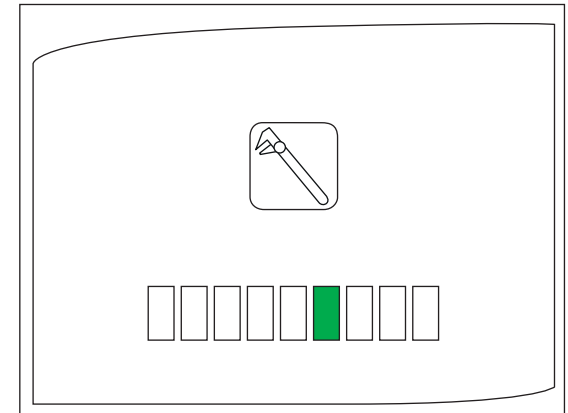
 **If the system has been calibrated, press **Reset** to reset factory default setting.**



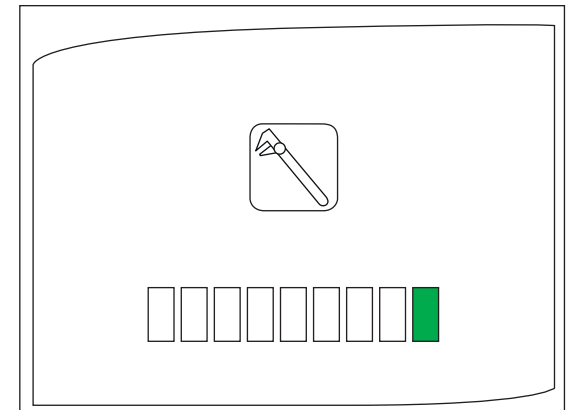
The following screen indicates that calibration is in process, and the system is prepurging.



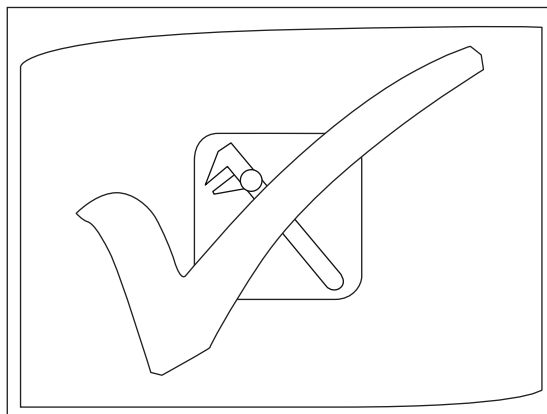
The following screen indicates the time that the arc is on.



The following screen indicates postpurge



Check appears to indicate that calibration has been successfully completed.



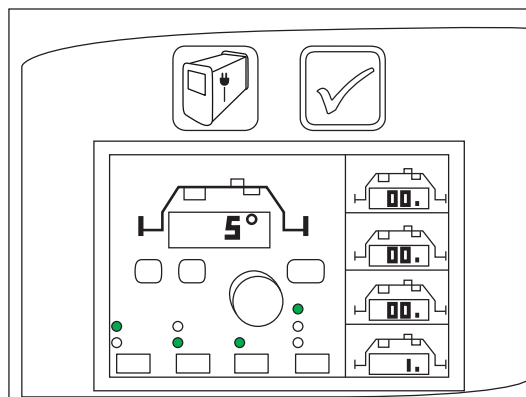
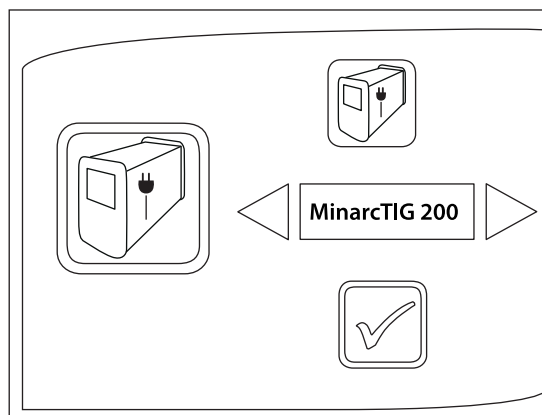
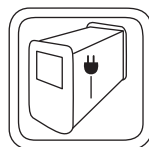
If an error occurred during calibration, an error screen of below type appears.

7. Exit the screen by pressing **Check Mark** and repeat the sequence.

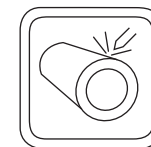
3.5.8 Selecting power source

1. Press the power source icon.
2. Select your power source from the list.
3. After pressing the power source icon the correct control panel setting is displayed on the screen.

i Power Source Trigger logic must be set to 2T (remote standard) mode. However, the terminology within the industry is not standardized.



3.5.9 Pulsed/non-pulsed welding



Select **Pulsed/Non-Pulsed** welding.



Pulsed Current

Non-Pulsed Current

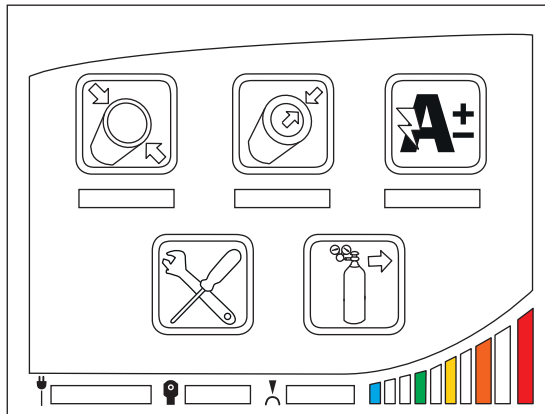
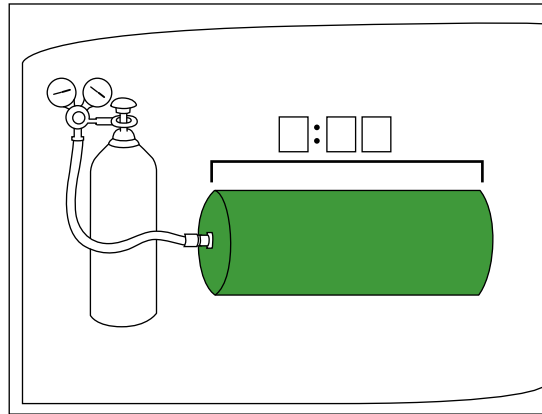
These alternate at each push of the button.

3.5.10 Gas purge

Gas purge fills the weld head with backing gas.

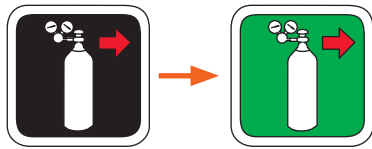
1. Connect the gas hoses.
2. Switch on the controller unit.
3. Press **Purge** on the main menu.
4. After purging, the purge icon turns green.
5. The system is now ready for welding.

i When using backing gas, make a branch to the gas hose after controller gas output. Then adjust the gas flow to both branches to the desired value (backing ca. 2–5 l/min and weld head 5–10 l/min). Pressing the purge purges the weld head and starts the gas-flow.



3.5.11 Preparing welding – test weld

1. Power On: Turn on the power of the power supply and the controller.
2. Weld Head: Clamp the weld head on the workpiece
3. Purging the Head: Purge the gas hose and chamber of the weld head by pressing the icon on the power supply. The icon changes from black to green when gas is flowing.



Purge the weld head and gas line for approximately ten (10) minutes prior to the start of welding per shift.

4. Purge the tube ID in preparation for welding.

i *Welding stainless steel requires purging.*

Isolating the weld root

Isolate the weld root by means of dams or other suitable containment devices. Purging requires openings through which the purging gas can enter and exit the weld joint area at controlled rates. The gas inlet should be located lower than the exit opening to prevent entrapment of air.

Preventing excessive pressure

Provisions for an adequate vent or exhaust are important to prevent excessive pressure buildup during welding. The size of the exit port should be equal to or greater than the size of the entry to prevent an increase in the gas pressure. If the weld joints are pre-tacked in larger assemblies, you may need to tape each unwelded joint to prevent excessive loss of purge gas.

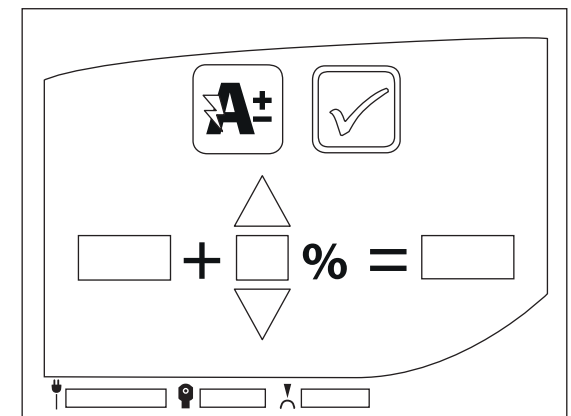
Purge flow rate

The purge flow rate is based on volume to be purged. A general rule of thumb is to purge at flow rates and times that will produce five to ten system volume changes prior to welding. The recommended maximum flow rate is a function of the volume and shape to be purged. Typically, the purge rate should not exceed 40 l/minute.

5. Load a Program: Select appropriate weld program as described in section Program storage. The red LED on the handle next to the Home position ignites. If not, press **Home**. The rotor rotates until Start position is reached, and the LED ignites. See weld head operation panel above in this manual.

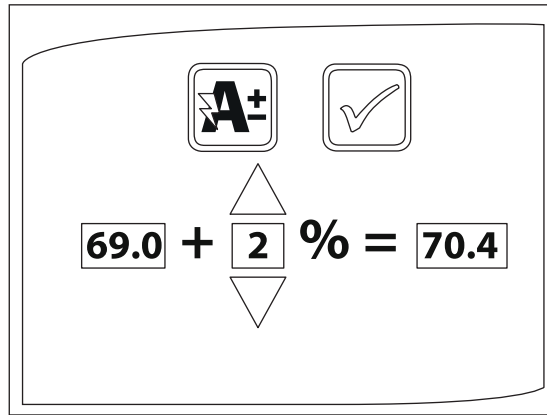
i *Do not start the weld head if it is out of its Home position. Once the rotary gear is out of its Home position, it is exposed to the walls of the chamber and collets that are at work return potential. In rare cases this can create an arc over so that welding current occurs between rotating gear and housing.*

6. Completion of the Weld: Autorewind function rotates the rotor into "open throat" position to allow the weld head to be removed. If the weld is not completed, press **Home** to rotate the rotor to the correct position to allow the weld head to be removed from the workpiece.
7. Remove the weld head: Open both sides of the hinged collet frame and remove the weld head from the workpiece.
8. Inspect the Test Weld : Visually inspect the test weld. If the weld is incompletely penetrated or lacks adequate bead width, adjust the weld current (amperage) upward.
 - a. Press the Amperage +/- button.
 - b. Increase the amperage by a small percentage.



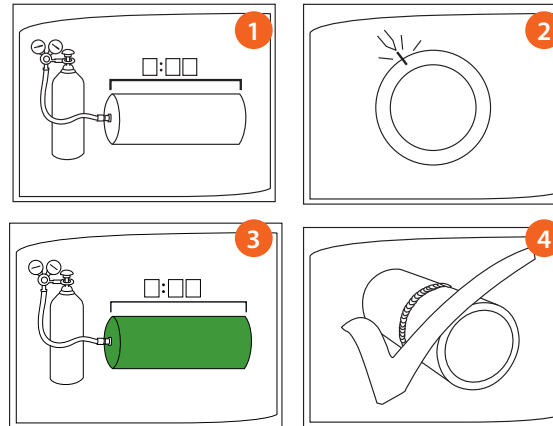
3.5.12 Icons and screens during welding

Various screens display during welding to indicate the function in progress.



9. Press the **Confirm** button.
10. Make a second test weld. Repeat the adjustment process as necessary.

i If the weld is excessively wide and the OD is concave, decrease the amperage by a percentage and make another test weld. The correction percentage appears on the main screen as a digit (+ amps) or as a minus digit (- amps).



1. Pre-purge

Press **Start Weld** on the weld head to initiate the weld sequence. Purging of gas inlet hose and weld head with argon occur for a preprogrammed time in seconds. Remaining time is displayed.

2. Arc ignition and weld progress

The electrode does not start to rotate immediately following arc ignition. This delay allows the arc to penetrate to the tube I.D. The delay time is determined by the tube wall thickness dimension. The electrode in the graphic rotates at the same speed as the actual electrode.

3. Post-purge

Following weld completion, the purge gas continues to flow for a predetermined time. This is to allow the weld to cool adequately to prevent oxidation of the stainless weld.

! Do not open the weld head during post-purge.

4. Weld cycle completed

You can now remove the weld head from the workpiece.

3.6 Equipment stop

To stop weld head and controller operation at any time:

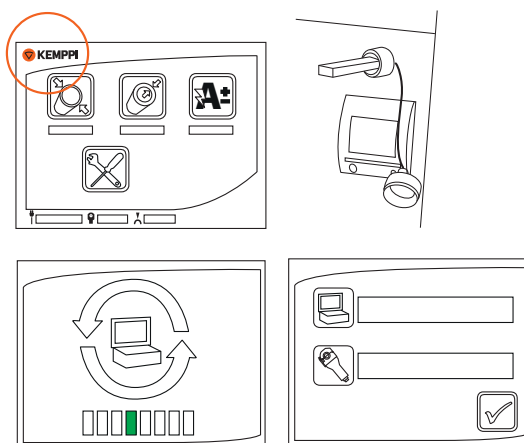
1. Press the **Stop** button on the weld head control panel, or
2. Press the large red **EQUIPMENT STOP** button on the controller unit. This is a locking switch that disconnects power from the controller. The control circuits remain powered.

 *The EQUIPMENT STOP button on the controller unit needs to be released before the unit can be used.*

3.7 Updating software

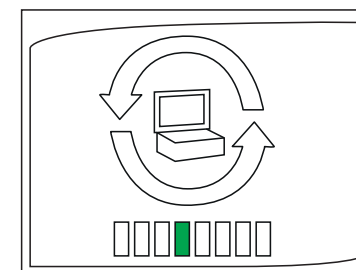
To check for software revisions:

1. Check the version displayed on the splash screen by pressing the Kemppi logo in the upper left corner of the Home screen.
2. Display shows controller software revision as well as weld head revision, if the weld head is connected.



To update software:

1. Use the USB port to load new software. The weld head does not have to be connected unless it is the weld head software that is to be updated.
2. Press the Kemppi logo on the Home screen.
3. Press the controller icon.
4. Insert the memory stick into the USB port of the controller unit.
5. The screen indicates that software transfer is in progress.



6. To complete the installation after download, press **Equipment Stop**.
7. Remove the stick.
8. To release **Equipment Stop**, rotate it slightly and pull up.

The software has been updated and the A5 TIG Orbital System 75 is ready for use.

If the weld head software is to be updated, repeat this procedure. Start by pressing the weld head icon.

4. ADDITIONAL DETAILS

4.1 Technical data

| Property | Value |
|---------------------------------------------------------------|--------------------|
| Input power | 90 – 240 VAC, 1A |
| Welding positions | all |
| Auto-stop | yes |
| Weld head | 7530 & 7540 |
| Pipe outer diameter (O.D.) | 9.5 – 101.6 mm |
| External dimensions | 330 x 420 x 170 mm |
| Weight | 6.0 kg |
| Degree of protection with cover opened | IP 22 |
| Degree of protection, cover closed (transportation & storage) | IP 65 |
| Operating temperature | -20...+40°C |

4.2 Ordering information

| Product name | Product code |
|---------------------------------------------------------------|---------------------------|
| Product name | Product code |
| A5 TIG Orbital Controller 75 | 6204075 |
| Power source: MinarcTig EVO 200 | See MinarcTig information |
| Power source MasterTig MLS 2300 AC/DC | See MasterTig information |
| Tungsten electrode 1.0 mm, L = 175 mm, 10 pc | 9873531 |
| Tungsten electrode 1.6 mm, L = 175 mm, 10 pc | 9873532 |
| Tungsten electrode 2.4 mm, L = 175 mm, 10 pc | 9873533 |
| 7530 Orbital weld head | 6206000 |
| 7540 Orbital weld head | 6206001 |
| 150 Series Orbital Tungsten Mount Kit 1.0 mm | SP800681 |
| 150 Series Orbital Tungsten Mount Kit 1.6 mm | SP800682 |
| 150 Series Orbital Tungsten Mount Kit 2.4mm | SP800683 |
| Dual flow meter regulator | SP800680 |
| Ultima TIG-cut, tungsten electrode cutting/sharpening machine | 6270001 |
| Neutrix, portal tungsten electrode sharpening machine | 6270002 |
| Auto grind, tungsten electrode automated grinder | 6270003 |
| Purge plug kit 10–100 mm | 6206009 |
| Oxygen content meter 10–1000 ppm | 6206008 |
| Storage case for weld head (optional) | |

See suitable collets in the collet table.


4.2.1 Ordering collets

When ordering collets, it is important to specify the exact OD dimension of the tube or fitting. Because of the wide range of fitting manufacturers, it is necessary to specify the fitting manufacturer and type. If possible, include data sheet or drawing defining the specification for the fitting in the order.

Each fitting manufacturer has different tolerances on the dimensions of the fittings. Several fitting manufacturers have special product lines specifically designed for orbital welding.

Collets for each type of weld head are specified by:

- Weld head model
- Tube/pipe OD
- Flush or extended

 *The codes in the below list are per pair of collets. One weld head requires two pairs*


4.2.2 Collets

When ordering collets, it is important to specify the exact OD dimension of the tube or fitting. Because of the wide range of fitting manufacturers, it is necessary to specify the fitting manufacturer and type. If possible, include data sheet or drawing defining the specification for the fitting in the order.

Each fitting manufacturer has different tolerances on the dimensions of the fittings. Several fitting manufacturers have special product lines specifically designed for orbital welding.

Collets for each type of weld head are specified by:

- Weld head model
- Tube/pipe OD
- Flush or extended

 *The ordering codes in the above list are per pair of collets. One weld head requires two pairs.*

Collet product codes for 7530 weld head

| Tube OD (inch) | Collet, Extended | Collet, Flush | Tube OD (mm) | Collet, Extended | Collet, Flush |
|----------------|------------------|---------------|--------------|------------------|---------------|
| 0.375 | 1001246-0.375 | 1001248-0.375 | 10 | 1001250-10 | 1001252-10 |
| 0.402 | 1001246-0.402 | 1001248-0.402 | 12.0 | 1001250-12 | 1001252-12 |
| 0.500 | 1001246-0.500 | 1001248-0.500 | 13.0 | 1001250-13 | 1001252-13 |
| 0.625 | 1001246-0.625 | 1001248-0.625 | 13.5 | 1001250-13.5 | 1001252-13.5 |
| 0.677 | 1001246-0.677 | 1001248-0.677 | 16.0 | 1001250-16 | 1001252-16 |
| 0.750 | 1001246-0.750 | 1001248-0.750 | 18.0 | 1001250-18 | 1001252-18 |
| 0.839 | 1001246-0.839 | 1001248-0.839 | 19.0 | 1001250-19 | 1001252-19 |
| 1.000 | 1001246-1.327 | 1001248-1.327 | 20.0 | 1001250-20 | 1001252-20 |
| 1.327 | 1001246-1.327 | 1001248-1.327 | 22.0 | 1001250-22 | 1001252-22 |
| 1.500 | 1001246-1.500 | 1001248-1.500 | 23.0 | 1001250-23 | 1001252-23 |
| 1.669 | 1001246-1.669 | 1001248-1.669 | 26.9 | 1001250-26.9 | 1001252-26.9 |
| 1.902 | 1001246-1.902 | 1001248-1.902 | 28.0 | 1001250-28 | 1001252-28 |
| 2.000 | 1001246-2.00 | 1001248-2.00 | 29.0 | 1001250-29 | 1001252-29 |
| 2.500 | 1001246-2.500 | 1001248-2.500 | 30.0 | 1001250-30 | 1001252-30 |
| 3.000 | 1001246-3.00 | 1001248-3.00 | 35.0 | 1001250-35 | 1001252-35 |
| | | | 40.0 | 1001250-40 | 1001252-40 |
| | | | 41.0 | 1001250-41 | 1001252-41 |
| | | | 44.5 | 1001250-44.5 | 1001252-44.5 |
| | | | 51.0 | 1001250-51 | 1001252-51 |
| | | | 52.0 | 1001250-52 | 1001252-52 |
| | | | 53.0 | 1001250-53 | 1001252-53 |
| | | | 54.0 | 1001250-54 | 1001252-54 |
| | | | 60.3 | 1001250-60.3 | 1001252-60.3 |
| | | | 70.0 | 1001250-70 | 1001252-70 |
| | | | 76.1 | 1001250-76.1 | 1001252-76.1 |

Collet product codes for 7540 weld head

| Tube OD (inch) | Collet, Extended | Collet, Flush | Tube OD (mm) | Collet, Extended | Collet, Flush |
|----------------|------------------|---------------|--------------|------------------|---------------|
| 0.500 | 1001254-0.500 | 1001256-0.500 | 12.0 | 1001258-12 | 1001260-12 |
| 0.625 | 1001254-0.625 | 1001256-0.625 | 13.0 | 1001258-13 | 1001260-13 |
| 0.677 | 1001254-0.677 | 1001256-0.677 | 13.5 | 1001258-13.5 | 1001260-13.5 |
| 0.750 | 1001254-0.750 | 1001256-0.750 | 16.0 | 1001258-16 | 1001260-16 |
| 0.839 | 1001254-0.839 | 1001256-0.839 | 18.0 | 1001258-18 | 1001260-18 |
| 1 | 1001254-1.00 | 1001256-1.00 | 19.0 | 1001258-19 | 1001260-19 |
| 1.327 | 1001254-1.327 | 1001256-1.327 | 20.0 | 1001258-20 | 1001260-20 |
| 1.500 | 1001254-1.500 | 1001256-1.500 | 22.0 | 1001258-22 | 1001260-22 |
| 1.669 | 1001254-1.669 | 1001256-1.669 | 23.0 | 1001258-23 | 1001260-23 |
| 1.902 | 1001254-1.902 | 1001256-1.902 | 26.9 | 1001258-26.9 | 1001260-26.9 |
| 2.000 | 1001254-2.000 | 1001256-2.000 | 28.0 | 1001258-28 | 1001260-28 |
| 2.500 | 1001254-2.500 | 1001256-2.500 | 29.0 | 1001258-29 | 1001260-29 |
| 3.000 | 1001254-3.000 | 1001256-3.000 | 30.0 | 1001258-30 | 1001260-30 |
| 3.500 | 1001254-3.500 | 1001256-3.500 | 35.0 | 1001258-35 | 1001260-35 |
| 4.000 | 1001254-4.000 | 1001256-4.000 | 40.0 | 1001258-40 | 1001260-40 |
| | | | 41.0 | 1001258-41 | 1001260-41 |
| | | | 44.5 | 1001258-44.5 | 1001260-44.5 |
| | | | 51.0 | 1001258-51 | 1001260-51 |
| | | | 52.0 | 1001258-52 | 1001260-52 |
| | | | 53.0 | 1001258-53 | 1001260-53 |
| | | | 54.0 | 1001258-54 | 1001260-54 |
| | | | 60.3 | 1001258-60.3 | 1001260-60.3 |
| | | | 70.0 | 1001258-70 | 1001260-70 |
| | | | 76.1 | 1001258-76.1 | 1001260-76.1 |
| | | | 85.0 | 1001258-85 | 1001260-85 |

See the most comprehensive and recent information on the Kemppi Automation website.

4.2.3 Tungsten electrode material and ordering information

Kemppi uses ceriated tungsten to increase electrode life, arc starting, and stability, and recommends this material for orbital use.

2% ceriated = no radiation risk

These tungsten electrodes are commonly marked in grey color.

Tungsten electrodes can be pre-cut and sharpened to certain lengths with Tungsten electrode sharpening and cutting devices. See standard length electrode ordering codes and electrode sharpening and cutting device codes at table below.

| | |
|---------|-------------------------------------------------------------------|
| 9873531 | 10 pcs. 1.0 mm diameter, 175 mm long |
| 9873532 | 10 pcs. 1.6 mm diameter, 175 mm long |
| 9873533 | 10 pcs. 2.4 mm diameter, 175 mm long |
| 6270001 | Ultima – TIG – cut, tungsten electrode cutting/sharpening machine |
| 6270002 | Neutrix, portable, tungsten-electrode sharpening machine |
| 6270003 | Auto Grind, tungsten-electrode automated grinder. |

Recommended tungsten electrode lengths of different tube sizes.

| <i>Electrode lengths for different tube OD, 7530 weld head</i> | | | | |
|----------------------------------------------------------------|----------------|--------------------|-------------|-------------|
| Tube OD [mm] | Tube OD [inch] | electrode diameter | | |
| | | 1.0 mm | 1.6 mm | 2.4 mm |
| | | length [mm] | length [mm] | length [mm] |
| 9.5 | 0.375 | 49.1 | 48.5 | 48.0 |
| 10.0 | 0.394 | 48.9 | 48.3 | 47.8 |
| 10.2 | 0.402 | 48.8 | 48.2 | 47.7 |
| 12.0 | 0.472 | 47.9 | 47.3 | 46.8 |
| 12.7 | 0.500 | 47.5 | 47.0 | 46.5 |
| 13.0 | 0.512 | 47.4 | 46.8 | 46.3 |
| 13.5 | 0.531 | 47.1 | 46.6 | 46.1 |
| 15.9 | 0.625 | 45.9 | 45.4 | 44.9 |
| 16.0 | 0.630 | 45.9 | 45.3 | 44.8 |
| 17.2 | 0.677 | 45.3 | 44.7 | 44.2 |
| 18.0 | 0.709 | 44.9 | 44.3 | 43.8 |
| 19.0 | 0.748 | 44.4 | 43.8 | 43.3 |
| 19.1 | 0.750 | 44.3 | 43.8 | 43.3 |
| 20.0 | 0.787 | 43.9 | 43.3 | 42.8 |
| 21.3 | 0.839 | 43.2 | 42.7 | 42.2 |
| 22.0 | 0.866 | 42.9 | 42.3 | 41.8 |
| 23.0 | 0.906 | 42.4 | 41.8 | 41.3 |
| 25.4 | 1.000 | 41.2 | 40.6 | 40.1 |
| 26.9 | 1.059 | 40.4 | 39.9 | 39.4 |
| 28.0 | 1.102 | 39.9 | 39.3 | 38.8 |
| 29.0 | 1.142 | 39.4 | 38.8 | 38.3 |
| 30.0 | 1.181 | 38.9 | 38.3 | 37.8 |
| 33.7 | 1.327 | 37.0 | 36.5 | 36.0 |
| 35.0 | 1.378 | 36.4 | 35.8 | 35.3 |
| 38.1 | 1.500 | 34.8 | 34.3 | 33.8 |
| 40.0 | 1.575 | 33.9 | 33.3 | 32.8 |

| <i>Electrode lengths for different tube OD, 7530 weld head...</i> | | | | |
|-------------------------------------------------------------------|----------------|--------------------|-------------|-------------|
| Tube OD [mm] | Tube OD [inch] | electrode diameter | | |
| | | 1.0 mm | 1.6 mm | 2.4 mm |
| | | length [mm] | length [mm] | length [mm] |
| 41.0 | 1.614 | 33.4 | 32.8 | 32.3 |
| 42.4 | 1.669 | 32.7 | 32.1 | 31.6 |
| 44.5 | 1.752 | 31.6 | 31.1 | 30.6 |
| 48.3 | 1.902 | 29.7 | 29.2 | 28.7 |
| 50.8 | 2.000 | 28.5 | 27.9 | 27.4 |
| 51.0 | 2.008 | 28.4 | 27.8 | 27.3 |
| 52.0 | 2.047 | 27.9 | 27.3 | 26.8 |
| 53.0 | 2.087 | 27.4 | 26.8 | 26.3 |
| 54.0 | 2.126 | 26.9 | 26.3 | 25.8 |
| 60.3 | 2.374 | 23.7 | 23.2 | 22.7 |
| 63.5 | 2.500 | 22.1 | 21.6 | 21.1 |
| 70.0 | 2.756 | 18.9 | 18.3 | 17.8 |
| 76.1 | 2.996 | 15.8 | 15.3 | 14.8 |
| 76.2 | 3.000 | 15.8 | 15.2 | 14.7 |

Electrode lengths for different tube OD, 7540 weld head

| Tube OD [mm] | Tube OD [inch] | electrode diameter | | |
|--------------|----------------|--------------------|-------------|-------------|
| | | 1.0 mm | 1.6 mm | 2.4 mm |
| | | length [mm] | length [mm] | length [mm] |
| 12.0 | 0.472 | 60.1 | 59.5 | 59.0 |
| 12.7 | 0.500 | 59.7 | 59.2 | 58.7 |
| 13.0 | 0.512 | 59.6 | 59.0 | 58.5 |
| 13.5 | 0.531 | 59.3 | 58.8 | 58.3 |
| 15.9 | 0.625 | 58.1 | 57.6 | 57.1 |
| 16.0 | 0.630 | 58.1 | 57.5 | 57.0 |
| 17.2 | 0.677 | 57.5 | 56.9 | 56.4 |
| 18.0 | 0.709 | 57.1 | 56.5 | 56.0 |
| 19.0 | 0.748 | 56.6 | 56.0 | 55.5 |
| 19.1 | 0.750 | 56.5 | 56.0 | 55.5 |
| 20.0 | 0.787 | 56.1 | 55.5 | 55.0 |
| 21.3 | 0.839 | 55.4 | 54.9 | 54.4 |
| 22.0 | 0.866 | 55.1 | 54.5 | 54.0 |
| 23.0 | 0.906 | 54.6 | 54.0 | 53.5 |
| 25.4 | 1.000 | 53.4 | 52.8 | 52.3 |
| 26.9 | 1.059 | 52.6 | 52.1 | 51.6 |
| 28.0 | 1.102 | 52.1 | 51.5 | 51.0 |
| 29.0 | 1.142 | 51.6 | 51.0 | 50.5 |
| 30.0 | 1.181 | 51.1 | 50.5 | 50.0 |
| 33.7 | 1.327 | 49.2 | 48.7 | 48.2 |
| 35.0 | 1.378 | 48.6 | 48.0 | 47.5 |
| 38.1 | 1.500 | 47.0 | 46.5 | 46.0 |
| 40.0 | 1.575 | 46.1 | 45.5 | 45.0 |
| 41.0 | 1.614 | 45.6 | 45.0 | 44.5 |
| 42.4 | 1.669 | 44.9 | 44.3 | 43.8 |
| 44.5 | 1.752 | 43.8 | 43.3 | 42.8 |

Electrode lengths for different tube OD, 7540 weld head...


| Tube OD [mm] | Tube OD [inch] | electrode diameter | | |
|--------------|----------------|--------------------|-------------|-------------|
| | | 1.0 mm | 1.6 mm | 2.4 mm |
| | | length [mm] | length [mm] | length [mm] |
| 48.3 | 1.902 | 41.9 | 41.4 | 40.9 |
| 50.8 | 2.000 | 40.7 | 40.1 | 39.6 |
| 51.0 | 2.008 | 40.6 | 40.0 | 39.5 |
| 52.0 | 2.047 | 40.1 | 39.5 | 39.0 |
| 53.0 | 2.087 | 39.6 | 39.0 | 38.5 |
| 54.0 | 2.126 | 39.1 | 38.5 | 38.0 |
| 60.3 | 2.374 | 35.9 | 35.4 | 34.9 |
| 63.5 | 2.500 | 34.3 | 33.8 | 33.3 |
| 70.0 | 2.756 | 31.1 | 30.5 | 30.0 |
| 76.1 | 2.996 | 28.0 | 27.5 | 27.0 |
| 76.2 | 3.000 | 28.0 | 27.4 | 26.9 |
| 85.0 | 3.346 | 23.6 | 23.0 | 22.5 |
| 88.9 | 3.500 | 21.6 | 21.1 | 20.6 |
| 101.6 | 4.000 | 15.3 | 14.7 | 14.2 |

5. TROUBLESHOOTING

5.1 Operation problems

Should you experience a malfunction from your machine, please consult the troubleshooting sections below first, and complete some basic checks.

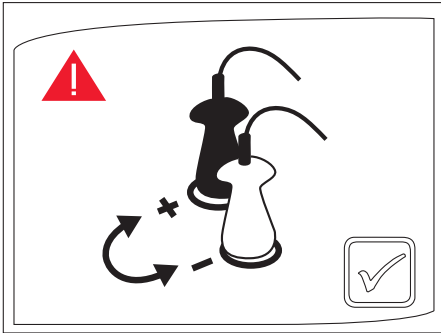
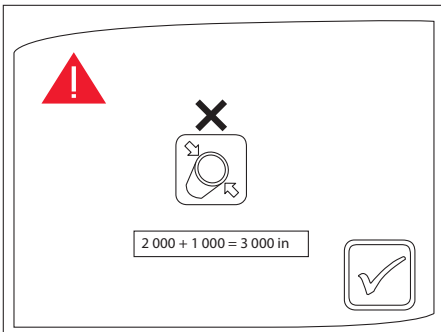

If the machine malfunction cannot be corrected with these measures, contact your Kemppi maintenance service workshop.

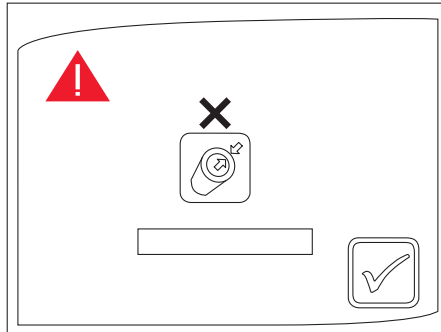
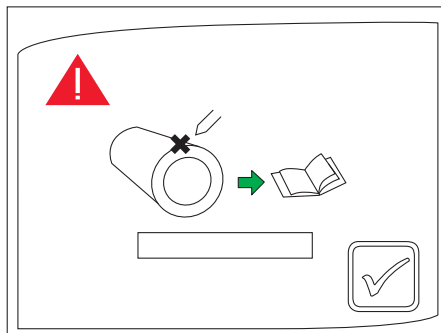
 *The problems listed and the possible causes are not definitive but serve to suggest some standard and typical situations that may present during normal environmental use when using the A5 TIG Orbital System 75.*

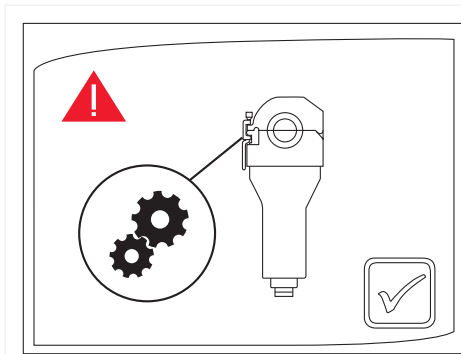
| <i>Problem:</i> | <i>Check the following:</i> |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Machine won't work | <ul style="list-style-type: none">• Check that mains plug is connected correctly.• Check that mains power distribution is switched on.• Check the mains fuse and or circuit breaker.• Check that power source 0/I switch is ON.• Check that interconnection cable set and connectors between the power source, controller unit, and weld head are correctly fastened. See Installation section of this manual. |
| Dirty, poor quality weld | <ul style="list-style-type: none">• Check shielding gas supply.• Check and set gas flow rate.• Check gas type for application.• Check that correct welding program is selected. |
| Variable welding performance | <ul style="list-style-type: none">• Tube is not round or weld head not properly centered. |

5.2 Warnings and error messages

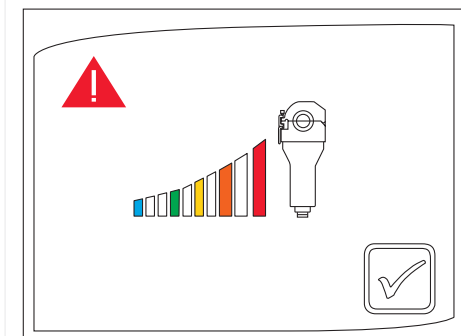
Acknowledge program's warning and error screens by pressing the Confirm button or by correcting the problem.

| Screen | Explanation |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
|  | No gas, or gas flow is too low. This warning only appears when a program has been started. |
|  | Power and work cables reversed. |
|  | Pipe OD incorrect. OD is smaller or larger for which the weld head is designed. |

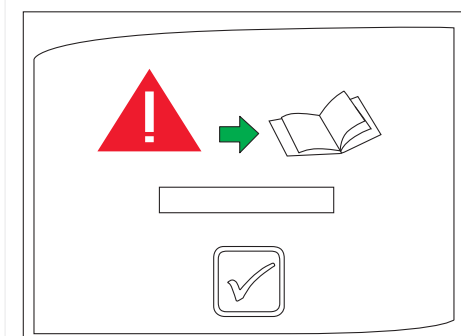
| | |
|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Pipe wall thickness is incorrect with respect to selected tube OD (For example, wall thickness is greater than the tube OD). |
|  | Arc outage. Arc failed to initiate at start of weld sequence or extinguished prior to weld completion. Possible causes: <ul style="list-style-type: none"> • Contaminated, eroded or improper length tungsten electrode • Tungsten clamp loose. Tighten screws. • Bad connection between the power source, controller, and weld head. Check all connections. • Broken electrode or work cable in weld head, handle or in cable. Inspect and replace if necessary. • Improperly cleaned tube surface or poor contact between collets and tube. Clean. • Incorrect size collets or dirty collets. Clean clamping surfaces. • Contact of tungsten electrode with work piece. |



Weld head jam. The horseshoe shaped rotor does not turn. Possible cause: debris in the drive train. Open the head and look for foreign material.



Weld head too hot. The temperature limit of the head has been reached. Possible cause: duty cycle too high. Let head cool between welds, or install a water cooler.



Other error warnings are identified by the following screen and a number. Contact Kemppi if necessary.

5.3 Common weld defects

| Problem | Possible solution |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Excessive weld oxidation (blue color) or porosity | <ul style="list-style-type: none"> Contaminated or improper gas Oil, dirt or other contaminant on tube ID/OD. Hole in gas line aspirating air Gas flow rate ID or OD too low Industrial grade gas inadequate. Use high purity |
| Melt-through during welding | <ul style="list-style-type: none"> Wall thickness less than programmed. Correct. Tube ends not in tight contact during welding. Use tube-squaring tool. |
| Completed weld not straight | <ul style="list-style-type: none"> Tube ends not square. Use tube-squaring tool. |

6. MAINTENANCE

When considering and planning routine maintenance, please consider the frequency of machine use and the working environment.


Correct operation of the machine and regular maintenance will help you avoid unnecessary downtime and equipment failure.

 *Disconnect the machine from the mains before handling the electrical cables.*

6.1 Daily maintenance

Check gas connections and cable / connector condition daily before use. Clean weld head arc chamber regularly. Change the electrodes when they wear out.

6.2 Periodic maintenance

 *Periodic maintenance should only be carried out by a suitably qualified person. Disconnect the plug of the machine from the mains socket and wait about 2 minutes (capacitor charge) before removing any parts.*

Check at least every half year:

- Electric connectors of the machine – clean any oxidized parts and tighten loose connections.
- Validate calibration of the weld head and controller according instructions given in this manual.

i Do not use compressed air for cleaning as there is a risk that the dirt will compact even more tightly into gaps of cooling profiles.

i Do not use pressure washing devices.

i Only an authorized trained electrician should carry out repairs to Kemppi machines.

6.3 Service Workshop maintenance

Kemppi Service Workshops complete maintenance according to their Kemppi service agreement.

The major points in the maintenance procedure are listed as follows:

- Cleaning of the machine
- Checking and maintenance of the welding tools
- Checking of connectors, switches and potentiometers
- Checking of electric connections
- Checking of mains cable and plug
- Damaged parts or parts in bad condition are replaced by new ones
- Maintenance testing.
- Operation and performance values of the machine are checked, and when necessary adjusted by means of software and test equipment.

Software loading

Kemppi Service Workshops can also test and load firmware and welding software.

7. DISPOSAL



Do not dispose of electrical equipment with normal waste!

In observance of European Directive 2002/96/EC on waste electrical and electronic equipment, and its implementation in accordance with national law, electrical equipment that has reached the end of its life must be collected separately and taken to an appropriate environmentally responsible recycling facility.

The owner of the equipment is obliged to deliver a decommissioned unit to a regional collection center, as per the instructions of local authorities or a Kemppi representative. By applying this European Directive you will improve the environment and human health.

And you know.