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OPERATING MANUAL

A3 MIG Welder

KEMPPI

CONTENTS

1. INTRODUCTION

1.1 General

Congratulations on choosing the A3 MIG Welder system. When 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 manual carefully before using the equipment for the first time. For your own safety and that of your working environment, pay 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 web site 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 attention in order to minimize damage and harm are indicated by the symbols below. 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.

2. INSTALLATION

The product is packed in specially designed transport cartons. However, always make sure the products have not been damaged during transportation prior to this.

Product packaging material is recyclable.

When moving the welding machine, never pull it from the welding gun or other cables. For lifting the power source, use the handles on top of the power source.

Detailed installation instructions and the technical information that is out of the scope of this manual are found in the A3 MIG Welder Integration guide.

Operating environment

The machines included in the system are suitable for both indoor and outdoor use. Always make sure that the air flow to the machine is unrestricted. The recommended operating temperature range is -20…+40°C.

Positioning the machines

Place the machine on a sturdy, level surface that is dry and will not allow dust or other impurities to enter the machine´s cooling air flow. Preferably, situate the machine in a suitable carriage unit so it is above floor level.

- The surface inclination may not exceed 15 degrees.
- Ensure the free circulation of the cooling air. There must be at least 20 cm of free space in front of and behind the machine for cooling-air circulation.
- Protect the machine against heavy rain and direct sunshine.

Do not operate the machine in the rain.

Never aim the spray of sparks from a grinding machine toward the equipment.

3. SYSTEM OVERVIEW

A3 MIG Welder system

A3 MIG Welder is a welding system for welding automation that includes all welding devices needed in robot welding.

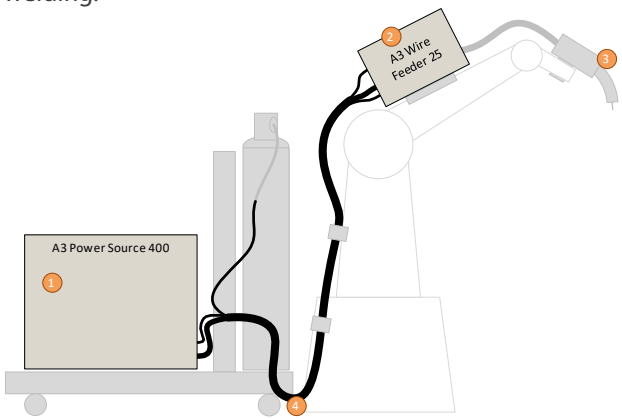


Figure 3.1 A3 MIG Welder system

1. Power Source
2. Wire feeder
3. MIG torch
4. Interconnection cable set

3.1 Power Source

A3 Power Source 400

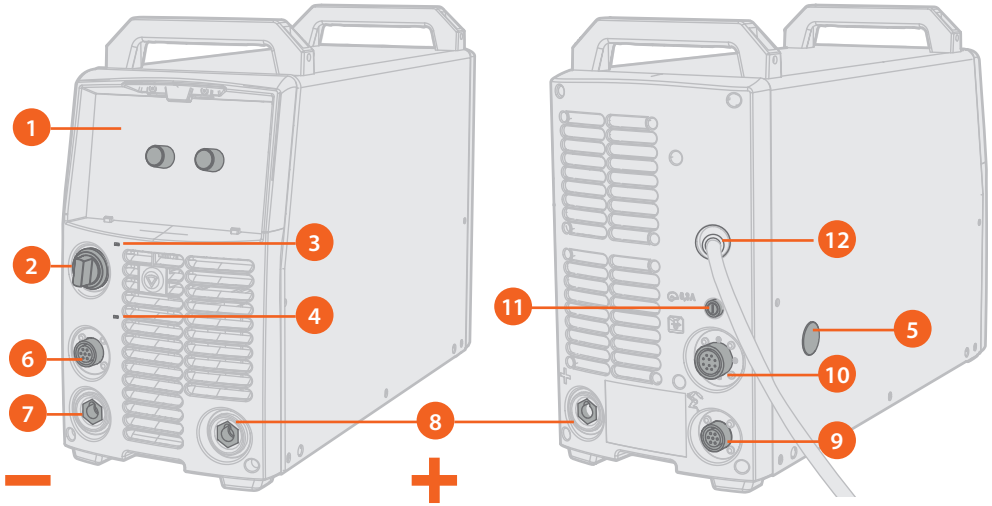


Figure 3.2 Power source, front and rear

1. Control panel
2. Main switch
3. Main power indicator light (ON/OFF)
4. Overheating indicator
5. System configuration DIP switches
6. Control cable connection
7. Welding cable connection, negative pole (–)
8. Welding cable connection, positive pole (+), front and rear
9. DeviceNet and safety stop connection
10. Wire feeder connection
11. Fuse (6.3 A, delayed)
12. Mains power cable

The A3 Power Source 400 is designed for demanding professional use. The power source is suitable for MIG/MAG, 1-MIG, WiseRoot and WiseThin processes. It supports also WiseFusion function. The Wise processes and functions are optional and can be activated by licenses.

3.2 Control panel

The control panel is used for controlling and monitoring the operation of the power source and the wire feeder. The buttons and knobs are used for adjusting functions. The displays and indicators reflect the operating modes of the machine.

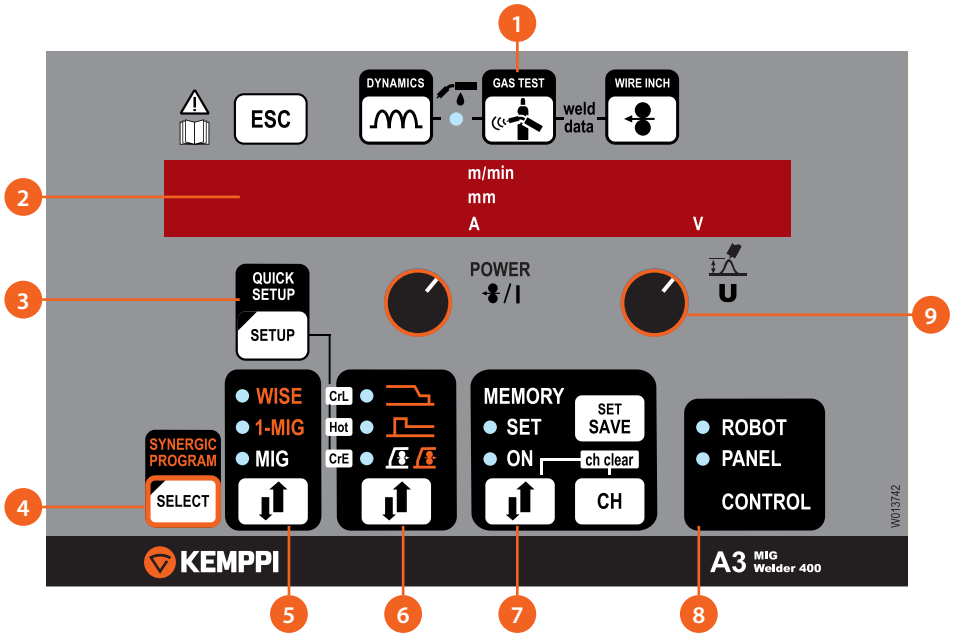


Figure 3.4 Control panel layout

1. Miscellaneous functions
2. Displays
3. System and welding setup
4. Synergic program selection
5. Welding process selection
6. Welding program setup
7. Memory channel setup
8. Robot control indicator
9. Control knobs

3.3 DIP switches

The A3 Power Source comprises two DIP switch panels on the right side of the power source. The switches can be accessed through a hole in the cover plate. The hole is covered by a rubber plug. The first panel (P1) configures DeviceNet baud rate and Mac ID. The second panel (P2) configures the touch sensor, safety stop, collision sensor, fieldbus byte order, and watchdog.

By default, all DIP switches are OFF.

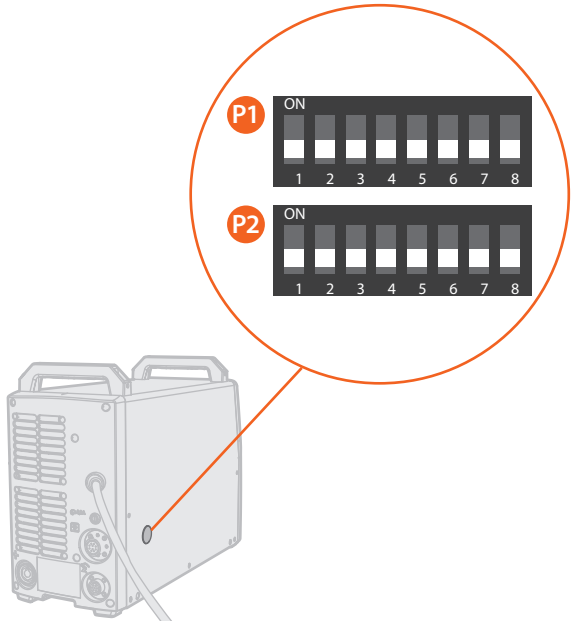


Figure 3.5 DIP switches in the power source

Panel P1 – DeviceNet configuration		
1-2	Baud rate	125-500 kbps
3-8	Mac ID	0-63
Panel P2 – System configuration		
1-2	Touch sensor voltage	50-200 V
3	Safety stop	OFF/ON
4	Collision sensor	OFF/ON
5	Collision sensor switch type	OPENING/CLOSING
6	Byte order	LITTLE-ENDIAN/BIG-ENDIAN
7	Watchdog	OFF/ON
8	(Reserved)	(Reserved)

Figure 3.6: Quick guide for DIP switch configuration

1	*2*	*Baud rate*
OFF	OFF	125 kbps
OFF	OFF	250 kbps
ON	OFF	500 kbps
ON	ON	(Reserved)

3	*4*	*5*	*6*	*7*	*8*	*Mac ID*
OFF	OFF	OFF	OFF	OFF	OFF	0
OFF	OFF	OFF	OFF	OFF	ON	1
OFF	OFF	OFF	OFF	ON	OFF	2
OFF	OFF	OFF	OFF	ON	ON	3
						...
ON	ON	ON	ON	OFF	OFF	60
ON	ON	ON	ON	OFF	ON	61
ON	ON	ON	ON	ON	OF	62
ON	ON	ON	ON	ON	ON	63

1	*2*	*Voltage*
OFF	OFF	50 V
OFF	ON	80 V
ON	OFF	110 V
ON	ON	200 V

3.4 Wire feeder

A3 Wire Feeder 25, Euro connector

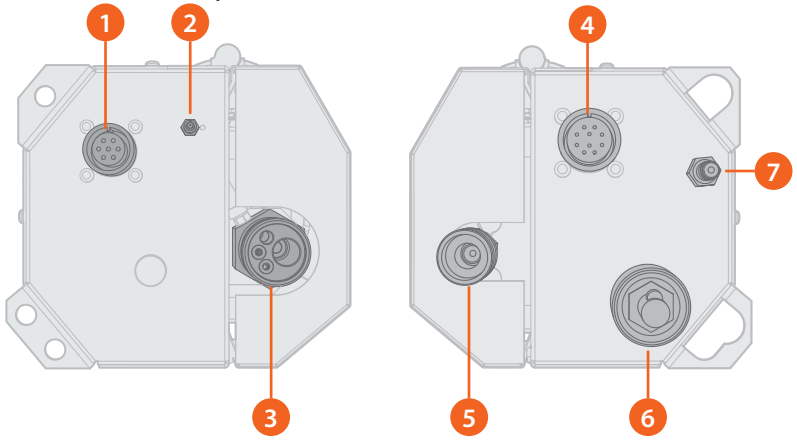


Figure 4.9 Wire feeder with Euro connector, front and rear

1. Peripheral connector
2. Wire inch button
3. Euro connector
4. Wire feeder control cable connector
5. Wire liner connector
6. Welding cable connector
7. Gas inlet

A3 Wire Feeder 25, Power connector

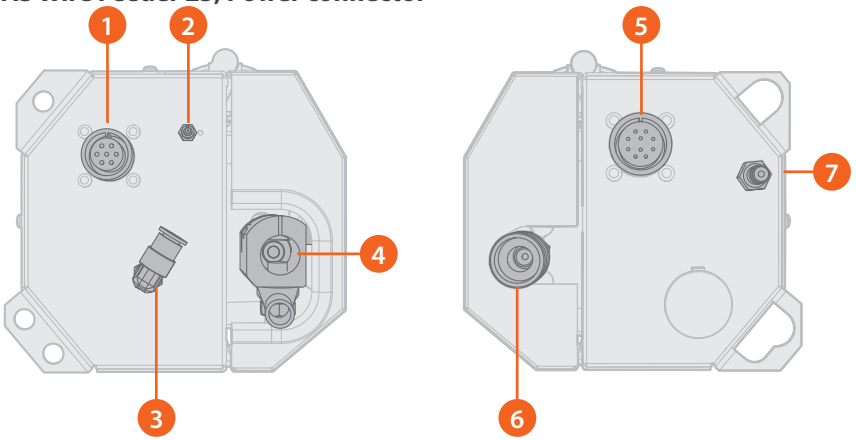
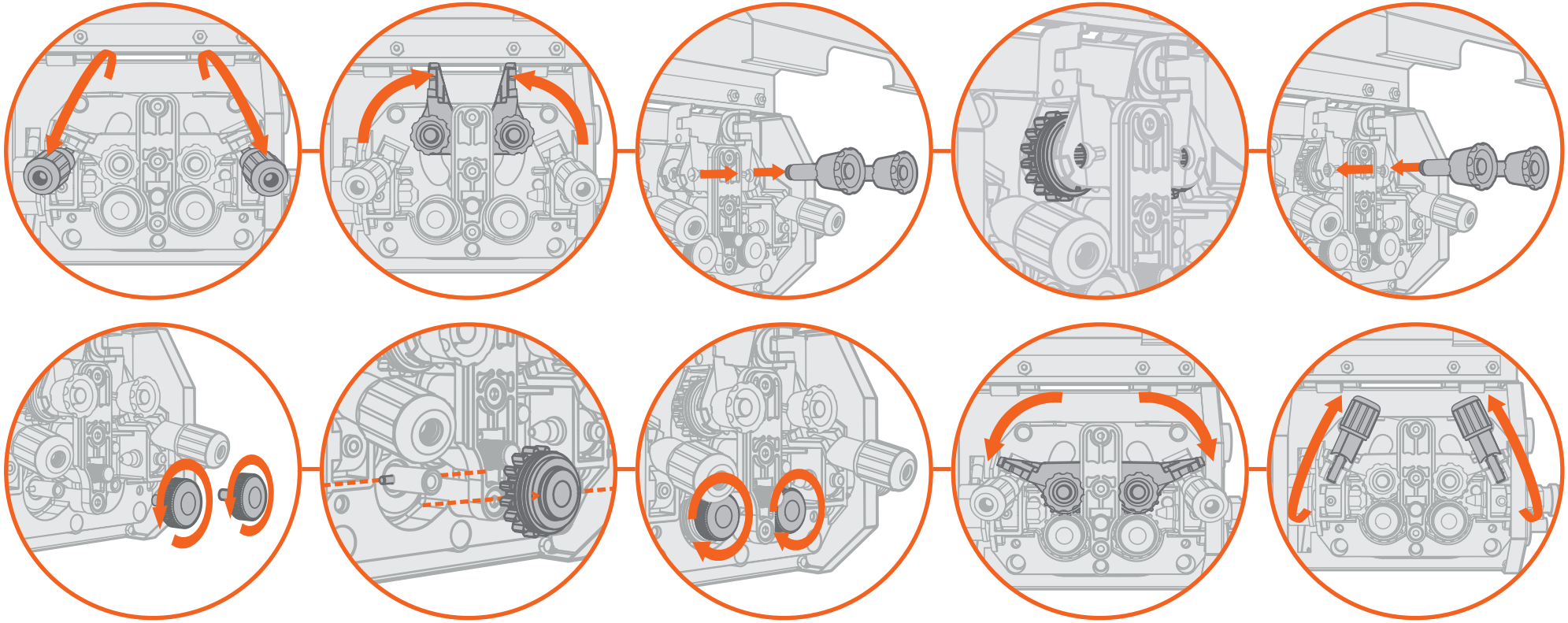


Figure 4.10 Wire feeder with PowerPin connector, front and rear

1. Peripheral connector
2. Wire inch button
3. Gas outlet
4. PowerPin connector with welding cable joint
5. Wire feeder control cable connector
6. Wire liner connector
7. Gas inlet

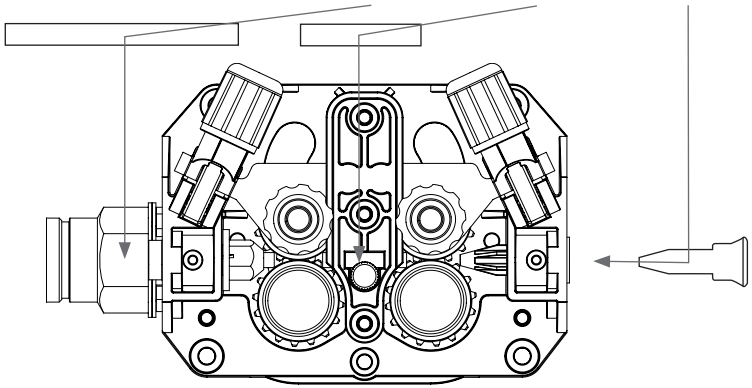
Threading the wire and adjusting tightness

When changing the welding wire, the pressure arms need to be released. Ensure that the groove of the feed rolls matches the diameter of filler wire used. Release the wire end and cut off any deformed section before pulling it out from the wire feeder. Straighten about 20 cm of the new filler wire and ensure the tip has no sharp edges. File if necessary, as a sharp wire edge may damage the wire gun liner – particularly softer plastic liners. Present the filler wire tip to the back of the wire feed rolls and press the wire inch button on the wire feed front panel. Feed the wire to the gun contact tip and prepare to weld.



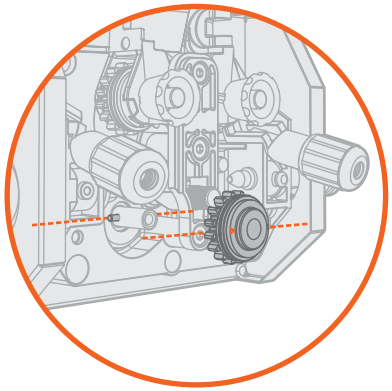
DuraTorque™ 400, 4-wheel wire feed mechanism accessories

Wire guide tubes					
	ø mm		*outlet tube*	*middle tube*	*inlet tube*
Ss, Al, (Fe, Mc, Fc) plastic	0.6		SP007437	SP007429	SP007293
	0.8 – 0.9		SP007438	SP007430	SP007294
	1.0		SP007439	SP007431	SP007295
	1.2		SP007440	SP007432	SP007296
	1.4		SP007441	SP007433	SP007297
	1.6		SP007442	SP007434	SP007298
	2.0		SP007443	SP007435	SP007299
	2.4		SP007444	SP007436	SP007300
Fe, Mc, Fc metal	0.8 – 0.9		SP007454	SP007465	SP007536
	1.0		SP007455	SP007466	SP007537
	1.2		SP007456	SP007467	SP007538
	1.4 – 1.6		SP007458	SP007469	SP007539
	2.0		SP007459	SP007470	SP007540
	2.4		SP007460	SP007471	SP007541



Wire feed rolls, metal			
	ø mm	*lower*	*upper*
Fe, Ss, (Al, Mc, Fc) V-groove V	0.8 – 0.9	W006074	W006075
	1.0	W006076	W006077
	1.2	W004754	W004753
	1.4	W006078	W006079
Fc, Mc, (Fe) V-groove, knurled V≡	1.0	W006080	W006081
	1.2	W006082	W006083
	1.4 – 1.6	W006084	W006085
	2.0	W006086	W006087
Al, (Fc, Mc, Ss, Fe) U-groove U	1.0	W006088	W006089
	1.2	W006090	W006091
	1.6	W006092	W006093

Mount the lower feed roll, ensuring that the pin on the shaft fits in the cut on the feed roll.



4. USING THE WELDER

4.1 Basic controls

Main switch

When you turn the on/off switch to position 1, the main power indicator is illuminated, and the welding system starts a power-up sequence. The system is ready for use when the control panel is ready. Always turn the machine on and off with the power source mains switch. Never use the mains plug as a switch.

Indicator lights

The indicator lights of the machine report its operational state: When the green main power indicator is on, it indicates that the machine is switched on. When the orange warning indicator light is on, the machine is overheated. This is due to a higher than regular working load exceeding the rated duty cycle. The cooling fan continues to cool the machine down. When the light goes off the machine is ready to weld again.

Cooling fans

The A3 Power Source incorporates two simultaneously operating cooling fans. The fans will start during welding as the machine reaches operational temperature, and they will run for 1 to 10 minutes after welding, depending on the heat effect of the completed cycle.

4.2 Control panel

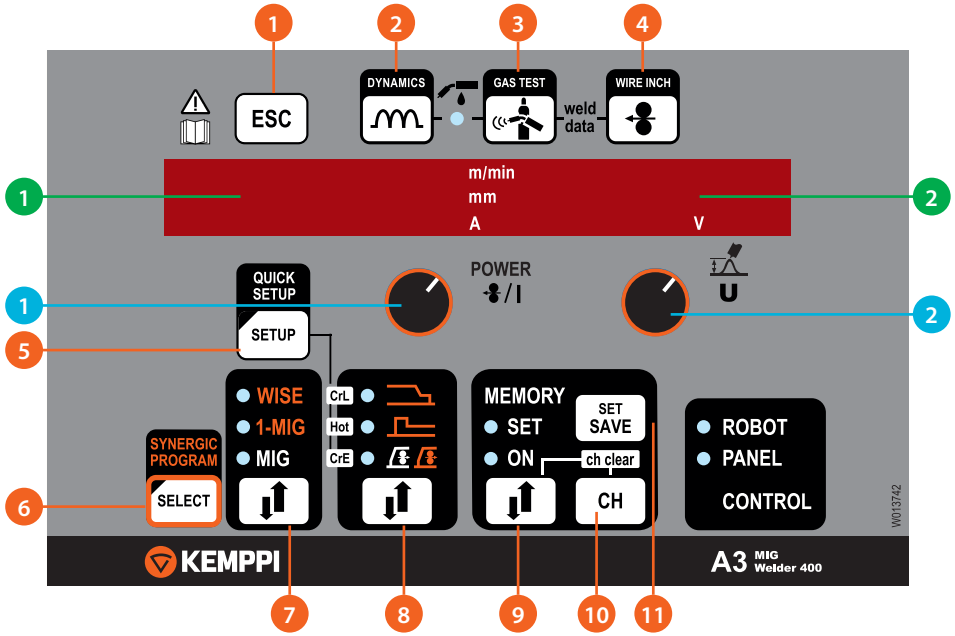


Figure 4.1 Control panel buttons, displays and knobs

1. Left display
2. Right display

1. Left selection/adjustment knob
2. Right selection/adjustment knob

1. Escape/Back button
2. Dynamics button
3. Gas test button
4. Wire inch button
5. System setup button
6. Synergic program selection button
7. Welding process selection button
8. Synergic feature setup button
9. Memory channel edit mode selection button
10. Memory channel selection button
11. Memory channel save button

Displays 1 and 2

The two displays of the control panel show adjustable operation parameters, their values, and the units of measure. During welding, display (1) shows the welding current value that is being used, while display (2) shows the welding voltage. The displays can show the following symbols.

Symbol	*Character*	*Symbol*	*Character*
A	A	S	S
b	B	t	T
c	C	u	U
d	D	v	V
E	E	w	W
F	F	x	X
G	G	y	Y
h	H	z	Z
i	I	1	1
J	J	2	2
K	K	3	3
L	L	4	4
M	M	5	5
n	N	6	6
o	O	7	7
P	P	8	8
q	Q	9	9
r	R	0	0

Control knobs 1 and 2

The left-hand control knob (1) allows the adjustment of the speed of wire feeding. The selected speed is shown on the display (1) on the left-hand side.

The right-hand side control knob (2) allows for controlling the welding voltage in MIG and 1-MIG processes, in which case the selected voltage is shown on the right-hand side display (2).

These control knobs are also used for specifying the operating parameters. A parameter for adjustment is selected with the left-hand knob, while the value of the parameter is selected with the right-hand knob.

Adjusting MIG dynamics (Arc Force)

When you press button (2), you can adjust the MIG welding dynamics of the machine by means of the knob (2).

When using the MIG or 1-MIG welding process, the welding dynamics setting affects the features of the welding arc and the amount of welding spatter as shown below:

The value 0 is the recommended basic setting.

Use values -1...-9 if you want a softer arc and less spatter.

Use values 1...9 if you want a rougher and more stable arc. This setting is useful when you are using 100% CO_2 shielding gas when welding steel.

Gas test

The gas test button (3) opens the gas valve without activating the wire feed or power source. By default, gas flows for 20 seconds. The remaining gas flow time is shown on the display.

The right-hand knob allows you to set the default gas flow time, between 10 and 60 seconds, and store the new default value in the machine's memory. To stop the gas test, press the ESC button (1).

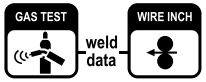
Wire feed test

When you press the Wire inch button (4), the wire feeder engine starts feeding. The gas valve does not open, and the power source is not activated.

The wire feed pace is 2 m/min for the first two seconds, and then 10 m/min.

When the button is released, the wire feeding stops. The machine automatically goes back to the normal state after approximately 3 seconds from release of the button or immediately when you press the ESC button.

Retrieving weld data



The weld data function allows you to return to the welding current and voltage used during the previous session, with the weld data feature. To use the feature, press buttons 3 and 4 simultaneously.

Selecting the welding process

The welding process selection button (7) allows you to select the welding process you want to use. You can select one of the following processes:

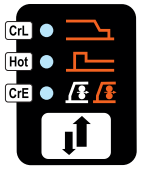
- regular MIG welding
- 1-MIG welding
- WiseThin & WiseRoot (optional)

In regular MIG welding, the wire feed speed and welding voltage are adjusted separately. Unlike the above, the 1-MIG, WiseThin and WiseRoot processes are synergic welding processes where the welding voltage and other welding parameters are interconnected so that the welding power and arc length are adjusted to attain optimal welding values.

The WiseThin and WiseRoot processes are optional features intended for welding automation. They must be acquired separately by licenses and are therefore not available in all configurations.

4.3 Standard MIG features

The standard A3 MIG Welder delivery includes three MIG features that facilitate welding and improve weld quality. These features are creep start, hot start and crater fill.



To use a MIG feature, press the feature selector button 8. Press the selector button repeatedly to use one or several features. Only the features allowed for the welding method you have chosen will be available.

Creep start (CrE)

The purpose of the creep start feature is to make controlled weld start easier and smoothen the initial stage of welding, for example when welding with high wire feed speeds. At the beginning, the machine will use a slow wire feed speed until the wire touches the work piece and the current starts flowing.

Creep start is available for both the regular MIG welding and the synergic 1-MIG welding.

Hot start (Hot)

The purpose of hot start is to reduce start faults, for example when welding aluminium or other materials with particularly good thermal conductivity. In this scenario, there is a fixed pre-gas time at the beginning of the welding, after which the welding power briefly rises above the specified power level. The power and time parameters for hot start can be specified in the SETUP settings.

Hot start is available for synergic 1-MIG welding.

Crater fill (CrL)

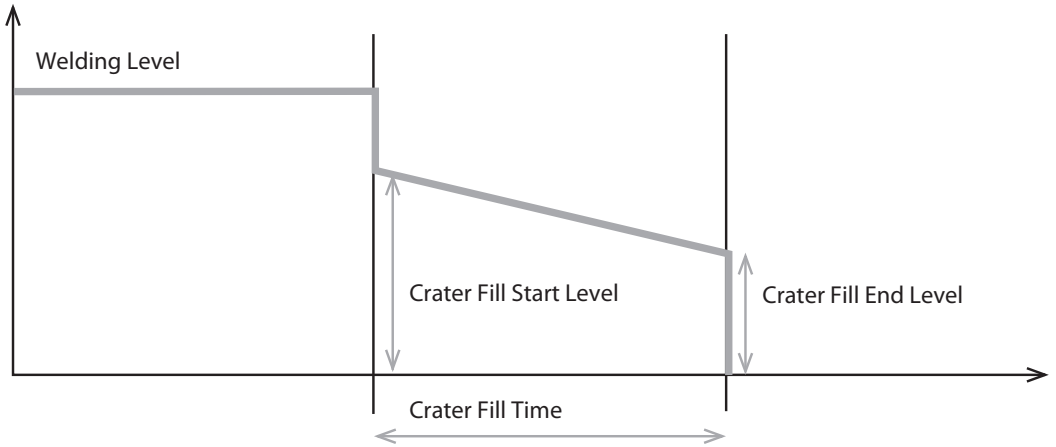


Figure 4.2 Crater fill

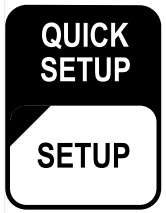
The purpose of crater fill is to facilitate controlled finishing of welding and to reduce the welding faults caused by the final crater. When you press the welding gun trigger completely down at the end of welding, the welding power is reduced to a pre-set crater fill level. To end the crater fill stage, release the gun trigger. The crater fill parameters can be specified in the SETUP settings.

Crater fill is available for synergic 1-MIG welding.

4.4 Optional MIG features

In addition to the standard MIG features, it is also possible to acquire optional features that further enhance the welding.

To use the optional features, enter a machine-specific activation code in the machine's control panel as shown below. To acquire an activation code, contact a Kemppi representative.

Activating optional features		
1.		Press and hold down the SETUP button (5) for at least 5 seconds. The SETUP settings menu appears on the display.
2.		Select the cod (cod) alternative with the left-hand side control knob in the control panel and then select the value Ent (ent) using the right-hand side control knob.
3.		Briefly press the SAVE button (11).
4.		When the display on the left-hand side reads 1 (1), enter the first value of the activation code using the right-hand side control knob. The value you have entered is shown in the right-hand side display.
5.		Select the entry of the next value using the left-hand side control knob.
6.		Enter the value corresponding to the value shown in the left-hand side display using the right-hand side control knob.
7.		Repeat steps 5 and 6 until you have entered all values of the activation code.
8.		Finally, press the SAVE button (11) briefly.

The control panel will read buc cES (success) to indicate that the activation code has been entered correctly and the optional feature is available. You can exit the code entry mode at any time by briefly pressing ESC.

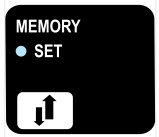
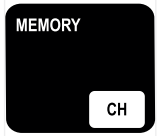
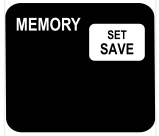
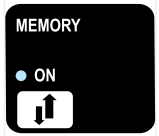
If the code entry failed, the control panel display will show an error code. For more information on error codes, see "Troubleshooting".

The operating instructions for optional features can be found in the documentation supplied with the feature.

4.5 Memory channels

Use the control panel memory channels to store welding parameters you use into the machine's memory for easy use later without the need to readjust all parameters. The control panel has 90 memory channels, numbered 0...89.

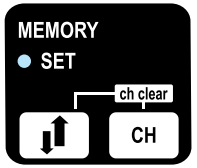
You can store the welding parameters you use, i.e., the wire feed speed and the welding voltage. You can also store MIG feature settings, such as creep start or crater fill settings.

Storing welding parameters in memory		
1.		Press the MEMORY button (9) twice. If a memory channel is free, the SET indicator starts flashing. In other cases, it will be turned on constantly. (If the memory is empty, one push of the button is enough.)
2.		Select the memory channel you want using the CH button (10).
3.		Specify the welding settings you want and store the selections by pressing SAVE button (11).
4.		Press the MEMORY button (9) twice. The ON indicator light will turn on and the welding parameters you selected are activated.
5.		Start welding.

If you want to change the welding parameters stored in a welding channel, go to the SET mode by pressing the MEMORY button. Now select the parameters you want and store them by pressing SAVE.

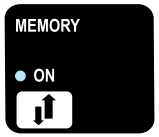
You can also store the welding parameters with the SET button when the memory feature is in the OFF state, i.e., when the MEMORY indicators are not on.

To clear the data in a memory channel, press the MEMORY and CH buttons simultaneously when the control panel is in the SET mode (the SET indicator is on).



Using stored welding parameters

1. Press the MEMORY button to turn on the ON indicator.



2. Select the memory channel you want from the robot.
3. Start welding.

4.6 Synergic 1-MIG, WiseThin, and WiseRoot welding

In synergic 1-MIG welding, the machine selects the optimal welding parameters suitable to the filler wire and shielding gas using the programs, or synergic curves, stored in the control panel. The welder controls the welding by adjusting the welding power and arc length.

The WiseThin and WiseRoot processes (advanced auto arc) are synergic welding processes developed for the special needs of robotic welding with welding characteristics optimised particularly for welding automation.

Selecting a welding program		
1.		Before you start welding, find the welding program suitable to your filler wire and shield gas in the tables below and then activate the program as follows:
2.		Select the welding process (1-MIG or Wise) with button (7).
3.		Press the SYNERGIC PROGRAM button (6) for more than 1 second. This will activate program selection and the control panel displays start flashing.
4.		Select the material group with the left-hand side control knob and the welding program for the material group with the right-hand side control knob according to the tables below. The program you selected is immediately recorded in the memory.
5.	 	Press ESC button (1) or the SYNERGIC PROGRAM button (6) to exit the menu.

MIG programs in the A3 MIG Welder machine

Please note with the aluminium and special alloy programs that the A3 MIG Welder system doesn't support push-pull guns.

WiseRoot and WiseThin programs are enabled by licenses.

1-MIG, Fe group			
Program number	*Wire, mm*	*Material*	*Shielding gas*
101	0.8	Fe	Ar+18%-25%CO_2
102	0.9	Fe	Ar+18%-25%CO_2
103	1.0	Fe	Ar+18%-25%CO_2
104	1.2	Fe	Ar+18%-25%CO_2
106	1.6	Fe	Ar+18%-25%CO_2
111	0.8	Fe	CO_2
112	0.9	Fe	CO_2
113	1.0	Fe	CO_2
114	1.2	Fe	CO_2
116	1.6	Fe	CO_2
121	0.8	Fe	Ar+8%CO_2
122	0.9	Fe	Ar+8%CO_2
123	1.0	Fe	Ar+8%CO_2
124	1.2	Fe	Ar+8%CO_2
126	1.6	Fe	Ar+8%CO_2
152	0.9	FEMC	Ar+18%-25%CO_2
154	1.2	FEMC	Ar+18%-25%CO_2
164	1.2	FEMC	CO_2
174	1.2	FEFC rutile	Ar+18%-25%CO_2
184	1.2	FEFC rutile	CO_2
194	1.2	FEFC basic	Ar+18%-25%CO_2

1-MIG, SS group			
Program number	*Wire, mm*	*Material*	*Shielding gas*
201	0.8	SS-316	Ar+2%CO_2
202	0.9	SS-316	Ar+2%CO_2
203	1.0	SS-316	Ar+2%CO_2
204	1.2	SS-316	Ar+2%CO_2
206	1.6	SS-316	Ar+2%CO_2
211	0.8	SS-316	Ar+30%He+1%O_2
212	0.9	SS-316	Ar+30%He+1%O_2
213	1.0	SS-316	Ar+30%He+1%O_2
214	1.2	SS-316	Ar+30%He+1%O_2
216	1.6	SS-316	Ar+30%He+1%O_2
221	0.8	SS-309	Ar+2%CO_2
222	0.9	SS-309	Ar+2%CO_2
223	1.0	SS-309	Ar+2%CO_2
224	1.2	SS-309	Ar+2%CO_2
231	0.8	SS-309	Ar+30%He+1%O_2
232	0.9	SS-309	Ar+30%He+1%O_2
233	1.0	SS-309	Ar+30%He+1%O_2
234	1.2	SS-309	Ar+30%He+1%O_2
242	0.9	FC-316	Ar+18%-25%CO_2
244	1.2	FC-316	Ar+18%-25%CO_2
252	0.9	FC-316	CO_2
254	1.2	FC-309L	Ar+18%-25%CO_2

1-MIG, Al group			
Program number	*Wire, mm*	*Material*	*Shielding gas*
303	1.0	Al-5356	Ar
304	1.2	Al-5356	Ar
306	1.6	Al-5356	Ar
313	1.0	AL-4043	Ar
314	1.2	Al-4043	Ar
316	1.6	Al-4043	Ar

1-MIG, SPE group			
Program number	*Wire, mm*	*Material*	*Shielding gas*
401	0,8	CuSi 3	Ar
402	0.9	CuSi 3	Ar
403	1.0	CuSi 3	Ar
404	1.2	CuSi 3	Ar
411	0.8	CuSi 3	Ar+2% CO_2
412	0.9	CuSi 3	Ar+2% CO_2
413	1.0	CuSi 3	Ar+2% CO_2
421	0.8	CuAl 8	Ar
423	1.0	CuAl 8	Ar
424	1.2	CuAl 8	Ar

WiseThin, Fe group			
Program number	Wire, mm	Material	Shielding gas
701	0.8	Fe	Ar+18%-25%CO_2
702	0.9	Fe	Ar+18%-25%CO_2
703	1.0	Fe	Ar+18%-25%CO_2
704	1.2	Fe	Ar+18%-25%CO_2
711	0.8	Fe	CO_2
712	0.9	Fe	CO_2
713	1.0	Fe	CO_2
714	1.2	Fe	CO_2

WiseThin, SS group			
Program number	Wire, mm	Material	Shielding gas
721	0.8	SS-316	Ar+2%CO_2
722	0.9	SS-316	Ar+2%CO_2
723	1.0	SS-316	Ar+2%CO_2
724	1.2	SS-316	Ar+2%CO_2

WiseThin, SPE group			
Program number	Wire, mm	Material	Shielding gas
743	1.0	CuSi 3	Ar
753	1.0	CuAl 8	Ar

WiseRoot, Fe group			
Program number	Wire, mm	Material	Shielding gas
802	0.9	Fe	Ar+18%-25%CO_2
803	1.0	Fe	Ar+18%-25%CO_2
804	1.2	Fe	Ar+18%-25%CO_2
812	0.9	Fe	CO_2
813	1.0	Fe	CO_2
814	1.2	Fe	CO_2

WiseRoot, SS group			
Program number	Wire, mm	Material	Shielding gas
822	0.9	SS-316	Ar+2%CO_2
823	1.0	SS-316	Ar+2%CO_2
824	1.2	SS-316	Ar+2%CO_2
832	0.9	SS-316	Ar+30%He+1%O_2
833	1.0	SS-316	Ar+30%He+1%O_2
834	1.2	SS-316	Ar+30%He+1%O_2

4.7 Welding and system setup

Quick setup

To set the values of the functional parameters for MIG features, use the QUICK SETUP feature, which you can activate by briefly pressing the SETUP button (5).

Select the parameter to adjust using the left-hand side control knob or the button (8) and then set the parameter value with the right-hand side control knob. The value you specified is instantly stored in the control panel memory. The following tables list the parameter values that can be specified for the MIG features.

QUICK SETUP, MIG				
Parameter	*Display*	*Value range*	*Factory setting*	*Description*
Creep start level	crE	10 ... 170 %	50 %	Percent of wire feed speed default 10% refers to slow start, 170% refers to fast start

QUICK SETUP, 1-MIG, WiseThin, WiseRoot				
Parameter	*Display*	*Value range*	*Factory setting*	*Description*
Creep start level	crE	10 ... 170 %	50 %	Percent of wire feed speed default 10% refers to slow start, 170% refers to fast start
Hot start level	hot	-50 ... 75 %	30 %	Percent of welding power: -50% refers to cold start +75% refers to hot start
Hot start time	h2t	0 ... 9.9 s	1.2 s	The duration of the hot start in seconds.
Crater fill start level	crS	Crater fill end level ... 250 %	90 %	The welding power at the beginning of the crater fill stage as a percentage of the welding power pre-set value.
Crater fill end level	crL	10 ... Crater fill start level	30 %	The welding power at the end of the crater fill stage as a percentage of the welding power pre-set value.
Crater fill time	crt	0 ... 9.9 s	2 s	The duration of the crater fill stage in seconds.

All setup parameters

The machine has several parameters, whose settings can be specified with the control panel's SETUP function as follows:

1. Press and hold down the SETUP button (5) for at least 5 seconds.
2. Select the parameter to adjust using the left-hand side control knob. The parameter name is shown in display left-hand display.
3. Specify the parameter value with the right-hand side control knob. The selected value is shown in the right-hand display. The parameter's value is immediately stored in the memory.
4. Exit the SETUP mode by pressing and holding down the SETUP button again for at least 5 seconds or by briefly pressing the ESC button.

All welding processes have their own setup parameters. For example, adjusting the post-current for synergic MIG welding does not affect the post-current of normal MIG welding.

The tables below show the features available in this welding machine and their possible values.

Regular MIG welding parameters				
Parameter	*Display*	*Value range*	*Factory setting*	*Description*
Pre-gas time	PrG	0.0 ... 9.9 s	0.0 s	Pre-gas time in seconds
Post gas time	PoG	0.1 ... 9.9 s, Aut (Aut)	Aut	Post gas time in seconds or automatically according to the welding current (Aut).
Creep start level	crE	10 ... 170 %	50 %	Percentage of wire feed speed: 10%-99% = slow start 100% = no creep start 101%-170% = accelerated start.
Start power	StA	-9 … +9	0	Strength of start pulse
Post current time	Poc	-9 ... +9	0	Post-welding current time

Synergic MIG welding parameters				
Parameter	*Display*	*Value range*	*Factory setting*	*Description*
Pre-gas time	PrG	0.0 ... 9.9 s, SYn (Syn)	Syn	Pre-gas time in seconds or automatically according to the synergic welding program (Syn).
Post gas time	PoG	0.1 ... 9.9 s, SYn (Syn)	Syn	Post gas time in seconds or automatically according to the synergic welding program (Syn).
Creep start level	crE	10 ... 170%	50 %	Percentage of wire feed speed: 10%-99% = slow start 100% = no creep start 101%-170% = accelerated start.
Hot start level	hot	-50 ... 75 %	30 %	Percent of welding power: -50% refers to cold start and +75% to hot start.
Hot start time	h2t	0.0 … 9.9 s	1.2 s	The duration of the hot start in seconds.
Crater fill start level	crS	Crater fill end level … 250 %	90 %	The welding power at the beginning of the crater fill stage as a percentage of the welding power pre-set value.
Crater fill end level	crL	10 % ... Crater fill start level	30 %	The welding power at the end of the crater fill stage as a percentage of the welding power pre-set value.
Crater fill time	crt	0.0 … 9.9 s	2.0 s	The duration of the crater fill stage in seconds.
Start power	StA	-9 … +9	0	Strength of the start pulse (not in WiseRoot or WiseThin processes).
Post current time	Poc	-9 ... +9	0	Post-welding current time
Synergic MIG display units	unL	m/min, mm, A	m/min	In 1-MIG and WiseRoot welding, the parameter shown in the left-hand side display: (wire feed speed (m/min), sheet thickness (mm) or average current (A).

Common system setup parameters				
Parameter	*Display*	*Value range*	*Factory setting*	*Description*
Cable compensation	cAL	-5.0 ... 9.0 V /100 A	1.0 V/100 A	Cable compensation (MIG) for voltage losses.
Long system mode	LSY	oFF (Off), on (On)	Off	Gives optimum welding characteristics with long welding cables. Recommended to be used when the cable length exceeds 40 m.
Code entry	cod	---, Ent (Ent)		Entering license code manually. See page 15 for details.
Scaling	ScA	0 ... 9999	0	A coefficient with which the values in the welding machine are scaled to the scale used by the robot.
Restore factory settings	FAc	oFF (Off), PAn (Pan), ALL (All)	Off	Restores factory settings if you select PAN or ALL and exit the menu. PAN will reset the panel settings and leave the memory channels untouched. ALL restores the whole system to the factory state.

WiseRoot and WiseThin parameters				
Parameter	*Display*	*Value range*	*Factory setting*	*Description*
Synergic start time	FSt	-9 … 9	0	Start time in WiseRoot/WiseThin welding.
Synergic start voltage	FuL	-30 … 30	0	Voltage level in the beginning of the WiseRoot/WiseThin welding.

WiseFusion parameters				
Parameter	*Display*	*Value range*	*Factory setting*	*Description*
WiseFusion on	Fus	oFF (Off), on (On) nA (N/A)	Off	Switch WiseFusion on/off (only in synergic processes). N/A = no license.
WiseFusion Level	FuP	10 … 60 % nA (N/A)	25 %	Percentage of WiseFusion level (only in synergic processes). N/A = no license.

WiseRoot, WiseThin and WiseFusion are optional features. To acquire activation codes, contact a Kemppi representative.

4.8 Touch sensor (seam search)

The touch sensor is a specific functional system used in automated welding for finding workpiece's accurate location and position. The touch sensor hardware and I/O are in the welding power source. A welding robot finds the edges of the workpiece by touching them either with a welding wire or a gas nozzle. Touches are detected by the touch sensor and the information is passed on to the robot controller.

The touch sensor generates a sensing voltage separately from the welding power source. Touch is detected when there is a short-circuit between the workpiece and the sensing tool resulting in a voltage drop. The negative pole of touch sensor's voltage source is connected to a welding minus. The positive pole of the sensor is connected either to a welding plus or a gas nozzle. The target for the positive pole can be changed by a user. A relay in the touch sensor device enables the configuration by a DIP switch.

The touch sensor system consists of hardware and software. The hardware consists of a touch sensor device and wiring in the wire feeder's control cable for the gas nozzle use (see Figure 4.4, "Touch sensing system"). The software enables configuration and control. The touch sensor is configured by using DIP switches, and it is controlled by the welding robot via the digital robot interface.

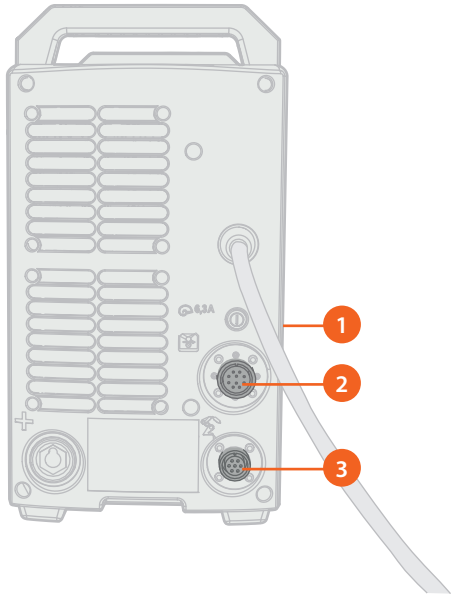


Figure 4.3 Touch sensor in the power source

1. Touch sensor device inside the welding power source
2. Wire feeder control cable connector (wiring for the gas nozzle)
3. Fieldbus / Digital robot interface

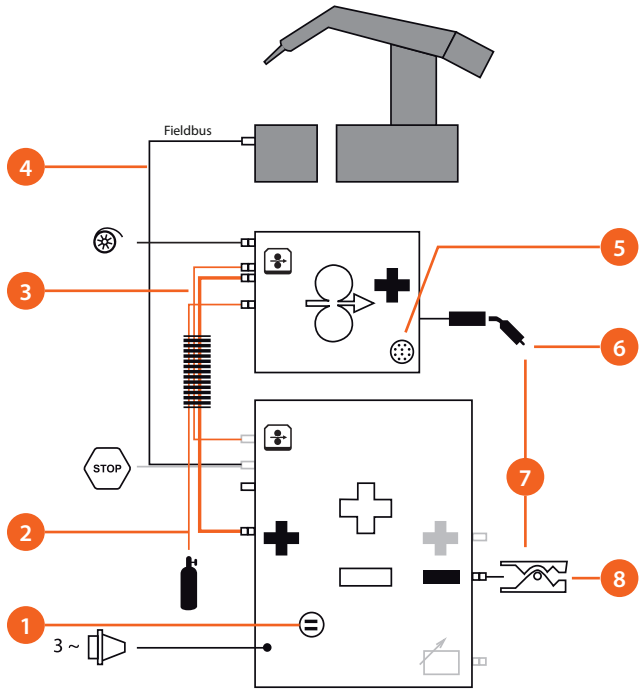


Figure 4.4 Touch sensing system

1. Configuration (DIP switches)
2. Welding plus (welding wire touch sensing)
3. Wire feeder control cable (gas nozzle touch sensing)
4. Fieldbus / Digital robot interface
5. Peripheral connector
6. Touch tool (welding wire or gas nozzle)
7. Touch detection
8. Welding minus (touch sensor ground)

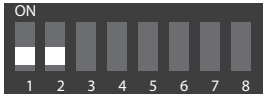
On/Off control

The touch sensor device behaves as a software controllable power source. The power source can be switched on and off from the robot controller by using the digital robot interface.

The touch sensor cannot be used when the welding cycle is on.

Voltage source, levels and safety

The touch sensor provides four selectable DC voltage levels. The voltage level can be configured by using the DIP switches 1 and 2 on the panel (2).

Panel (2) switches 1-2	*Nominal*	*Minimum*	*Typical*	*Maximum*
	50 V (default)	47.5 V	54.0 V	58.0 V
	80 V	76.0 V	80.0 V	84.0 V
	110 V	104.0 V	108.0 V	113.0 V
	200 V	190.0 V	200.0 V	210.0 V

All levels have limited continuous power supply to ensure human safety. The 200 V supply drops down under the 113 V level when loaded by a 5.6 kΩ resistor which is the nominal DC resistance of the human body. In some cases, voltage levels above 113 V can still cause minor harm, such as pain, to a person.

The power source and the touch sensing circuitry are galvanically isolated from the other systems in the welding power source.

Touch tool

Two alternative touch tools can be used for touch sensing (see Figure 4.5, "Welding wire used as touch tool" and Figure 4.6, "Gas nozzle used as touch tool"). The regular tool is the welding wire (welding plus). Sometimes the welding wire is not accurate enough. The tip of the welding wire can bend resulting in incorrect position information. In that case the gas nozzle can be used instead. Using the gas nozzle requires extra wiring from wire feeder's 7-pin peripheral connector (pin C) to the gas nozzle. The touch tool can be managed by the robot controller by using the digital robot interface.

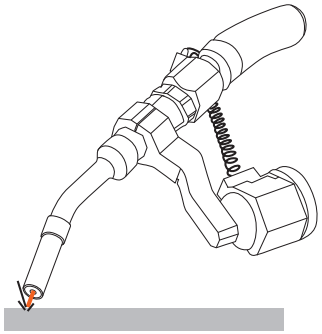


Figure 4.21 Welding wire used as touching tool

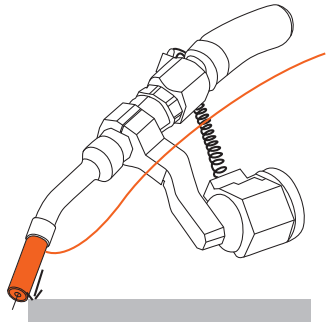


Figure 4.22 Gas nozzle used as touching tool

4.9 Collision sensor

For information on connecting and configuring the collision sensor, see the A3 MIG Welder Integration guide.

The collision sensor is a module mounted between a robot arm and a welding torch. It protects the torch neck from bending and breaking on a collision to an obstacle. The collision detection is usually based on micro switches or optical switches which act on the collision. The detection is passed to the robot that uses it to stop motion immediately to prevent any damage.

In the A3 MIG Welder the collision sensor signal is read by the power source, and the information is passed to the robot by the welding system. In addition, a collision causes always the Error 146 Collision detected in the welding system. When the error occurs, the power source stops welding immediately.

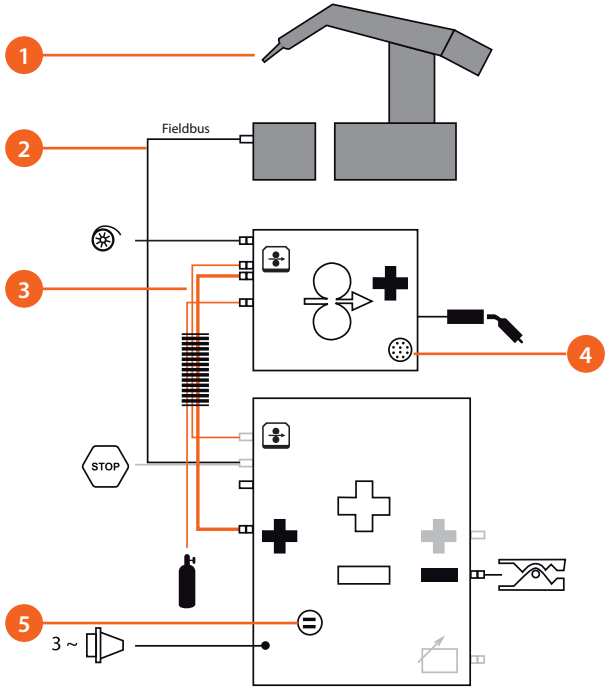


Figure 4.7 Collision sensing system

1. Collision sensor
2. Fieldbus / Digital robot interface
3. Wire feeder control cable
4. Peripheral connector
5. Configuration using DIP switches

The collision sensor is mounted to the robot arm, and it is a mounting point for the welding torch.

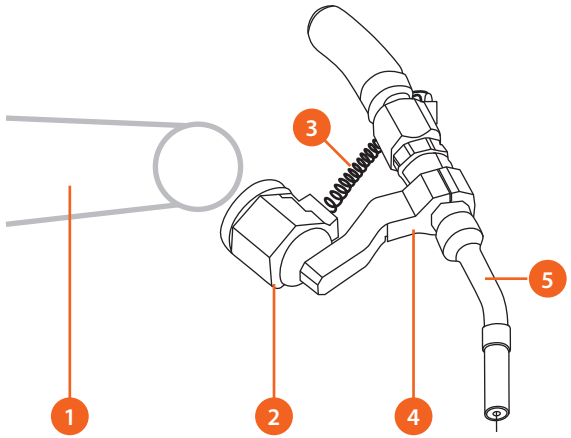


Figure 4.8: Collision sensor mounting

1. Robot arm
2. Collision sensor
3. Collision signal cable
4. Torch suspension
5. Torch neck

There is a 7-pin peripheral connector in the front panel of the wire feeder. The collision sensor signal is available in the pin B, and the supply for the signal is in the pin A. See the A3 MIG Welder Integration guide for more details.

5. TROUBLESHOOTING

5.1 Typical problems

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 MIG/MAG process with the A3 MIG Welder.

Problem	*Check the following*
Machine won't work	• Check mains plug is connected correctly • Check mains power distribution is switched on • Check the mains fuse and/or circuit breaker • Check power source 0/1 switch is ON (1) • Check interconnection cable set and connectors between the power source and wire feed unit are correctly fastened. See the manual schematic • Check earth return cable is connected • Check control panels are switched on.
Dirty, poor quality weld	• Check shielding gas supply • Check and set gas flow rate • Check gas type for application • Check gun/electrode polarity • Check correct welding program selected • Check correct channel number selected on wire feeder control panel • Check power supply – Phase down?
Variable welding performance	• Check wire feed mechanism is correctly adjusted • Check correct drive rolls are fitted • Check wire spool overrun tension is correctly adjusted • Check gun liner is not blocked, replace if necessary • Check correct gun liner is fitted for the filler wire size and type • Check contact tip for size, type and wear • Check gun is not over heating in application • Check cable connections and earth return clamp • Check welding parameter settings.
Filler wire won't feed	• Check that pressure arms are closed and adjusted in wire feed mechanism • Check welding gun switch function • Check Euro gun collar is correctly fastened • Check gun liner is not blocked • Check contact tip, size, type, wear • Check and try alternative gun.

5.2 Error codes

Code	*Description*	*Measures*
2	UNDERVOLTAGE Undervoltage in the mains supply (phase missing)	Check the fuses.
3	OVERVOLTAGE Lengthy overvoltage in the mains supply.	
4	OVERHEAT The overheat detector of the power source has gone off during welding. Welding has continued for too long without interruption or the ambient temperature is too high.	Do not switch off the power source. Let the fans cool down the device.
101	NO WELDING PROGRAM Internal program error. The selected synergic welding curve was not found in the memory. The system memory card is detached or defective.	Switch off and restart the power source. Contact the maintenance service if the error is not resolved.
131	FIELDBUS INIT FAILED Failed to initialize the fieldbus during start-up.	Restart the device. Contact the maintenance service if the error is not resolved.
132	ROBOT COMMUNICATION ERROR Communication to the robot has been lost. The fieldbus cable has been broken or detached, or there is a robot failure or shutdown. Welding is interrupted when a lost connection is detected.	Check the fieldbus cable. If the robot has been shut down, turn the robot on. Switch off and restart the power source.
133	SAFETY STOP The safety stop signal is activated by a user. Welding is immediately interrupted.	Identify the reason for the safety stop. Do not release the safety stop signal before the cause has been identified and resolved.
146	COLLISION DETECTED The collision sensor has been activated. The welding torch mounted on the arm of a welding robot has collided with the welding piece or another obstacle.	Reverse the robot arm until the torch no longer touches the obstacle. Check the torch in case of damages.
154	WIRE FEED MOTOR OVERCURRENT Current limit is exceeded while the wire feed motor is running, and the motor is stopped. The wire feeder rolls are too tight, the wire spool is too tight, or the wire is stuck.	Check and replace the consumables in the wire feeder unit and the torch.
202	CURVE NOT ACTIVATED An activated memory channel has not been configured properly.	Specify a welding curve for the memory channel.
###	OTHER ERROR CODES	Switch off and restart the power source. Contact the maintenance service if the error is not resolved.

6. OPERATION DISTURBANCES

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

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

Operation of the overload protection

Yellow thermal protection lamp is lit when the thermostat is operating, due to loading beyond the stated duty cycle.

The thermostat will operate, if machine is continuously loaded over rated values or cooling air circulation is blocked.

Internal fans will cool the machine, and when the pilot lamp is not lit the machine is automatically ready for welding.

Control fuses

Fuse, 6.3 A delayed, on the rear wall of the machine provides protection for auxiliary devices.

Use the same type and rating of fuse as marked beside the fuse adapter. Damage caused by incorrect fuse selection is not covered by the guarantee.

Under- and overvoltage in the mains supply

Primary circuits of the machine are protected against sudden, transient overvoltage. The machine is designed to withstand 3 x 440 V voltage continuously. Ensure that voltage is kept within this permissible limit, especially when the mains supply is provided by a combustion engine generator. If the mains have undervoltage (under approx. 300 V) or overvoltage (over approx. 480 V) machine control stops operation automatically.

Loss of a phase in the mains supply

Loss of a mains power phase causes noticeably poor welding properties. In some cases, the machine won't start at all. Loss of a phase can be due to following:

- Blowing of mains supply fuse
- Defective mains cable
- Bad connection of mains power cable on machine terminal block or plug of machine.

7. 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.

7.1 Daily maintenance

Check the overall condition of the welding gun. Remove welding spatter from the contact tip and clean the gas nozzle. Replace worn or damaged parts. Only use original Kemppi spare parts.

Check the condition and connection of the welding circuit components: welding gun, earth return cable and clamp, sockets and connectors.

Check the condition of the feed rolls, needle bearings and shafts. Clean and lubricate bearings and shafts with a small quantity of light machine oil if necessary. Assemble, adjust and test function.

Check that the feed rolls are suitable for the filler wire you are using, and that their pressure adjustment is correct.

7.2 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 the cover plate.

Check at least every half year the electric connectors of the machine – clean any oxidized parts and tighten loose connections.

You must know the correct tension torques values before starting the reparation of the loose joints.

Clean the inner parts of the machine from dust and dirt e.g. with a soft brush and vacuum cleaner. Also clean the ventilation net behind the front grill.

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

Do not use pressure washing devices.

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

7.3 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.

8. 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.

9. ORDERING NUMBERS

Product		*Code*
A3 Power Source 400	Welding power source, 400 A, DeviceNet	6201403
A3 Wire Feeder 25-RH-EUR	Wire feeder, right handed, euro connector	6203403
A3 Wire Feeder 25-RH-PP	Wire feeder, right handed, power pin connector	6203413
INTERCONNECTION CABLE 70MM2 5M	Interconnection cable set, 5 meters, air cooled, for euro connector wire feeder	SP801064A
EARTH RETURN CABLE 70 MM2 5 M	Earth return cable, 70 mm², 5 m	SP801062A
A3 FIELDBUS BRANCHE CABLE 5M	Branch cable set for DeviceNet and safety stop	W015563

10. TECHNICAL DATA

A3 Power source		*400*
Power supply		
Supply voltage 3~ 50/60 Hz		400 V, -15 % … +20 %
Mains connection cable		H07RN-F 4G6 (5 m)
Maximum supply current		23 A
Effective supply current		21 A
Fuse		35 A delayed
Efficiency (100 % duty cycle)		87 %
Power factor (at max. current)		0.9
Minimum short circuit power Ssc of supply network		4.7 MVA
Idle power		25 W
Rated power	80 % ED	19.5 kVA
	100 % ED	18.5 kVA
Primary current	50 % ED I1max	28 A
	100 % ED I1	25.5 A
Welding characteristics		
No-load voltage (peak)		U0 = 85 V – 95 V
Open circuit voltage (average)		50 V
Welding voltage range		10 V - 46 V
Output capacity 40°C	80 % ED	400 A
	100 % ED	380 A
Auxiliary device supply		
Supply voltage		50 V DC
Fuse		6.3 A delayed
Environmental characteristics, dimensions and classification		
Operating temperature range		-20 °C … +40 °C
Storage temperature range		-40 °C … +60 °C
External dimensions LxWxH		590 x 230 x 500 mm
Weight		36 kg
Degree of protection		IP21S
EMC class		A

A3 Wire Feeder		*25*
Electrical characteristics		
Operating voltage (safety voltage)		50 V DC
Rated power		100 W
Load capacity	80 % ED	600 A
	100 % ED	500 A
Wire feeder		
Wire feed speed		0 … 25 m/min
Wire feed mechanism		4-roll, single motor
Gun connection		Euro / PowerPin
Filler wires	ø Fe, Ss	0.6 … 1.6 mm
	ø Flux-cored wire	0.8 … 1.6 mm
	ø Al	1.0 … 1.6 mm
	ø CuSi	0.8 … 1.2 mm
Environmental characteristics, dimensions and classification		
Operating temperature range		-20 °C ... +40 °C
Storage temperature range		-40 °C ... +60 °C
External dimensions LxWxH		269 x 175 x 169 mm
Weight		4.5 kg
Degree of protection		IP21S
EMC class		A

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Declarations of Conformity – Overensstemmelseserklæringer – Konformitätserklärungen –
Declaraciones de conformidad – Vaatimustenmukaisuusvakuutuksia – Déclarations de conformité –
Dichiarazioni di conformità – Verklaringen van overeenstemming – Samsvarserklæringer – Deklaracje zgodności –
Declarações de conformidade – Заявления о соответствии – Försäkran om överensstämmelse – 符合性声明

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