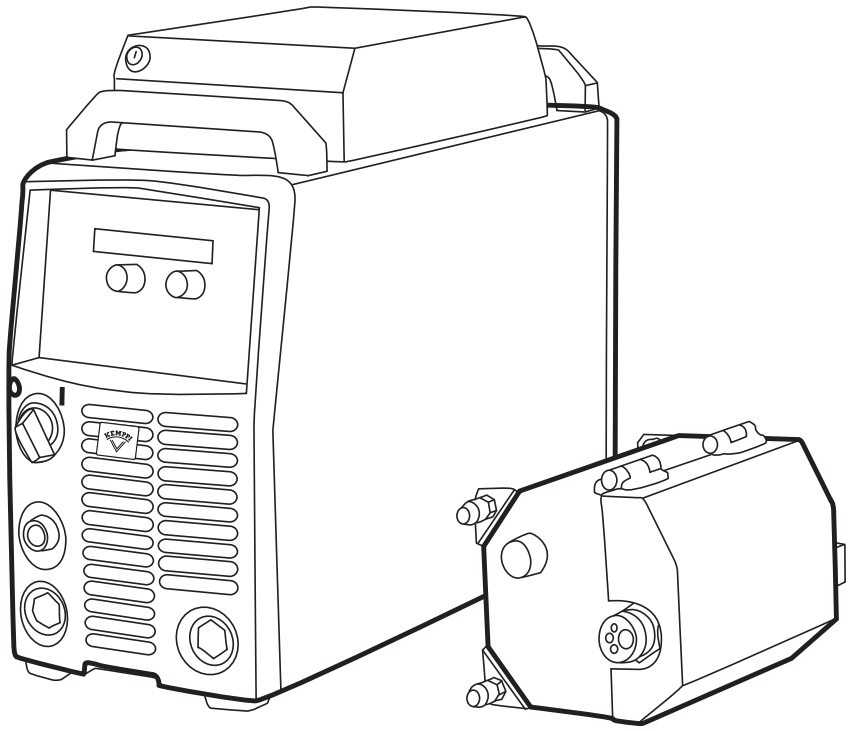
KEMPPI
The Joy of Welding

KempArc | SYN 300, 400, 500
DT 400



Operating manual • English **EN**

Käyttöohje • Suomi **FI**

Bruksanvisning • Svenska **SV**

Bruksanvisning • Norsk **NO**

Brugsanvisning • Dansk **DA**

Gebrauchsanweisung • Deutsch **DE**

Gebruiksaanwijzing • Nederlands **NL**

Manuel d'utilisation • Français **FR**

Manual de instrucciones • Español **ES**

Instrukcja obsługi • Polski **PL**

Инструкции по эксплуатации • По-русски **RU**

Manual de utilização • Português **PT**

OPERATING MANUAL

English

KempArc SYN 300, 400, 500, DT 400 / © Kemppi Oy / 1117

CONTENTS

1. PREFACE

1.1 GENERAL

Congratulations on your choice of the Kemparc SYN-series welding system. Reliable and durable, Kemppi products are affordable to maintain, and they increase your work productivity.

This user manual contains important information on the use, maintenance and safety of your Kemppi product. The technical specifications of the device can be found at the end of the manual. Please read the manual carefully before using the equipment for the first time. For your 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 authorised 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.

NOTE! Items in the manual that require particular attention in order to minimise damage and personal harm are indicated with this symbol. Read these sections carefully and follow their instructions.

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 INTRODUCTION

KempArc SYN is a product family for welding automation that includes all welding devices needed in robot welding. The KempArc SYN welding system includes the following devices:

- **KempArc SYN 300**, **SYN 400** and **SYN 500** are synergetic welding power sources designed particularly for welding automation that are suitable for MIG welding with direct current. There are three power types of power sources: the 300, 400 and 500 ampere models. For more information on using power sources and their functions, see "Power source".
- **RF 59** is a control panel that contains the programs and welding parameters needed in controlling the welding hardware. The panel functions allow the user to control the operation of the welding hardware and adjust its welding settings. The control panel is located in the front panel of the welding power source. For more information on using the control panel and its functions, see "Control panel".
- **KempArc DT 400** is a wire feeding device that feeds welding wire to the welding robot at the speed it requires at any time. For more information on using the wire feeder and its functions, see "Wire feeder".

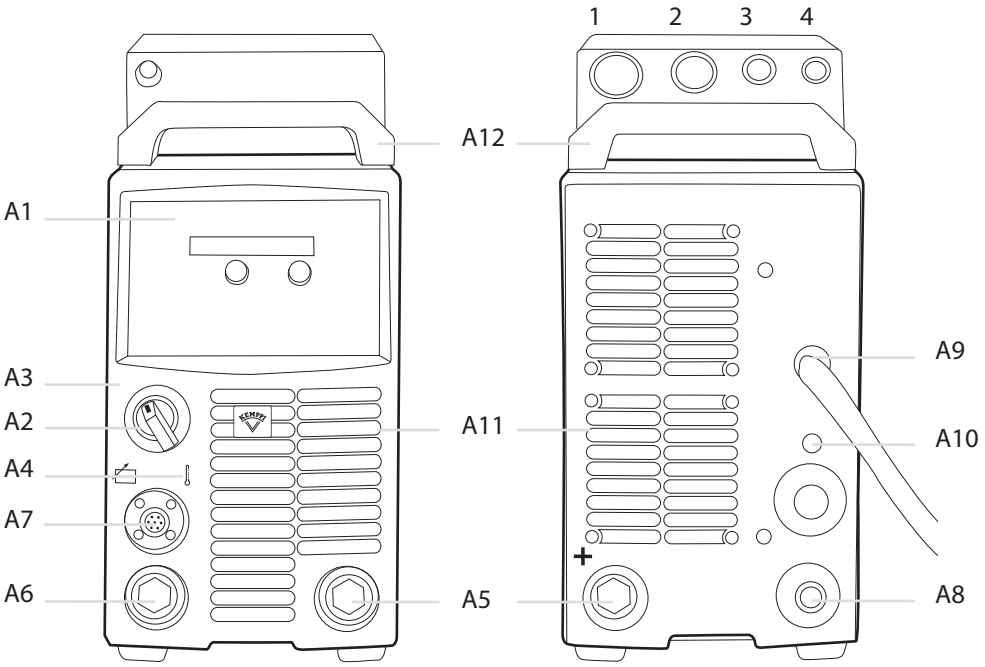
This guide presents the functions, operation and technical properties of the above devices. The devices also include the KempCool 10 cooler, but its functions and features are presented in a separate guide.

The KempArc Synergic hardware is connected to the welding robot control system with the control unit on top of the power source.

2. USE

2.1 POWER SOURCE

2.1.1 Power source components



1 Robot Control
2 Wire Feeder
3 Throughput
4 Analog

A1 Control panel
A2 Main switch
A3 Signal light (I/O)
A4 Thermal warning light
A5 Welding cable connection (parallel)
A6 Earthing cable connection
A7 Control cable connection (parallel)
A8 Cooling unit
A9 Mains cable
A10 Fuse for control cable connection (6.3 A slow)
A11 Fan grill
A12 Transportation handles

2.1.2 Positioning of the machine

Place the machine on a firm, dry and level surface. Where possible, do not allow dust or other impurities to enter the machines cooling air flow. Preferably site the machine above floor level; for example on a suitable carriage unit.

Notes for positioning the machine

- The surface inclination should 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 to circulate.
- Protect the machine against heavy rain and direct sunshine.

NOTE! The machine should not be operated in the rain as the protection class of the machine, IP23S, allows for outside preserving and storage only.

NOTE! Never aim metallic grinding spray/sparks towards the equipment.

2.1.3 Distribution network

All regular electrical devices without special circuits generate harmonic currents into distribution network. High rates of harmonic current may cause losses and disturbance to some equipment.

KempArc 500

This equipment complies with IEC 61000-3-12 provided that the short-circuit power Ssc is greater than or equal to 4.6 MVA at the interface point between the user's supply and the public supply network. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short-circuit power Ssc greater than or equal to 4.6 MVA.

KempArc 400

This equipment complies with IEC 61000-3-12 provided that the short-circuit power Ssc is greater than or equal to 4.7 MVA at the interface point between the user's supply and the public supply network. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short-circuit power Ssc greater than or equal to 4.7 MVA.

KempArc 300:

WARNING: This equipment does not comply with IEC 61000-3-12. If it is connected to a public low voltage system, it is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment may be connected.

2.1.4 Connecting the power source to the electric network

The KempArc SYN power source is connected to a 400-V three-phase network. The machine is equipped with a five-metre mains cable that does not have a plug. Before use, check the mains cable and install a mains plug. If the cable does not comply with the local electrical regulations, replace it with a compliant cable.

NOTE! The mains cable or plug may be installed or replaced by only an electrical contractor or installer authorised to perform such operations.

Replacement of the mains cable

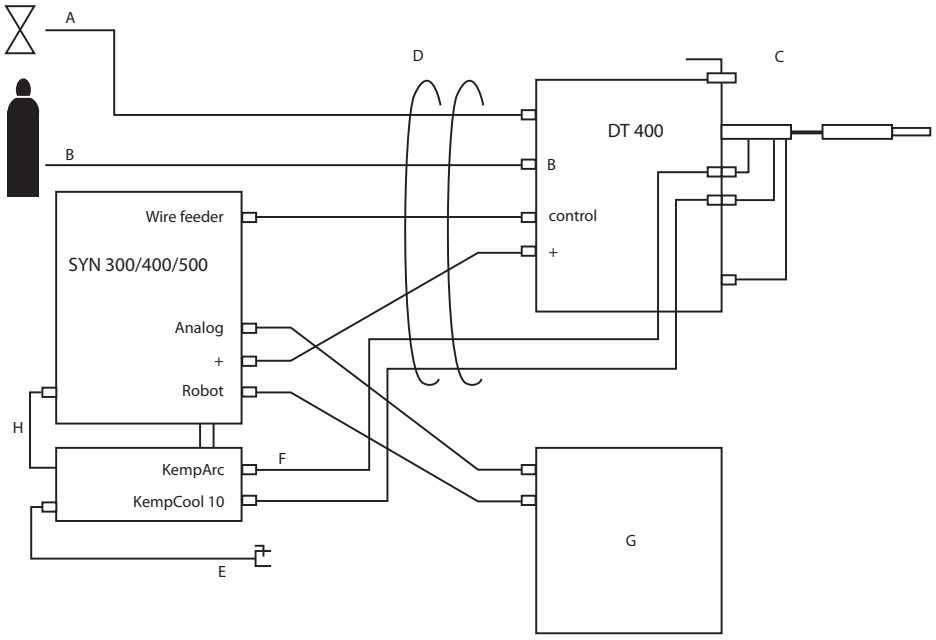
1. Unscrew the mounting screws on the top and sides of the machine, and remove the case by lifting it.
2. Disconnect the phase leads from connectors L1, L2, and L3, and disconnect the protective earth lead.
3. Pass the cable to the machine through the inlet ring at the rear of the machine, and secure the cable with a cable clamp.
4. Connect the cable's phase leads to connectors L1, L2, and L3.
5. Connect the yellow-green protective earth lead to its connector ⏚.

NOTE! Do not connect the zero lead if you are using a five-lead cable.

The table below lists the fuse sizes for 100% load in a 400-V three-phase network with 4 x 6-mm² cable for different power source models.

Model	Fuse
SYN 300	20 A delayed
SYN 400	25 A delayed
SYN 500	35 A delayed

2.1.5 Connecting the cables



A. air hose
B. shield gas hose
C. air blow
D. intermediate cable
E. earthing cable
F. cooling liquid hoses
G. robot controller
H. cooling unit control cable

Welding and earthing cables

The welding and earthing cables are rubber-insulated copper cables. The recommended cross-sections of the cables for different power source models are as follows:

Model	Welding cable
SYN 300	50 ... 70 mm^2
SYN 400	70 ... 90 mm^2
SYN 500	70 ... 90 mm^2

The table below shows the typical load capacities of the cables when the ambient temperature is 25 °C and the lead temperature is 85 °C.

Welding cable	Duty cycle (ED)			Voltage loss / 10 m
	100 %	60 %	30 %	
50 mm^2	285 A	370 A	520 A	0.35 V / 100 A
70 mm^2	355 A	460 A	650 A	0.25 V / 100 A
95 mm^2	430 A	560 A	790 A	0.18 V / 100 A

NOTE! Do not overload the welding cables, as an overload may cause voltage loss and overheating.

Connecting welding and earthing cables

The power source has two welding cable and control cable connectors. With them, the welding robot's welding torch and, if necessary, a manual welding torch for tack welding can be connected to the power source.

Connect the welding and earthing cables as follows.

1. Connect the power source to the electric network according to the instructions above.
2. Connect the earthing cable to the earthing connector A6.
3. Connect the welding cable to the welding current connector A5.

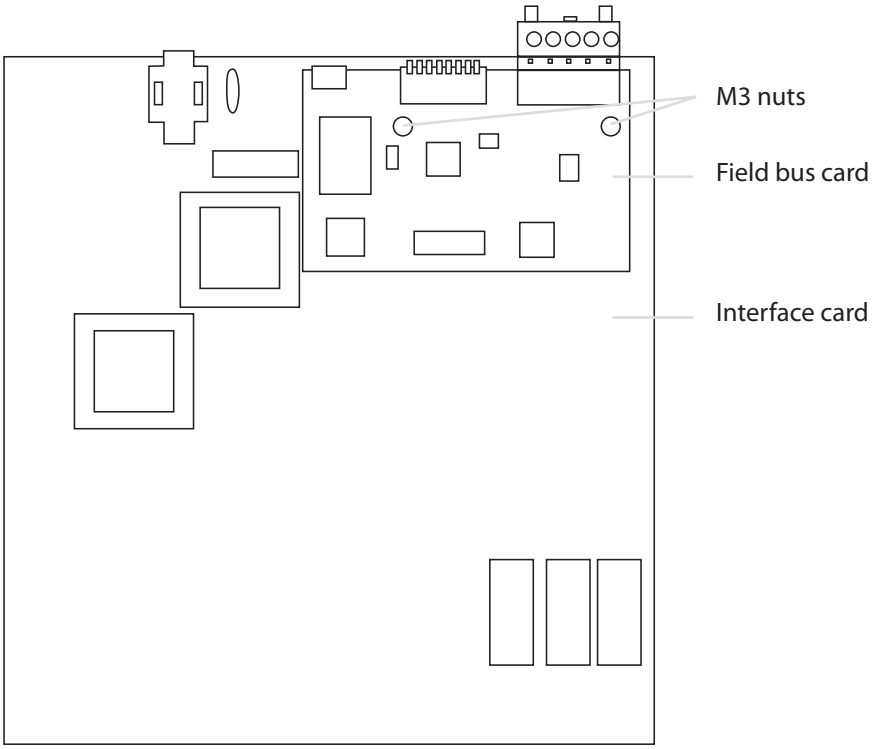
NOTE! Do not overload the welding cables, as an overload may cause voltage loss and overheating.

You can conect the control cables of manual welding wire feeders or the control cable of a remote controller to the control cable connectors.

Before starting the welding, connect the earth clamp directly to the work piece in such a way as to maximise the contact surface of the clamp. The point of connection must be unpainted and free of corrosion.

2.1.6 Installing the field bus card

1. Remove the cover of the control unit on top of the power source by unscrewing the cover screws.
2. Put the field bus card on top of the interface card and attach with two M3 nuts (see image).
3. Put the control unit cover back in place.
4. Connect the welding robot's field bus cable to the control unit connector.



NOTE! Separate the field bus cable for the welding robot from the mains cables, as they may interfere with the control logic operation.

2.1.7 Starting the power source

Start the power source by turning the main switch A2 on the front panel to the I position. The standby indicator A3 turns on.

NOTE! Always turn the device on and off using the main switch, not via the mains socket.

The cooling fan is started for a moment when the main switch is turned to the 'I' position. The fan turns off after a while and then restarts during welding when the machine has warmed up sufficiently. The fan continues running even after up to 10 minutes of welding, depending on the temperature of the machine.

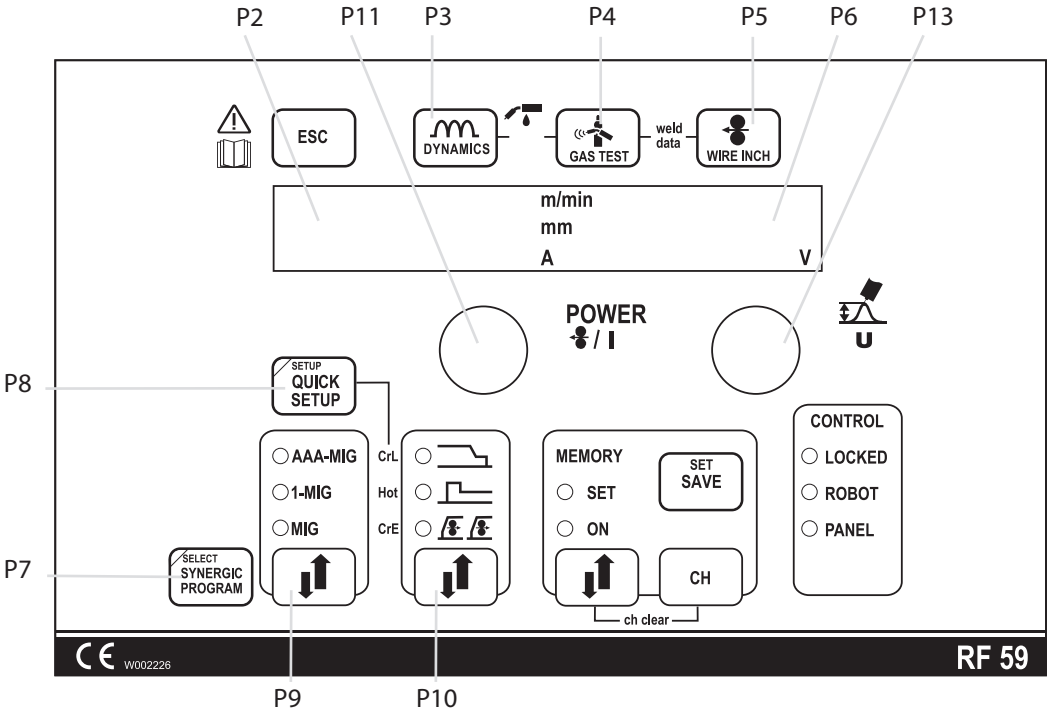
2.1.8 Power source indicators

The following indicators can be found on the front panel of the power source:

- When the green mains indicator A3 is on, the power source is in standby mode. This indicator is on when the machine is connected to the mains supply with the main switch in the 'I' position.
- When the yellow overheating indicator A4 is on, the machine has overheated. When the indicator turns off, the machine can be used again.
- When indicator A4 blinks, the machine has encountered a failure. Attempt to remedy the problem according to the instructions in Section 4, 'Troubleshooting'. If the failure cannot be eliminated, turn off the machine, and turn it on again. If the failure persists, write down any fault code that may be shown on the display and contact authorised Kemppi service agent.

2.2 CONTROL PANEL

2.2.1 Control panel parts



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

Esc button

Use the Esc button to move to the previous menu level.

Displays

- The control panel displays show adjustable operation parameters, their values, and the units of measure.
- During welding, display P2 shows the welding current value that is currently in use, while display P6 shows the welding voltage.

Control knobs

- The left-hand control knob P11 allows the adjustment of the speed of wire feeding. The selected speed is shown on the display on the left-hand side.
- The right-hand side control knob P13 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, and the base current in WiseThin processes, in which case the adjustment range is +/- 50.

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.

2.2.2 Adjusting MIG dynamics (Arc Force)

When you press button P3, you can adjust the MIG welding dynamics of the machine by means of the right-hand knob.

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.

When using a WiseThin process, the welding dynamics setting affects the forming pulse as shown below:

- Use values -1...-30 if you want a softer arc and smaller penetration.
- Use values 1...30 if you want a rougher and greater penetration.

2.2.3 Gas test

The gas test button P4 opens the gas valve without activating the wire feed or power source. By default, gas flows for 20 seconds. The gas flow time remaining 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.

2.2.4 Wire feed test

When you press the Wire inch button, P6, the wire feeder engine starts but 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.

2.2.5 Selection of liquid- or gas-cooled MIG gun

You can select a MIG gun cooled with liquid or gas by pressing buttons P3 and P4 simultaneously and holding them down for at least one second.

- When the display reads GAS, you can use a gas-cooled MIG gun with the equipment.
- When the display reads COOLEr, you can use a liquid-cooled MIG gun with the equipment.

You can change the gun selection by pressing buttons P3 and P4 again, as above. With a liquid-cooled gun selected, the liquid cooling function is started when the power source is started the next time.

2.2.6 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 P4 and P5 simultaneously.

2.2.7 Selecting the welding process

The welding process selector button P9 allows you to select the welding process you want to use. You can select one of the following processes:

- normal MIG welding
- 1-MIG welding
- WiseThin (optional)

In normal MIG welding, the wire feed speed and welding voltage are adjusted separately. Unlike the above, the 1-MIG and WiseThin processes are synergetic 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 process is an optional feature intended for welding automation. It must be acquired separately and is therefore not available in all configurations.

2.2.8 Additional MIG features included in the standard delivery

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

To use an additional MIG feature, press the feature selector button P10. Press the selector button repeatedly to use one or several features. Only the additional features allowed for the welding method you have chosen will be available.

Creep start

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 normal MIG welding and the synergetic 1-MIG welding.

Hot start

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 synergetic 1-MIG welding.

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 preset 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 synergetic 1-MIG welding.

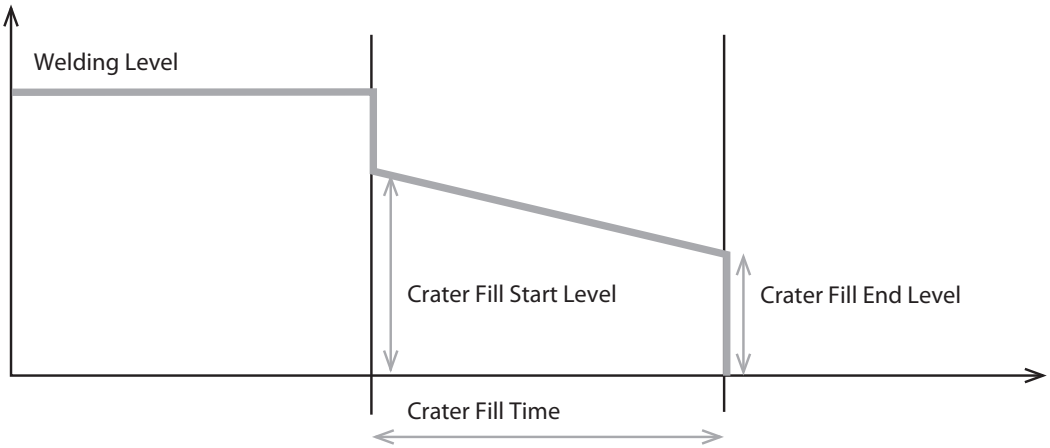
Specifying the SETUP settings for additional features

To set the values of the functional parameters for additional MIG features, use either the SETUP feature in the control panel (see 2.2.12 "SETUP functions in the control panel") or the QUICK SETUP feature, which you can activate by pressing the QUICK SETUP button, P8.

Select the parameter to adjust using the left-hand side control knob P11 or the button P10 and then set the parameter value with the right-hand side control know P13. The value you specified is instantly stored in the control panel memory. The following table lists the parameter values that can be specified for additional MIG features.

Name of parameter	Name displayed	Parameter values	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	10 ... 90 %	90 %	The welding power at the beginning of the crater fill stage as a percentage of the welding power preset value.
Crater Fill End Level	CrL	10 ... 90 %	30 %	The welding power at the end of the crater fill stage as a percentage of the welding power preset value.
Crater Fill Time	Crt	0 ... 9.9 s	2 s	The duration of the crater fill stage in seconds.

NOTE! In crater fill, the initial value of the welding power must be greater than the final value, and therefore the adjustment ranges for the initial and final values are restricted automatically, if necessary.



2.2.9 Optional additional MIG features

In addition to the additional MIG features included in the standard delivery, it is also possible to acquire optional features that further expand the operating features of the machine.

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

Activating optional additional features

1. Press and hold down the SETUP button P8 for at least 5 seconds. The SETUP settings menu appears on the display.
2. Select the Cod alternative with the left-hand side control knob in the control panel and then select the value Ent using the right-hand side control knob.
3. Briefly press the SAVE button.
4. When the display on the left-hand side reads 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 briefly.

The control panel will read Suc cEs to indicate that the activation code has been entered correctly and the additional 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 additional features can be found in the documentation supplied with the additional feature.

2.2.10 Memory features (MEMORY button)

Use the control panel memory features 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 positions, 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 additional feature settings, such as creep start or crater fill settings.

Storing welding parameters in memory

1. Press the MEMORY button twice. If a memory channel is free, the SET indicator starts flashing. In other cases the indicator 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.
3. Specify the welding settings you want and store the selections by pressing SAVE.
4. Press the MEMORY button 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

6. Press the MEMORY button to turn on the ON indicator.
7. Select the memory channel you want from the robot.
8. Start welding.

2.2.11 Synergetic 1-MIG welding and WiseThin welding

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

The synergetic WiseThin process (advanced auto arc) is a synergetic welding process developed for the special needs of robotic welding with weldig 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. Press the SYNERGIC PROGRAM button P7 for more than 1 second. This will activate program selection and the control panel displays start flashing.
3. 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.
4. Press ESC button or the SYNERGIC PROGRAM button P7 to exit the menu.

MIG programs in the KempArc SYN machine

1-MIG, Fe group			
Program number	Wire, mm	Material	Shield 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	Shield 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	Shield 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			
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			
903	1,0	Fe	Ar+18%-25%CO_2
904	1,2	Fe	Ar+18%-25%CO_2
913	1,0	Fe	CO_2
914	1,2	Fe	CO_2

WiseThin, SS group			
923	1,0	SS-316	Ar+2%CO_2
924	1,2	SS-316	Ar+2%CO_2
933	1,0	SS-316	Ar+30%He+1%O_2
934	1,2	SS-316	Ar+30%He+1%O_2

Using the welding program

5. Select the welding process 1-MIG with the P9 button.
6. Press the SYNERGIC PROGRAM button to display the material group and the welding program number. Make sure that the welding program corresponds to the filler wire and shield gas you use.
7. Check the wire type and shield gas for the welding program in the table below.
8. Adjust the welding power with the left-hand side knob and the arc length with the right-hand side knob.

2.2.12 SETUP features of the control panel

The machine has a number of additional features, or parameters, whose settings can be specified with the control panel's SETUP function as follows:

1. Press and hold down the SETUP button P10 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 2.
3. Specify the parameter value with the right-hand side control knob. The selected value is shown in the display P6. The parameter's value is immediately stored in the memory.
4. You can 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 synergetic MIG welding does not affect the post-current of normal MIG welding.

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

Normal MIG welding parameters and their values

Name of parameter	Name displayed	Parameter values	Factory setting	Description
Pre Gas Time	PrG	0.0 ... 9.9 s	0.0 s	Pre-gas time 0 ... 9.9 s.
Post Gas Time	PoG	Aut, 0.1 ... 32.0 s	1,0	Post gas time, Aut = Automatic, depending on welding current 0.1 ... 32 s
Creep Start Level	Cre	10 ... 170%	50 %	Percentage of wire feed speed, 10% refers to slow start, 170% to accelerated start
Post Current Time	PoC	-9 ... +9	0	Post-welding current time

Synergetic MIG welding parameters and their values

Name of parameter	Name displayed	Parameter values	Factory setting	Description
Creep Start Level	Cre	10 ... 170 %	50 %	Percentage of wire feed speed, 10% refers to slow start, 170% to accelerated start
Hot Start Level	Hot	-50 ... 75 %	30 %	Percent of welding power: -50% refers to cold start and +75% to hot start
Crater Fill Level	CrL	10 ... 90 %	30 %	The crater fill level, 10% is the lowest power and 90% the greatest one, relative to welding power (preset value).
Post Current Time	PoC	-9 ... +9	0	Post-welding current time
Synergic MIG Unit	Unl	m/min, mm, A	m/min	In synergic welding, the parameter shown in the left-hand side display (wire feed speed/plate thickness/average current).

Parameters common to all MIG processes and their values

Name of parameter	Name displayed	Parameter values	Factory setting	Description
Cable Compensation	CAL	-5.0 ... 9.0 V/100 A	1.0 V/100 A	Cable compensation (MIG) for voltage losses.
Code Entry	Cod	---, Ent	---	Entry of additional features, see page 14.
Restore Factory Settings	FAC	OFF, PAn, All	OFF	Restores factory settings if you select ON and exit the menu.
Scaling	SCA	0 ... 5000	0	A coefficient with which the values in the welding machine are scaled to the scale used by the robot.

Checking the parameters in the MEMORY ON state

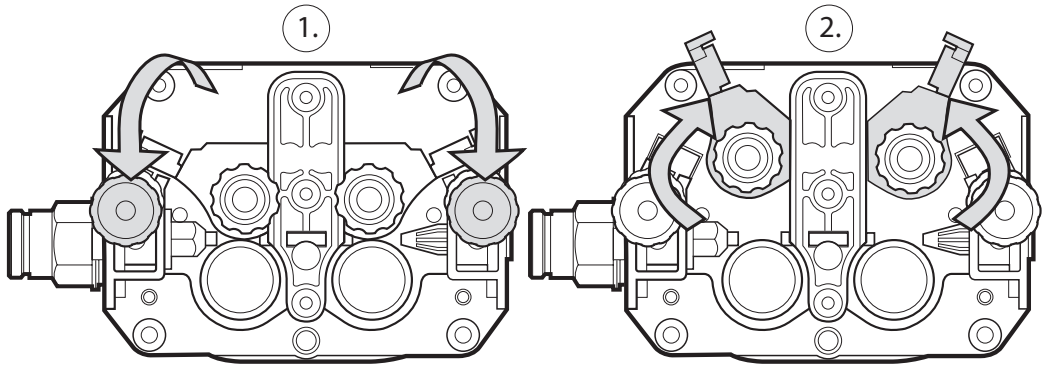
You can check parameter values in the MEMORY ON state by pressing the button of the parameter you want. The parameter value will be shown in the display. You cannot modify parameter values in the MEMORY ON state.

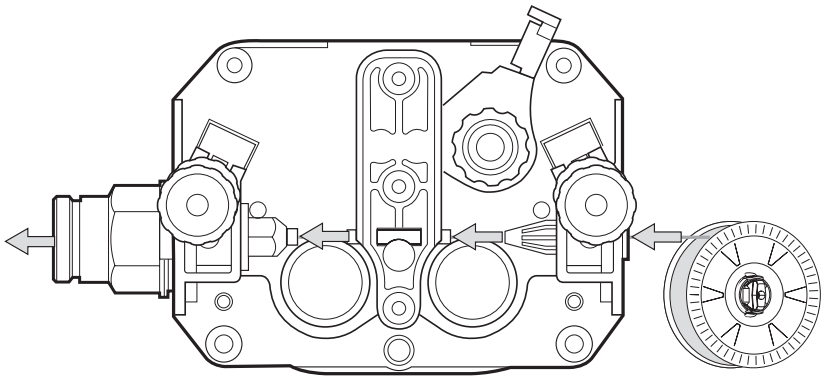
2.3 WIRE FEEDER

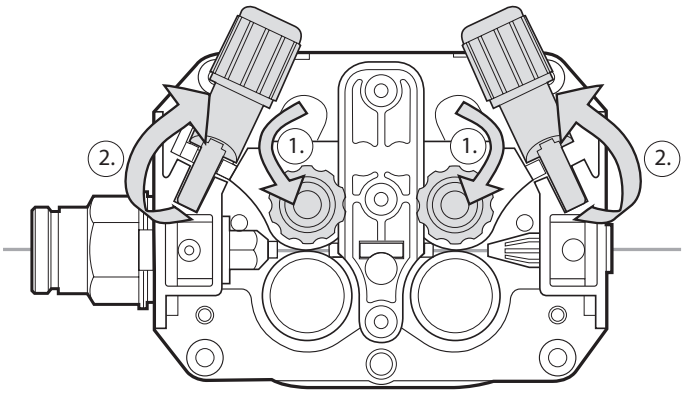
Wire guide adapter

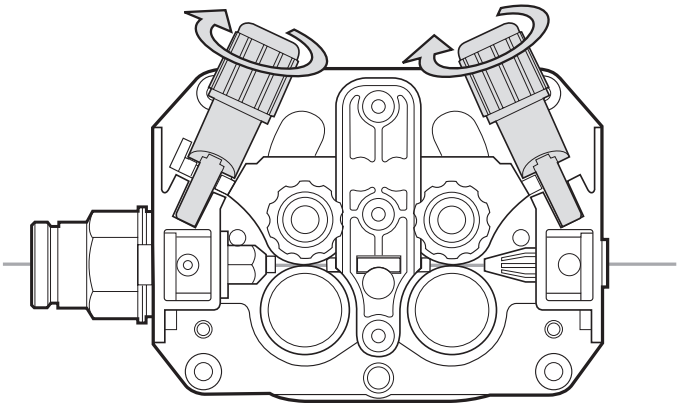
The welding wire is taken to the wire feeder through a metallic wire guide adapter. Push the wire guide to the end of the adapter and screw in with the top fixing locks. Attach a spring at the end of the adapter to serve as the bend support for the wire guide and to prevent the wire from bending too heavily. Fix the support spring with the bottom fixing locks.

Threading the wire and adjusting tightness









3. MAINTENANCE

The utilisation level of the power source and its working environment should be taken into consideration in planning the frequency of maintenance of the machine. Proper use of the machine and regular maintenance help you avoid unnecessary downtime and failures.

3.1 CABLES

- Check the condition of welding and mains cables daily.
- Make sure to replace damaged cables immediately. Only use original Kemppi spare parts.
- Make sure that all extension cables used in the mains connection are in proper condition and compliant with regulations.

NOTE! The mains cables may be repaired and installed only by electrical contractors and installers authorised to perform such operations.

3.2 POWER SOURCE

Before cleaning the interior of the machine, you need to remove the case by unscrewing the mounting screws of the machine.

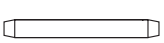
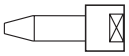
NOTE! To prevent damage, wait approximately two minutes after disconnecting the mains cable before removing the machine's case.

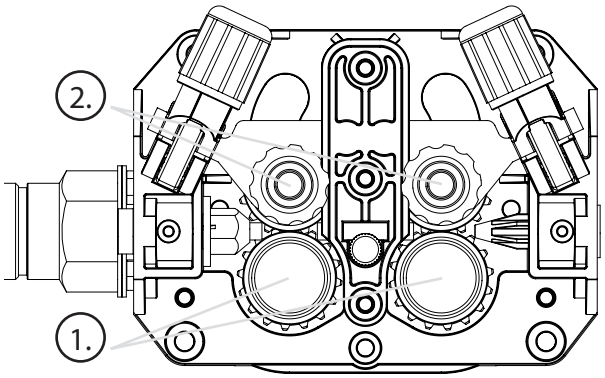
Perform the following cleaning and maintenance at least every six months:

1. Clean the interior of the machine and the fan grill's net of any dust and stains – for example, with a soft brush and vacuum cleaner.
   - Do not use pressurised air. The stain may become compressed into the grooves of the coolers.
   - Do not use a pressure-washing device.
2. Check the electrical connections of the machine. Clean any oxidised connections, and tighten the loosened ones.
   - Check for the right tension before tightening the connections.

NOTE! Remember that the machine may be repaired only by an electrical contractor or installer authorised to perform such operations.

3.2.1 DuraTorque™ 400, 4-wheel wire feeder mechanism

Wire guide tubes							
Ss, Al, Fe, Mc, Fc	ø 0.6...1.6 mm	→	ø 2.5/64 mm, W000762, silver, plastic	→	ø 2.5/33 mm, W000956, silver, plastic	→	ø 2.0 mm, W000624, plastic
	ø 1.6..0.20.4 mm	→	ø 3.5/64 mm, W001430, silver, plastic	→	ø 3.5/33 mm, W001431, silver, plastic	→	ø 3.5 mm, W001389, plastic
Fe, Mc, Fc	ø 0.6..0.00.8 mm	→	ø 1.0/67 mm, W001432, white, steel	→	ø 2.0/33 mm, W001435, orange, steel	→	ø 2.0 mm, W000624, plastic
	ø 0.9...1.6 mm	→	ø 2.0/64 mm, W001433, orange, steel			→	ø 3.5 mm, W001389, plastic
	ø 1.6..0.20.4 mm	→	ø 4.0/63 mm, W001434, blue, steel	→	ø 4.0/33 mm, W001436, blue, steel	→	ø 3.5 mm, W001391, brass
							



Parts of the DT400 metal feed rolls					
W000731	gear ring 1	driving			2 pcs per unit
W000732	gear ring 2	pressing			2 pcs per unit
W000711	drive ring	V groove	1,2/1,2	optional	4 pcs per unit
W000718	drive ring	V groove	1,0/1,0	optional	4 pcs per unit
W000891	drive ring	V groove	1,0/1,2	optional	4 pcs per unit
9420507	washer		10.5x30x2.5		2 pcs per unit

3.3 REGULAR MAINTENANCE

Make sure that the machine receives regular and appropriate maintenance. Authorised Kemppi service agents perform regular maintenance by agreement. For more information on regular maintenance, contact a Kemppi representative.

3.4 DISPOSAL OF THE MACHINE

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 centre, per the instructions of local authorities or a Kemppi representative. By applying this European Directive you will improve the environment and human health.

4. TROUBLESHOOTING

In the event of a failure of the machine, contact an authorised Kemppi service agent. Before taking your unit for servicing, check the list below.

4.1 OVERLOAD (YELLOW INDICATOR LIT)

Two simultaneously operating fans cool the power source. The machine may, however, overheat if continuously loaded above the rated values or if the circulation of cooling air is prevented.

Overheating is indicated by a yellow indicator light in the front panel of the power source. You then need to stop welding and let the machine cool down. The indicator light turns off when welding can be resumed.

4.2 CONTROL CABLE CONNECTOR FUSE

The back panel of the power source has a fuse that protects the control cable connector. Using an incorrect type of fuse will damage the power source. Therefore, it is important that you always use the correct fuse type. The type and size of the fuse are indicated next to the fuse socket.

4.3 ELECTRIC NETWORK OVERVOLTAGE OR UNDERVOLTAGE

If the power source is used in an electric network with insufficient voltage (less than 300 V), the control features of the device are automatically disabled.

The primary circuits of the power source are protected against power spikes. The product's mains voltage range is broad enough to prevent over-voltage problems at up to 440 V. Make sure that the voltage remains within the allowed range, especially if the operating power is supplied by a generator set. For information on the allowable voltage range, see "Technical specifications" in this guide.

4.4 MISSING PHASE IN THE ELECTRIC NETWORK

If a phase is missing from the mains current, the welding features will be adversely affected or the machine may have problems starting. Loss of a phase can be caused by a:

- Blown mains fuse
- Damaged mains cable
- Poor mains cable connection in the machine's terminal block or mains socket

4.5 ERROR CODES

The machine always checks its operation automatically during start-up and reports any failures detected. If failures are detected during start-up, they are shown as error codes on the control panel display.

Err3: Power source overvoltage

The machine has stopped the welding because it has detected momentary voltage spikes or continuous overvoltage dangerous to the machine in the electric network. Check the quality of the supply network.

Err4: Power source overheating

The power source has overheated. The cause may be one of the following:

- The power source has been used for a long time at maximum power.
- The circulation of cooling air to the power source is blocked.
- The cooling system has experienced a failure.

Remove any obstacle to air circulation, and wait until the power source fan has cooled down the machine.

Err5 Water unit alarm

The water circulation is blocked. The cause may be one of the following:

- Congestion or disconnection in the cooling pipeline
- Insufficient cooling liquid
- Excessive cooling liquid temperature

Check the circulation of the cooling liquid and the air circulation of the water unit.

Err23: Power source overvoltage warning

The power source has detected voltage spikes in the electric network. Short power spikes can be managed. They do not lead to interruptions in welding but may decrease the welding quality. Check the quality of the supply network.

Err61: The water unit is not found

The water unit is not connected to the equipment, or the connection has failed. Connector the water unit.

Other error codes:

If an error code not listed above is shown, contact Kemppi service and tell them the error code.

5. ORDERING NUMBERS

Power source/Interface		
KempArc	SYN 300 (digital)	6201300
	SYN 400 (digital)	6201400
	SYN 500 (digital)	6201500
KempArc	SYN 300 (analogue)	6201300AN
	SYN 400 (analogue)	6201400AN
	SYN 500 (analogue)	6201500AN
Wire feeder	DT 400	6203400
Interbus S		9774120IBC
Interbus S	optical	9774120IBO
Profibus		9774120PRF
Devicenet		9774120DEV
Cooling unit KempCool 10		6208100
Cables		
Intermediate cable	5 m (power source - wire feeder)	6260421
Intermediate cable	10 m (power source - wire feeder)	6260425
Earthing cable	70 mm^2, 5 m	6184711
Earthing cable	70 mm^2, 10 m	6184712

6. TECHNICAL DATA

KempArc		SYN 300	SYN 400	SYN 500
Connection voltage		400 V -15 % ... +20 %	400 V -15 % ... +20 %	400 V -15 % ... +20 %
Rated power	60% ED	-	-	26.1 kVA
	80% ED	-	19.5 kVA	-
	100% ED	13.9 kVA	18.5 kVA	20.3 kVA
Primary current	50% ED I_{1max}	19.8	28	40
	100% ED I_1	19.8	25.5	31
Connection cable	HO7RN-F	4G6 (6 mm^2), 5 m	4G6 (6 mm^2), 5 m	4G6 (6 mm^2), 5 m
Fuse, delayed		25 A	35 A	35 A
Load capacity 40 °C	60% ED	-		500 A
	80% ED	-	400 A	-
	100% ED	300 A	380 A	430 A
Idle power		25 W		
Efficiency		87%		
Power factor		0.9		
Voltage supply for auxiliary devices		50 V DC		
Fuse (X14, X15)		6.3 A delayed		
Voltage supply for the cooling device		50 VDC		
Welding voltage range	MIG	10 V ... 37 V	10 V ... 39 V	10 V ... 42 V
Max. welding voltage		46 V		
Open circuit voltage		50 V		

KempArc		SYN 300	SYN 400	SYN 500
Operating temperature range		-20 ... +40 °C	-20 ... +40 °C	-20 ... +40 °C
Storage temperature range		-40 ... +60 °C	-40 ... +60 °C	-40 ... +60 °C
Degree of protection		IP23S	IP23S	IP23S
EMC class		A	A	A
Minimun short circuit power Ssc of supply network *		-	4.7	4.6
External dimensions LxWxH		590x230x500 mm	590x230x500 mm	590x230x500 mm
Weight		35 kg	36 kg	37 kg

* See paragraph 2.1.3.

DT 400		
Operating voltage		50 V DC
Rated power		100 W
Load capacity	80% ED	600 A
	100% ED	500 A
Operating principle		4-wheel feed
Wire feed speed		0 ... 25 m/min
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
Welding gun connector		Euro
Operating temperature range		-20 ... +40 °C
Storage temperature range		-40 ... +60 °C
Degree of protection		IP23S
External dimensions LxWxH		269x175x169 mm
Weight		4.5 kg

KEMPPI OY
Hennalankatu 39
PL 13
FIN-15801 LAHTI
FINLAND
Tel +358 3 899 11
Telefax +358 3 899 428
export@kemppi.com
www.kemppi.com

Kotimaan myynti:
Tel +358 3 899 11
Telefax +358 3 734 8398
myynti.fi@kemppi.com

KEMPPI SVERIGE AB
Box 717
S-194 27 UPPLANDS VÄSBY
SVERIGE
Tel +46 8 590 783 00
Telefax +46 8 590 823 94
sales.se@kemppi.com

KEMPPI NORGE A/S
Postboks 2151, Postterminalen
N-3103 TØNSBERG
NORGE
Tel +47 33 346000
Telefax +47 33 346010
sales.no@kemppi.com

KEMPPI DANMARK A/S
Literbuen 11
DK-2740 SKOVLUNDE
DANMARK
Tel +45 4494 1677
Telefax +45 4494 1536
sales.dk@kemppi.com

KEMPPI BENELUX B.V.
Postbus 5603
NL-4801 EA BREDA
NEDERLAND
Tel +31 765717750
Telefax +31 765716345
sales.nl@kemppi.com

KEMPPI (UK) Ltd
Martti Kemppi Building
Fraser Road
Priory Business Park
BEDFORD, MK44 3WH
UNITED KINGDOM
Tel +44 (0)845 6444201
Telefax +44 (0)845 6444202
sales.uk@kemppi.com

KEMPPI FRANCE S.A.S.
65 Avenue de la Couronne des Prés
78681 EPONE CEDEX
FRANCE
Tel +33 1 30 90 04 40
Telefax +33 1 30 90 04 45
sales.fr@kemppi.com

KEMPPI GmbH
Otto-Hahn-Straße 14
D-35510 BUTZBACH
DEUTSCHLAND
Tel +49 6033 88 020
Telefax +49 6033 72 528
sales.de@kemppi.com

KEMPPI SPÓŁKA Z O.O.
Ul. Borzymowska 32
03-565 WARSZAWA
POLAND
Tel +48 22 7816162
Telefax +48 22 7816505
info.pl@kemppi.com

KEMPPI AUSTRALIA PTY LTD.
13 Cullen Place
P.O. Box 5256, Greystanes NSW 2145
SMITHFIELD NSW 2164
AUSTRALIA
Tel. +61 2 9605 9500
Telefax +61 2 9605 5999
info.au@kemppi.com

ООО KEMPPI
Polkovaya str. 1, Building 6
127018 MOSCOW
RUSSIA
Tel +7 495 739 4304
Telefax +7 495 739 4305
info.ru@kemppi.com

ООО КЕМППИ
ул. Полковая 1, строение 6
127018 Москва
Tel +7 495 739 4304
Telefax +7 495 739 4305
info.ru@kemppi.com

KEMPPI, TRADING (BEIJING) COMPANY, LIMITED
Room 420, 3 Zone, Building B,
No.12 Hongda North Street,
Beijing Economic Development Zone,
100176 Beijing
CHINA
Tel +86-10-6787 6064
+86-10-6787 1282
Telefax +86-10-6787 5259
sales.cn@kemppi.com

肯倍贸易（北京）有限公司
中国北京经济技术开发区宏达北路12号
创新大厦B座三区420室 (100176)
电话： +86-10-6787 6064
+86-10-6787 1282
传真： +86-10-6787 5259
sales.cn@kemppi.com

KEMPPI INDIA PVT LTD
LAKSHMI TOWERS
New No. 2/770,
First Main Road,
KAZURA Gardens,
Neelangarai,
CHENNAI - 600 041
TAMIL NADU
Tel +91-44-4567 1200
Telefax +91-44-4567 1234
sales.india@kemppi.com