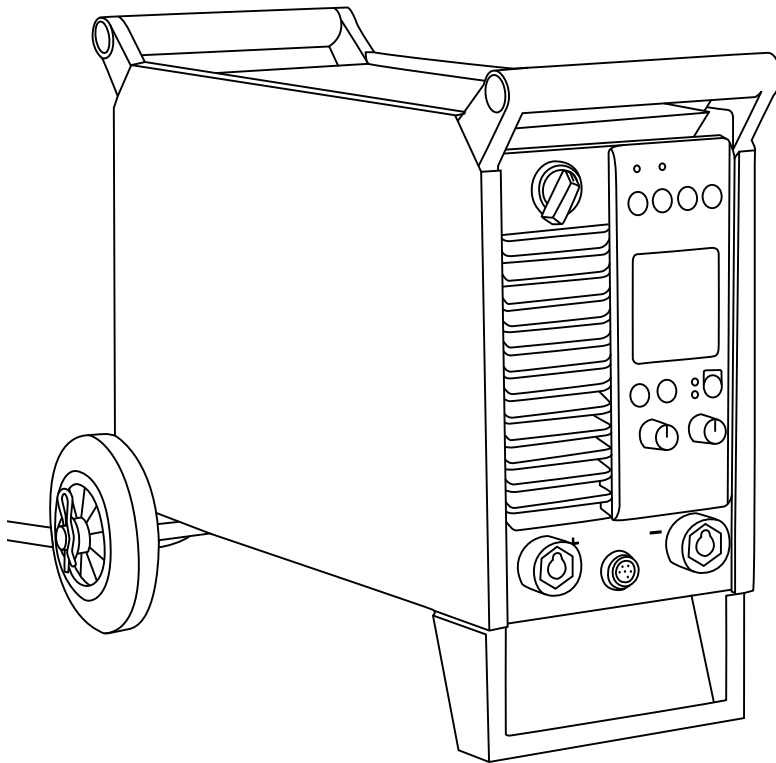


# HiArc

M 400A, M 500A

Operating manual *EN*





# **OPERATING MANUAL**

**English**

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# 1. INTRODUCTION

## 1.1 General

Congratulations on choosing the HiArc series power source. 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 device can be found at the end of the manual.

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

For more information on Kemppi products, contact Kemppi Oy, consult an authorised Kemppi dealer, or visit the Kemppi web site at [www.kemppi.com](http://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.

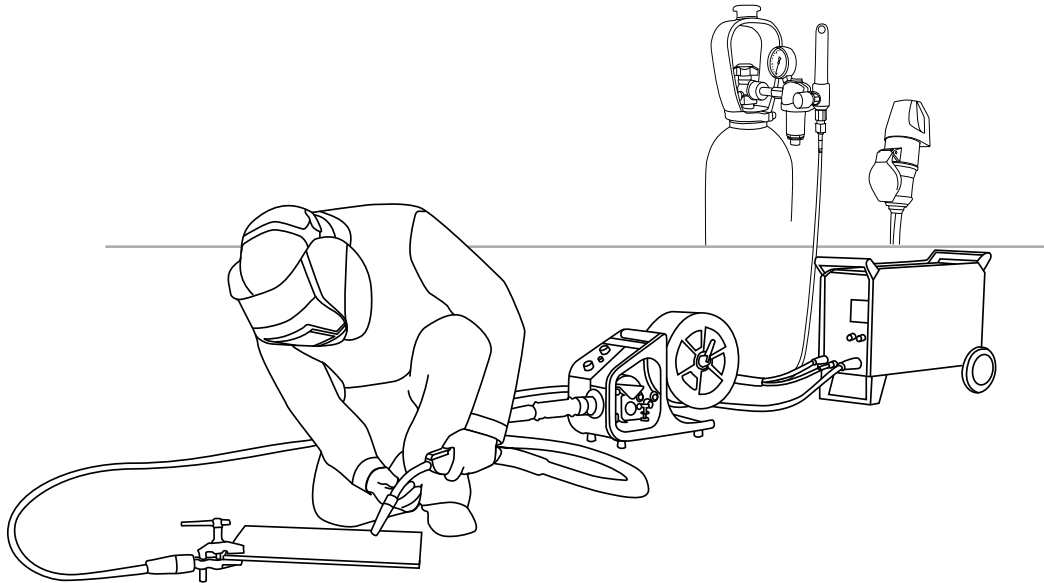
## 1.2 About HiArc product series

Kemppi's HiArc M 400A/M 500A products are inverter MIG/MAG welding power sources to be used in a 3-phase mains power supply. HiArc welding machines are designed for industrial and professional use.

These MIG/MAG power sources can be used with various wire feeders. However, it is recommended to use Kemppi's HiArc F wire feeder units, which have been designed especially for use with your HiArc power source.

The HiArc power sources are equipped with Automatic adjustment features. This means that you can use either manual mode or Automatic mode when adjusting the welding parameters. In Automatic mode, the HiArc chooses automatically the suitable preset welding parameters according to your wire and gas selections.

Enjoy welding with your Kemppi product!



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## 2. INSTALLATION

### 2.1 Before use

The product is packed in cartons designed specifically for them. However, always make sure before use that the products have not been damaged during transportation.

Check also that you have received the components you ordered and the instruction manuals needed. Product packaging material is recyclable.

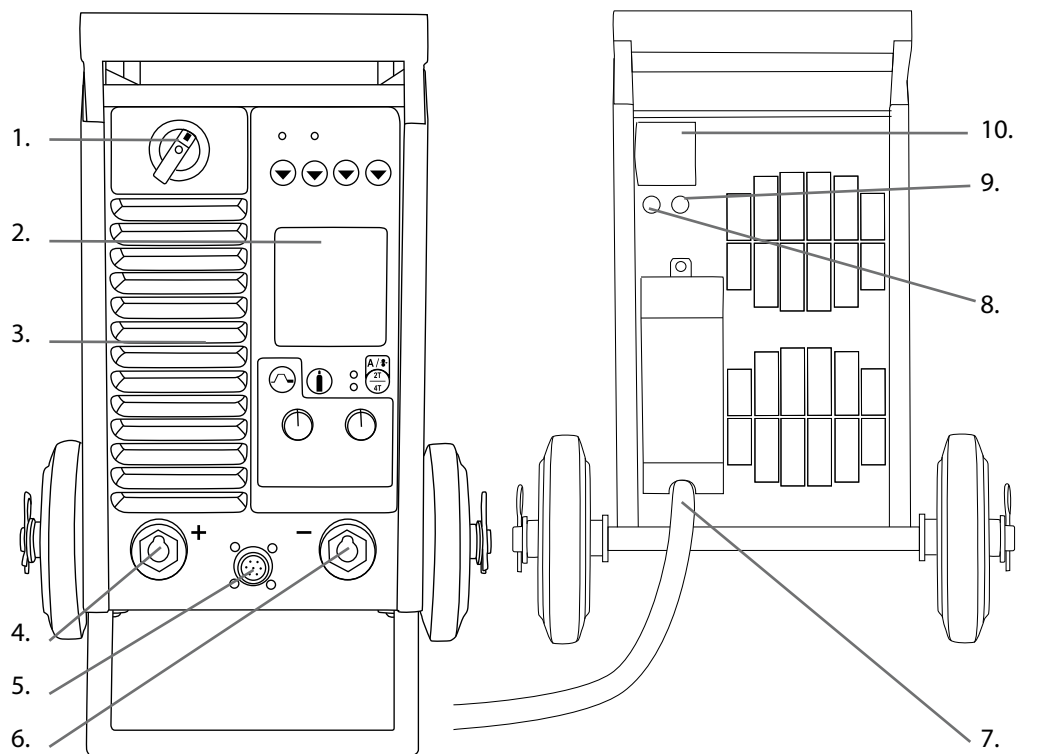
*NOTE! When moving the welding machine, always lift it from the handle, never pull it from the welding gun or other cables.*

#### Operating environment

This machine is suitable for both indoor and outdoor use. Always make sure that the air flow in the machine is unrestricted. The recommended operating temperature range is  $-20\dots+40\text{ }^{\circ}\text{C}$ .

Please read also the Safety Instructions concerning the operating environment.

### 2.2 Machine introduction



#### FRONT

1. ON/OFF switch
2. LCD display
3. Fan grill
4. Wire feeder cable connector (+)
5. Control cable connection
6. Earth return cable connector (-)

#### BACK

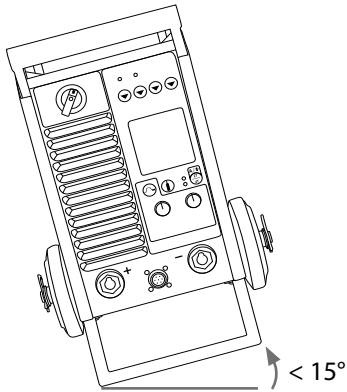
7. Mains lead connector
8. Power source fuse, 8A
9. Shielding gas heater fuse, 6.3 A
10. Connector for shielding gas heater

## 2.3 Positioning of the machine

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

Notes for positioning the machine

- 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.

The machine is not allowed to be operated in the rain as the protection class of the machine, IP23S, allows preserving and storing outside only.

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

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## 2.4 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.

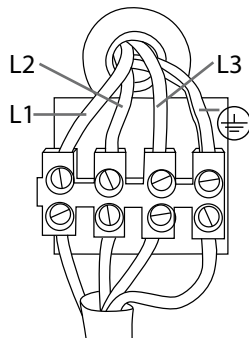
## 2.5 Connecting cables

On the front side of the machine, there are connectors for the interconnection cable and the control cable for connecting the power source to the wire feeder.

On the back side of the machine, there is a terminal strip connector, where you connect the mains cable leads.

### 2.5.1 Mains connection

HiArc must be connected to an earthened 3-phase power supply using the terminal strip connector in the backside of the machine. Attach the mains cable leads as shown in the picture below.



#### To connect the mains cable do the following:

1. Remove the mains lead cover plate.
2. Connect the mains cable's phase lead connectors to L1, L2, and L3 terminals.
3. Connect the protective earth lead to its terminal.
4. Secure the cable clamp.

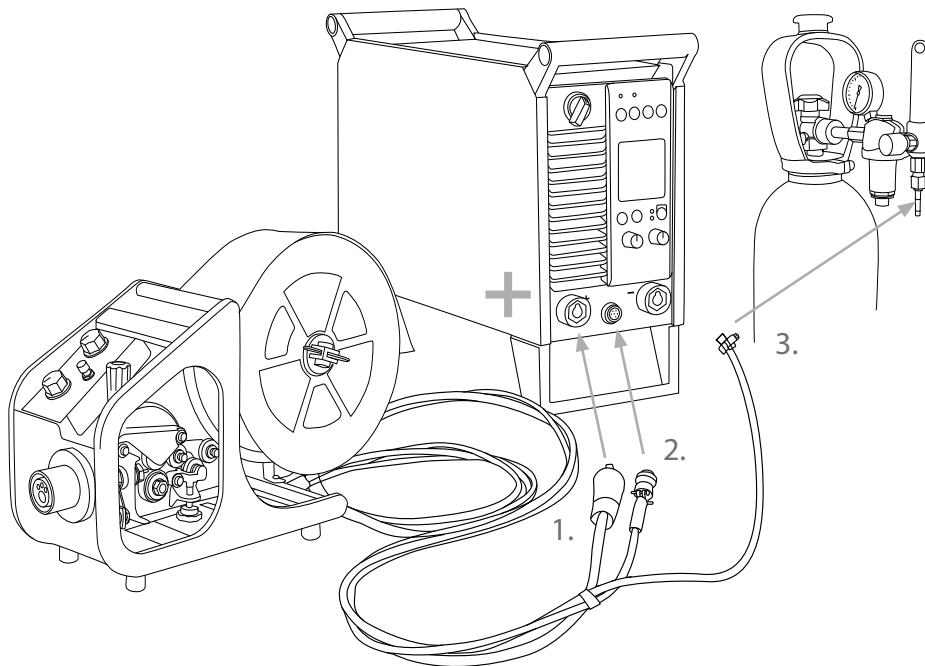
Check also that the mains cable complies with the local electrical regulations, and replace the cable if necessary. See 'Technical data'.

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

## 2.5.2 Wire feeder connection

The HiArc power source is designed to be used with the HiArc F wire feed units.

To connect the F 10 wire feeder unit to the power source, complete the following steps:

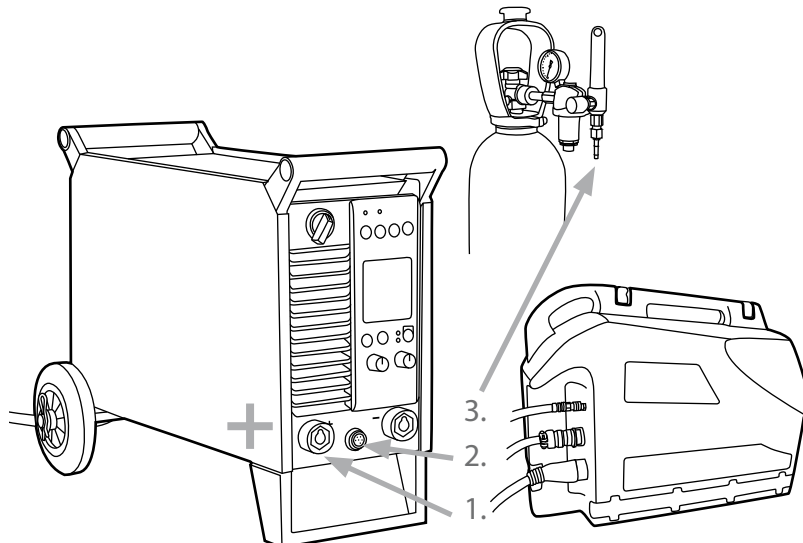


1. Attach the HiArc F wire feed unit power cable to the + connector of the HiArc power source. Hand tighten the connector with a clockwise push and twist action to lock.
2. Attach the HiArc F wire feed unit control cable plug to the control socket of the power source.
3. Connect the shielding gas hose to the gas bottle or to the shielding gas distribution system.

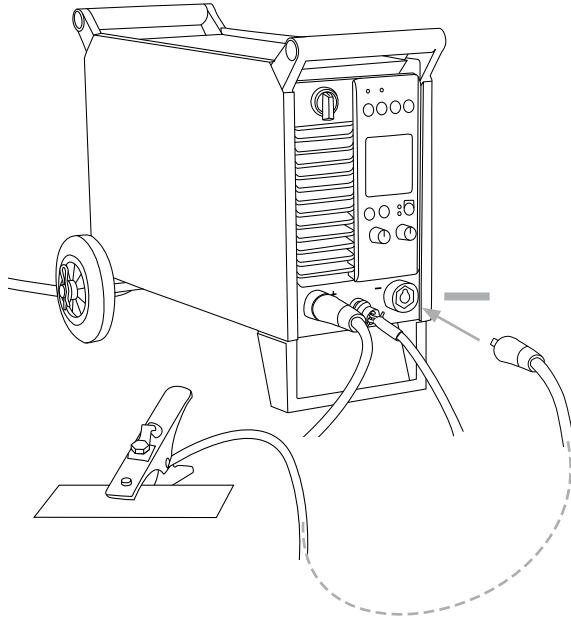
*NOTE! Please read carefully the wire feeder installation and operation instructions in the Kemppi HiArc F operating manual.*

*NOTE! Normally the wire feeder should be connected to the plus pole. However, with some filler wires and shielding gases, you should connect the feeder to the minus pole, and the earth return cable to the plus pole.*

HiArc F 30 connections to the power source:



### 2.5.3 Earth return cable connection



Attach the earth return cable to the minus (-) connector. Hand tighten the connector with a clockwise push and twist action to lock.

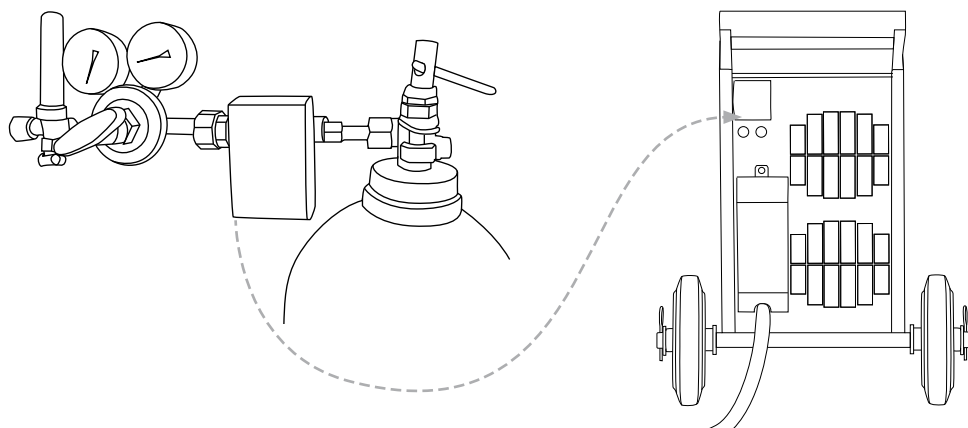
Attach the other end of the earth return cable to the workpiece before welding.

*NOTE! When attaching the earth return clamp to the work piece, remember to clean the work piece surface so as to achieve safe and undisturbed operation.*

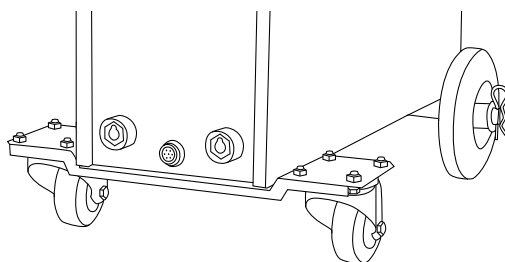
### 2.6 Optional accessories

There are two optional kits available to be used with the power source.

- When using CO<sub>2</sub> shielding gas, a 36 V gas heater can be connected to the power supply located at the back of the HiArc power source. Please see the plug-in delivery package for usage and fitting instructions.

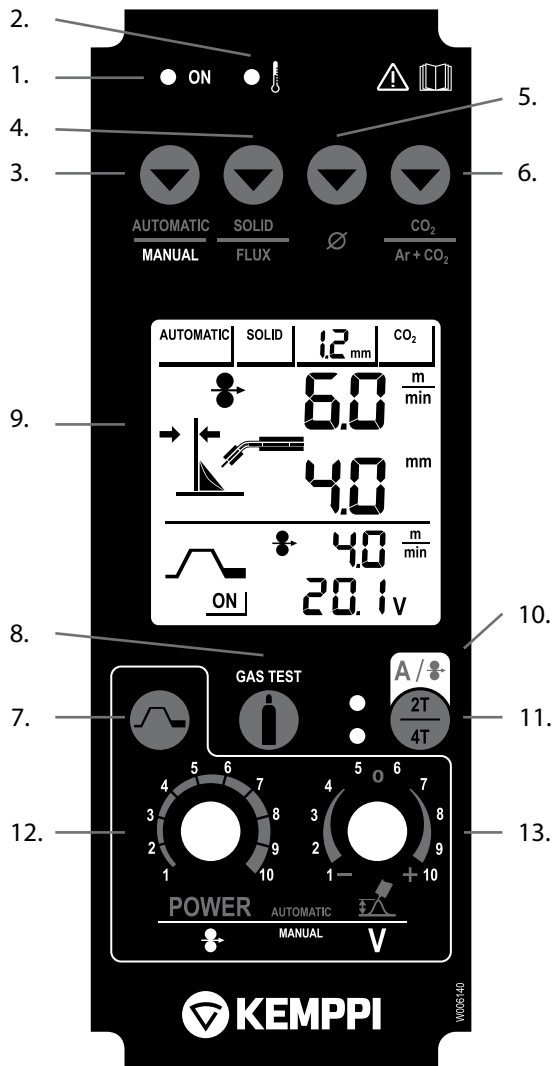


- **Castor wheel kit** replaces the static front support leg of the machine and allows the machine to be free wheeled.



### 3. USING THE MACHINE

#### 3.1 Control panel



#### Control panel offer the following control functions

1. Indicator light for ON/OFF
2. Overheating indicator
3. Selection for MANUAL or AUTOMATIC mode
4. Selection for filler wire material type (automatic mode)
5. Selection for filler wire diameter (automatic mode)
6. Selection for shielding gas (automatic mode)
7. Selection of crater fill function
8. Gas test
9. Display
10. Selection for display of amperes/wire feed speed (automatic mode)
11. Selection of 2T/4T gun operating mode
12. Control knob for wire feed speed or power (Crater fill only)
13. Control knob for voltage or arc length (Crater fill only)

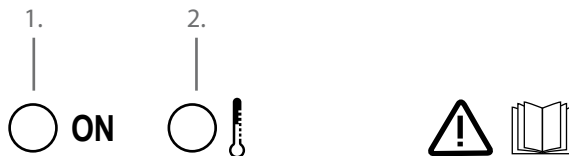
### 3.2 Starting the machine



To start the machine, turn the main switch to position 'I'. Initially, the firmware version number is displayed in the LCD display. After that, the firmware number is replaced with the parameter display, and the machine is ready for setup.

### 3.3 LED indicators

There are two LED indicator lights on the top of the control panel.



1. The ON light indicates that the power source is turned on.
2. The second light indicates that the machine is over heated.

*NOTE! The machine stops automatically when it reaches its maximum operating temperature. If the heat indicator led is on, the machine has exceeded its normal maximum operating temperature. Stop welding and wait until the led turns off. The machine is then ready for welding to continue.*

### 3.4 Manual and Automatic operating modes

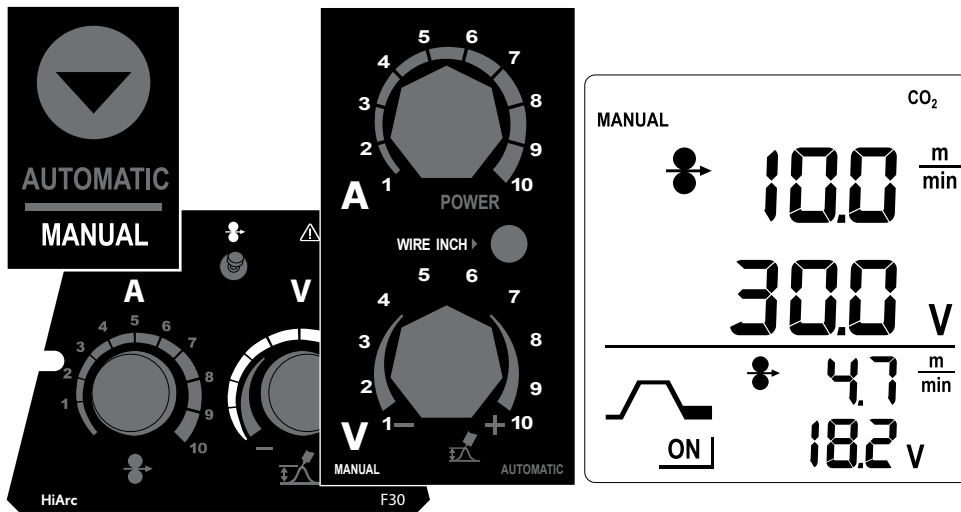


The HiArc power source has two operating modes: Automatic mode and Manual mode. To change between operating modes, press control panel button 3.

- In Manual mode you set the welding current and wire feed parameters manually using the control knobs on the wire feeder panel.
- In Automatic mode you can use the ready-made HiArc welding programs (pre-set curves) to easily select the optimal welding parameters. Just set the welding wire and shielding gas type you are using, and let the HiArc calculate the optimal settings for the welding parameters. You can then adjust the welding power and fine tune the welding voltage at the wire feeder panel. In Automatic mode you can use the pre-set Automatic values also when making the Tail Arc settings.

*NOTE! There are welding programs available only for Fe wires.*

### 3.4.1 Using Manual operating mode

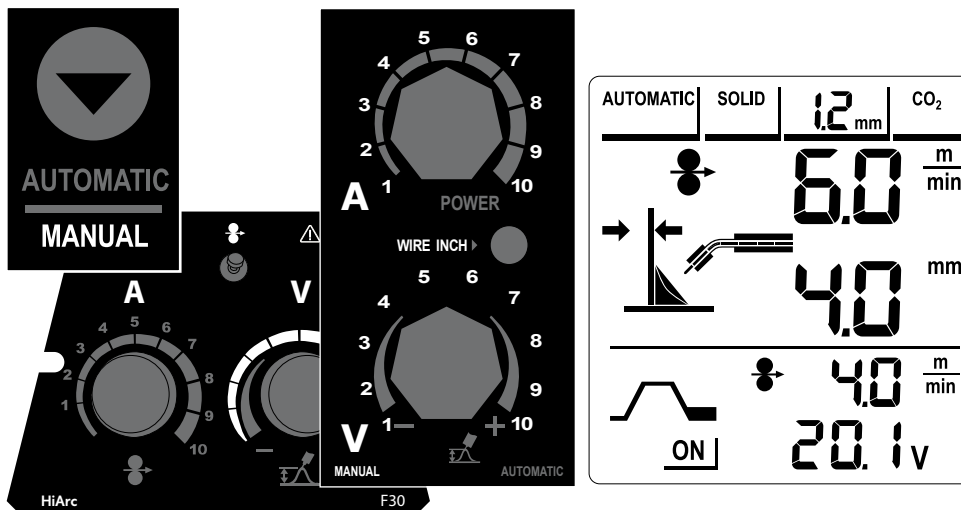


Press AUTOMATIC/MANUAL button to select the Manual mode. In Manual mode, the display shows no Automatic mode information, such as welding wire thickness.

In Manual operating mode, you use control knobs of the wire feeder to set the welding voltage and wire feed speed.

Set these values according to the base material, the type and size of the welding wire, and according to your own welding style.

### 3.4.2 Using Automatic operating mode



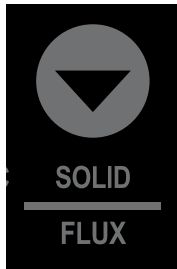
The Automatic mode is in use by default, when you start the machine. Press the AUTOMATIC/MANUAL button to change between Automatic and manual operating modes.

When you set the welding power with the wire feeder's control knob (A), the HiArc calculates the optimal welding parameters. With the wire feeder's arc length control knob (V) you can make fine-adjustments to the arc length. The optimal Automatic values are calculated automatically also when you select the Tail Arc settings with the power source controls.

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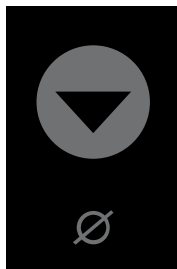
### 3.4.3 Selection for filler wire, diameter and gas

#### Solid/Flux button (Automatic mode)



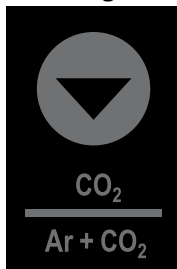
With this button you can select the welding wire type that you are using. You can select either solid wire or flux-cored wire. The Automatic option can be used for Fe wires.

#### Filler wire diameter (Automatic mode)



With this button you can select the thickness of the welding wire you are using. By pressing the button repeatedly you can browse thicknesses in the range 0.8–1.6 mm (0.8–1.4 mm with M 350A)

#### Selecting shielding gas



Press the shielding gas selection button to set the shielding gas type to either CO<sub>2</sub> or mixed gas according to the gas you are using.

Select CO<sub>2</sub> if you are using carbon dioxide. Select Ar + CO<sub>2</sub> (MAG) if you are using mixed gas.

*NOTE! HiArc M 400A and M 500A have a factory set pre-gas time of 0.2 s and a Post-gas time of between 2 – 4 s, depending on the welding power settings.*

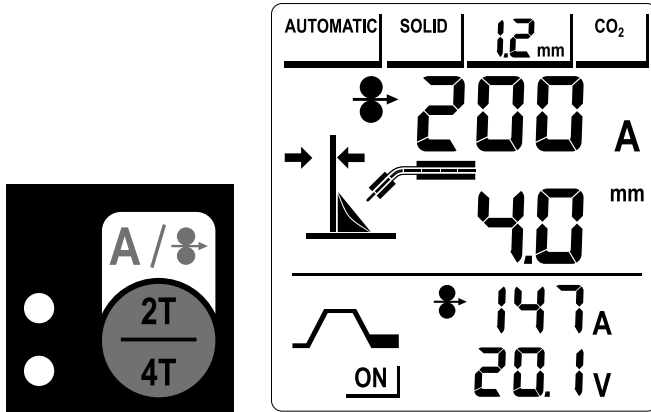
### 3.4.4 Gas test



To test the shielding gas flow, press the gas test button once. The shielding gas starts to flow and stops automatically after 20 seconds.

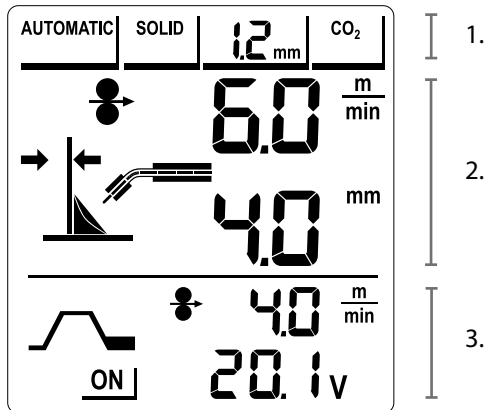
To interrupt the gas test, press the button again.

### 3.4.5 Selection for display of amperes/wire feed speed (automatic mode)



A long press (5 secs) of button 11 also switches the display from m/min to amperes.

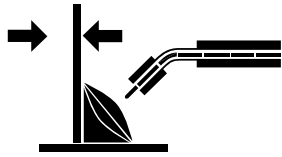
### 3.4.6 LCD display



1. Automatic settings
2. Welding parameters
3. Crater fill parameters

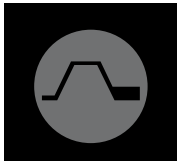


### 3.4.7 Material thickness and weld shape display



When operating in AUTOMATIC mode the material thickness is displayed, based on your input selections for plate thickness in mm. As you adjust the power control (2), you will see the graphic indicating plate thickness become thicker or thinner. Select the desired settings and you are ready to weld.

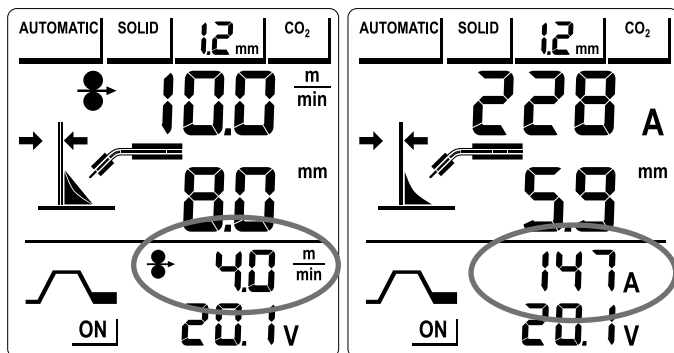
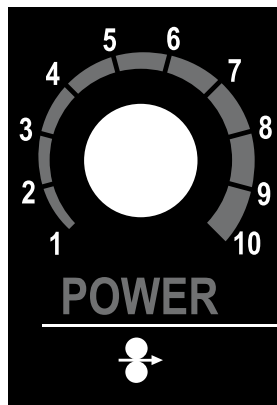
### 3.5 Crater fill



Crater fill function is OFF by default, when you start the machine. Press Crater fill button to select Crater fill function ON.

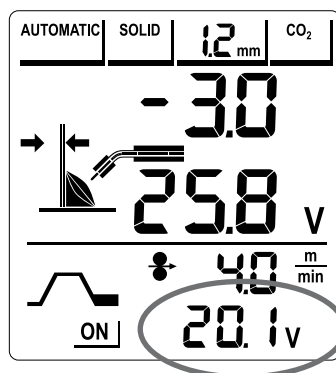
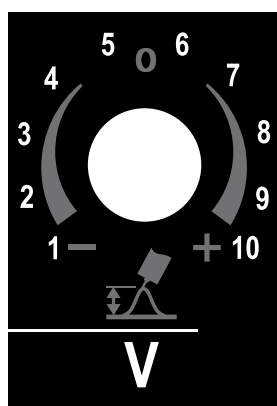
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#### 3.5.1 Crater fill (wire feed speed or power)



This control knob increases and reduces the speed of filler wire delivery or power to the welding arc at crater fill phase. The scale is regulated in meters per minute or amperes.

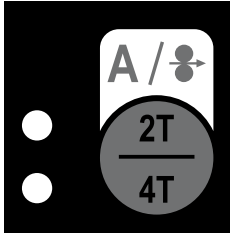
#### 3.5.2 Crater fill (voltage or arc length)



This control knob increases and reduces the available output voltage of the machine to the welding arc. The scale is regulated in volts.

In automatic mode this control knob offers minor arc voltage adjustment for fine tuning the welding arc at crater fill phase.

### 3.6 Trigger logic function

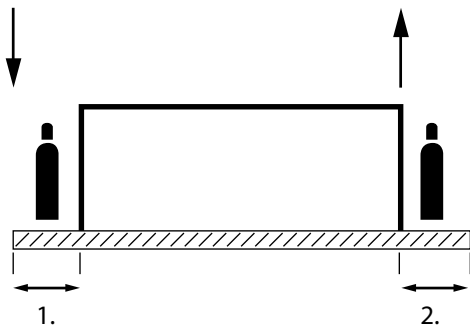


The HiArc power source is equipped with a crater fill function, which makes your welding more efficient and helps you avoid welding defects at the end of the weld sequence. With this function you can use an additional crater fill current level, which can be lower or higher than your normal welding current level.

#### 2T mode

MIG welding with 2T mode of the gun trigger.

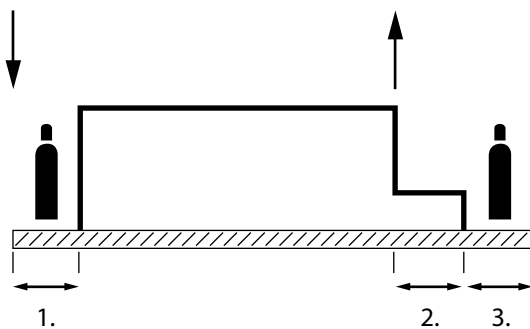
- Push the trigger – welding starts after preset pre-gas time.
- Release the trigger – welding ends. Post-gas flows for preset time.



1. Pre-gas time
2. Post-gas time

#### 2T mode and crater fill function

- Push the trigger – welding starts after preset pre-gas time.
- Release the trigger – values drop to preset crater fill level and welding ends after preset time. Post-gas flows for preset time.

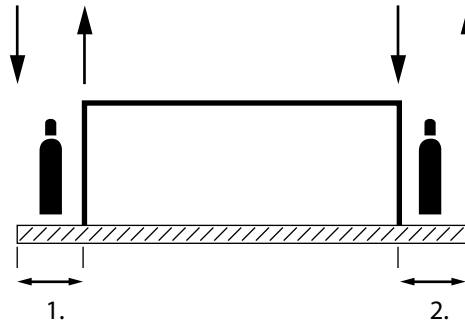


1. Pre-gas time
2. Crater fill time
3. Post-gas time

#### 4T mode

MIG welding with 4T mode of the gun trigger.

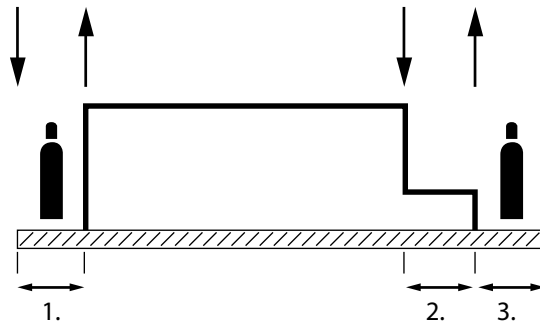
- Trigger pushed down – flow of shielding gas starts.
  - Trigger released – welding starts.
  - Trigger pushed down – welding ends and shielding gas flow continues.
  - Trigger released – flow of shielding gas ends.
- Notice: PostGas Time at least preset minimum.



1. Pre-gas time
2. Post-gas time

#### 4T mode and crater fill function

- Trigger pushed down – flow of shielding gas starts.
- Trigger released – welding starts.
- Trigger pushed down – welding values change to crater fill level.
- Trigger released – welding ends. Post-gas time flows for preset time.



1. Pre-gas time
2. Crater fill time
3. Post-gas time

### 3.7 Calibrating wire feed speed

To ensure that the pre-sets and meter displays work as planned, you must calibrate the wire feed speed of your HiArc power source and F 10 wire feeder welding equipment.

#### Calibration

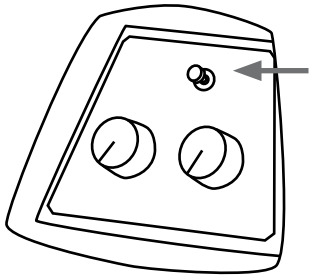
1. Start the calibration by pressing Crater Fill button for 3 seconds.



2. Press Gas Test button to select either HiArc F 10 or HiArc F 30 wire feeder.


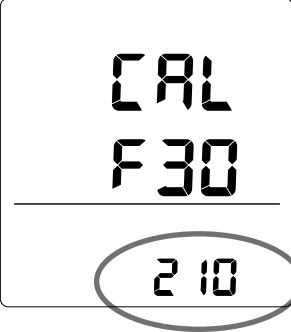
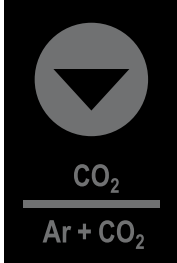
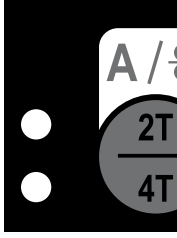


3. Cut the filler wire at the contact tip.
4. Press WIRE INCH button at the wire feeder.
  - Wire feed starts and continues for 12 seconds



5. When wire feed stops, cut the wire at the contact tip and measure the length of the fed wire in mm.

6. At the power source control panel, enter the length of the wire using the buttons below.

	To toggle between ones, tens and hundreds	
	To add the number by one	
	To subtract the number by one	

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*NOTE! If you enter a value that does not fit in, the machine forces the value within the acceptable limits. This is to prevent you from entering false values.*

7. Press WIRE INCH button again.
  - Wire feed starts and continues for 2 seconds.
8. When wire feed stops, cut the wire and measure its length.
9. At the power source control panel, enter the length of the wire in the same manner as in step 6
10. Press WIRE INCH button.

**To skip the calibration**

- If you want to skip the calibration, press Crater Fill button for 3 seconds. The machine exits the calibration mode.
- If the device is left idle for 5 minutes, it automatically exits the calibration mode.
- If the device is turned off before the step 10, it automatically exits the calibration mode, and the old calibration values remain.

## 4. TROUBLESHOOTING

Problem	Cause
The machine stops working. Overheating indicator is lit, and Err 4 is displayed.	The machine has overheated. <ul style="list-style-type: none"><li>• Ensure that cooling air has unrestricted flow.</li><li>• The machine's duty cycle has been exceeded.</li></ul> If no other damage is caused, the fan starts working and the machine recovers within a couple of minutes. If the problem persists, please contact Kemppi service representative.
Machine stops working. Err 2 or Err 3 is displayed.	The mains voltage is either too low (Err 2) or too high (Err 3). * The machine recovers automatically, when the mains voltage is in the recommended range (342 – 484 V).
Machine stops working. Err 43 is displayed.	The wire feeder motor is overloaded. Check that you are using the right wire type and that the wire feed route is unobstructed.
Poor welding result	Several factors affect the welding quality. <ul style="list-style-type: none"><li>• Check wire feed calibration.</li><li>• Check that the earth return clamp is properly attached, the point of contact is clean and that the cable and its connectors are intact.</li><li>• Check the voltage and wire speed settings on the control panel are correct for the given wire size and type.</li><li>• Check that the shielding gas flow rate at the gun nozzle is correct.</li><li>• Check that the shielding gas is suitable for the filler wire used.</li><li>• Check that the wire feed is constant, and adjust if necessary.</li><li>• Check that the mains voltage is not too irregular.</li></ul>
Main switch indicator does not switch on	The machine has no mains voltage <ul style="list-style-type: none"><li>• Check the mains fuses</li><li>• Check the mains cable and the wall plug</li></ul>

\* Contact Kemppi service in case of Err 2 and Err 3 without mains voltage cause.

## 5. MAINTENANCE

### 5.1 Regular maintenance

Check regularly the electrical connections of the machine. Clean any oxidised connections, and tighten the loosened cable connections.

Let authorised Kemppi service workshop make periodic service to your machine. Appropriate use and regular service guarantee trouble-free use of the machine. This allows you to avoid interruptions and increase the productivity of the machine.

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

### 5.2 Disposal of the machine



Do not dispose of electrical equipment with normal waste!

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 you will improve the environment and human health.

## 6. TECHNICAL DATA

HiArc		M 400A	M 500A
Connection voltage	3~, 50/60 Hz	380 – 440 V (-10 %...+10 %)	380 – 440 V (-10 %...+10 %)
Rated power at max. current	60 % ED	17.6 kVA	24.5 kVA
	100 % ED	12.5 kVA	17 kVA
Supply current	$I_{1max}$	27 A	37 A
	$I_{1eff}$	19 A	29 A
Output at 40 °C	60 % ED	400 A / 34 V	500 A / 39.0V
	100 % ED	310 A / 29 V	390 A / 33.5V
Fuse (delayed)		25 A	35 A
Open circuit voltage		60 – 70 V	60 – 70 V
Power factor at 60 %		0.90	0.92
Efficiency at 100 %		87 %	87 %
Welding range		13 – 39V	13 – 50 V
External dimensions	L x W x H	647 x 385 x 485 mm	716 x 385 x 485 mm
Weight		36 kg	41 kg
EMC class		A	A
Degree of protection		IP23S	IP23S
Gas heater connection		110 V/150 W	110 V/150 W
<b>Standards</b>			
IEC 60974-1			
IEC 60974-10			

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## 7. ORDERING CODES

HiArc M 400A power source		63104001
HiArc M 500A power source		63105001
HiArc F 10 wire feeder		6310010
HiArc F 30 wire feeder		6310030
<b>Welding guns (Euro connector)</b>		
FE 42	3.5 m	6604203
FE 42	5.0 m	6604204
<b>Interconnection cables</b>		
HiArc F30 50-5-GH	50 mm <sup>2</sup> , 5 m	6260500
HiArc F30 70-5-GH	70 mm <sup>2</sup> , 5 m	6260501
HiArc F30 50-10-GH	50 mm <sup>2</sup> , 10 m	6260513
HiArc F30 70-10-GH	70 mm <sup>2</sup> , 10 m	6260514
HiArc F30 50-15-GH	50 mm <sup>2</sup> , 15 m	6260515
HiArc F30 70-15-GH	70 mm <sup>2</sup> , 15 m	6260516
HiArc F30 70-20-GH	70 mm <sup>2</sup> , 20 m	6260523
HiArc F30 70-30-GH	70 mm <sup>2</sup> , 30 m	6260633
<b>Optional extensions</b>		
HiArc 10-70-G	70 mm <sup>2</sup> , 10 m	6310710
HiArc 15-70-G	70 mm <sup>2</sup> , 15 m	6310715
HiArc 10-50-G	50 mm <sup>2</sup> , 10 m	6310510
HiArc 15-50-G	50 mm <sup>2</sup> , 15 m	6310515
<b>Earth return cables</b>		
Earth return cable, HiArc M 400A	50 mm <sup>2</sup> , 5 m	6184511H
Earth return cable, HiArc M 500A	70 mm <sup>2</sup> , 5 m	6184711H
<b>Accessories</b>		
Castor wheel kit		W005977
Fastening plate, HiArc M 400A		W007362
Fastening plate, HiArc M 500A		W007378

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**KEMPPI OY**

Kempinkatu 1  
PL 13  
FI-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**

Perchstetten 10  
D-35428 LANGGÖNS  
DEUTSCHLAND  
Tel +49 6 403 7792 0  
Telefax +49 6 403 779 79 74  
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 КЕМППИ**

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 Garden,  
Neelankarai,  
CHENNAI - 600 041  
TAMIL NADU  
Tel +91-44-4567 1200  
Telefax +91-44-4567 1234  
sales.india@kemppi.com