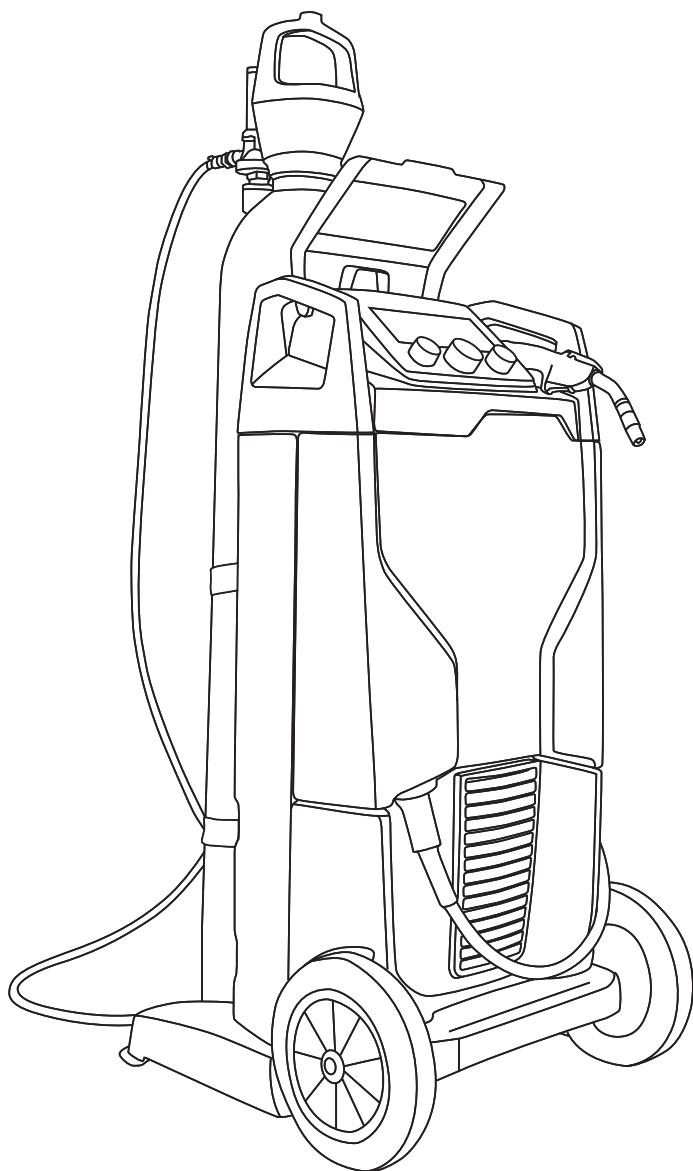


# Kempact

251R, 253R, 323R, 181A, 251A, 253A, 323A



Operating manual	<b>EN</b>
Käyttöohje	<b>FI</b>
Bruksanvisning	<b>SV</b>
Bruksanvisning	<b>NO</b>
Brugsanvisning	<b>DA</b>
Gebrauchsanweisung	<b>DE</b>
Gebruiksaanwijzing	<b>NL</b>
Manuel d'utilisation	<b>FR</b>
Manual de instrucciones	<b>ES</b>
Instrukcja obsługi	<b>PL</b>
Инструкции по эксплуатации	<b>RU</b>
操作手册	<b>ZH</b>
Manual de utilização	<b>PT</b>
Manuale d'uso	<b>IT</b>



# **OPERATING MANUAL**

**English**

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EN

# 1. INTRODUCTION

## 1.1 General

Congratulations on choosing Kempact RA welding equipment. Used correctly, Kemppi products can significantly increase the productivity of your welding, and provide years of economical service.

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

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

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

For Kemppi's standard safety instructions and warranty terms and conditions, please visit our 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 Kempact RA

Kempact RA MIG/MAG welding machines are designed for professional industrial use. Before use or doing any maintenance work on the machine, read the operating manual and keep it for further reference.

Welding and earth return cables are supplied in the delivery package, including gun, earth clamp and connections.

### 1.2.1 Properties

Kempact RA family sets new standards for the compact MIG/MAG equipment class and offers many innovative features, designed to make welding more accurate and productive.

All models are suitable for welding a wide range of filler wire materials, including Fe, FCAW, MCAW and MIG brazing. Kempact Adaptive models include a memory function for saving frequently used weld settings. They also feature automatic power regulation, adjusted through selection of plate thickness and weld profile.

All Kempact RA models feature a large and clear orange backlit LCD display for easy and fast reference of parameter settings. All models include stepless control of voltage and wire feed speed, spot and cycle arc timer, and 2T/4T gun switch selection, WireLine™ maintenance alert indicator, Brights™ cabinet lighting, GasMate™ chassis design and HOT SPOT carbon arc function.

### 1.2.2 About welding

In addition to the welding machine, welding outcome is influenced by the work piece to be welded, welding technique and the welding environment. Therefore, recommendations in this manual must be followed.

During welding, an electric welding circuit is created between the filler wire and the welded piece. On delivery, the welding gun euro connector is connected to the positive pole. The terminals are located inside the wire feed case door and should not be changed unless you intend to run a filler wire that is directed to be used in reverse polarity, electrode negative.

When a filler wire is loaded to the machine and the gun trigger is pressed, the wire feed mechanism drives the filler wire through the wire liner to the contact tip mounted in the welding gun. The earth return socket on the back of the machine is set as the negative terminal, and when connected to the workpiece via the earth return lead, it completes the welding circuit.

When the filler wire touches the work piece, a short circuit occurs, forming the needed closed electrical circuit. A welding arc is formed and welding commences. Unrestricted current flow is possible only when the earth return clamp is properly attached to the workpiece and the fixing point of the clamp to the workpiece is clean, and free from paint and rust.

## 2. PREPARATIONS

**NOTE!** Please read the separate safety instruction booklet provided before you commence welding. Pay particular attention to the risks associated with fire and explosion.

### 2.1 Unpacking

When the machine leaves the factory, the wire drive system and gun it is set for use with ferrous filler wire (181/251 models WHITE 0.8 wire feed rolls and 253/323 models RED 1.0 wire feed rolls). If you wish to use an alternative thickness filler wire or type, make sure that you select appropriate feed rolls/groove size, welding gun contact tip and gun liner, and also ensure that the machine polarity is correctly set for the material filler type used.

If using aluminium or stainless steel filler wire, we recommend you change the wire liner to a Kemppi plastic type, which is better suited for the material.

Before using the equipment, always make sure it was not damaged during transportation. Also check that you have received what you ordered and that there are instructions for it.

The packaging material of the products is suitable for recycling.

#### Environment

The machine is suitable for both indoor and outdoor use, but it should be protected from rain and sunshine. Store the machine in a dry and clean environment and protect it from sand and dust during use and storage. The recommended operating temperature range is  $-20 \dots +40$  °C. Place the machine in such a way that it does not come in contact with hot surfaces, sparks and spatters. Make sure the air flow into the machine is unrestricted.

### 2.2 Positioning and location 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.

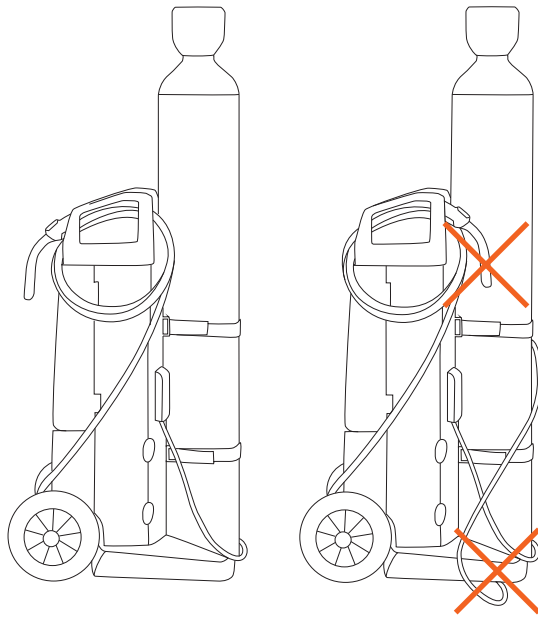
Notes for positioning the machine

- 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 around 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 use a wet welding machine.

**NOTE!** When locating and siting the machine prior to and during operation, it is important to ensure that the metal chassis of the machine does not come into contact with the welding circuit, and/or surfaces so connected.



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

## 2.3 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.

### **Kempact 181A, 251R, 251A:**

Equipment complying with IEC 61000-3-12

### **Kempact 253R, 253A:**

This equipment complies with IEC 61000-3-12 provided that the short-circuit power  $S_{sc}$  is greater than or equal to 2.7 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  $S_{sc}$  greater than or equal to 2.7 MVA.

### **Kempact 323R, 323A:**

This equipment complies with IEC 61000-3-12 provided that the short-circuit power  $S_{sc}$  is greater than or equal to 2.1 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  $S_{sc}$  greater than or equal to 2.1 MVA.

### **Kempact 251 MVU:**

This equipment complies with IEC 61000-3-12 provided that the short-circuit power  $S_{sc}$  is greater than or equal to 1.1 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  $S_{sc}$  greater than or equal to 1.1 MVA.

### **Kempact 323 MVU:**

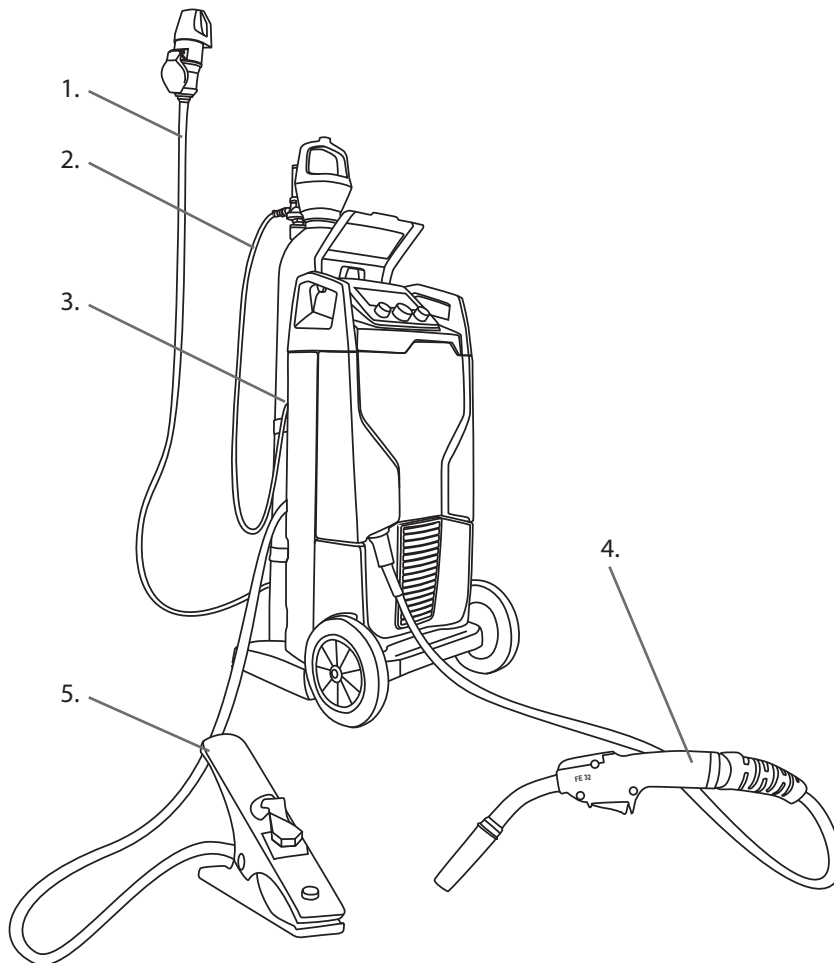
This equipment complies with IEC 61000-3-12 provided that the short-circuit power  $S_{sc}$  is greater than or equal to 1.5 MVA at the interface point between the user's supply and the public supply network. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short-circuit power  $S_{sc}$  greater than or equal to 1.5 MVA.

## **2.4 Serial number**

The serial number of the unit is marked on the rating plate. The serial number makes it possible to trace product manufacturing series. You might need the serial number when placing spare parts orders or when planning maintenance.

## **3. MACHINE INTRODUCTION**

### **3.1 General view of the machine**



1. Supply voltage cable
2. Main switch
3. Shielding gas hose connector
4. Welding gun and cable
5. Earth return clamp and cable



## 3.2 Cable connections

### Connection to the mains



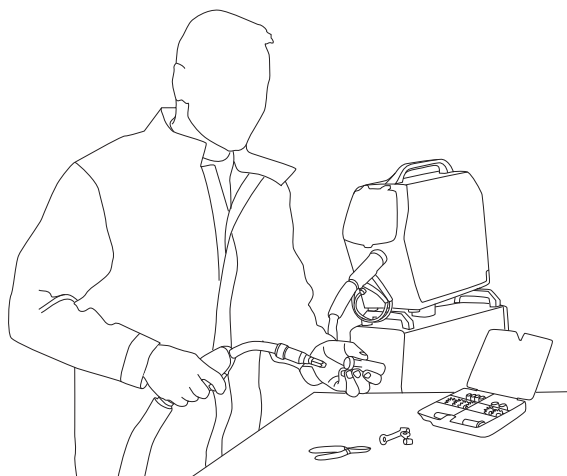
Kempact RA models are available in either 1-phase 230 V, 3-phase 400 V, or multi-voltage units. Machines supplied with a mains power cable are not equipped with a plug, so you must select and fit a suitable mains plug before you use the machine for the first time.

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

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

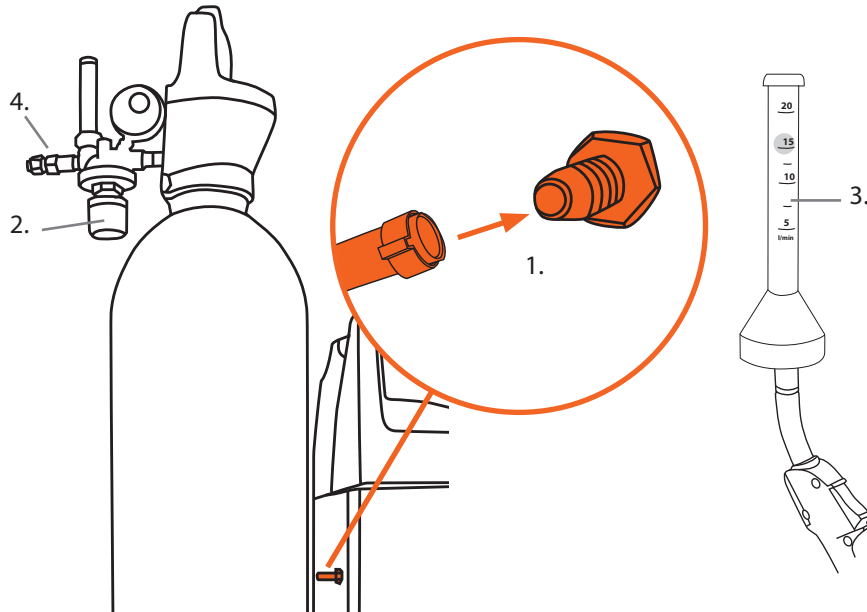
### Welding gun

Kempact RA welding machines are supplied with Kemppi FE range welding guns as standard. These guns are designed for industrial applications and if used and maintained correctly will provide productive and reliable service.



**NOTE!** The gun is set at the factory for use with ferrous filler wires. Should you wish to use the gun with an alternative filler wire size or type, please select the appropriate contact tip and wire liner.

## Shielding gas



Shielding gas is used for replacing air around the welding arc. For steel wires, use CO<sub>2</sub> (carbon dioxide) or a mixture of Ar (argon) and CO<sub>2</sub> for shielding gas. Welding performance will be improved when using mixed gas products. For stainless steel filler wires, use a mixture of Ar and CO<sub>2</sub> (2 %), and for aluminium and CuSi filler wires, use pure argon. The required flow rate of the shielding gas is determined by the thickness of the welded sheet and the used welding power. Alternative gas mixtures are available. Contact your gas supplier for further advice.

The machine is delivered with a 1.5 m gas hose. Connect the gas hose to the machine's male connector at the back of the machine. Connect the other end of the gas hose to the gas cylinder via a suitable and approved single stage regulator valve, where outlet flow rates can be adjusted.

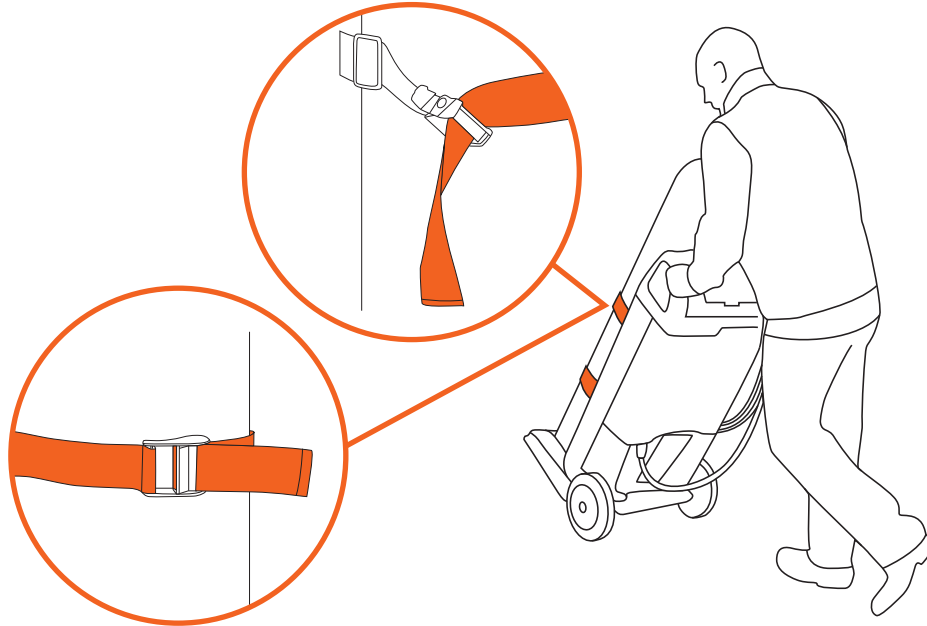
**NOTE!** Never attempt to connect directly to a compressed gas cylinder. Always use an approved and tested regulator and flow meter.

Connecting the gas hose to a typical welding regulator control valve

1. Connect the hose to the welding machine
2. Open the regulator valve of the gas cylinder
3. Measure the gas flow
4. Adjust the flow with the adjustment knob (12–18 lpm)

**NOTE!** Use a suitable shielding gas for the welding application. Always secure the gas cylinder in an upright position with either a specially made wall rack or the Kempact RA GasMate chassis, securing the cylinder in place with the webbing and metal buckles provided. Always close the cylinder valve after welding.

## Moving the machine and gas cylinder



The Kempact RA is designed to provide safe gas cylinder storage and movement in satisfactory workshop conditions. The floor surface should be sound, level and free from obstructions. These notes must be followed and an adequate risk assessment completed prior to use of the equipment. Cylinder size and weight vary and therefore affect the total weight and balance of equipment movement.

### To move the machine and a small cylinder:

1. Load and secure the gas cylinder with straps provided.
2. Grip the machine handles and place one foot to the foot base plate, located in front of the air intake grill. Press your foot firmly downwards and pull back the machine at the same time, so lifting the machine and gas cylinder to a position for movement.

### To move the machine and a large cylinder:

1. Load and secure the gas cylinder with straps provided.
2. With one hand, firmly grip the top of the cylinder and with the other hand grip one of the machine handles.
3. Place one foot to the foot base plate, located in front of the air intake grill. Press your foot firmly downwards and pull back the machine at the same time, so lifting the machine and gas cylinder to a position for movement.

### Additional safety notes:

**NOTE!** In both cases listed above, you will quickly feel the fulcrum point, mechanical advantage and the point of balance. You are now ready to move your machine and gas cylinder to a new location. However, caution should be observed at all times when moving heavy equipment and local safety conditions and laws must be respected.

**NOTE!** Be careful when lowering the cylinder to its resting position. Whilst maintaining a firm grip, ensure that you keep your back straight and extend your arms. Maintain firm pressure to the foot base plate and slowly lower the machine and cylinder to its resting position. You will feel the weight increase as you move forwards over the point of balance. Ensure you keep a firm grip and your weight as far back as possible, as you lower the cylinder and machine chassis carefully to the floor.

**NOTE!** The chassis is designed to provide stability in the upright position, when loaded with or without a gas cylinder. Reasonable effort is required to raise and lower the machine and cylinder to a position of movement. If you are light in weight or in any way unsure about moving the machine and cylinder, you should consider an alternative method or process. A local Health and Safety audit and risk assessment may be necessary before heavy or new equipment is taken into use, including the use for carrying or transporting compressed shielding gas cylinders.

**NOTE!** In all cases the chassis design is not recommended for lifting its weight clear of the ground by the handles or any other means, with or without a gas cylinder loaded in place. When transporting the machine between sites, welding gas cylinders must be removed from the chassis, secured and transported by other means.

## 4. BEFORE YOU START USING THE UNIT

### 4.1 Installing filler wire

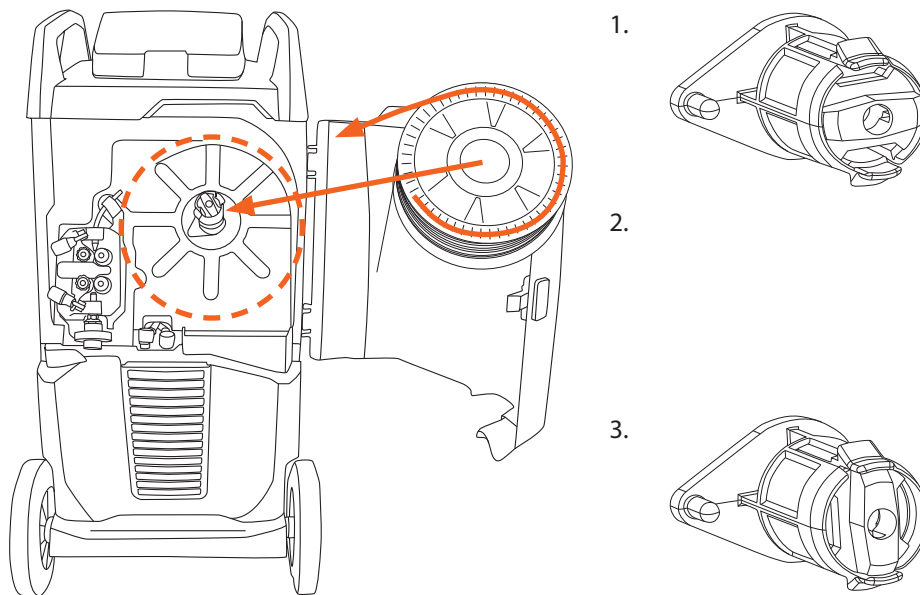
Kempact RA is designed for 300 mm wire spools and the following filler wire types:

- solid wires
- flux-cored wires
- self-shielded flux-cored wires
- stainless steel wires
- aluminium wires
- brazing wires

When choosing appropriate filler materials, remember that the wire must have approximately the same melting point as the base material to be welded. MIG brazing process is an exception to this rule.

**NOTE!** When changing the filler wire, always check that the feed rolls, their groove shape and size and the wire liner inside the welding gun cable are suitable for the wire you are using. Also check that you are using the correct polarity for the filler wire.

### 4.2 Mounting and locking of filler wire spool

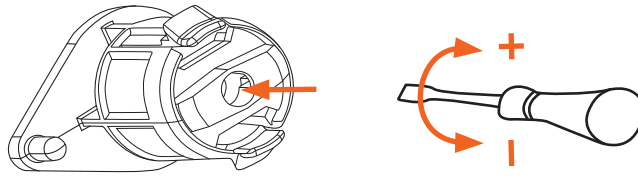


#### To mount the wire spool:

1. Turn the locking knob of the spool holder so that the locking clips are opened (1).
2. Check the rotating direction of the wire spool and push the spool into its place so that it rotates in the right direction (2).
3. Turn the locking knob of the spool holder to close the locking clips (3).

**NOTE!** Check that the filler wire spool is correctly mounted and locked into position. Ensure the spool is not damaged or deformed in such a way that it can rub or chaff against the internal surface of the wire feed unit chassis or door. This may result in increased drag, impacting on weld quality. This may also result in long term wire feed unit damage, rendering the unit unserviceable or unsafe to use.

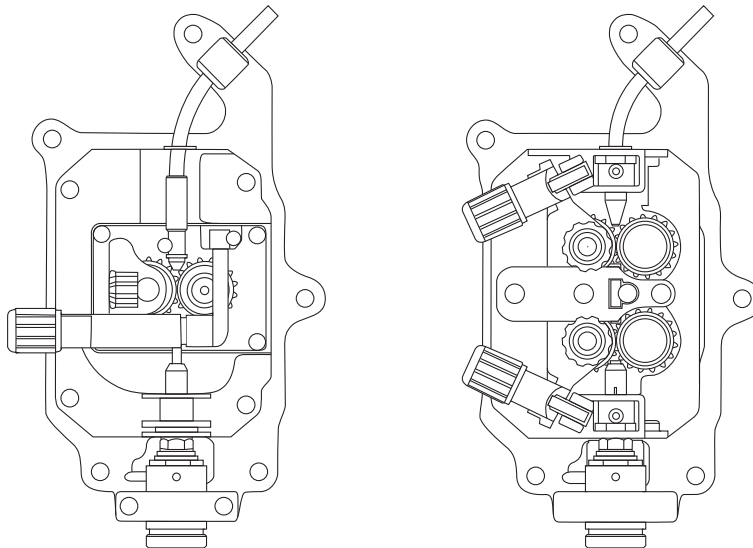
### 4.3 Setting the spool brake force



To prevent the filler wire from uncoiling on overrun following use at high feed speeds, you can change the brake force of the welding spool. Adjust the spool brake force through the hole in the spool locking mechanism. Increase the force by turning the screw clockwise and decrease it by turning it anticlockwise.

**NOTE!** Do not over tighten and reduce the pressure for light filler wire types.

### 4.4 Loading the welding wire to feed mechanism



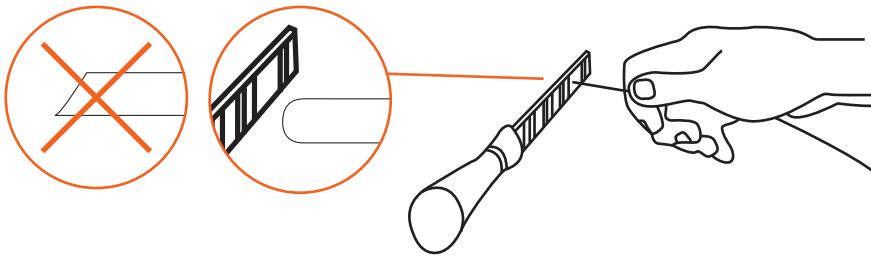
GT02

DuraTorque

**NOTE!** Always ensure that ALL wire guide tubes are correctly selected and installed before connecting the welding gun.

1. Release the pressure lever(s) and open the pressure arm(s) carrying the top wire feed roll, lifting clear on its pivot.
2. Draw some loose filler wire from the spool and carefully push it through the liner and bronze guide at the back of the wire feed mechanism. Push the filler wire over the feed roll groove and through the wire guide(s) tubes and Euro connector block, exposing about 150 mm of filler wire from the front of the machine.
3. Close the top feed roll(s) lever(s) over the filler wire and close the pressure arm(s).

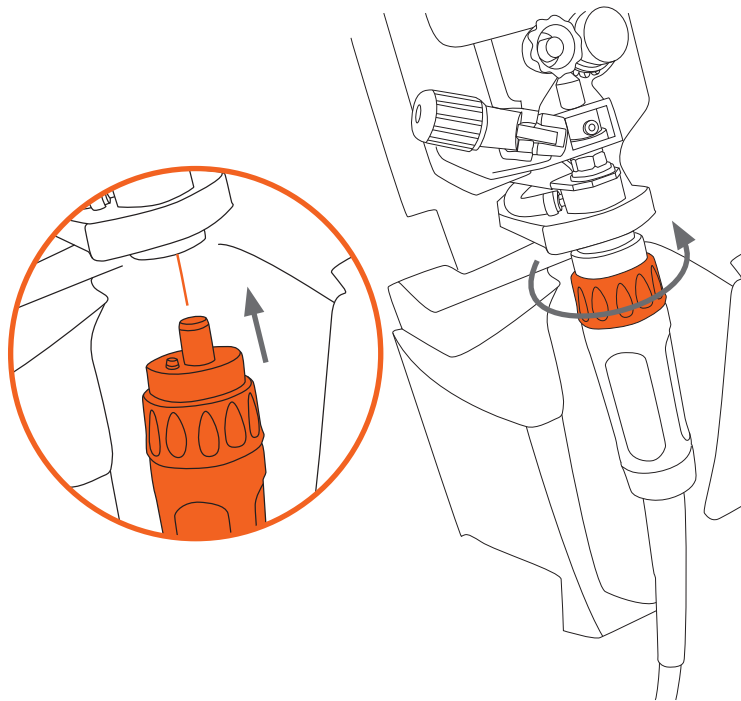
4. Cut away any deformed filler wire section and dress the sharp wire tip.



5. Connect the welding gun and tighten the collar.
6. Press the welding gun trigger and allow the filler wire to feed through the gun cable to the contact tip.

Check once again that the filler wire is still properly seated in the grooves of both top and bottom feed rolls.

## 4.5 Welding gun



Connect the welding gun connector to the Euro adapter socket located below the wire feed mechanism and hand tighten only. Do not over tighten the gun collar.

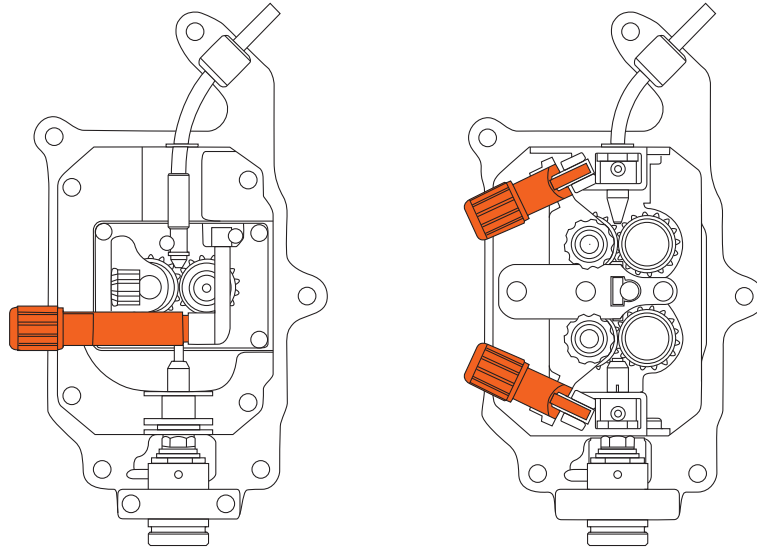
**NOTE!** Remember to remove the sharp cut tip of the filler wire before loading the wire to the welding gun, so preventing damage to the liner inside the welding gun cable. This is particularly important for soft filler wires such as aluminium. It will also improve feed quality and increase the service life of your gun liner.

## 4.6 Setting the pressure of the feed rolls

To ensure the filler wire runs smoothly into the welding gun wire liner you should adjust the pressure of the feed rolls of the wire drive mechanism.

Turn the orange coloured pressure adjustment knob(s) in a clockwise direction to increase the pressure applied to the welding filler wire, and anticlockwise to decrease it.

**NOTE!** Periodically remove and clean the short wire spiral located at the back of the wire feed mechanism. See item D.



There is a graduation scale marked on the pressure arm above or below the orange adjustment knob, depending on the Kempact RA used. For models fitted with the two roll GT02 wire drive system, the more pressure applied, the greater the number of graduation marks visible. For models fitted with the four roll DuraTorque wire drive system, the more pressure applied, the fewer number of graduation marks visible.

**For hard steel and stainless steel filler wires** make sure there is sufficient pressure applied, so avoiding filler wire slippage in the feed rolls.

**NOTE!** Too much wire feed roll pressure may flatten the filler wire, damage its coating, increase friction and result in the filler wire sticking in the welding gun liner or contact tip. Also excessive pressure will result in increased wear to wire drive roll bearings, reducing their life.

## 4.7 Wire guide tubes and feed rolls

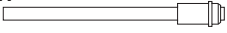

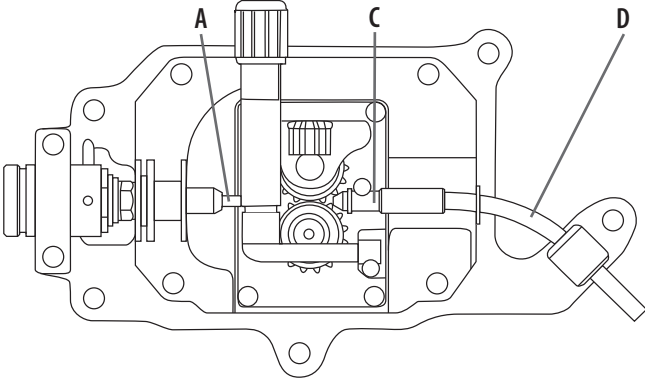
### Wire guide tubes

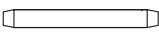
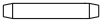
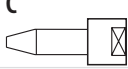
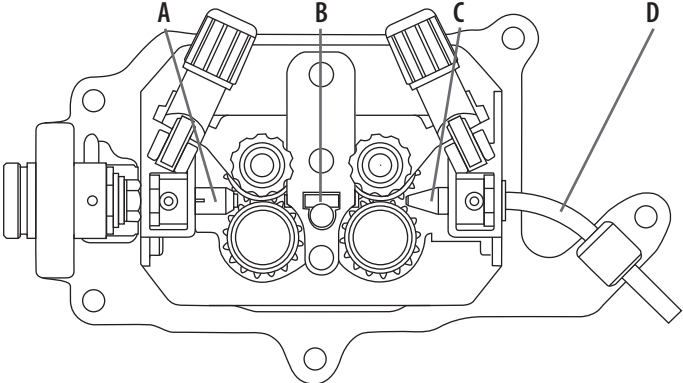
A = front tube

B = centre tube

C = rear tube

D = wire spiral guide

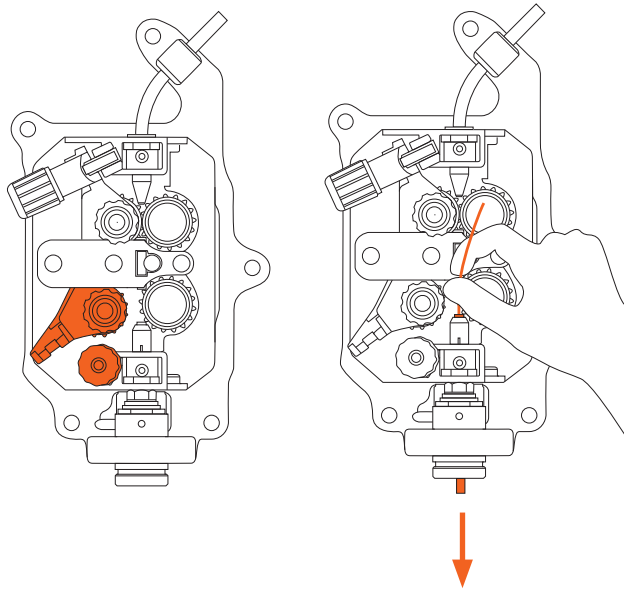
GT 02: models 251R, 181A, 251A			
Ss, Al, Fe, MC, FC	∅ 0.6–1.6mm	∅ 2.5/97mm, W006164, plastic	∅ 2.0mm, W006019, brass
D W006410, ∅ 2.5/125mm, steel	A 		C 
			

DuraTorque: models 253R, 323R, 253A, 323A				
Ss, Al, Fe, MC, FC	∅ 0.6–1.6mm	∅ 2.5/75mm, W006369, plastic	∅ 2.5/33mm, W000956, plastic	∅ 2.0mm, W005784, brass
Fe, MC, FC	∅ 0.6–0.8mm	∅ 1.5/75mm, W006421, steel	∅ 2.0/33mm, W001435, steel	
	∅ 1.0–1.6mm	∅ 2.0/75mm, W006422, steel		
D W006410, ∅ 2.5/125mm, steel	A 		B 	C 
				



### Removing front tube

Release pressure tension arm. Push the front tube out of its housing with a piece of filler wire.



### Wire feed rolls

**NOTE!** Orange part code colour denotes standard delivery specification.

GT 02 and DuraTorque				
	ø mm		driving	pressing
Fe, Ss, Al, V-groove	0.6		W001045	W001046
	0.8/0.9		W001047	W001048 (GT 02)
	1.0		W000675	W000676 (DuraTorque)
	1.2		W000960	W000961
Fe, FC, MC, knurled, V-groove	1.0		W001057	W001058
	1.2		W001059	W001060
Fe, FC, MC, Ss, Al, U-groove	1.0		W001067	W001068
	1.2		W001069	W001070

**For aluminium filler wires** select the correct feed roll type from the chart supplied and adjust for the minimum pressure necessary for reliable filler wire drive without deformation of the wire itself.

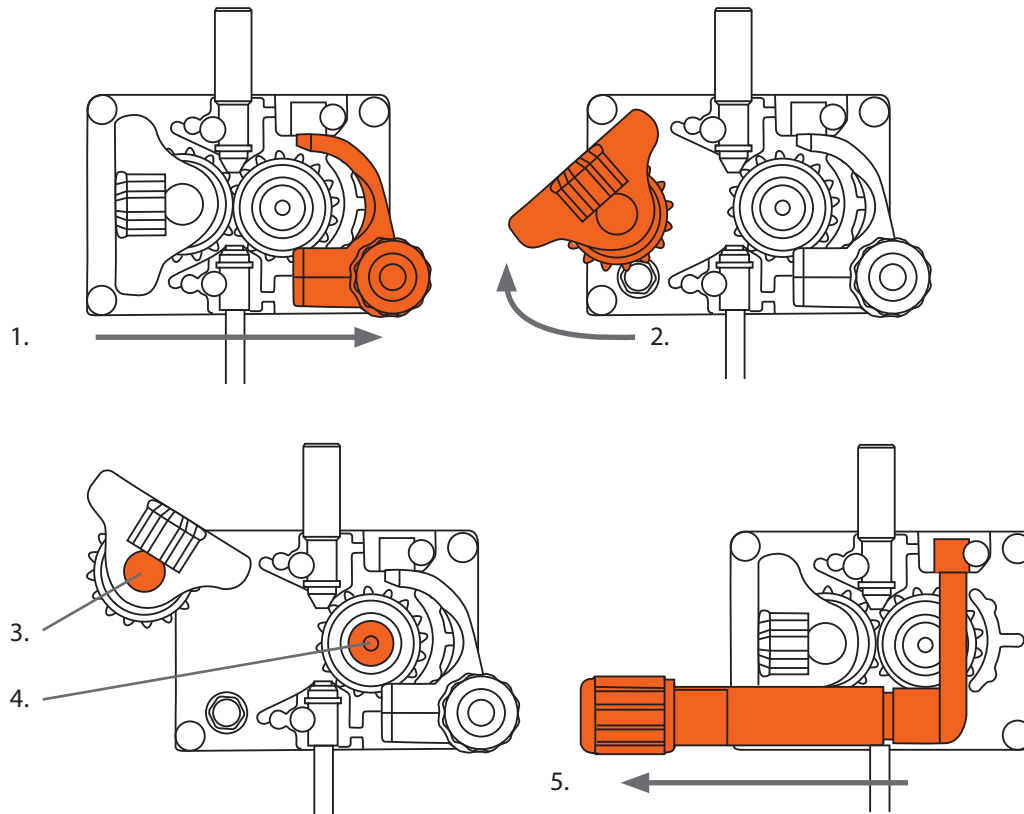
**For flux-cored filler wires** select a knurled feed roll to achieve better wire grip.

**NOTE!** Slight slippage is recommended in the case of aluminium filler wires. This ensures that the soft wire is not deformed and flattened and that the feed rolls skid over the soft wire if it stops when passing through the gun liner or contact tip.

**For aluminium and stainless steel filler wires**, always use Kemppi DL Teflon gun liners. These liners are especially developed by Kemppi and significantly reduce friction losses, so improving welding performance and quality.

## 4.8 Changing the feed rolls

Kempact RA machines are factory fitted with wire feed rolls as part of the delivery packages. However, it may be necessary to select alternative feed rolls to suit different filler wire sizes used. So you may occasionally need to replace the feed rolls. Kemppi feed rolls and gun liners are colour-coded in order to make identification easy.

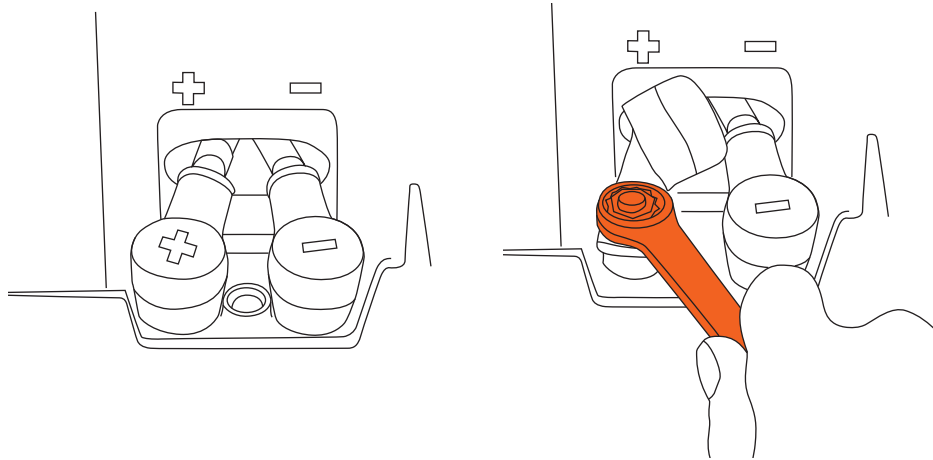


### To change the feed rolls:

1. Pull and release the pressure tension arm.
2. Lift the upper feed roll on its pivot to the maximum open position.
3. Pull out mounting pin of the upper feed pressure roll and replace the roll with a new one.
4. Open the locking screw of the lower feed roll and replace the roll with a new one.
5. Return the upper pressure feed roll to its down position and replace the pressure tension arm.
6. Adjust the pressure tension as instructed in the earlier section.

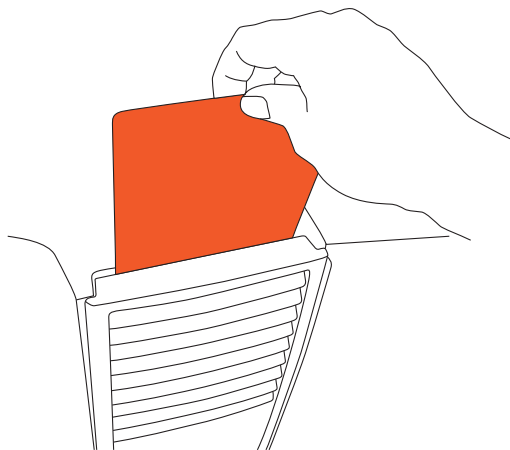
## 4.9 Reversing polarity

Some filler wires are recommended to be welded with the gun in the minus pole (-), so the polarity should be reversed. Check the recommended polarity from the filler wire package.



1. Disconnect the machine from the mains.
2. Expose the terminal connections by bending the protective rubber covers away from the terminal.
3. Remove the terminal tightening nuts and washers. Note the correct order of the washers!
4. Interchange the cables.
5. Install the washers in place and re-tightening the securing nuts.
6. Replace the rubber terminal covers. The rubber covers must always protect the terminals during use.

### 4.9.1 Dusty work environments



If the working environment frequently carries airborne metallic dust particles due to fabrication practices, it is recommended that you install a filter cassette to the machine.

Particle filter cassette's ordering code: W005852.

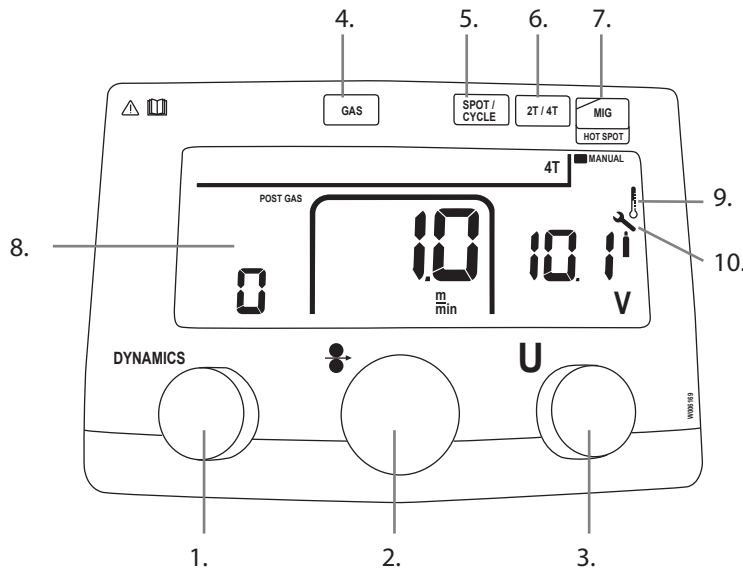
Fitting the particle filter cassette provides additional protection to your welding machine and lengthens its service intervals.

#### **Filter maintenance**

Once fitted, the filter should be removed, checked and cleaned with dry compressed air weekly. Every six months, wash the filter in a solution of warm soapy water. Allow to dry thoroughly before replacing.

## 5. USING CONTROL PANELS

### 5.1 Regular control panel



Models featuring the regular (R) control panel offer the following control functions and features.

1. Control knob for welding dynamics
2. Control knob for wire feed speed
3. Control knob for welding voltage
4. Shielding gas button
5. Timer button for spot welding and cycle arc welding
6. 2T/4T gun switch latching button
7. Selection for MIG/MAG or HOT SPOT function
8. Parameter display
9. Overheating indicator
10. WireLine service indicator

#### 1. Control knob for welding dynamics

Dynamics function controls the rate of rise of current when the filler wire is in short circuit with the welding plate. This control adjustment is necessary due to the alternative welding parameters, materials, wire sizes, gas types and current values used.

The welding dynamics scale is -9 to +9. Negative values make the rise of current slower, which results in a hotter and more fluid weld characteristic. Positive values make the rise of current faster, which results in a colder welding condition. This can result in more spatter during welding depending on the filler wire size and type used.

#### How to find the optimal dynamics setting?

Start by setting '0' and make a test weld after selecting the correct wire feed speed and voltage values. Fine tune the welding arc by trying different values in the negative (-) and positive (+) sides of the dynamics scale.

#### 2. Control knob for wire feed speed

This control knob increases and reduces the speed of filler wire delivery to the welding arc. The scale is regulated in meters per minute. There is also a graphical display bar indicating the proportion of motor speed selected.

### 3. Control knob for welding voltage

This control knob increases and reduces the available output voltage of the machine to the welding arc. The scale is regulated in volts and is also supported by a graphical display bar that indicates the proportion of the available output voltage selected.

### 4. Shielding gas button



This button sets the machine's dynamics range for either mixed (Ar/CO<sub>2</sub>) or carbon dioxide (CO<sub>2</sub>) shielding gas. A single press of the button changes the set-up for the intended gas type. The selected shielding gas type is shown in the LCD display panel. If using argon shielding gas for aluminium or CuSi MIG brazing filler wires, use the mixed gas setting (Ar/CO<sub>2</sub>).

### 5. Timer button for spot and cycle arc welding



The spot and cycle arc timer offers two modes of function. By pressing and selecting the SPOT timer, you regulate the time duration for one single 'SPOT' welding cycle from either 0.1 to 9.9 seconds of arc time. By selecting the 'CYCLE' arc timer you regulate the machine to a repeating cycle of arc time and pause time. The pause time offered is 0.1 to 3 seconds. Select function by depressing button 4. Regulation and adjustment of SPOT and CYCLE arc values are adjusted by the voltage control (item 3). Function selection is confirmed by either one dot (SPOT TIME) or dash line (CYCLE TIME) under the word 'Timer' in the display.

### 6. 2T/4T gun switch latching button



This button offers you two modes of welding gun functions. The selected mode is indicated as either 2T or 4T in the display.

- **In 2T mode** the welding arc is started by a single press and hold of the welding gun trigger. Welding continues whilst the trigger is held, and stops when the trigger is released.
- **In 4T mode** the gun trigger is pressed and gas starts to flow. When the trigger is released, the arc ignites. Welding continues until the trigger is pulled and released for a second time. This mode is useful for long welding durations.

### 7. Selection for MIG/MAG or HOT SPOT welding function



This button switches the machine from standard MIG/MAG welding mode to a specialised process function for localised spot heating and stress relieving for metal panels.

This function is normally used in the automotive industry and light sheet fabrication. To switch between functions, press and hold the button for 5 seconds. See further information on HOT SPOT function later in this manual.

### 8. Parameter display

The large illuminated parameter display is designed to provide excellent visibility of welding values and machine settings in a variety of welding situations. The display is protected by a polycarbonate lens fitted into the control panel housing.

## 9. Overheating indicator



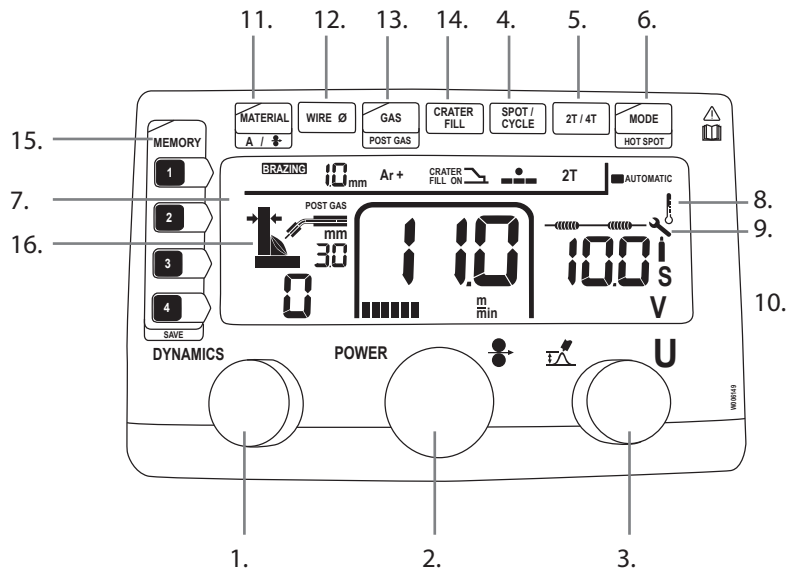
Under normal working conditions the overheating indicator is not visible. However, should the machine exceed its working duty cycle, welding will cease and the thermometer symbol will illuminate indicating that the machine has overheated. The cooling fans of the machine will continue to operate. When normal operating temperature is regained, the machine will reset and welding can continue. The overheating indicator will no longer be visible.

## 10. WireLine service indicator



Under normal working conditions, the WireLine service indicator is not visible. However, if the welding gun contact tip or liner becomes dirty and blocked or the wire feed mechanism needs routine maintenance or the friction plates in the spool brake need adjustment or maintenance, the Spanner service symbol will illuminate indicating that maintenance is required. Welding is not prevented when the WireLine service symbol is active.

## 5.2 Adaptive control panel



Models featuring the adaptive (A) control panel offer the following control functions.

1. Dynamics control
2. Control knob for wire feed speed or power (adaptive mode)
3. Control knob for voltage or arc length (adaptive mode)
4. Timer button for spot welding and cycle arc welding
5. Selection of 2T/4T gun operating mode
6. Selection for MANUAL, AUTOMATIC or HOT SPOT function
7. Parameter display
8. Overheating indicator
9. WireLine service indicator
10. Post gas symbol
11. Selection for materials type or display of amperes/wire feed speed (adaptive mode)
12. Selection for filler wire diameter (adaptive mode)
13. Selection for shielding gas or post gas function (adaptive mode)
14. Selection of crater fill function (adaptive mode)
15. Selection for memory function
16. Material thickness and weld shape display

### 1. Dynamics control

Dynamics function controls the rate of rise of current when the filler wire is in short circuit with the welding plate. This control adjustment is necessary due to the alternative welding parameters, materials, wire sizes, gas types and current values used.

The welding dynamics scale is -9 to +9. Negative values make the rise of current slower, which results in a hotter and more fluid weld characteristic. Positive values make the rise of current faster, which results in a colder welding condition. This can result in more spatter during welding depending on the filler wire size and type used.

#### How to find the optimal dynamics setting?

Start by setting '0' and make a test weld after selecting the correct wire feed speed and voltage values. Fine tune the welding arc by trying different values in the negative (-) and positive (+) sides of the dynamics scale.

### 2. Control knob for wire feed speed or power (adaptive mode)

This control knob increases and reduces the speed of filler wire delivery or power to the welding arc. The scale is regulated in meters per minute or amperes. There is also a graphical display bar indicating the proportion of motor speed or power selected.

### 3. Control knob for voltage or arc length (adaptive mode)

This control knob increases and reduces the available output voltage of the machine to the welding arc. The scale is regulated in volts and is also supported by a graphical display bar that indicates the proportion of the available output voltage selected.

In adaptive mode this control knob offers minor arc voltage adjustment for fine tuning the welding arc.

### 4. Timer button for spot welding and cycle arc welding



The spot and cycle arc timer offers two modes of function. By pressing and selecting the SPOT timer, you regulate the time duration for one single 'SPOT' welding cycle from either 0.1 to 9.9 seconds of arc time. By selecting the 'CYCLE' arc timer you regulate the machine to a repeating cycle of arc time and pause time. The pause time offered is 0.1 to 3 seconds. Select function by depressing button 4. Regulation and adjustment of SPOT and CYCLE arc values are adjusted by the voltage control (item 3). Function selection is confirmed by either one dot (SPOT TIME) or dash line (CYCLE TIME) under the word 'Timer' in the display.

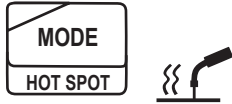
### 5. Selection of 2T/4T gun operating mode



This button offers you two modes of welding gun functions. The selected mode is indicated as either 2T or 4T in the display.

- **In 2T mode** the welding arc is started by a single press and hold of the welding gun trigger. Welding continues whilst the trigger is held, and stops when the trigger is released.
- **In 4T mode** the gun trigger is pressed and gas starts to flow. When the trigger is released, the arc ignites. Welding continues until the trigger is pulled and released for a second time. This mode is useful for long welding durations.

## 6. Selection for MANUAL, AUTOMATIC or HOT SPOT function



This button switches the machine from standard MIG/MAG welding mode to a specialised process function for localised spot heating and stress relieving for metal panels.

This function is normally used in the automotive industry and light sheet fabrication. To switch between functions, press and hold the button for 5 seconds. See further information on HOT SPOT function later in this manual.

## 7. Parameter display

The large illuminated parameter display is designed to provide excellent visibility of welding values and machine settings in a variety of welding situations. The display is protected by a polycarbonate lens fitted into the control panel housing.

## 8. Overheating indicator



Under normal working conditions the overheating indicator is not visible. However, should the machine exceed its working duty cycle, welding will cease and the thermometer symbol will illuminate indicating that the machine has overheated. The cooling fans of the machine will continue to operate. When normal operating temperature is regained, the machine will reset and welding can continue. The overheating indicator will no longer be visible.

## 9. WireLine service indicator



Under normal working conditions, the WireLine service indicator is not visible. However, if the welding gun contact tip or liner becomes dirty and blocked or the wire feed mechanism needs routine maintenance or the friction plates in the spool brake need adjustment or maintenance, the Spanner service symbol will illuminate indicating that maintenance is required. Welding is not prevented when the WireLine service symbol is active.

## 10. Post gas symbol

POST GAS

This symbol indicates that the post gas function is active. Kempact Regular (R) models have fixed post gas function, but in Kempact Adaptive (A) models the post gas time can be changed through a long press of button 13. In both models, the words POST GAS on the display identify that the function is active.

## 11. Selection for materials type or display of amperes/wire feed speed (adaptive mode)



When operating in adaptive mode and AUTOMATIC is selected from the mode selection button 6, a selection of filler materials types is presented through short presses of button 11. Materials selection includes FE, BRAZING, FCAW, MCAW. When selecting a suitable filler material, POWER regulation is achieved through POWER selection knob 2. A long press (5 secs) of button 11 also switches the display from m/min to amperes.

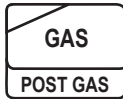


## 12. Selection for filler wire diameter (adaptive mode)



When operating in adaptive mode and AUTOMATIC is selected from the mode selection button 6, you can select from the filler wire diameter options. Following your materials selection through button 11, press button 12 briefly to select the filler wire diameter. Not all materials have alternative choices.

## 13. Selection for shielding gas or post gas function (adaptive mode)



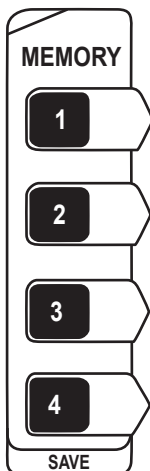
When operating in adaptive mode and AUTOMATIC is selected from the mode selection button 6, you can select from the shielding gas option for the filler material type set. Shielding gas options are displayed with a short press of button 13. When operating in either MANUAL or AUTOMATIC mode you can also select POST GAS function and make adjustments to the POST GAS time value with adjustment knob 3. The POST GAS adjustment range is from 0.1 second to 3.0 seconds.

## 14. Selection of crater fill function (adaptive mode)



When operating in adaptive mode and AUTOMATIC is selected from the mode selection button 6, you can select CRATER FILL function. CRATER FILL function activates a pre-set slope timer at the end of the welding cycle and operates in either 2T or 4T gun switch mode when the off signal is given.

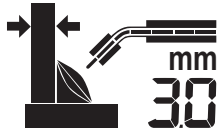
## 15. Selection for memory function



When operating in either MANUAL or AUTOMATIC mode, you can store your welding parameters using the MEMORY function. There are four MEMORY locations to choose from, and you can store either MANUAL or AUTOMATIC welding setup in any channel location. To store your welding settings, simply press and hold a MEMORY button for 5 seconds.

To recall the welding settings for future use, simple short press the MEMORY buttons. To record new weld settings to a channel, repeat the long press sequence.

## 16. Material thickness and weld shape display



When operating in adaptive mode and AUTOMATIC is selected from the mode selection button 6, the material thickness and weld shape is displayed, based on your input selections for plate thickness in mm and weld shape. Adjust these values through control knobs 2 and 3. As you adjust the power control (2), you will see the graphic indicating plate thickness become thicker or thinner, and as you adjust the arc length control (3) you will see the weld shape change from convex, flat and concave. Select the desired settings and you are ready to weld.

## 5.3 Parameter guides

Fe 0.8 mm, 5 – 18 % CO <sub>2</sub> /Ar								
PlateThickness	mm	0.5	0.8	1	1.5	2	2.5	3
WireFeedSpeed	m/min	2	2.5	3.5	5	8	10	13
SetVoltage	V	14.5	15	15.5	16	17	18	20
MeanCurrent	A	40	50	65	97	130	155	185

Fe 1.0 mm, 5 – 25% CO <sub>2</sub> /Ar							
Plate Thickness	mm	0.7	1.5	2	3	4	5
Wire Feed Speed	m/min	1.4	3.2	4.5	6.5	8.5	11.0
Set Voltage	V	15.0	17.5	18.4	21.4	23.8	28.8
Mean Current	A	40	100	150	180	200	240

Fe 1.2 mm, 5 – 25% CO <sub>2</sub> /Ar							
Plate Thickness	mm	1	1.5	2	3	4	6
Wire Feed Speed	m/min	1.5	2.2	3.2	5.0	6.0	7.2
Set Voltage	V	14.6	17.0	17.8	21.0	22.7	26.3
Mean Current	A	75	100	140	180	220	250

## 6. MIG/MAG WELDING

**NOTE!** Welding fumes may be dangerous to your health. Ensure that there is ample ventilation during welding! Never look at the arc without a face shield specifically designed for arc welding! Protect yourself and your surrounding area from the arc and hot welding spatter!

**NOTE!** Always wear protective clothing, gloves, face and eye shields suitable for welding. It is recommended that you make practice welds before you commence welding your main work piece.

**NOTE!** The work piece will be very hot. Protect yourself and others at all times.

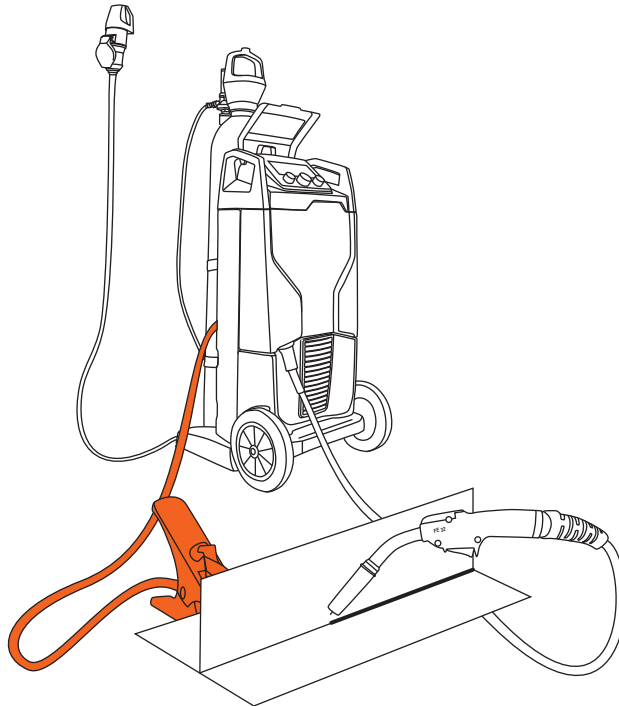
You can start welding after you have made the necessary preparation described throughout these instructions.

Providing you ensure that the equipment is correctly prepared and set for the material type and joint to be welded, you will achieve exceptionally high quality welding results.

- Ensure that the correct filler wire type and size is selected for the work piece.
- Ensure that the correct wire liner and contact tip size is fitted to the welding gun.
- Ensure that the correct shielding gas type is connected and the flow rate adjusted before welding starts.

- Ensure the earth return clamp is connected to the work piece
- Ensure that you are wearing the correct safety equipment before you start welding – including: suitable welding clothing, the correct welding face shield with a suitable shade welding lens, welding gloves and when necessary, a welding mask.

**NOTE!** Please read section 1.2.2 before proceeding further.



EN

Having checked that the equipment is prepared in the correct way for the welding task ahead, and that you are wearing the necessary protective equipment, you are ready to commence welding.

MIG/MAG welding can be performed down hand, vertically and overhead: either right to left (right handed operators) or left to right (left handed operators)

First, present the welding gun nozzle to a practice work piece. The gun nozzle should be approximately 15 mm away from the surface of the work piece and weld joint. If welding a T fillet joint, the gun should be held at an angle of approximately 45 degrees, bisecting the 90 degree joint at the midway point. Starting at the right hand side of the joint (right handed operators only), lean the gun backwards slightly, so the gun nozzle is pointing forwards, towards the centre of the work piece. This is called a 'pushing technique' and is suitable for most applications.

Pull the welding gun trigger. The filler wire will move forward, and a short circuit will occur and the arc will be established. Keeping the gun trigger depressed, the molten weld pool will start to form. Begin to travel the gun forwards, in a controlled manner and travel speed. Providing you have correctly set your equipment, the quality of your weld deposit is now determined by your skill and technique.

The resulting weld deposit, width and shape, should be consistent in appearance and quality. If you are welding too fast the weld bead may be too thin or even intermittent in appearance. Try to slow your travel speed slightly and maintain an even approach to the joint. If you are welding too slowly, you may find the weld deposit is too heavy, the weld piece overheats and possibly burns a hole through the plate. All that may be required to ensure a successful result here is an increase in forward travel speed, but you may also need to reduce the power setting slightly, to achieve the desired result.

As with all craft skills – practice will make perfect! For more information, visit the Welding ABC section in [www.kemppi.com](http://www.kemppi.com).

## 6.1 HOT SPOT function

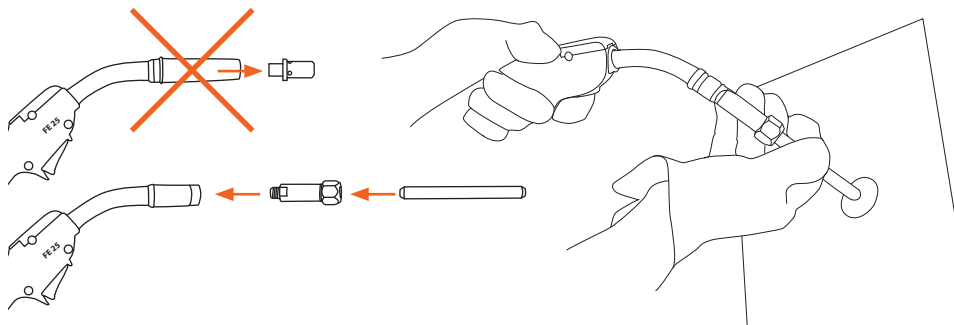
**NOTE!** The HOT SPOT component kit is suitable for use with the FE 20/25 welding guns only.

### Setting and function

1. Before using HOT SPOT function, release the pressure tension arms at the wire feed mechanism.
2. Rotate the filler wire spool slowly clockwise, removing the filler wire away from the FE welding gun contact tip and neck.
3. Fit the special HOT SPOT electrode adaptor and carbon electrode into the gun head as shown.

9592106 holder

4192160 carbon electrode



4. Select HOT SPOT mode with the control panel button 6.
5. Select the required HOT SPOT power level. There are 4 power level options depending on the machine type in use.
6. Place the carbon electrode to the work piece, fixing, or area requiring spot heating.
7. Pull the trigger to activate the HOT SPOT function. The electrode will quickly heat up and depending on the power level set, will glow red hot.
8. When sufficient heating effect is reached, release the trigger and remove the electrode from the work piece.
9. When HOT SPOT process is complete, press control panel button 6 to return the machine to standard MIG/MAG mode.
10. When cool and safe to handle, remove the HOT SPOT carbon and holder, replacing the standard FE welding gun parts ready to continue welding.

**NOTE!** HOT SPOT function is only possible in 2T gun trigger mode. If 4T selection is made, the function will automatically revert to 2T operation.

## 7. MAINTENANCE

**NOTE!** Be careful when handling electrical cables!

In maintaining the unit, take into consideration the rate of use and the environment it is used in. When the unit is used properly and serviced regularly, you will avoid unnecessary disturbances in use and production.

### 7.1 Daily maintenance

- Remove welding spatters from the welding gun's tip and check the condition of the parts. Change damaged parts to new ones immediately. Only use original Kemppi spare parts.
- Change damaged insulation parts to new ones immediately.
- Check the tightness of the welding gun's and earth return cable's connections.
- Check condition of mains and welding cables and replace damaged cables.
- See that there is enough space around the unit for ventilation.

Service the wire feed mechanism at least every time the spool is changed.

- Check the wear of the feed roll groove and change the feed roll when necessary.
- Carefully clean the welding gun wire liner with dry compressed air.

**NOTE!** When using compressed air pistols, ensure you are wearing adequate safety equipment including, suitable work clothing, gloves and eye protection. Never direct compressed air pistols or the end of the liner at your skin, face or others in the vicinity.

**NOTE!** Kempact RA models are fitted as standard with both over temperature and WireLine service indicators (described earlier in the manual).



If the overheating indicator is displayed, this may be due to welding durations exceeding the set duty cycle. The machine will reset after a cooling rest period. However, if the optional cooling air intake filter is fitted to the machine, this may be contaminated, restricting cooling airflow and require cleaning. See section 4.9.1.



If the WireLine service indicator is illuminated, this indicates that the wire delivery system is not running efficiently. Checks, adjustment or cleaning is required to the spool hub friction assembly, wire feed mechanism or gun/liner assembly. Welding is not prevented when the WireLine service symbol is active, and is maintenance advice only.

## 7.2 Gun spare parts

**NOTE!** Orange part code colour denotes standard delivery specification.

**FE 20:** 6602003 (3.5 m), 6602004 (5.0 m)



<b>Gas nozzle</b> (AxBxC)	<b>9580101</b>	60.5 x 18 x 14 mm, standard				
	958010101	60.5 x 18 x 14 mm, with insulating bush (= 9580101 + 9591079)				
	4113470	60.5 x 18 x 14 mm, for spot welding				
	9580101E	60.5 x 20 x 14 mm, thick wall				
<b>Insulating bush</b>	<b>9591010</b>					
<b>Contact tip (M6)</b>	9876634	ø 0.6 mm				
	<b>9876635</b>	0.8 mm				
	9876633	0.9 mm				
	9876636	1.0 mm				
	9876637	1.2 mm				
<b>Contact tip adapter (M6)</b>	<b>9580173</b>					
<b>Insulating ring</b>	<b>9591079</b>					
<b>Locking spring</b>	<b>4275240</b>					
<b>Neck</b>	<b>4153040</b>	45°				
<b>Wire liner</b>	<b>4188573</b>		ø 0.6–0.8 mm		3.5 m	
	W006453		0.9–1.2 mm		3.5 m	
	W006457		0.8–1.0 mm	Al/Ss	3.5 m	
	W006459		1.0–1.6 mm	Al/Ss	3.5 m	
	<b>4188576</b>		0.6–0.8 mm		5 m	
	W006454		0.9–1.2 mm		5 m	
	W006458		0.8–1.0 mm	Al/Ss	5 m	
	W006460		1.0–1.6 mm	Al/Ss	5 m	



FE 25: 6602503 (3.5 m), 6602504 (5.0 m)



<b>Gas nozzle</b> (A x B x C)	9580101	60.5 x 18 x 14 mm, standard				
	958010101	60.5 x 18 x 14 mm, with insulating bush (= 9580101 + 9591079)				
	4113470	60.5 x 18 x 14 mm, for spot welding				
	9580101E	60.5 x 20 x 14 mm, thick wall				
<b>Insulating bush</b>	9591010					
<b>Contact tip (M6)</b>	9876634	ø 0.6 mm				
	9876635	0.8 mm				
	9876633	0.9 mm				
	9876636	1.0 mm				
	9876637	1.2 mm				
<b>Contact tip adapter (M6)</b>	9580173					
<b>Insulating ring</b>	9591079					
<b>Locking spring</b>	4275240					
<b>Neck</b>	4153040	45°				
<b>Wire liner</b>	4188573		ø 0.6–0.8 mm		3.5 m	
	W006453		0.9–1.2 mm		3.5 m	
	W006457		0.8–1.0 mm	Al/Ss	3.5 m	
	W006459		1.0–1.6 mm	Al/Ss	3.5 m	
	4188576		0.6–0.8 mm		5 m	
	W006454		0.9–1.2 mm		5 m	
	W006458		0.8–1.0 mm	Al/Ss	5 m	
	W006460		1.0–1.6 mm	Al/Ss	5 m	

**FE 27:** 6602703 (3.5 m), 6602704 (5.0 m)

**FE 32:** 6603203 (3.5 m), 6603204 (5.0 m)



<b>Gas nozzle</b> (A x B x C)	<b>4295760</b>	76 x 20 x 14 mm, standard / M8				
	4295760L	79 x 20 x 14 mm, long / M8				
	4295760C	76 x 20 x 12 mm, conical / M8				
	4294970	70 x 20 x 14 mm, standard / M6				
<b>Contact tip</b> (M6)	9876634	ø 0.6 mm				
	9876635	0.8 mm				
	9876633	0.9 mm				
	9876636	1.0 mm				
	9876637	1.2 mm				
	9876639	1.6 mm				
<b>(M8)</b>	9580122	ø 0.8 mm		9580122A	ø 0.8 mm	
	9580121	0.9		9580121A	0.9	
	<b>9580123</b>	1.0		9580123A	1.0	
	9580124	1.2		9580124A	1.2	
	9580125	1.4		9580125A	1.4	
	9580126	1.6		9580126A	1.6	
	9580123ZR	1.0	CuCr1Zr	9580122SS	0.8	
	9580124ZR	1.2	CuCr1Zr	9580121SS	0.9	
	9580125ZR	1.4	CuCr1Zr	9580123SS	1.0	
	9580123AG	1.0	CuAg	9580124SS	1.2	
	9580124AG	1.2	CuAg	9580126SS	1.6	
<b>Contact tip adapter</b>	4294890	M6				
	<b>4295740</b>	M8				
<b>Gas diffuser</b>	<b>4294880</b>					
	4294880CER					
<b>Neck</b>	<b>3146780</b>	50°				
<b>Wire liner</b>	4188573		ø 0.6–0.8 mm		3.5 m	
	<b>W006453</b>		0.9–1.2 mm		3.5 m	
	W006455		1.4–1.6 mm		3.5 m	
	W006457		0.8–1.0 mm	Al/Ss	3.5 m	
	W006459		1.0–1.6 mm	Al/Ss	3.5 m	
	4188576		0.6–0.8 mm		5 m	
	<b>W006454</b>		0.9–1.2 mm		5 m	
	W006456		1.4–1.6 mm		5 m	
	W006458		0.8–1.0 mm	Al/Ss	5 m	
	W006460		1.0–1.6 mm	Al/Ss	5 m	





**FE 35:** 6603503 (3.5 m), 6603504 (5.0 m)



<b>Gas nozzle</b> (AxBxC)	4300260	77 x 22 x 16 mm, standard				
	4300260L	80 x 22 x 16 mm, long				
	4300260C	77 x 22 x 13 mm, conical				
	4307050	77 x 22 x 16 mm, standard, spatter protection bush				
<b>Insulating bush</b>	4307020					
<b>Contact tip (M8)</b>	9580122	∅ 0.8 mm		9580122A	∅ 0.8 mm	
	9580121	0.9		9580121A	0.9	
	9580123	1.0		9580123A	1.0	
	9580124	1.2		9580124A	1.2	
	9580125	1.4		9580125A	1.4	
	9580126	1.6		9580126A	1.6	
	9580123ZR	1.0	CuCr1Zr	9580122SS	0.8	
	9580124ZR	1.2	CuCr1Zr	9580121SS	0.9	
	9580125ZR	1.4	CuCr1Zr	9580123SS	1.0	
	9580123AG	1.0	CuAg	9580124SS	1.2	
	9580124AG	1.2	CuAg	9580126SS	1.6	
	<b>Contact tip adapter</b>	4295740	M8			
<b>Gas diffuser</b>	W004390					
<b>Insulator</b>	W004165					
<b>Neck</b>	SP004585	50°				
	SP600317	50°, neck includes temperature protection spring as standard.				
<b>Wire liner</b>	4188573		∅ 0.6–0.8 mm		3.5 m	
	W006453		0.9–1.2 mm		3.5 m	
	W006455		1.4–1.6 mm		3.5 m	
	W006457		0.8–1.0 mm	Al/Ss	3.5 m	
	W006459		1.0–1.6 mm	Al/Ss	3.5 m	
	4188576		0.6–0.8 mm		5 m	
	W006454		0.9–1.2 mm		5 m	
	W006456		1.4–1.6 mm		5 m	
	W006458		0.8–1.0 mm	Al/Ss	5 m	
	W006460		1.0–1.6 mm	Al/Ss	5 m	

**FE 42:** 6604203 (3.5 m), 6604204 (5.0 m)



SP004585

SP600317



<b>Gas nozzle</b> (A x B x C)	4300380	80 x 25 x 18 mm, standard				
	4300380L	83 x 25 x 18 mm, long				
	4300380C	80 x 25 x 14 mm, conical				
	4307070	80 x 25 x 18 mm, standard, spatter protection bush				
	4308190	89.5 x 25x18 mm, special long				
<b>Insulating bush</b>	4307030					
<b>Contact tip</b> (M8)	9580122	∅ 0.8 mm		9580122A	∅ 0.8 mm	
	9580121	0.9		9580121A	0.9	
	9580123	1.0		9580123A	1.0	
	9580124	1.2		9580124A	1.2	
	9580125	1.4		9580125A	1.4	
	9580126	1.6		9580126A	1.6	
	9580123ZR	1.0	CuCr1Zr	9580122SS	0.8	
	9580124ZR	1.2	CuCr1Zr	9580121SS	0.9	
	9580125ZR	1.4	CuCr1Zr	9580123SS	1.0	
	9580123AG	1.0	CuAg	9580124SS	1.2	
	9580124AG	1.2	CuAg	9580126SS	1.6	
<b>Contact tip adapter</b>	4304600	M8				
<b>Gas diffuser</b>	W004505					
<b>Insulator</b>	W004579					
<b>Neck</b>	SP004578	50°				
	SP600316	50°, neck includes temperature protection spring as standard.				
<b>Wire liner</b>	4188573		∅ 0.6–0.8 mm		3.5 m	
	W006453		0.9–1.2 mm		3.5 m	
	W006455		1.4–1.6 mm		3.5 m	
	W006457		0.8–1.0 mm	Al/Ss	3.5 m	
	W006459		1.0–1.6 mm	Al/Ss	3.5 m	
	4188576		0.6–0.8 mm		5 m	
	W006454		0.9–1.2 mm		5 m	
	W006456		1.4–1.6 mm		5 m	
	W006458		0.8–1.0 mm	Al/Ss	5 m	
	W006460		1.0–1.6 mm	Al/Ss	5 m	

## 7.3 Troubleshooting

Welding performance can be effected by a number of issues, including the welding gun and/or other parts of the welding system. The following information will help you to check, identify and rectify possible causes of welding malfunction.

**NOTE!** The problems listed and the possible causes are not definitive, but serve to suggest some standard and typical situations that may present during normal use when using the MIG/MAG process.

<b>Dirty, poor quality weld?</b>
<ul style="list-style-type: none"><li>• Check that spatter is not blocking the nozzle or contact tip adapter</li><li>• Check shielding gas supply</li><li>• Check and set gas flow rate</li><li>• Check gas type for application</li><li>• Check gun polarity. Example: Fe solid filler wire: Earth return socket should be connected to the - pole, wire feed/gun connection to the + pole</li><li>• Check power supply – Phase down?</li></ul>
<b>Variable welding performance?</b>
<ul style="list-style-type: none"><li>• Check wire feed mechanism is correctly adjusted</li><li>• Check correct drive rolls are fitted</li><li>• Check wire spool/hub overrun tension is correctly adjusted</li><li>• Check gun liner is not blocked. Replace if necessary</li><li>• Check correct gun liner is fitted for the filler wire size and type</li><li>• Check contact tip for size, type and wear</li><li>• Check gun is not over heating for the application</li><li>• Check cable connections and earth return clamp</li><li>• Check welding parameter settings.</li></ul>
<b>Filler wire won't feed?</b>
<ul style="list-style-type: none"><li>• Check wire feed mechanism. Adjust as necessary</li><li>• Check welding gun switch function.</li><li>• Check euro gun connector is correctly fitted</li><li>• Check gun liner is not blocked</li><li>• Check contact tip, size, type, wear</li><li>• Check filler wire diameter for correct size</li></ul>
<b>High spatter volume?</b>
<ul style="list-style-type: none"><li>• Check welding parameter values</li><li>• Check inductance/dynamics values</li><li>• Check gas type and flow</li><li>• Check welding polarity and cable connections</li><li>• Check filler material selection</li><li>• Check filler wire delivery system</li><li>• Check power supply. Are all electrical phases present?</li><li>• Check that operator maintains correct technique/arc length/travel speed/gun angle</li></ul>

**NOTE!** Many of these checks may be carried out by the operator. However certain checks relating to mains power must be completed by an authorised trained electrician.

## 7.4 Storage

Store the unit in a clean and dry place. Shield it from rain, and in temperatures exceeding +25 °C from direct exposure to sun.

## 7.5 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.

## 8. ERROR CODES

### **Error 2: Mains under voltage**

The machine has detected mains under voltage that disturbs welding. Check the quality of the supply network.

### **Error 3: Mains over voltage**

The machine has detected momentary voltage spikes or continuous overvoltage that can damage the machine if allowed to continue. Check the quality of the supply network.

### **Error 4: Wire feed motor over current**

Wire feed motor current is higher than the designed limit. Check condition of welding gun contact tip, liner and wire feed mechanism.

### **Other error codes**

The machine can display alternative codes not listed. In the event of an unlisted code appearing, contact an authorised Kemppi service agent and report the error code shown.

## 9. ORDERING CODES

Kempact 251R, 253R, 323R, 181A, 251A, 253A, 323A		253RMV, 323RMV, 253AMV, 323AMV	
Kempact 251R, FE25 3.5m	P2203	Kempact 323RMV, FE 27, 3.5m	P2216
Kempact 251R, FE25 5m	P2204	Kempact 323RMV, FE 27, 5m	P2215
Kempact 253R, FE27 3.5m	P2207	Kempact 323RMV, FE 32, 3.5m	P2219
Kempact 253R, FE27 5m	P2208	Kempact 323RMV, FE 32, 5m	P2220
Kempact 323R, FE32 3.5m	P2211	Kempact 253AMV, FE 27, 3.5m	P2218
Kempact 323R, FE32 5m	P2212	Kempact 253AMV, FE 27, 5m	P2217
Kempact 181A, FE20 3.5m	P2201	Kempact 323AMV, FE 32, 3.5m	P2221
Kempact 181A, FE20 5m	P2202	Kempact 323AMV, FE 32, 5m	P2222
Kempact 251A, FE25 3.5m	P2205		
Kempact 251A, FE25 5m	P2206		
Kempact 253A, FE32 3.5m	P2209		
Kempact 253A, FE32 5m	P2210		
Kempact 323A, FE32 3.5m	P2214		
Kempact 323A, FE32 5m	P2215		
<b>Welding guns</b>			
FE 20, 3.5m	6602003	FE 20, 5.0 m	6602004
FE 25, 3.5m	6602503	FE 25, 5.0 m	6602504
FE 27, 3.5m	6602703	FE 27, 5.0 m	6602704
FE 32, 3.5m	6603203	FE 32, 5.0 m	6603204
FE 35, 3.5m	6603503	FE 35, 5.0 m	6603504
FE 42, 3.5m	6604203	FE 42, 5.0 m	6604204
<b>Consumables for guns, see pages 27–34</b>			
<b>Consumables for wire feed mechanism, see pages 14–15</b>			
<b>Earth return cable and clamp</b>	25 mm <sup>2</sup> , 5 m (181, 251, 253, 253MV)		6184211
	35 mm <sup>2</sup> , 5 m (323, 323MV)		6124311
<b>Shielding gas hose</b>	1.5 m		4292020
<b>Particle filter</b>			W005852

## 10. TECHNICAL DATA

### 1phase models

Kempact		181A		251R, 251A
Connection voltage	1~, 50/60 Hz	230V ±15%	1~, 50/60Hz	240V ±15%
Rated power at max. current	50% ED I <sub>1max</sub> (180A)	5 kVA	30% ED I <sub>1max</sub> (250A)	8.5 kVA
Supply current	50 % ED I <sub>1max</sub> (180A)	22 A	30 % ED I <sub>1max</sub> (250A)	36 A
	100 % ED I <sub>1eff</sub> (140A)	16 A	100 % ED I <sub>1eff</sub> (150A)	17 A
Connection cable	H07RN-F	3G1.5 (1.5 mm <sup>2</sup> , 5 m)	H07RN-F	3G2.5 (2.5 mm <sup>2</sup> , 5 m)
Fuse	Type C	16 A	Type C	20 A
Welding range		10V/20A–26V/180A		10V/20A–29V/250A
No load voltage		36 V		36 V
Idle power		35 W		35 W
Power factor at max.	180 A / 23 V	0.99	250 A / 26.5 V	0.99
Efficiency at 100% ED	140 A / 21 V	82%	150 A / 21.5 V	82%
Wire feed speed adjustment range		1.0–14.0 m/min		1.0–18.0 m/min
Voltage adjustment range		8.0–26.0 V		8.0–29.0 V
Filler wires	Fe solid	0.8...1.2 mm		0.8...1.2 mm
	Fe cored wires	0.8...1.2 mm		0.8...1.2 mm
	Ss	0.8...1.2 mm		0.8...1.2 mm
	Al	1.0...1.2 mm		1.0...1.2 mm
	Brazing	0.8...1.0 mm		0.8...1.0 mm
Wire spool	max	300 mm / 20 kg		300 mm / 20 kg
Shielding gases		CO <sub>2</sub> , Ar, Ar+CO <sub>2</sub> mixed		CO <sub>2</sub> , Ar, Ar+CO <sub>2</sub> mixed
External dimensions	L x W x H	623 x 579 x 1070 mm	L x W x H	623 x 579 x 1070 mm
Weight	Not including gun and cables	44 kg	Not including gun and cables	44 kg
Temperature class		F (155 °C)		F (155 °C)
EMC class		A		A
Degree of protection		IP23S		IP23S
Operating temperature range		-20...+40 °C		-20...+40 °C
Storage temperature range		-40...+60 °C		-40...+60 °C
Standards		IEC 60974-1		IEC 60974-1
		IEC 60974-5		IEC 60974-5
		IEC 60974-10		IEC 60974-10
		IEC 61000-3-12		IEC 61000-3-12

### 3 phase models

Kempact		253R, 253A		323R, 323A
Connection voltage	3~, 50/60Hz	400 V ±15%	3~, 50/60Hz	400 V ±15%
Rated power at max. current	40% ED I <sub>1max</sub> (250A)	8.5 kVA	35% ED I <sub>1max</sub> (320A)	12 kVA
Supply current	40% ED I <sub>1max</sub> (250 A)	11.9 A	35% ED I <sub>1max</sub> (320A)	17.2 A
	100% ED I <sub>1eff</sub> (150 A)	6.1 A	100% ED I <sub>1eff</sub> (190A)	8.2 A
Connection cable	H07RN-F	4G1.5 (1.5 mm <sup>2</sup> , 5 m)	H07RN-F	4G1.5 (1.5 mm <sup>2</sup> , 5 m)
Fuse	Type C	10 A	Type C	10 A
Welding range		10V/20A–31V/250A		10V/20A–32.5V/320A
No load voltage		41 V		45 V
Idle power		25 W		25 W
Power factor at max.	250 A / 26.5 V	0.93	320 A / 30 V	0.94
Efficiency at 100% ED	150 A / 21.5 V	88%	190A / 23.5 V	86%
Wire feed speed adjustment range		1.0–18.0 m/min		1.0–20.0 m/min
Voltage adjustment range		8.0–31.0V		8.0–32.5 V
Filler wires	Fe solid	0.8...1.2 mm		0.8...1.2 mm
	Fe cored wires	0.8...1.2 mm		0.8...1.2 mm
	Ss	0.8...1.2 mm		0.8...1.2 mm
	Al	1.0...1.2 mm		1.0...1.2 mm
	Brazing	0.8...1.0 mm		0.8...1.0 mm
Wire spool	max	300 mm / 20 kg		300 mm / 20 kg
Shielding gases		CO <sub>2</sub> , Ar, Ar+CO <sub>2</sub> mixed		CO <sub>2</sub> , Ar, Ar+CO <sub>2</sub> mixed
External dimensions	L x W x H	623 x 579 x 1070 mm	L x W x H	623 x 579 x 1070 mm
Weight	Not including gun and cables	44 kg	Not including gun and cables	44 kg
Temperature class		F (155 °C)		F (155 °C)
EMC class		A		A
Degree of protection		IP23S		IP23S
Operating temperature range		-20...+40 °C		-20...+40 °C
Storage temperature range		-40...+60 °C		-40...+60 °C
Standards		IEC 60974-1		IEC 60974-1
		IEC 60974-5		IEC 60974-5
		IEC 60974-10		IEC 60974-10

### 3 phase models, MVU

Kempact		253 MVU		323 MVU	
Connection voltage	3~, 50/60 Hz	230V –15%...400V +15%		3~, 50/60 Hz	230V –15%...400V +15%
Rated power at max. current	40% ED $I_{1max}$ (250 A, 230 V)	9 kVA		35% ED $I_{1max}$ (320 A, 230 V)	13.5 kVA
	40% ED $I_{1max}$ (250 A, 400 V)	8.5 kVA		35% ED $I_{1max}$ (320 A, 400 V)	12.5 kVA
Supply current	40% ED $I_{1max}$ (250 A, 230 V)	22.2 A		35% ED $I_{1max}$ (320 A, 230 V)	33.3 A
	40% ED $I_{1max}$ (250 A, 400 V)	12.3 A		35% ED $I_{1max}$ (320 A, 400 V)	17.8 A
	100% ED $I_{1eff}$ (150 A, 230 V)	10.8 A		100% ED $I_{1eff}$ (190 A, 230 V)	14.8 A
	100% ED $I_{1eff}$ (150 A, 400 V)	6.2 A		100% ED $I_{1eff}$ (190 A, 400 V)	8.3 A
Connection cable	H07RN-F	4G1.5 (1.5 mm <sup>2</sup> , 5 m)		H07RN-F	4G1.5 (1.5 mm <sup>2</sup> , 5 m)
Fuse	Type C (230V)	16 A		Type C (230 V)	16 A
	Type C (400V)	10 A		Type C (400 V)	10 A
Welding range		10V/20A–31V/250A			10V/20A–32.5V/320A
No load voltage		46 V			50 V
Idle power		35 W			35 W
Power factor at max.	250A/26.5V (230V)	0.94		320A/30V (230V)	0.94
	250A/26.5V (400V)	0.93		320A/30V (400V)	0.94
Efficiency at 100% ED	150A/21.5V (230V)	0.79		190A/23.5V (230V)	0.80
	150A/21.5V (400V)	0.82		190A/23.5V (400V)	0.83
Wire feed speed adjustment range		1.0–18.0 m/min			1.0–20.0 m/min
Voltage adjustment range		8.0–31.0 V			8.0–32.5 V
Filler wires	Fe solid	0.8...1.2 mm			0.8...1.2 mm
	Fe cored wires	0.8...1.2 mm			0.8...1.2 mm
	Ss	0.8...1.2 mm			0.8...1.2 mm
	Al	1.0...1.2 mm			1.0...1.2 mm
	Brazing	0.8...1.0 mm			0.8...1.0 mm
Wire spool	max	300 mm / 20 kg			300 mm / 20 kg
Shielding gases		CO <sub>2</sub> , Ar, Ar+CO <sub>2</sub> mixed			CO <sub>2</sub> , Ar, Ar+CO <sub>2</sub> mixed
External dimensions	L x W x H	623 x 579 x 1070 mm		L x W x H	623 x 579 x 1070 mm
Weight	Not including gun and cables	44 kg		Not including gun and cables	44 kg



<b>Temperature class</b>		F (155 °C)		F (155 °C)
<b>EMC class</b>		A		A
<b>Degree of protection</b>		IP23S		IP23S
<b>Operating temperature range</b>		-20...+40 °C		-20...+40 °C
<b>Storage temperature range</b>		-40...+60 °C		-40...+60 °C
<b>Standards</b>		IEC 60974-1		IEC 60974-1
		IEC 60974-5		IEC 60974-5
		IEC 60974-10		IEC 60974-10

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