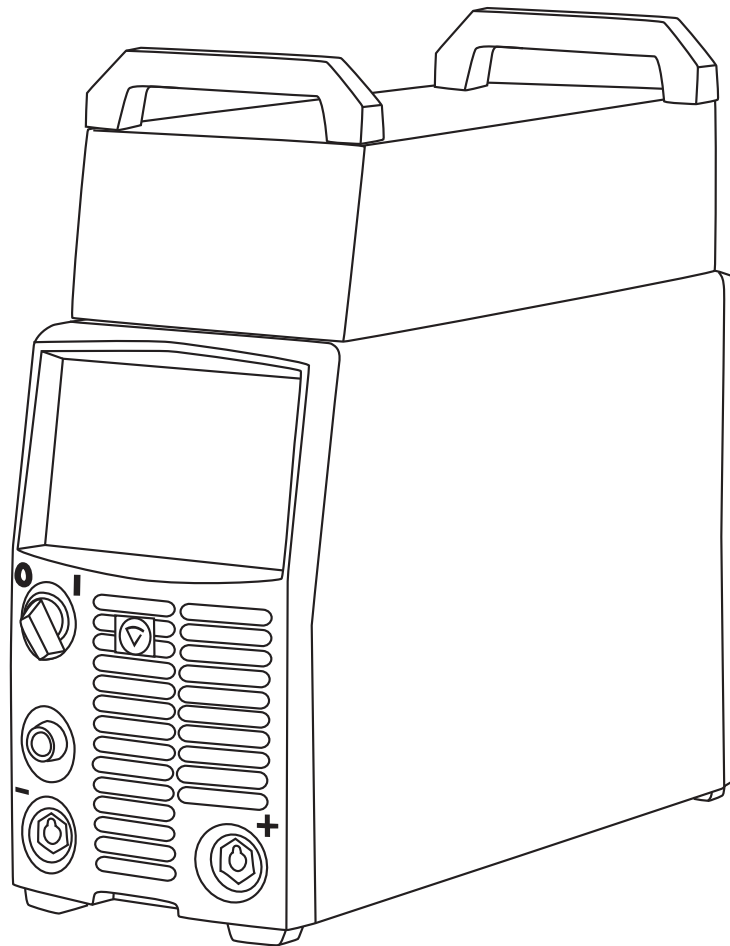


KempArc

Pulse TCS

Operating manual *EN*



OPERATING MANUAL

English

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1. INTRODUCTION

1.1 GENERAL

Congratulations on choosing the KempArc™ Pulse TCS 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.

For Kemppi's standard safety instructions and warranty terms and conditions, please visit our web site at www.kemppi.com.

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

Important notes

Items in the manual that require particular attention in order to minimise damage and personal harm are indicated with the '*NOTE!*' notation. 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 KEMPARC PULSE TCS

KempArc Pulse TCS is a dual wire MIG/MAG welding system designed for demanding robotic applications. It is equipped with a Tandem Control System (TCS), which means that it includes two power sources and two control panels, both of them piloting independently their own filler material feeds into the weld pool.

The system consists of two KempArc Pulse 450 A power sources, two DT 400 wire feeders, one for the left side and one for the right side, and a welding gun with two contact tips. The system has a liquid-cooling system managed by the KempCool 40 cooling unit.

With Kemppi's welding software products, such as modified processes and welding programs, you can customize your KempArc Pulse TCS system to suit exactly your special welding needs.

2. INSTALLATION

2.1 BEFORE USE

KempArc Pulse TCS welding system is delivered in several packages. Product packaging material is recyclable. Check that you have received following components and that they have not been damaged during transportation:

- KempArc Pulse TCS 450 A power source (2 pcs)
- KempCool 40 cooler unit (1 pcs)
- Power source fixing plates and their accessories
- DT400 and DT400L wire feeders
- Fieldbus interface card
- TCS cable and interconnection cables (2 pcs)
- Tandem welding torch and its fixing bracket

The detailed parts list can be found in the ordering codes section at the end of this operating manual.

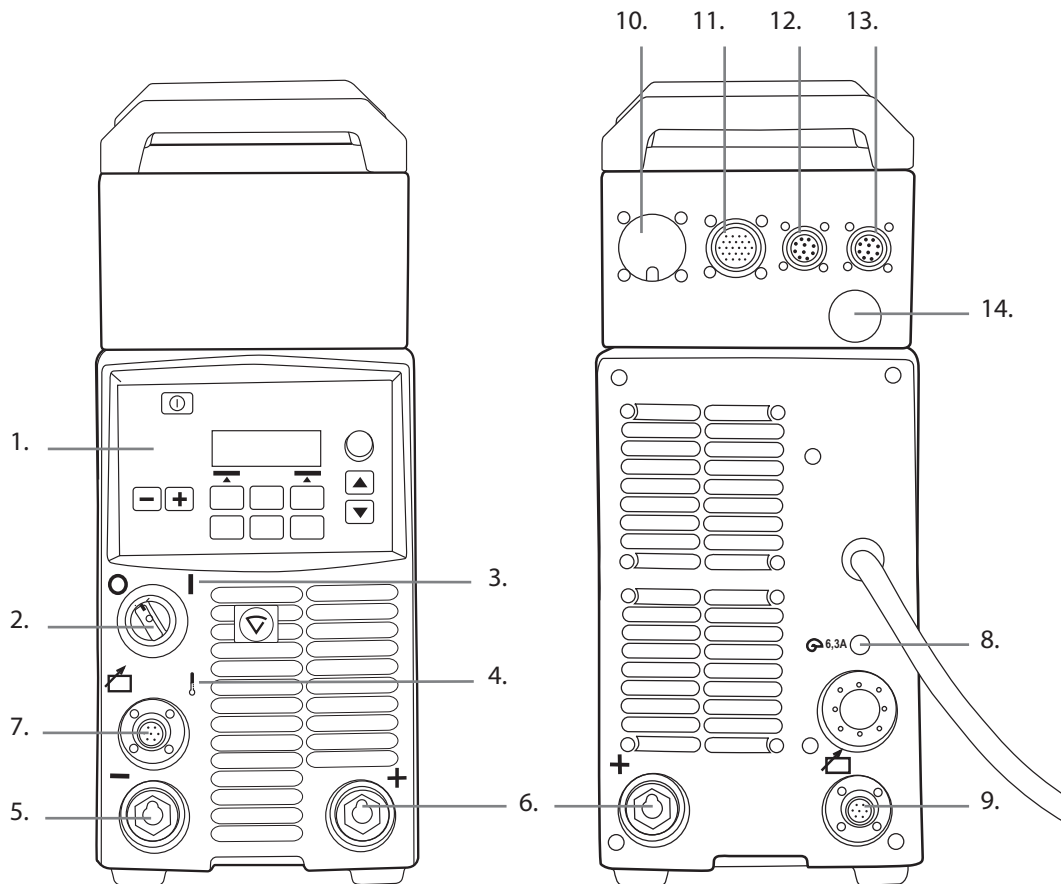
NOTE! When moving the welding machine, always lift it from the handle, never pull it from the welding gun or other cables.

Operating environment

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

Please ensure you read the safety instructions concerning operating environments supplied in this manual.

2.2 MACHINE INTRODUCTION



1. Control panel K 60
2. Main switch (ON/OFF)
3. Main power indicator light (ON/OFF)
4. Warning indicator for thermal protection
5. Welding cable connection, negative pole (-)
6. Welding cable connection, positive pole (+)
7. Control cable connection
8. Fuse, 6.3 A, delayed
9. Control cable connection
10. Robot control connection
11. Wire feeder connection
12. Throughput connection
13. Analogue connection
14. Connection for KempArc Browser or Tandem

2.3 MAIN SWITCH

When you turn the main switch to position I, the main switch indicator light turns on and the machine is ready for use.

NOTE! Always start and stop the machine from the main switch, never use the plug as a switch!

2.4 INDICATOR LIGHTS

Indicator lights display the machine's operational state. When the green indicator is lit, it displays that the machine is switched on and is ready for use, and that it is connected to the mains supply with the power source main switch in position I.

When the orange indicator is lit, it indicates that the thermal protection circuit has been activated due to high working loads that exceed the rated duty cycle. The cooling fan will continue to run and cool the machine down. When the light turns off, the machine is again ready to weld.

2.5 OPERATION OF THE COOLING FAN

KempArc Pulse TCS power sources incorporate two simultaneously operating fans.

- The fan starts momentarily, when you turn the machine on from the main switch.
- The fan will start during welding as the machine reaches operational temperature, and it will run for 1 to 10 minutes after the welding has stopped, depending on the welding cycle completed.

2.6 MACHINE ASSEMBLY AND POSITIONING

KempArc Pulse TCS is delivered with a KempCool 40 cooler unit, which also serves as a stand for the two power sources. The cooler unit delivery package contains the fixing screws and plates for attaching the power sources on top of the cooler unit.

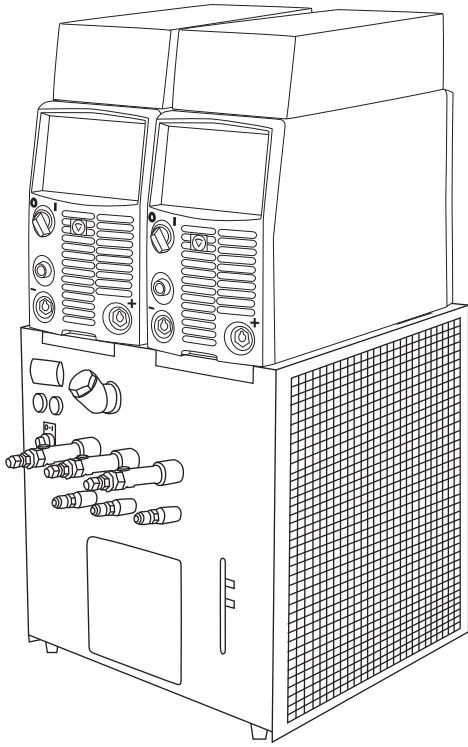
To assemble the KempArc equipment, do the following:

1. Attach the fixing plates to the power sources with the screws delivered in the package.
2. Lift the leading power source onto the cooler unit, and attach the cooler control lead to the connector on the bottom of the power source.
3. Fix with four screws on the facing side and the backside.
4. Lift the other power source onto the cooler unit and fix with screws.

NOTE! Remember to attach first the fixing plates to the power sources, then lift the power sources on the cooler unit.

NOTE! When starting to use the machine, do the following configuration settings in the K 60 control panel menu:

- Set Water Cooling mode to AUTO in the leading machine that is connected to the cooler.
- Set the Water Cooling mode to OFF in the other machine.



If it is necessary to place the power sources elsewhere, use a firm, dry and level surface. Try not to allow dust or other impurities to enter the machines cooling air flow. Preferably site them above floor level, for example on a suitable carriage unit.

Notes for positioning the machine

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

NOTE! Do not operate the machine in the rain. The protection class is IP23S, which allows for outside preserving and storage only.

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

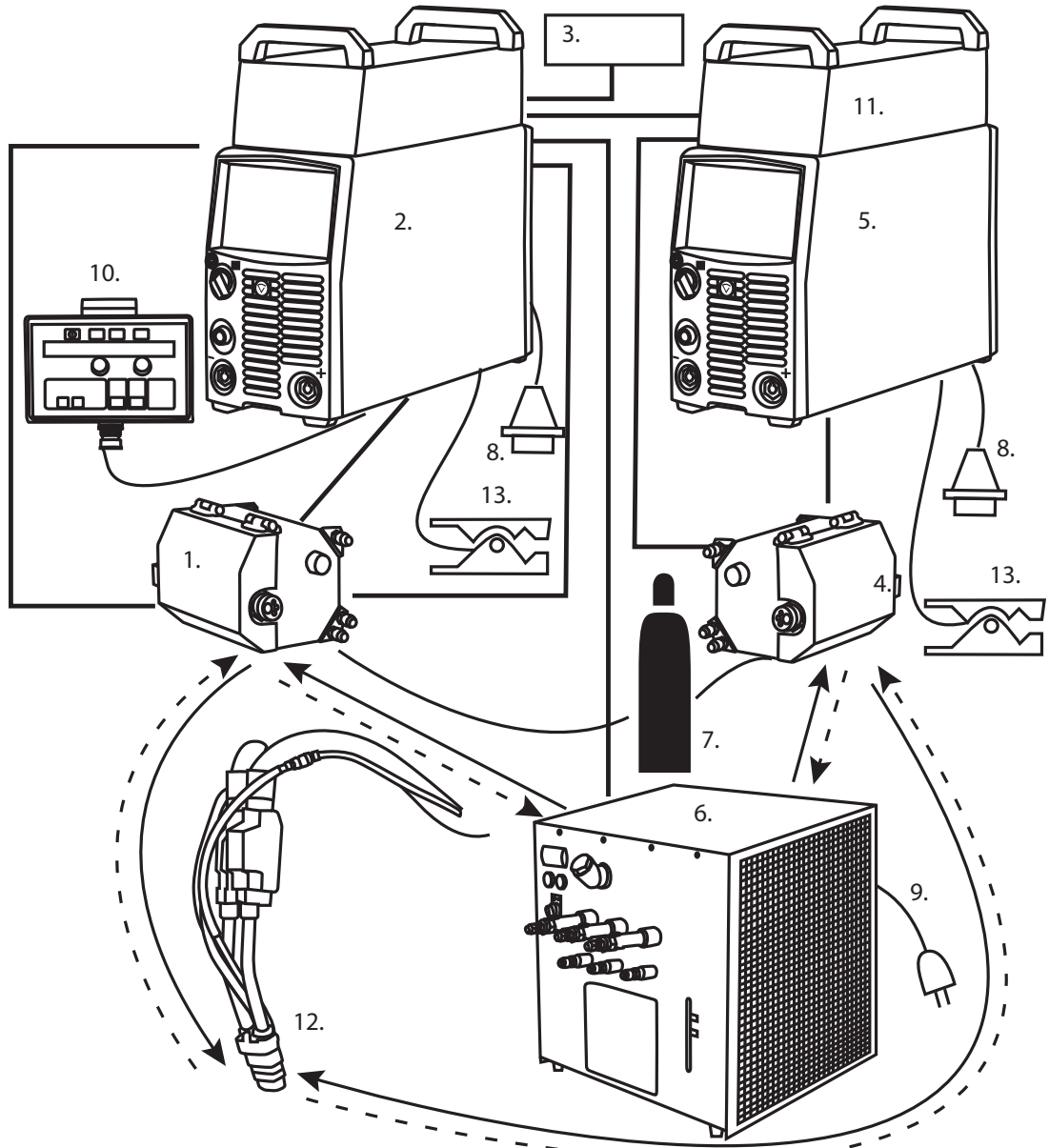
2.7 DISTRIBUTION NETWORK

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

KempArc Pulse TCS:

This equipment complies with IEC 61000-3-12 provided that the short-circuit power S_{SC} is greater than or equal to 5.5 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 5.5 MVA.

2.8 OVERVIEW OF THE SYSTEM



1. DT 400 wire feeder (right-handed)
2. KempArc Pulse TCS power source, master unit
3. Robot controller
4. DT 400L wire feeder (left-handed)
5. KempArc Pulse TCS, slave unit
6. KempCool 40 cooling unit
7. Shielding gas supply
8. Power cable (3-phase)
9. Power cable for cooling unit (1-phase)
10. KF 62 remote control panel (optional)
11. Robot control connection
12. Liquid cooled tandem welding gun
13. Earth return cable and clamp

2.9 CONNECTING TO MAINS POWER

NOTE! Always check before use that all cables are in good working condition: the mains cable, interconnecting cable, shielding gas hose, earth return cable and clamp. Ensure that connectors are correctly fastened. Loose connectors can impair welding performance and damage connectors.

KempArc power sources are delivered as standard with a 5-meter mains power cable. No mains plug is fitted at the Kemppi factory.

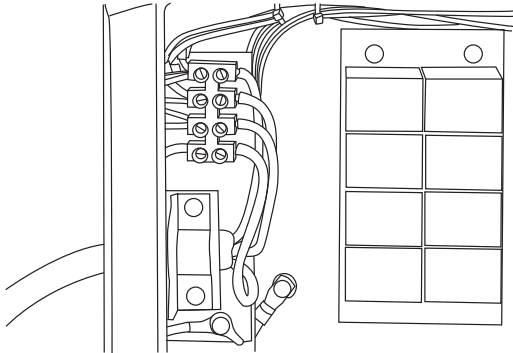
NOTE! If local country based regulations state an alternative power cable is required, the mains cable must be replaced in conformity with the regulations. Connection and installation of the mains cable and plug, should only be carried out by a suitably qualified person.

Remove the machine cover plate to enable mounting of a mains cable. KempArc Pulse TCS power sources can be connected to the 3-phase mains supply of 400 V.

If changing the mains cable take into consideration the following:

The cable is entered into the machine through the inlet ring on the rear panel of the machine and fastened with a cable clamp. The phase conductors of the cable are coupled to supply terminals L1, L2 and L3. If the cable has also a green and yellow coloured protective grounding conductor, it should be coupled to the terminal marked with \oplus .

If you are using a 5-lead cable, do not connect the neutral conductor.



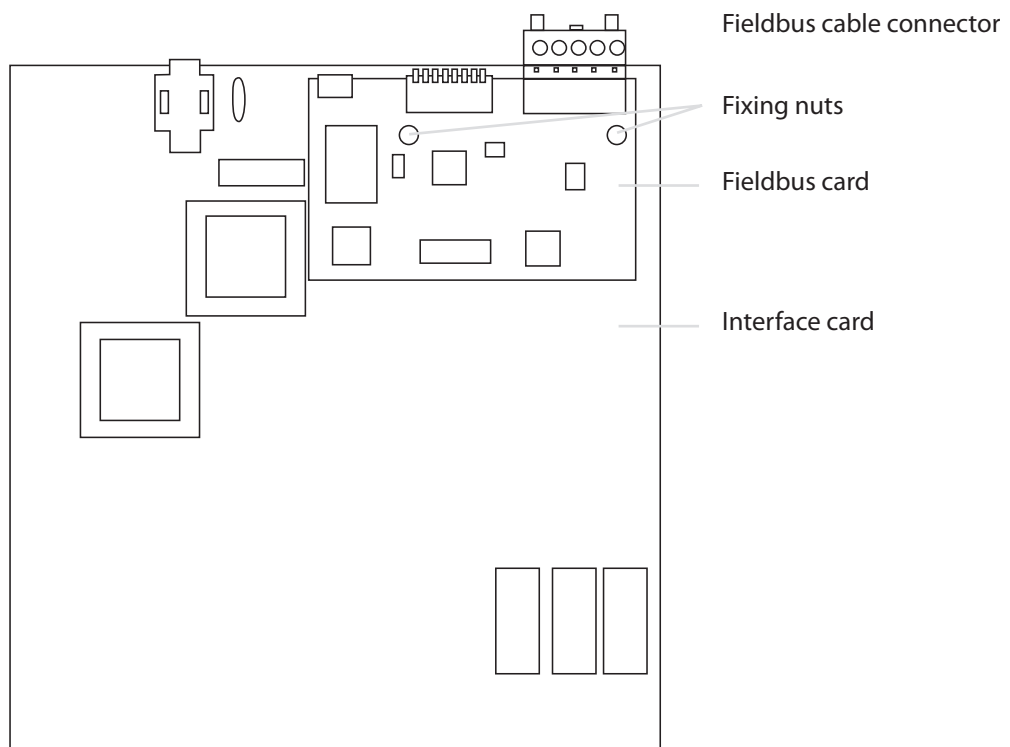
2.10 CONNECTING TO WELDING ROBOT

Select which one of the KempArc Pulse TCS power sources you want to make the leading unit that controls the first filler wire. In this unit you should install the fieldbus card, which connects the KempArc Pulse TCS system to the robot control unit.

It is recommended to install the fieldbus card to the same power source unit, which is connected to the KempCool 40 cooling unit.

To install the fieldbus card, do the following:

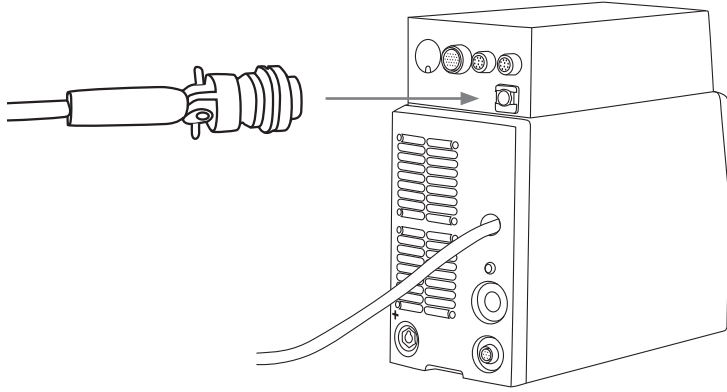
1. Open the cover of the black control unit box located above the power source.
2. Install the fieldbus card onto the interface card as shown in the picture. Attach the fixing nuts.
3. Connect the welding robot's fieldbus cable to the fieldbus card's connector.
4. Close the cover of the black control unit box.



2.11 ENABLING TANDEM CONTROL SYSTEM

The KempArc Pulse TCS welding system is equipped with a Tandem Control system (TCS), which allows both filler wires to be controlled independently of each other. To enable the control system, you need to connect the two power sources to each other using a tandem control cable.

Connect tandem control cable to BROWSER/TANDEM connections on the back of the control boxes as shown in the picture.



2.12 INTERCONNECTION WITH WIRE FEEDERS

Both power sources are connected to wire feeders with their own interconnection cable sets. Each cable set includes the following parts:

- a welding current cable
- a control cable
- four cooling hoses, two blue ones and two red ones
- a shielding gas hose.

Kemppi provide a choice of interconnection cable sets for different environments. Only materials that meet the demands of Kemppi's international markets are used in their construction.

Used correctly, Kemppi cable sets ensure high welding performance and serviceability.

Before use, always ensure the cable set is in good condition and that connectors are correctly fastened. Loose connections reduce welding performance and may result in damage to connectors due to heating effects.

For correct connection and configuration of cable sets, please refer to overview of the system earlier in this operating manual.

2.12.1 Connecting the welding cables

The welding cables are used for delivering the welding power to the robot's tandem welding gun. To connect the welding cables, do the following:

1. Connect the welding cable to the plus pole (+) located on the back of the leading power source that delivers filler wire to the first contact tip of the tandem welding gun..
2. Attach the other end of the welding cable to the wire feeder, which delivers filler wire to the leading contact tip.
3. Connect the welding cable to the plus pole (+) on the back of the trailing power source that delivers filler wire to the second contact tip of the tandem welding gun..
4. Attach the other end of the welding cable to the wire feeder, which delivers filler wire to the trailing contact tip.

You can also use a manual welding gun for tack welding when necessary. It is connected to the plus pole (+) on the front of the power source.

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

2.12.2 Connecting the control cables

The KempArc Pulse TCS power sources control the behaviour of the wire feeds independently for each filler wire. This is done through the control cables that run between power sources and wire feeders.

1. Connect the control cables to the WIRE FEEDER connection on the back of the KempArc Pulse TCS control box.
2. Connect the other end of the cable to the control cable connectors on wire feeders.

2.12.3 Connecting the cooling hoses

The KempArc Pulse TCS system is equipped with KempCool 40 liquid cooling unit. There are three cooling circuits available: two for each welding gun neck and one for the gas nozzle. However, not all welding gun brands have liquid cooling in the gas nozzle.

Attach the snap connectors of the cooling hoses to the connectors on the KempCool 40 cooling unit. Blue one for outgoing and red one for incoming cooling liquid.

For more instructions about using the cooling unit, see KempCool 40 operating manual.

NOTE! There should be two red and two blue hoses in each interconnection cable set, but one pair of them will remain unused in one of the power sources.

2.12.4 Connecting the shielding gas

Connect the shielding gas hose from the gas supply to the gas snap connectors on the back of the DT400 and DT400L wire feeders as shown in the picture.

2.13 CONNECTING THE WELDING GUN

The KempArc Pulse TCS delivery package is equipped with a tandem welding gun of the customer's choice, and with the fixing bracket for fastening the gun to the robot arm.

There are several gun types available, including normal tandem guns and push-pull guns. The type of tandem welding gun depends on the welding application.

Attach the welding gun to the robot arm and connect the welding gun cables to the Euro connectors at DT400 and DT400L wire feeders.

2.14 CONNECTING EARTH RETURN CABLES

In KempArc Pulse TCS welding system you have two earth return cables, both of which must be connected to the work piece.

KempPi always recommend the use of high quality copper cables with a suitable cross-sectional area. Cable size should be selected depending on the intended welding application. However when using pulsed MIG/MAG process or longer cables or higher welding power, the voltage loss increases, which leads to smaller cross-sectional interconnecting power and earth return cables will restrict the welding performance of your machine.

- KempArc Pulse TCS: 70 to 95 mm²

The enclosed table shows typical load capacity and voltage loss values of rubber insulated copper cables, when ambient temperature is 25 °C and the cable temperature is 85 °C.

| Cable | Load capacity at duty cycle | | | Voltage loss / 10 m |
|--------------------|-----------------------------|-------|-------|---------------------|
| | 100 % | 60 % | 30 % | |
| 70 mm ² | 355 A | 460 A | 650 A | 0.25 V / 100 A |
| 95 mm ² | 430 A | 560 A | 790 A | 0.18 V / 100 A |

Do not overload welding cables due to voltage losses and heating.

NOTE! Always check the serviceability of the earth return cable and clamp. Ensure the metal surface to which the cable is connected is clean from paint and rust. Check the connector to the power source is fastened correctly.

3. USING THE MACHINE

3.1 CONTROL FROM THE ROBOT

The welding parameter control can be handled either from the robot control unit or from the welding machine's own K 60 control panel or using the K 62 remote control panel. However, there are some settings, such as Wise functions, memory channel settings and the machine configurations, which cannot be changed remotely.

In normal everyday usage, it is the welding robot that controls the welding parameters. KempArc power sources are compatible with several communication protocols used by various robot brands.

Supported protocols:

CANopen, Modbus, Profibus, Interbus (myös optinen), Ethernet, DeviceNet

Below you can see a typical data package used for controlling the welding machine. The content of the package varies according to the robot brand.

| | | |
|---------------|------|--------------|
| WireFeedSpeed | Word | Byte0, Byte1 |
| Voltage/Trim | Word | Byte2, Byte3 |
| MemoryChannel | Byte | Byte4 |
| Dynamics | Byte | Byte5 |
| Start | Bit0 | Byte6 |
| Not In Use | Bit1 | |
| WireInch | Bit2 | |
| WireRetract | Bit3 | |
| GasPurge | Bit4 | |
| Not In Use | Bit5 | |
| Touch Sensing | Bit6 | |
| OnLine | Bit7 | |
| FieldBusCheck | Bit0 | Byte7 |
| ErrorReset | Bit1 | |
| Not In Use | Bit2 | |
| Not In Use | Bit3 | |
| Not In Use | Bit4 | |
| ExtOut1 | Bit5 | |
| ExtOut2 | Bit6 | |
| ExtOut3 | Bit7 | |

Below you can see a typical data package that welding machine sends to the robot control unit.

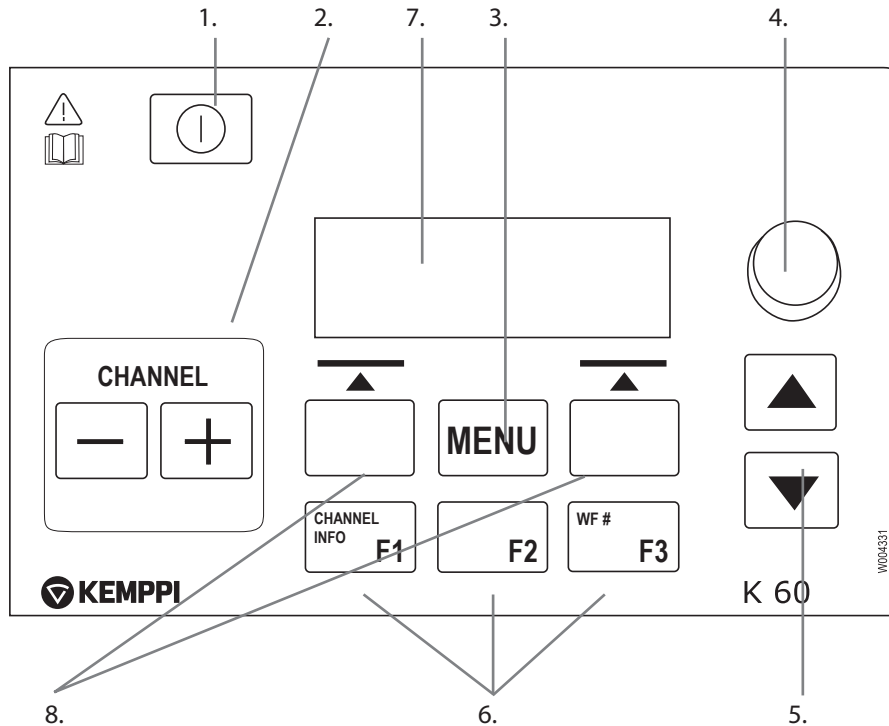
NOTE! The content of the data package varies depending on the robot brand used. This example is only a made-up representation of the real situation.

| | | |
|------------------|------|--------------|
| WeldingCurrent | Word | Byte0, Byte1 |
| WeldingVoltage | Word | Byte2, Byte3 |
| ErrorNumber | Byte | Byte4 |
| CycleOn | Bit0 | Byte5 |
| ArcEstablished | Bit1 | |
| TouchSensed | Bit2 | |
| PowerSourceReady | Bit3 | |
| Error | Bit4 | |
| Ready | Bit5 | |
| LocalRemote | Bit6 | |
| AutoManual | Bit7 | |
| Throughput1 | Bit0 | Byte6 |
| Throughput2 | Bit1 | |
| Throughput3 | Bit2 | |
| Throughput4 | Bit3 | |
| Throughput5 | Bit4 | |
| Throughput6 | Bit5 | |
| Not In Use | Bit6 | |
| Not In Use | Bit7 | |
| Not In Use | Byte | Byte7 |

3.2 CONTROL FROM THE K 60 PANEL

KempArc Pulse TCS features K 60 control panel with a clear and logical LCD menu display. The menu allows the operator to refine, adapt and manage the arc process and system function before, during and after welding.

3.3 LAYOUT OF CONTROL PANEL K 60



1. Power on button

- Long press (5 sec) switches the panel on or off.
- Short press returns channel information.

NOTE! This button connects power to the control panel. Use the main switch on the front of the power source to switch the power source on or off.

2. Welding channel selection buttons

KempArc Pulse TCS offers 100 memory channels for you to store your frequently used welding jobs.

- To browse memory channels, press + and – buttons.
- To define a new welding job to an empty channel, press the button under the display text NEW.

3. MENU button

This button takes you to the main menu list. Proceed following the instructions on screen.

4. Adjustment knob

Turn the knob to change the value of the selected parameter.

5. Menu browsing buttons

Use up and down arrows to move the selection up and down in the menu structure.

6. Menu shortcut buttons

- F1 displays the channel information.
- F3 selects another parallel connected wire feeder sub system as a setup target.

7. Menu display

8. Soft key buttons for menu selection

Use these buttons to select menu items. Their functions are determined by the selected menu items.

3.4 MENU FUNCTIONS OF CONTROL PANEL K 60

3.4.1 Main menu functions

| | Value range | Factory setting | Description |
|------------------------------|--------------|-----------------|--|
| Edit Channel | | | for making changes to existing welding channel |
| Weld Data | | | for checking out the values of the last weld |
| Special settings | | | for adjusting special welding parameters |
| System Config Menu | | | for device configuration and information |
| Language | | | for selecting your menu language |
| Select Feeder (WF#) | | | for selecting another parallel wire feeder as a setup target |
| K 60 Robot menu list | | | |
| Interface Version* | 1 – 99 | 1 | signal frame selection |
| Voltage Scaling | 0 – 5000 | 0 | |
| WSF Scaling | 0 – 5000 | 0 | |
| Current Scaling | 0 – 5000 | 0 | |
| EM Stop Logic** | 0 or 1 | 0 | |
| Door Switch On** | 0 or 1 | 0 | |
| LimitFunctions Menu** | | | |
| Current Tol | | 50 A | not in use in interface version 1 |
| Voltage Tol | | 5.0 V | not in use in interface version 1 |
| CurrentTolTime | | 1.0 s | not in use in interface version 1 |
| WSF Tol Time | | 1.0 s | not in use in interface version 1 |
| Gun Menu | | | |
| Front Pull | ON or OFF | OFF | |
| Test Menu | | | |
| Wire Inch | 1 – 20 m/min | 1 m/min | adjustment with the control knob |
| Gas Test | | | press the button |

* For more information, contact robotics@kempPi.com

** Not in use in Interface version 1

3.4.2 Welding parameters (Channel menu 2/6)

MIG

| | | | |
|-----------------|----------------|----------------------|--|
| WFSpeed | 0.7 – 25 m/min | | 0.05 m/min steps when WFSpeed < 5 m/min and 0.1 m/min steps when WFSpeed > 5 m/min |
| WFS-Max | | | Set the limit for maximum WFSpeed |
| WFS-Min | | | Set the limit for minimum WFSpeed |
| Voltage | 8 – 50V | 0.1V steps | Controls the length of the arc |
| Dynamics | -9 ... +9 | Factory setting is 0 | Controls the short circuit behaviour of the arc. The lower the value the softer the arc is. The higher the value the rougher the arc is. |

1-MIG

| | | | |
|----------------------|----------------|--------------------------------------|--|
| WFSpeed | 0.7 – 25 m/min | | 0.05 m/min steps when WFSpeed < 5 m/min and 0.1 m/min steps when WFSpeed > 5 m/min |
| WFS-Max | | | Set the limit for maximum WFSpeed |
| WFS-Min | | | Set the limit for minimum WFSpeed |
| FineTuning | | Factory setting is 0 (= curve point) | Adjusts the arc voltage of the curve within certain limits. In other words, it adjusts the length of the arc within certain limits |
| FineTuningMax | 0 – 9 | 0.5 steps | Set the limit for maximum arc length |
| FineTuningMin | -9 ... 0 | 0.5 steps | Set the limit for minimum arc length |
| Dynamics | -9 ... +9 | Factory setting is 0 | Controls the short circuit behaviour of the arc. The lower the value the softer the arc is. The higher the value the rougher the arc is. |

PULSE MIG

| | | | |
|----------------------|----------------|--------------------------------------|--|
| WFSpeed | 0.7 – 25 m/min | | 0.05 m/min steps when WFSpeed < 5 m/min and 0.1 m/min steps when WFSpeed > 5 m/min |
| WFS-Max | | | Set the limit for maximum WFSpeed |
| WFS-Min | | | Set the limit for minimum WFSpeed |
| FineTuning | | Factory setting is 0 (= curve point) | Adjusts the base current of the curve in certain limits. In other words, it adjusts the length of the arc in certain limits. |
| FineTuningMax | 0 – 9 | 0.5 steps | Set the limit for maximum arc length |
| FineTuningMin | -9 ... 0 | 0.5 steps | Set the limit for minimum arc length |
| Dynamics | -9 ... +9 | Factory setting is 0 | Controls the short circuit behaviour of the arc. The lower the value the softer the arc is. The higher the value the rougher the arc is. |
| Pulse Current | -10 ... +15 % | Factory Setting is 0% | Reduces the pulse current of the curve at the maximum 10% and raises it at the maximum 15%. |

DOUBLE PULSE MIG

| | | | |
|----------------------|-----------------|--------------------------------------|--|
| WFSpeed | 0.7 – 25 m/min | | 0.05 m/min steps when WFSpeed < 5 m/min and 0.1 m/min steps when WFSpeed > 5 m/min |
| WFS-Max | | | Set the limit for maximum WFSpeed |
| WFS-Min | | | Set the limit for minimum WFSpeed |
| FineTuning | | Factory setting is 0 (= curve point) | Adjusts the base current of the curve in certain limits. In other words, it adjusts the length of the arc in certain limits. |
| FineTuningMax | 0 – 9 | 0.5 steps | Set the limit for maximum arc length |
| FineTuningMin | -9 ... 0 | 0.5 steps | Set the limit for minimum arc length |
| Dynamics | -9 ... +9 | Factory setting is 0 | Controls the short circuit behaviour of the arc. The lower the value the softer the arc is. The higher the value the rougher the arc is. |
| Pulse Current | -10 ... +15 % | Factory Setting is 0% | Reduces the pulse current of the curve at the maximum 10% and raises it at the maximum 15% |
| DPulseAmp | 0.1 – 3.0 m/min | Factory setting is CURVE | Adjusts the amplitude of the WFSpeed in 0.1 m/min steps. Value comes from Welding Curve. |
| DPulseFreq | 0.4 – 8.0 Hz | Factory setting is CURVE | Adjusts the frequency of the double pulse in 0.1 Hz steps. Value comes from Welding Curve. |

WISEROOT / WISETHIN)

| | | | |
|------------------------|----------------|--------------------------|--|
| WFSpeed | 0.7 – 14 m/min | | 0.05 m/min steps when WFSpeed < 5 m/min and 0.1 m/min steps when WFSpeed > 5 m/min |
| WFS-Max | | | Set the limit for maximum WFSpeed |
| WFS-Min | | | Set the limit for minimum WFSpeed |
| BaseCurrent | | | Adjusts the base current of the curve in certain limits. In other words, it adjusts the "length of the arc" in certain limits. |
| BaseCurrentMax | 0 – 50 % | 1% steps | Set the limit for maximum "arc length" |
| BaseCurrentMin | -50 ... 0 % | 1% steps | Set the limit for minimum "arc length" |
| FormingPulse | | | Adjusts the forming pulse current of the curve in certain limits. In other words, it controls arc pressure. |
| FormingPulseMax | 0 – 50 % | 1% steps | Set the limit for maximum forming pulse current |
| FormingPulseMin | -50 ... 0 % | 1% steps | Set the limit for minimum forming pulse current |
| StartTime | -9 ... +9 | Factory setting is CURVE | Set how long arc behaves like normal synergic MIG/MAG process after the arc start. It gives heat for the arc start. |
| StartVoltage | | | Set the arc voltage which is used during StartTime. In other words, it adjusts the length of the arc during StartTime. |

3.4.3 Welding functions

OTHER PROCESSES (In Edit Channel menu 3/6)

| | | | |
|----------------------|--------------------------------|---|---|
| HotStart | ON, OFF or USER | Factory setting is USER => USER can freely choose is the HotStart ON or OFF | |
| HOTStartLevel | -50 ... +100 % | 1 % steps. Factory setting 40 % | |
| Hot 2T Time | 0 – 9.9 s | 0.1 s steps. Factory setting 1.2 s | |
| CraterFill | ON, OFF, USER | Factory setting is USER => USER can freely choose is the CraterFill ON or OFF | |
| CraterStart | 10 – 250 % | Factory setting is 100% | Set the level of the curve where the crater filling will start |
| CraterFillEnd | 10 – 250 % lower than start | 1 % steps. Factory setting 30% | Set the level of the curve where the crater filling will end. |
| CraterTime | 0.0 – 10.0 s | 0.1 s steps. Factory setting 1.0 s | CraterFill Slope Time |
| Creep Start | 10 – 99 % | 1% steps. OFF, CURVE (OFF = 100%) | Factory setting is CURVE (Creep Start value comes from Welding Curve). |
| StartPower | -9 ... +9 | Factory setting is 0 | Adjusts arc ignition |

WISEROOT / WISETHIN

| | | | |
|----------------------|--------------------------------|---|---|
| HotStart | ON, OFF or USER | Factory setting is USER => USER can freely choose is the HotStart ON or OFF | |
| HOTStartLevel | -50 ... +100 % | 1 % steps. Factory setting 40 % | |
| Hot 2T Time | 0 – 9.9 s | 0.1 s steps. Factory setting 1.2 s | |
| CraterFill | ON, OFF, USER | Factory setting is USER => USER can freely choose is the CraterFill ON or OFF | |
| CraterStart | 10 – 250 % | Factory setting is 100% | Set the level of the curve where the crater filling will start. |
| CraterFillEnd | 10 – 250 % lower than start | 1 % steps. Factory setting 30% | |
| CraterTime | 0.0 – 10.0 s | 0.1 s steps. Factory setting 1.0 s | |
| Creep Start | 10 – 99 % | 1% steps. OFF, CURVE (OFF = 100%) | Factory setting is CURVE (Creep Start value comes from Welding Curve). |

ADVANCED FUNCTIONS

| | | | |
|------------------------|-----------------------|--------------------------|--|
| WisePenetration | ON or OFF | | Penetration control selection |
| Penet%(123A) | -30 ... +30 % | Factory setting: 0 % | Wise penetration percent setting. Set penetration Current. |
| WiseFusion | ON or OFF | | WiseFusion selection |
| WiseFusion% | 20 – 60 % or CURVE | Factory setting is CURVE | When WISE FUSION is ON it controls the amount of short circuits in the arc. The lower the value there will be less short circuits in the arc. The higher the value there will be more short circuits in the arc. |
| MatchLogLevel | -50 ... +100 % | | Set the "MiniLog level" Only in use in case of manual feeder. |

SYSTEM CONFIG MENU (In Main menu 4/7)

| | | | |
|---------------------------|---|----------------------------|--|
| Water Cooling | Water Cooler control: OFF / AUTO / ON. | Factory setting: AUTO | OFF: Water Cooler always OFF. AUTO: Water Cooler automatic control ON: Water Cooler starts when welding starts and is turned off after a delay when welding stops. ON: Water Cooler is always ON. |
| Cable Length | Cable length: 10m - 100m, 5m steps. | Factory Setting: 10m. | Welding cable loop length setting for optimising arc control. |
| FineCalib | Fine Tuning Calibration Point: 0V/100A ... 100V/100A, 1V steps. | Factory Setting: 10V/100A. | Compensation for varying cable resistance. |
| System Clock | | System Clock Settings. | |
| Device Information | System Device information: DevSW: Unit Software Version. SysSW: System Software Version (Base software version). BootSW: Boot Software Version. SW Item: Software Item Number (IFS number). Serial: Device Serial number. Prog: Programmer name Date: Programming date. | | |
| Restore Settings | <p>User 1 (one of ten users) Channel: Selected user can restore to his backup memory channels one by one. Other users' memory channels remain untouched. Setup settings remain untouched.</p> <p>User 1 (one of ten users) All Channels: Selected user can restore all of his backup memory channels (0-9) at one time. Other users' memory channels remain untouched. Setup settings remain untouched.</p> <p>Restore To Factory: All channels (of all users) are removed. All users' backup channels are removed. All setup settings are set to defaults.</p> | | |
| Licence Code | Entering Licence Code numbers: Up/Down arrows are used to select the code number position. Pulse encoder is used to select the code number (0 – 255) to be entered. Soft Key Button on the right is used to activate the license number (after all numbers have been entered). In case the code was wrong the earlier view will be displayed. | | |

| | | | |
|-----------------------|---|--------------------------|---|
| WeldData Delay | Adjustment Range: 1s – 60s 1s steps. | Factory Setting: 20s. | Defines how long the Weld Data is displayed after Welding Ends. Weld Data display is also turned off when pulse encoder is turned or any button is pressed. |
| Display Delay | Adjustment Range: 1 – 20 1 steps. | Factory Setting: 10. | Defines how long time the information is displayed (like: "Setting Saved" text). This is not always the exact time. |
| Pre Gas Time | Pre Gas Time setting: 0.0s – 9.9s – CURVE, 0.1s steps. | Factory Settings: CURVE. | CURVE: Pre Gas time is read from the Welding Curve. 0.0 – 9.9s: User Pre Gas time setting. |
| Post Gas Time | Post Gas Time setting: 0.0s – 9.9s – CURVE, 0.1s steps. | Factory Settings: CURVE. | CURVE: Pre Gas time is read from the Welding Curve. 0.0 – 9.9s: User Post Gas time setting. |

ADMINISTRATOR MENU (In Main menu 2/7, User Identification)

| | | | |
|------------------------|--|------------------------|--|
| Change PIN Code | Administrator pin code change. | Factory PIN code: 0000 | |
| Ask PIN | PIN code inquiry selection: OFF / StartUp / Menu | Factory Setting: OFF | OFF: No PIN code inquiry. StartUp: Control panel (K 60) always asks for the PIN code when the machine is turned on. KF 62 is not affected and always works without PIN. Menu: Control panel (K 60) asks every time for PIN code when MENU button is pressed and when the display is in channel info mode i.e. in start-up view. PIN code inquiry is made only once when entering the menu. After that the menu button can be pressed any time without PIN inquiry. |

BUTTON FUNCTIONS

| | |
|---|--|
| ON / OFF Button | Short Press: Panel returns to default start-up display view (Channel info display). Long Press: When control panel K 60 is ON => Control panel and all KF 62 panels are turned OFF. When control panel is OFF => Control panel and all KF 62 panels are turned ON. Pressed while machine is turning ON: Restore to factory shortcut. Panel will ask confirmation to restore factory setting. If control panel is OFF and some other KF 62 panel is turned ON the control panel turns also ON and will be linked automatically to this KF panel (WF# function). |
| F1 Button | F1 button gives further information of selected memory channel. Pressed while machine is turned ON: Restore language selection to English. |
| F3 Button (WF#) | F3 button can be used to select Wire Feeder. Panel allows selecting only those WF numbers that are found connected on the sys-tem. |
| Channel +/- | Memory channel selection. |
| Up/Down Button | Moving Up/Down in menu. |
| Right/Left selection buttons (Soft Keys) | Button function depends on where in menu you are. |

Welding software delivery

KempArc Pulse TCS offers possibility to use customer specific welding software, Wise and Match products. When the equipment is delivered and installed, it contains the welding software ordered by the customer. The welding software is designed specifically to be used in tandem welding. If the system is set up to be used in a specific project, and you want to optimise the system for that application, you can order new software and easily install it to your machine using the DataGun field programming device.

Wise and Match products are optional software solutions for various welding needs. They allow you to customise the features and the welding properties of your KempArc Pulse TCS equipment to suit your personal way of work and for special welding applications, such as root pass or thin sheet welding, automatic welding power regulation and arc length recognition. With Wise and Match products you can optimise your equipment for your particular welding needs. For more information, please contact robotics@kempPi.com.

***NOTE!** The KempArc Pulse TCS delivery includes the WiseFusion function and a general purpose welding program. You can order more Wise functions and welding programs from KempPi. Before making the order, please consult KempPi specialist, because the tandem welding process presents special requirements for the software products.*

Work Pack is a collection of welding software for various applications. The welding table below details the Work Pack delivery option. Additional welding software products can be purchased and added later if required.

| Group | N:o | Pulse | 1-MIG | Wire ø mm | Material | Gas |
|-------|-----|-------|-------|-----------|--------------|--------------------------|
| Alu | A01 | X | X | 1 | AlMg5/AlMgMn | Ar |
| Alu | A02 | X | X | 1.2 | AlMg5/AlMgMn | Ar |
| Alu | A12 | X | X | 1.2 | AlSi5/AlSi12 | Ar |
| Fe | F03 | X | X | 1 | Fe | Ar+18–25%CO ₂ |
| Fe | F04 | X | X | 1.2 | Fe | Ar+18–25%CO ₂ |
| Ss | S03 | X | X | 1 | Ss-316/308 | Ar+2%CO ₂ |
| Ss | S04 | X | X | 1.2 | Ss-316/308 | Ar+2%CO ₂ |
| Ss | S06 | X | | 1 | Ss-316/308 | Ar+2%CO ₂ |
| Fe | R04 | | X | 1.2 | FeFC_Rut | Ar+18–25%CO ₂ |
| Fe | M04 | | X | 1.2 | FeMC | Ar+18–25%CO ₂ |
| Ss | S84 | | X | 1.2 | FC-316 | Ar+25%CO ₂ |

Further welding programs are available upon request through KempPi.

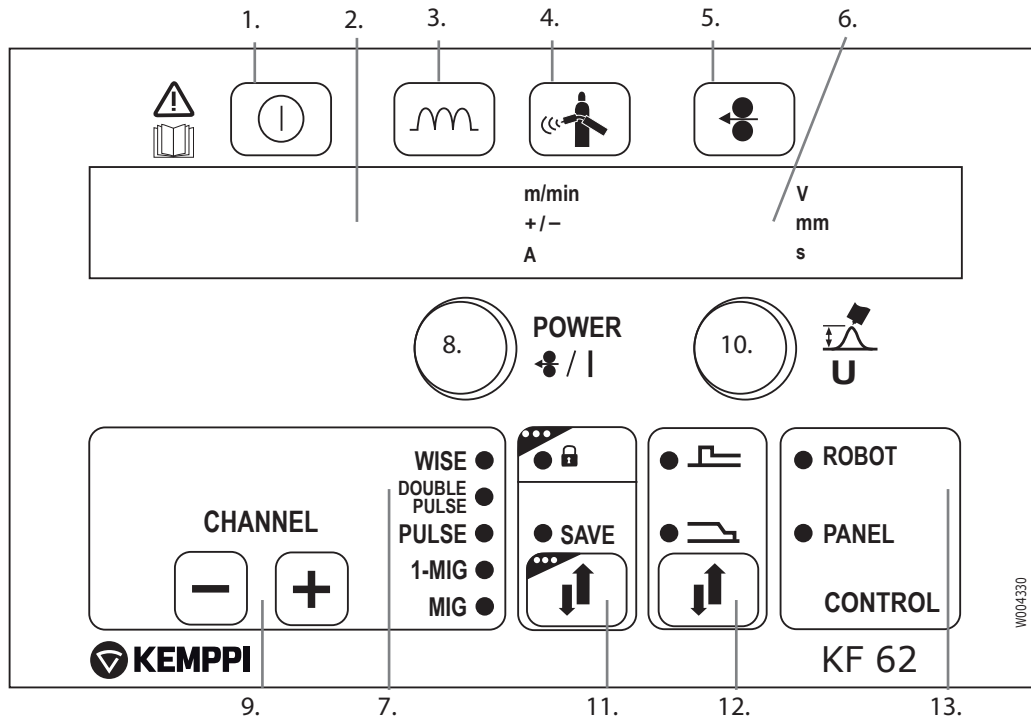
| Group | N:o | Pulse | 1-MIG | Wire ø mm | Material | Gas |
|-------|-----|-------|-------|-----------|--------------|--------------------------|
| Alu | A13 | X | X | 1.6 | AlSi5/AlSi12 | Ar |
| Fe | F01 | X | X | 0.8 | Fe | Ar+18–25%CO ₂ |
| Fe | F02 | X | X | 0.9 | Fe | Ar+18–25%CO ₂ |
| Ss | S73 | X | | 1 | Inc625/SMO | Ar+He+CO ₂ |

Kempki Wise products are modified welding processes. Below you can find welding programs available for WiseRoot and WiseThin processes.

| Group | N:o | WiseRoot | WiseThin | Wire ø mm | Material | Gas |
|-------|-----|----------|----------|-----------|------------|--------------------------|
| Fe | F01 | | X | 0.8 | Fe | Ar+18-25%CO ₂ |
| Fe | F02 | X | X | 0.9 | Fe | Ar+18-25%CO ₂ |
| Fe | F03 | X | X | 1 | Fe | Ar+18-25%CO ₂ |
| Fe | F04 | X | X | 1.2 | Fe | Ar+18-25%CO ₂ |
| SS | S03 | X | X | 1 | SS-316/308 | Ar+2%CO ₂ |
| SS | S04 | X | X | 1.2 | SS-316/308 | Ar+2%CO ₂ |
| Cu | C03 | | X | 1 | CuSi3 | Ar |
| Cu | C13 | | X | 1 | CuAl8 | Ar |
| Fe | F21 | | X | 0.8 | Fe | CO ₂ |
| Fe | F22 | X | X | 0.9 | Fe | CO ₂ |
| Fe | F23 | X | X | 1 | Fe | CO ₂ |
| Fe | F24 | X | X | 1.2 | Fe | CO ₂ |
| Ss | S01 | | X | 0.8 | Ss-316/308 | Ar+2%CO ₂ |
| Ss | S02 | X | X | 0.9 | Ss-316/308 | Ar+2%CO ₂ |
| Ss | S12 | X | | 0.9 | Ss-316/308 | Ar+He+CO ₂ |
| Ss | S13 | X | | 1 | Ss-316/308 | Ar+He+CO ₂ |
| Ss | S14 | X | | 1.2 | Ss-316/308 | Ar+He+CO ₂ |

EN

3.5 LAYOUT AND BUTTONS OF REMOTE PANEL KF 62



1. Power on button (long press)
2. Meter display for
 - a) wire feed speed/welding current display
 - b) parameter that is being adjusted
3. Dynamics button
MIG welding dynamics and Arc Force adjustment

4. Gas test button
5. Wire inch button
6. Meter display for
 - a) welding voltage/plate thickness/timer settings
 - b) adjustment value of selected parameter
7. Welding process indicators: MIG, 1-MIG, PULSE, DOUBLE PULSE, WISE*
8. Control knob for setting values for
 - a) wire feed speed
 - b) welding power (Synergic 1-MIG and PULSE)
 - c) additional parameters (= Wire inch, Gas Test)
9. Memory channels 0 – 99, programming through K 60 panel on the power source
10. Control knob for setting values for
 - a) welding voltage
 - b) welding arc length (Synergic 1-MIG and PULSE)
 - c) additional selected parameters (= MIG Dynamics)
11. Dual function button for
 - a) saving parameter adjustments
 - b) locking the control panel (long press)
12. Button for activating the Crater fill or Hot start functions
13. Indicators showing whether the welding parameters come from welding robot or control panel

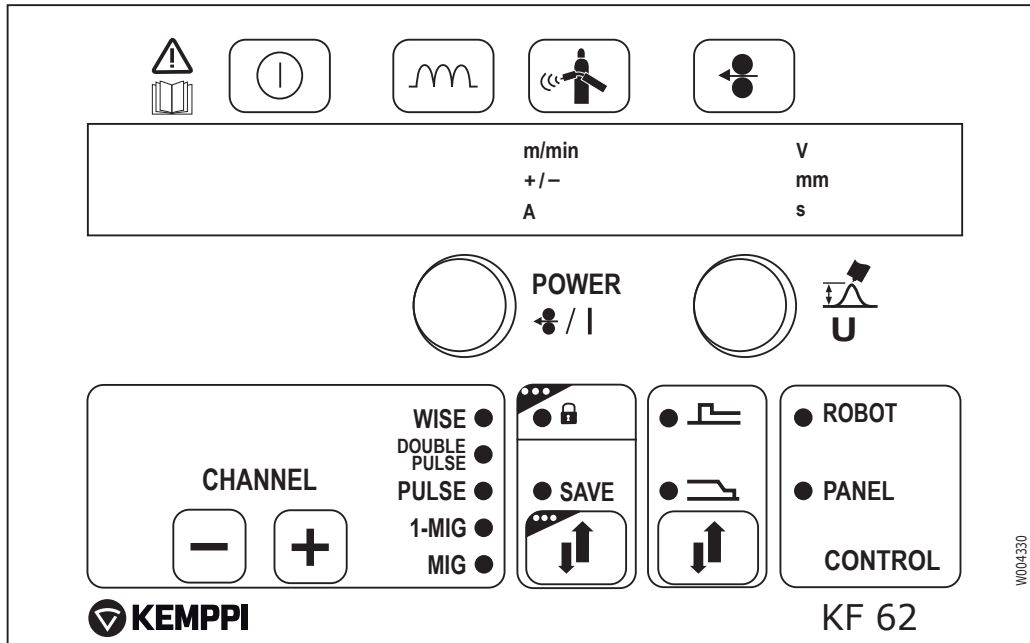
* Not included on standard delivery.

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

Automatic Weld Data display:

Last recorded welding values are displayed post welding. See power source panel K 60. Select MENU and then Weld Data.

3.6 FUNCTIONS OF REMOTE PANEL KF 62



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

Displays

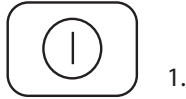
- The control panel displays show adjustable operation parameters, their values, and the units of measure.
- During welding, the left-hand display (2) shows the welding current value that is in use, and the right-hand display (6) shows the welding voltage.

Control knobs

- The left-hand control knob allows the adjustment of wire feed speed. The selected speed is shown on the left-hand display.
- In MIG and 1-MIG processes, the right-hand control knob allows controlling the welding voltage, in which case the selected voltage is shown on the right-hand display. In WiseRoot-A and WiseThin-A processes it adjusts the base current, in which case the adjustment range is ± 50 .

These control knobs are also used for specifying the operating parameters. Select the parameter with the left-hand knob and adjust its value with the right-hand knob.

3.6.1 Power On button



1.

Short Press: Control panel returns to default display.

Long Press:

- Turns ON the remote panel (KF 62) and the power source panel (K 60), and gives control to remote panel.
- If the remote panel (KF 62) is on, long press of this button turns it OFF.

3.6.2 Dynamics button



2.

Short press of this button activates

- Dynamics adjustment when using MIG or Synergic MIG process
- Forming Pulse adjustment when using WiseRoot or WiseThin process.

3.6.3 Gas Test button



3.

Use this button to test shielding gas flow. When you press the button, gas valve is opened without activating the wire feed or power source. Gas flow will continue for 20 seconds by default. You can see the remaining gas flow time on the display.

If you want to change the default gas flow time, turn the right-hand knob to set the desired time in the range of 10 to 60 seconds. The new time is saved in the memory, and gas test continues after a short delay.

You can stop the gas test by pressing any button.

3.6.4 Wire Inch button



4.

Use this button to run the filler wire. Wire feeder starts immediately when you press the button. The default wire feed speed is 1 m/min. You can change the wire feed speed by turning the left-hand control knob.

You can stop the wire feeder by releasing the button. When you press the button again, wire feed re-starts and slopes to selected speed, if you have set a higher wire feed speed.

3.6.5 Memory channel selection buttons



5.



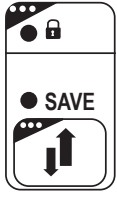
6.

Use these buttons to select a memory channel.

The control panel automatically finds the previous (-) or next (+) memory channel that is set in machine's memory, and shows it on display.

At startup the machine uses the default memory channel selected by the robot.

3.6.6 Save and Panel Lock button



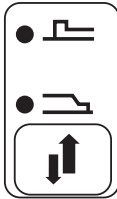
7.

Use this button for saving a memory channel or locking the control panel.

Short Press: Saves the selected memory channel.

Long Press: Locks the control panel so that no parameter changes are allowed.

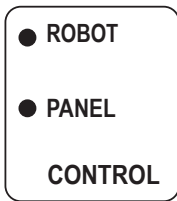
3.6.7 Crater Fill and Hot Start button



8.

Use this button to select Crater Fill or Hot Start functions.

3.6.8 Control display



9.

These indicators show where the welding parameter values come from.

- ROBOT: The welding parameter values come from the welding robot.
- PANEL: The welding parameter values come from the welding machine's memory channel.

3.6.9 Power control knob

POWER



10.

Use this knob to adjust the wire feed speed or welding power in either Basic, Synergic or Pulsed MIG/MAG processes. Adjustment can be made before or during the arc process. This control knob can also be used for adjusting additional parameter values when selected.

3.6.10 Voltage control knob



11.

Use this knob to adjust the arc length, welding voltage and welding parameter values. You can make the adjustments before or during welding.

3.7 GETTING STARTED

3.7.1 Selecting the interface language

The default menu language is English. If you want to select another menu language, do the following:

1. Connect the mains power and switch on the power source at the main switch.
 - If this is the initial system activation, you may need to press and hold the **POWER ON** button in the to left corner of the K 60 control panel. Hold the button down for 5 seconds.
2. Press the **MENU** button to display the main menu, which includes 7 menu items.
 - You can move around in the menu list by pressing the up and down buttons.
 - As you browse the menu item list, the currently selected item is shown at the bottom of the display, marked as 1/7, 2/7 , 3/7 etc.
 - The selected menu item is marked with a black, arrow-shaped cursor.
3. Browse to the menu item **LANGUAGE (5/7)** and press the **SELECT** soft key button.
4. Browse to your language and press the **SELECT/SAVE** soft key button. Your language choice is now confirmed and will remain selected unless you change it later.

3.7.2 Using memory channels

You can have several setups of welding parameter values for use in various welding applications. These setups (or welding jobs) are stored as memory channels in K 60 control panel. There are up to 200 memory channels to be used.

To define a new welding job, you need to make the necessary welding parameter selections and then record them to a memory channel of your choice.

When you want to weld you simply select the corresponding memory channel number on the remote control panel KF 62 and start welding. Only the most often used controls are available in the KF 62 control panel, making welding easy and convenient.

3.7.3 Creating the first memory channel

If you are starting new KempArc Pulse TCS setup or one that contains no memory channels, follow these steps to create the first channel.

1. Power on the machine from the main switch. You may need to press the control panel's **Power On** button for 5 seconds to activate the K 60 control panel.
2. An empty memory channel appears. Press the **NEW** soft key.
3. With 'Edit Channel' selected, press **SELECT** soft key.
4. With 'Create New' selected, press **SELECT** soft key.
5. Select the desired welding process and other welding parameters.
 - Use **up and down arrow** buttons to move around in the menus
 - Approve selections by pressing the **SELECT** soft key.
6. When you have made all settings, press **SAVE** soft key to store the settings in the active memory channel number.

3.7.4 Creating and modifying memory channels

1. Press **MENU** button to display the main menu.
2. With 'Edit Channel' selected, press **SELECT**.
3. Select the channel number to be changed and press **SELECT**.
 - Use **up and down arrow** buttons to change the displayed channel number.
 - Use **Channel Info (F1)** button to see the present settings of the displayed channel.
 - To create a new channel, select a channel that is marked **(Empty)**.
4. Browse the menu to select the desired options and parameters.
 - Use **up and down arrow** buttons to move around in the menus.
 - Approve selections by pressing the **SELECT** soft key.
 - See the menu item descriptions in section Menu functions earlier in this manual.
5. When you have made all settings, press **SAVE** soft key to store the settings in the selected memory channel number.

3.7.5 Fast information buttons

There are two shortcut buttons on the control panel that use can use to display important information on screen.

- F1 (CHANNEL INFO) button displays the basic data recorded to the selected channel.
- F3 (WF#) displays active and selected wire feed unit, and allows a new wire feed unit selection. KempArc Pulse TCS allows up to 7 wire feed units to be connected to one power source.

NOTE! Only one wire feed unit can be active at any one time and must be selected before it will operate.

4. ABOUT TANDEM MIG/MAG WELDING

4.1 WHAT IS TANDEM MIG/MAG WELDING?

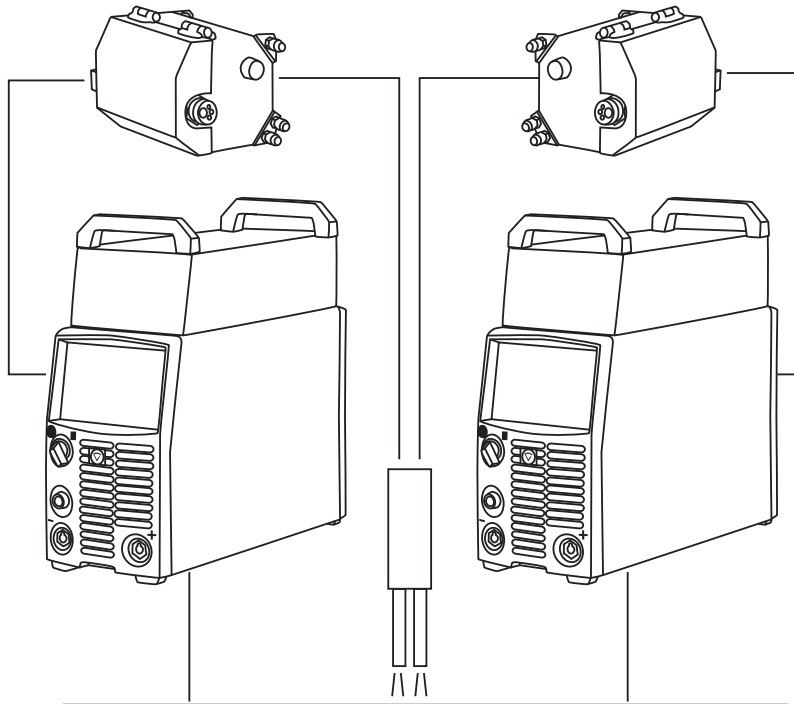
Tandem MIG/MAG welding is a high speed double-wire welding process, where two filler wires are fed simultaneously into the weld pool. Both filler wires are controlled by their own power sources. The welding gun is equipped with two contact tips, which are electrically insulated from each other. This allows filler wires to have different electrical potentials.

Tandem welding has always been considered a productive yet challenging welding process, where it is difficult to find the right parameter settings to reach a good balance between fast welding speed and welding accuracy.

In KempArc Pulse TCS, however, the two filler wires are controlled by Kemppi's tandem control system (TCS), which allows independent and very accurate control of the welding wires. The operation of each filler wire is adjusted dynamically during the welding according to various control parameters and the weld pool shape. This makes it possible to achieve a fast and easy system setup and exceptionally high welding productivity.

4.2 HOW DOES IT WORK?

In tandem welding, there is a leading arc that controls the weld penetration, while the trailing arc affects the weld bead appearance. Both filler wires contribute to the common weld pool, but they are independently controlled by their respective power sources. It is also possible to use the tandem equipment to perform 1-wire welding.



4.3 THE FOUR OPERATION MODES

There are four different operation mode combinations available in KempArc Pulse TCS system.

Pulsed + Pulsed

Both leading and trailing arcs operate in a pulsed mode, controlled by the Kemppi Tandem Control System so that the peak of each pulse occurs in the background of the other arc. This is the most commonly used operation mode.

Pulsed + Standard

The leading arc operates in pulsed mode, while trailing arc is constant voltage. This helps to achieve maximum welding speed and gap bridging.

Standard + Pulsed

The leading arc is in constant voltage mode to maximize the penetration and travel speed, while the trailing arc is in pulse mode to reduce heat input and to cool the weld pool. This mode provides the deepest penetration.

Standard + Standard

Both leading and trailing arcs operate in constant voltage mode. This mode is mainly used in 1-wire welding, where the active wire is switched when welding direction changes. This reduces the cycle time.

5. BASIC TROUBLESHOOTING

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 environmental use when using the MIG/MAG process with KempArc Pulse TCS.

| Problem | Check the following |
|-------------------------------|--|
| Machine won't work? | <ul style="list-style-type: none"> • Check mains plug is connected • Check mains power distribution is switched on • Check the mains fuse and or circuit breaker • Check power source O/I switch is ON • Check interconnection cable set and connectors between the power source and wire feed unit are correctly fastened. See the manual schematic • Check earth return lead is connected • Check control panels are switched on – Orange buttons top left, long press. |
| Dirty, poor quality weld? | <ul style="list-style-type: none"> • Check shielding gas supply • Check and set gas flow rate • Check gas type for application • Check gun/electrode polarity. Example: Fe solid filler wire: Earth return should be connected to the – pole, wire feed unit to the + pole connector • Check correct welding curve selected • Check correct Channel (job) number selected on KF 62 control panel • Check power supply – Phase down? |
| Variable welding performance? | <ul style="list-style-type: none"> • Check wire feed mechanism is correctly adjusted • Check correct drive rolls are fitted • Check wire spool overrun tension is correctly adjusted • Check gun liner is not blocked. Replace if necessary • Check correct gun liner is fitted for the filler wire size and type • Check contact tip for size, type and wear • Check gun is not over heating in application • Check cable connections and earth return clamp • Check welding parameter settings. |
| Filler wire won't feed? | <ul style="list-style-type: none"> • Check wire feed mechanism. Pressure arms are closed? Close and adjust • Check welding gun switch function. • Check euro gun collar is correctly fastened to euro block • Check gun liner is not blocked • Check contact tip, size, type, wear • Check and try alternative gun. |
| High spatter volume? | <ul style="list-style-type: none"> • Check welding parameter values • Check inductance/Dynamics values • Check cable compensation value if long cables are fitted • Check gas type and flow • Check welding polarity – cable connections • Check filler material selection • Check correct welding curve selected • Check correct Channel (job) number selection • Check filler wire delivery system • Check power supply – 3 x phase present? |

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.

6. OPERATION DISTURBANCES

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

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

6.1 OPERATION OF THE OVERLOAD PROTECTION

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

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

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

6.2 CONTROL FUSES

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

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

6.3 UNDER AND OVER VOLTAGES IN THE MAINS SUPPLY

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

6.4 LOSS OF A PHASE IN THE MAINS SUPPLY

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

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

7. MAINTENANCE

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

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

NOTE! Disconnect the machine from the mains before handling the electrical cables.

7.1 DAILY MAINTENANCE

- Check the overall condition of the welding gun. Remove welding spatter from the contact tip and clean the gas nozzle. Replace worn or damaged parts. Only use original KempPi spare parts.
- Check the condition and connection of the welding circuit components: welding gun, earth return cable and clamp, sockets and connectors.
- Check the condition of the feed rolls, needle bearings and shafts. Clean and lubricate bearings and shafts with a small quantity of light machine oil if necessary. Assemble, adjust and test function.

7.2 PERIOD MAINTENANCE

NOTE! Period maintenance should only be carried out by a suitably qualified person. Disconnect the plug of the machine from the mains socket and wait approx. 2 minutes (capacitor charge) before removing the cover plate.

Check at least every half year:

- Electric connectors of the machine – clean any oxidized parts and tighten loose connections.

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

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

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

Do not use pressure washing devices.

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

7.3 SERVICE SHOP MAINTENANCE

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

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

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

Software loading

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

8. DISPOSAL 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.

9. ORDERING NUMBERS

| | | |
|---|--------------------------|------------|
| KempArc Pulse TCS package | | P161 |
| KempArc Pulse TCS power source | | 6200455 |
| KempArc DT 400 wire feeder | right hand side | 6203400 |
| KempArc DT 400L wire feeder | left hand side | 6203400L |
| KF 62 remote panel | | 6200800 |
| Remote panel cable | 10 m | 4308370 |
| KempArc Browser | | 6202200 |
| Fieldbus card options | | |
| Devicenet | | 9774120DEV |
| Can Open | | 9774120CAN |
| Ethernet | | 9774120ETH |
| Interbus Copper | | 9774120IBC |
| Interbus Optical | | 9774120IBO |
| Profibus | | 9774120PRF |
| Profinet | | 9774120PRN |
| Earth return cable | 5 m, 70 mm ² | 6184711 |
| Earth return cable | 10 m, 70 mm ² | 6184712 |
| Interconnection cable, water cooled (with extra water hose for cooling gas nozzle) | 10 m | 6260466 |
| Interconnection cable, water cooled (with extra water hose for cooling gas nozzle) | 25 m | 6260467 |
| Interconnection cable, water cooled* | 10 m | 6260465 |
| Interconnection cable ROBOT 95-5-WH* | 5 m | 6260461 |
| Tandem control cable | | W005451 |
| Cooling unit KempCool 40 | | 6208400 |
| Software installation device DataGun | | 6265023 |
| WiseRoot welding process – A | | 9991011 |
| WiseThin welding process – A | | 9991013 |
| WisePenetration welding function – A | | 9991010 |
| WiseFusion welding function - A | | 9991015 |
| Welding program | | 9990401 |

| Selection of full metal feed rolls | Drive roll No bearing (1) | Compressing roll With bearing (2) |
|---|--|--|
| V-Groove 0.8/0.9 | W006074 | W006075 |
| | 1.0 W006076 | W006077 |
| | 1.2 W004754 | W004753 |
| | 1.6 W006078 | W006079 |
| Knurled | 1.0 W006080 | W006081 |
| | 1.2 W006082 | W006083 |
| | 1.4/1.6 W006084 | W006085 |
| | 2.0 W006086 | W006087 |
| U-Groove | 1.0 W006088 | W006089 |
| | 1.2 W006090 | W006091 |
| | 1.6 W006092 | W006093 |

* Other cable lengths available on request.

To select the suitable tandem welding gun and fixing bracket, please contact Kemppi.

10. TECHNICAL DATA

| KempArc Pulse TCS | | |
|---|------------|--------------------|
| Connection voltage | 3~50/60 Hz | 400 V -15...+20 % |
| Rated power | 60 % ED | 22.1 kVA |
| | 100 % ED | 17.8 kVA |
| Connection cable | H07RN-F | 4G6 (5 m) |
| Fuse (delayed) | | 35 A |
| Output 40 °C | 60 % ED | 450 A |
| | 100 % ED | 380 A |
| Welding current and voltage range | | 10...50 V |
| Open circuit voltage | | 50 V |
| Open circuit power | | 100 W |
| Power factor at max. current | | 0.9 |
| Efficiency at max. current | | 88 % |
| Operating temperature range | | -20...+40 °C |
| Storage temperature range | | -40...+60 °C |
| EMC class | | A |
| Minimum short circuit power S_{sc} of supply network* | | 5.5 MVA |
| Degree of protection | | IP23S |
| External dimensions | L x W x H | 590 x 230 x 430 mm |
| Weight | | 36 kg |
| Voltage supply for auxiliary devices | | 50 V DC / 100 W |
| Fuse (delayed) | | 6.3 A |
| Voltage supply for cooling unit | | 24V DC / 50 VA |

| DT 400 | | |
|-----------------------------|-----------|--------------------|
| Operating voltage | | 50 V DC |
| Rated power | | 100 W |
| Load capacity 40 °C | 80% ED | 600 A |
| | 100% ED | 500 A |
| Operating principle | | 4 wheel feed |
| Wire feed speed | | 0 – 25 m/min |
| Filler wires | Fe, Ss | 0.6 – 1.6 mm |
| | FCW | 0.8 – 1.6 mm |
| | Al | 1.0 – 1.6 mm |
| Welding gun connector | | Euro |
| Operating temperature range | | -20...+40 °C |
| Storage temperature range | | -40...+60 °C |
| EMC class | | A |
| Degree of protection | | IP23S |
| External dimensions | L x W x H | 269 x 175 x 169 mm |
| Weight | | 4.5 kg |

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