

Operation instructions • english
Gebrauchsanweisung • deutsch
Gebruiksaanwijzing • nederlands
Manuel d'utilisation • français

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MASTER

MLS™ 1600

MASTERTIG

MLS™ 2000



CONTENTS

1. PREFACE	3
1.1. INTRODUCTION	3
1.2. PRODUCT INTRODUCTION	3
1.3. OPERATION SAFETY	3
2. INSTALLATION	4
2.1. REMOVAL FROM PACKAGING	4
2.2. LOCATING THE MACHINE	4
2.3. SERIAL NUMBER	4
2.4. INSTALLATION AND MAIN PARTS	4
2.5. INSTALLATION OF THE PANEL	5
2.6. MAINS CONNECTION	5
2.7. WELDING CABLE CONNECTIONS	6
2.7.1. CHOOSING WELDING POLARITY IN MMA WELDING	6
2.7.2. EARTHING	6
2.8. SHIELD GAS	6
2.8.1. INSTALLING GAS BOTTLE	7
3. OPERATION	7
3.1. WELDING PROCESSES	7
3.1.1. MMA WELDING	7
3.1.2. TIG WELDING	7
3.1.3. SYNERGIC PULSED TIG WELDING	7
3.1.4. LONG PULSED TIG	7
3.2. OPERATION FUNCTIONS	8
3.2.1. POWER SOURCE	8
3.2.2. FUNCTION PANELS	8
3.2.3. SAVING WELDING SETTINGS (MTM)	13
3.2.4. TAKING THE SAVED SETTINGS INTO USE	14
3.2.5. REMOTE CONTROLLING MEMORY CHANNELS	14
3.2.6. SET-UP FUNCTIONS	14
3.3. STORAGE	14
4. MAINTENANCE	15
4.1. MAINTENANCE	15
4.1.1. EVERY SIXTH MONTHS	15
4.1.2. SERVICE CONTRACT	15
4.2. ORDERING NUMBERS	15
4.3. TROUBLESHOOTING	16
4.4. DISPOSAL OF THE MACHINE	16
5. TECHNICAL DATA	17
6. TERMS OF GUARANTEE	18

1. PREFACE

1.1. INTRODUCTION

Congratulations on having purchased a KEMPPI product. Properly installed and used Kemppi products should prove to be productive machines requiring a small amount of seasonal maintenance. This manual is arranged to give you a good understanding of the equipment and its safe operation. It also contains maintenance information and technical specifications. Read this manual completely from front to back before installing, operating or maintaining the equipment for the first time. For further information on Kemppi products please contact us or your nearest Kemppi distributor. The specifications and designs presented in this manual are subject to change without prior notice.

In this document, where ever there exists a danger to life or injury the following symbol is used:



Read the warnings carefully and follow the instructions. Please also study the Operation safety instructions and respect them when installing, operating and servicing the machine.

1.2. PRODUCT INTRODUCTION

Kemppi MASTER MLS™ 1600 is a MMA welding machine designed for industrial use and for welding all kinds of covered electrodes including difficult-to-weld types such as cellulose electrodes. The equipment consists of power source, welding cables and function panel.

Kemppi MASTERTIG MLS™ 2000 is a TIG welding system especially designed for industrial use and for welding e.g. stainless steel materials. The equipment consists of a power source, panel and TIG-welding torch.

The power source is a multifunctional machine for demanding professional use, suitable for MMA, TIG and pulsed TIG welding with direct current. The power source is controlled with IGBT-transistors with a frequency of approximately 60 kHz and the operational functions with a microprocessor. The welding torch is gas-cooled.

1.3. OPERATION SAFETY

Please study these Operation safety instructions and respect them when installing, operating and servicing the machine.

Welding arc and spatters

The welding arc hurts unprotected eyes. Be careful also with reflecting arc flash. Welding arc and spatter burn unprotected skin. Use safety gloves and protective clothing.

Danger for fire or explosion

Pay attention to fire safety regulations. Remove flammable or explosive materials from welding place. Always have sufficient fire-fighting equipment where ever you are welding. Be prepared for hazards in special welding jobs, eg. for the danger of fire or explosion when welding container type work pieces. Note! Fire can break out from sparks even several hours after the welding work has been finished!

Mains voltage

Never take welding machine inside a work piece (e.g. container or truck). Do not place welding machine on a wet surface. Always check cables before operating the machine. Change damaged cables without delay. Damaged cables may cause an injury or start a fire. Connection cable must not be crushed, it must not touch sharp edges or hot work pieces.

Welding power circuit

Isolate yourself by using proper protective clothing, do not wear wet clothing. Never work on a wet surface or use damaged cables. Do not put TIG-torch or welding cables on welding machine or on other electric equipment. Do not press TIG-torch switch, if the torch is not directed towards the work piece.

Welding fumes

Take care that there is sufficient ventilation during welding. Take special safety precautions when welding metals which contain lead, cadmium, zinc, mercury or beryllium.

Lifting the equipment

Always remove gas bottle before lifting.

2. INSTALLATION

2.1. REMOVAL FROM PACKAGING

The equipment is packed in durable packages specially designed for them. It is however necessary to check the equipment before installing it, to make sure that the equipment or a part of it was not damaged during the transportation. Also check that the delivery corresponds your order and that you have received all the necessary instructions for installing and operating the equipment. The packaging material can be recycled.

2.2. LOCATING THE MACHINE

Place the machine on a horizontal, stable and clean ground. Protect the machine from rain and direct sunshine. Check that there is enough space for cooling air circulation in front of and behind the machine.

2.3. SERIAL NUMBER

The serial number of the machine is marked on the rating plate. Identifying the serial number is the only proper means of maintaining and identifying parts for a specific product. It is important to make correct reference to the serial number of the product when making repairs or ordering spare parts.

2.4. INSTALLATION AND MAIN PARTS



Front of machine

1. remote control connector
2. TIG torch control connector, not in MMA-version
3. shield gas & current connector for TIG-torch, not in MMA-version
4. (+) -connector for electrode holder or earth cable, in TIG-welding for earth cable
5. (-) -connector for earth cable or electrode holder in MMA-welding (stick welding)



Rear of machine

1. Mains switch
2. Snap connector for gas



Torch



Installing torch cable

2.5. INSTALLATION OF THE PANEL



1.



2.

1. Fasten the cable connectors of the panel to the power source (2 pieces).
2. Place the bottom edge of the panel behind the securing clips on the machine. Remove the fixing pin from the top edge with, for example, a screwdriver. Then gently push the upper part of the panel into place. Make sure that the cables do not get damaged, continue gently pushing the upper part of the panel until it clips into place. Finally, push the fixing pin back into its place.

2.6. MAINS CONNECTION



Only an authorized electrician is allowed to install mains cable!

The power source is equipped with a 3 m mains cable with an earthed plug. The plug can be changed only by an authorized electrician. The fuse and cable sizes are given in the chapter Technical data in the end of this document.



This equipment's electromagnetic compatibility (EMC) is designed for use in an industrial environment. Class A equipment is not intended for use in residential location where the electrical power is provided by the public low-voltage supply system.

2.7. WELDING CABLE CONNECTIONS

2.7.1. Choosing welding polarity in MMA welding

You can change the welding polarity by choosing (+) or (-) cable connector.

2.7.2. Earthing

If possible, always fasten the earth clamp of earth cable directly on work piece.

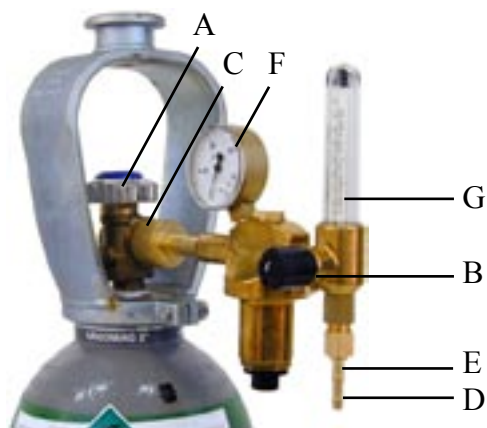
1. Clean contact surface from paint and rust.
2. Fasten clamp properly, so that contact surface is as large as possible.
3. Check that clamp is fastened firmly.

2.8. SHIELD GAS

⚠ Handle gas bottle with care. There is a risk for injury if gas bottle or bottle valve is damaged!

Use as shield gas argon or other gas suitable for TIG welding. The flow rate of the gas is defined by the welding current and the size of the electrode. If the gas flow is not suitable it might be difficult to weld. Contact your local Kemppi-dealer for choosing gas and equipment.

Parts of gas flow regulator



- A Gas bottle valve
- B Pressure regulation screw
- C Connecting nut
- D Hose spindle
- E Jacket nut
- F Gas bottle pressure meter
- G Gas hose pressure meter

2.8.1. Installing gas bottle

⚠ Always fasten gas bottle properly in vertical position in a special holder on the wall or on a carriage. Remember to close gas bottle valve after having finished welding.

The following installing instructions are valid for most gas flow regulator types:

1. Step aside and open the bottle valve (A) for a while to blow out possible impurities from the bottle valve.
2. Turn the pressure regulation screw (B) of the regulator until no spring pressure can be felt.
3. Close needle valve, if there is one in the regulator.
4. Install the regulator on bottle valve and tighten connecting nut (C) with a wrench.
5. Install hose spindle (D) and jacket nut (E) into gas hose and tighten with hose clamp.
6. Connect the hose with the regulator and the other end with the power source. Tighten the jacket nut.
7. Open bottle valve slowly. Gas bottle pressure meter (F) shows the bottle pressure. Note! Do not use the whole contents of the bottle. The bottle should be filled when the bottle pressure is 2 bar.
8. Open needle valve if there is one in the regulator.
9. Turn regulation screw (B) until hose pressure meter (G) shows the required flow (or pressure).
When regulating flow amount, the power source should be switched on and gas test button on the panel pressed simultaneously.

Always close bottle valve after having finished welding. If the machine will be out of use for a long time, unscrew the pressure regulation screw.

3. OPERATION

**⚠ Welding in places presenting an immediate fire or explosion hazard is forbidden!
Welding fumes may cause injury, take care of sufficient ventilation during welding!**

3.1. WELDING PROCESSES

3.1.1. MMA welding

MMA welding, as well as carbon arc gouging, is possible with all MASTER MLS™ and MASTERTIG MLS™ power sources with all MLS panel versions when switched to MMA process.

3.1.2. TIG welding

MASTERTIG MLS™ power sources are intended to specialized TIG welding machines with HF arc ignition and versatile panel functions depending on the panel in use. The panels predominantly for TIG welding are MTL, MTX and MTM. Also the MEL and MEX panel on MASTER MLS™ power source can be used for TIG welding with contact ignition.

3.1.3. Synergic Pulsed TIG welding

MTX and MTM panels include the synergic pulsed TIG process in which you only need to adjust the welding current while other pulse parameters are pre-programmed. Pulsing frequency is high causing concentrated arc and increased welding speed.

3.1.4. Long Pulsed TIG

This method gives you the possibility to adjust all the pulse parameters. It can be used for easier weld pool control. It is included in MTX and MTM panels.

3.2. OPERATION FUNCTIONS

3.2.1. Power source



Always switch the machine on and off from main switch. Do not use the mains plug for switching! Never watch the arc without a proper face shield designed for arc welding! Protect yourself and the surroundings for welding arc and hot spatters!

3.2.2. Function panels

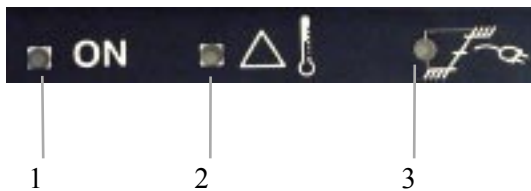
Welding settings suitable for the work piece are chosen with different function panels before welding starts. See 3.1. Welding processes.

The Kemppi Multi Logic System, MLS, allows you to select between different function panels according to your welding application: MEL and MEX panel for MMA welding, or MTL, MTX, MTM for TIG welding with basic functions or with pulsed TIG, 4T-LOG or MINILOG control of welding current or with memory channels.

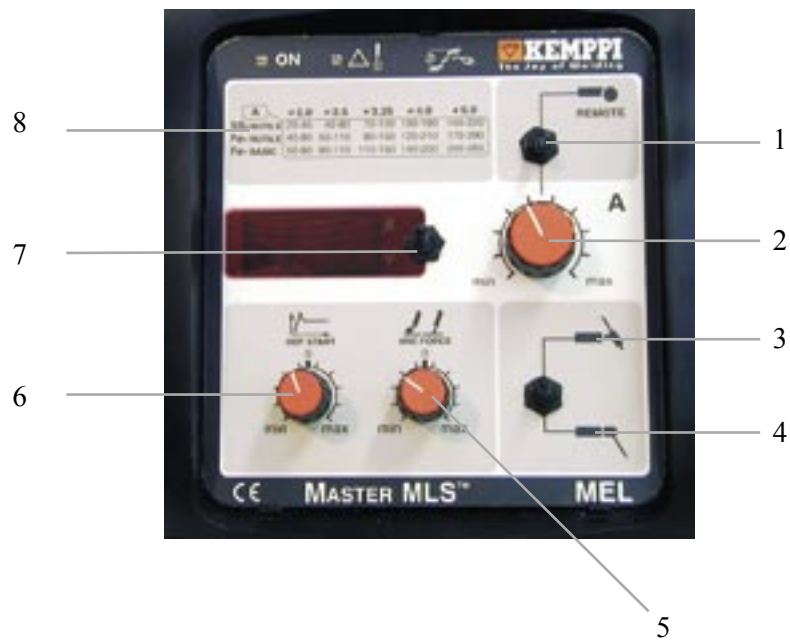
Master MLS MEX panel with operation instructions is available separately.

3.2.2.1. Indicator lights

1. Power On light
2. Thermal overload light
3. Wrong mains voltage, over or under-voltage



3.2.2.2. MMA welding panel MEL



1. Remote/local control switch
2. Welding current potentiometer
3. Contact TIG welding
4. MMA welding
5. Arc force
6. Hot start
7. Digital display and amperage/voltage switch
8. Welding current table

3.2.2.3. TIG welding panel MTL – basic functions



4. Selection button for MMA welding
5. Selection button for arc force (MMA) and pedal low/high (TIG welding)
6. Selection button for hot start (MMA) and gas test (TIG welding)
7. Selection for TIG welding, 4T and 2T functions
8. Selection for HF/contact TIG
9. Selection for panel, pedal and remote control
10. Selection for welding parameters
11. Adjustment for welding parameters
12. Pre-gas 0 - 10 s
13. Upslope 0 - 10 s
14. Welding current
15. Downslope 0 - 15 s
16. Post-gas 1 - 30 s
17. Return to welding current button

4. MMA

Select MMA welding by pressing the selection button of MMA welding. The led lights when MMA is on.

5. Arc force

Press the arc force button and you will see the numerical value corresponding to the dynamics on the display. You can change the value by turning the pulse potentiometer. If numerical value is adjusted negative (-1...9), the arc is softened. The amount of spatter decreases when welding at the upper end of the recommended current range of the electrode. On the positive side (1...9) the arc is rough. In TIG mode pedal max. and min. current can be selected.

6. Hot start

By pressing hot start button you will see the numerical value corresponding to the hot start pulse on the display. You can change the value by turning the potentiometer. In TIG mode gas test function can be selected.

7. TIG welding is selected

7. Welding torch trigger 2-sequence function

Gas flow starts, when the torch switch is pressed. After preset pre-gas time welding starts and current will rise to the welding level within the up-slope time. Release the torch switch, and the current starts to drop and after the selected down-slope time the arc is broken. After this, the shielding gas will flow for the time selected.

7. Welding torch trigger 4-sequence function

Gas flow starts, when the torch switch is pressed. Release the torch switch, the ignition spark ignites the arc and the current will rise to the welding level within the up-slope time. Press the torch switch down. The welding continues. Release the torch switch, and the current starts to drop and after the selected down-slope time the arc is broken. After this, the shielding gas will flow for the time selected.

8. HF-contact

TIG arc can be started either with high frequency (HF) or without (contact ignition). HF ignition is chosen by pressing the HF/Contact button No. 8 to turn on the HF light.

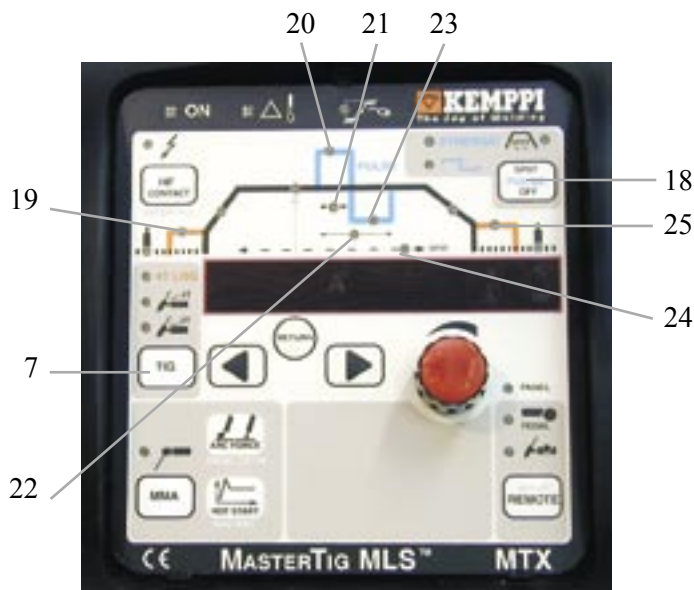
9. Remote

If you choose to adjust the welding current with a remote control unit you need to connect the unit and select remote button. The panel led switches off and then you select the unit. There is an automatic recognition of remote control units with potentiometers and only the symbol of a unit connected can be chosen. The foot pedal control works only in 2T.

10., 11. and 17. Adjustment of parameters

To select welding parameters you only need to use two buttons arrow-left and arrow-right. Adjustment is done with the potentiometer. By pressing the return button adjustment of parameter goes straight to welding current. The display shows automatically numeric values and the units of the parameters. When you adjust parameters, you can see the value on the numerical display. After 10 seconds, the display will return to the welding current.

3.2.2.4. TIG welding panel MTX – pulsed tig functions



- 7. 4T-LOG
- 18. Selection for spot, synergic quickpulse and long pulse
- 19. Search arc 10 - 80% of welding current
- 20. Pulse current 10A - max.
- 21. Pulse ratio 10 - 70 % of pulse time
- 22. Frequency 0,2 - 300 Hz
- 23. Base current 10 - 70% of pulse current
- 24. Spot time 0 - 10 s
- 25. Tail arc 10 - 80% of welding current

7. Welding torch trigger 4T-LOG function (only MTX panel)

When torch switch is pressed current goes to search arc, after the switch is released current goes to welding current within the up-slope time. When the switch is pressed again, current goes to downslope and then to the tail arc. Current stops when the switch is released.

18. Spot

Spot function is practical when welding a definite spot. It can be used both in 2T and 4T. Enter the spot time adjustment by pressing arrow button and when led lights you can choose the needed spot time by turning pulse potentiometer.

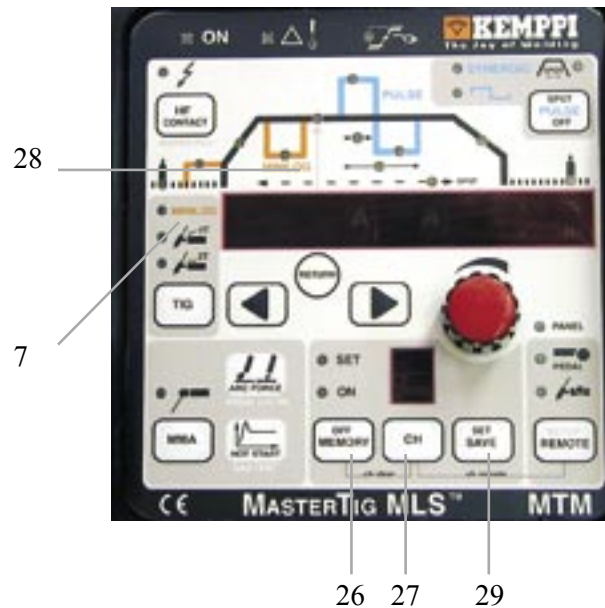
18. Synergic quickpulse

Press the PULSE button twice and the synergic light turns on. Pulse parameters are automatically calculated when mean welding current is selected. Other pulse selections are not necessary.

18. Long pulse

Long pulse method gives you a possibility to adjust all the pulse parameters (pulsing frequency, pulse ratio, pulse current and pause current). You can also set the mean welding current which results in a new pulse current value calculated using the set percentage values of pulse ratio and pause current like when entering Pulse mode. When you adjust the pulse ratio percentage, pulse current or pause current percentage a new mean welding current value is calculated and displayed on the panel.

3.2.2.5. TIG welding panel MTM – pulsed TIG and MINILOG function with memory



- 7. Minilog
- 26. Selection for Memory function (see 3.2.3.)
- 27. Selection for channel in memory function
- 28. Minilog 10 - 90% of welding current
- 29. SAVE

7. Minilog operation

When torch switch is pressed gas flow starts, when you release the switch current goes to search arc. A quick press and current goes to welding current within the up-slope time. After a new short press it goes to minilog operation and you can select two current levels, the welding current and the minilog current, and you can move from one to the other by quickly pressing the torch trigger. Press the torch trigger over 1 second and release it and current goes to downslope.

3.2.3. Saving welding settings (MTM)

MTM panel has 10 memory channels for user settings. The selections for saving are made on MEMORY field. Not only welding parameters but also selections are saved in the memory. Stick welding values can also be stored in memory channels. Proceed as follows:

1. Press MEMORY button twice and if the SET light starts blinking, the channel is free. If the channel is in use then the led will remain on.
2. Select memory channel by pressing CH -button.
3. Select the parameters and press SAVE button
4. Press MEMORY button twice. ON led is lit.
5. Start welding and adjust settings if necessary.

If saved settings need to be changed, the lit led has to be moved from ON into SET position in order to select parameters. Press the SAVE button. It is also possible to save the currently used parameters in the panel by pressing SET when the memory function is in off state (no lights on). Channel is cleared if MEMORY and CH buttons are pressed simultaneously in SET state.

3.2.4. Taking the saved settings into use

1. Select MEMORY by pressing the button.
2. Select memory channel by pressing CH button.
3. Start welding.

3.2.5. Remote controlling memory channels

Memory channels are selected by pressing simultaneously both REMOTE and CH button. With the remote control you can recall saved settings on memory channels.

3.2.6. Set-up functions

For modifying functions of panels a so called Setup state is included. This state is entered by pressing the Remote (setup) button longer than normally. Exit is performed in the same way. You can select the function (see list below) by pressing the arrow buttons and then change the setting by turning the panel potentiometer.

Display	Function	Factory setting
A1	Upslope with constant time setting / gradient (steepness) setting	0 constant time
A2	Downslope with constant time setting / gradient (steepness) setting	0 constant time
A3	TIG antifreeze off / on	1 on
A4	MMA antifreeze off / on	1 on
A5	MMA hot start pulse non adaptive / adaptive	0 non adaptive
A6	Downslope cut off on / off	0 on
A7	MMA no load voltage 80V / 40V	0 80 V
A8	2T downslope normal / cuts off by short switch action	0 normal
A9	Tacking automatics off / on	0 off
A10	Current at arc start steep / slightly sloped	0 steep
A11	Downslope linear / non linear	0 linear
A12	MMA -TIG method selection with remote control off /on	0 off
A13	Search arc off / on	1 on
A14	Possibility to current freezing during downslope off/ on	0 off
A15	Control of channels with torch up-down off / on	0 off
A16	Control of current with torch up-down is always active / active only when selected with remote button	0 always active
A17	Not in use in Mastertig 2000 MLS	
A18	Modified selection of cut off in MTL and MTM panels. For downslope, press start switch and keep it down (4T and Minilog)	0 normal
A19	Not in use in Mastertig 2000 MLS	

3.3. STORAGE

The machine must be stored in a clean and dry room. Protect the machine from rain and keep it away from direct sunshine in places where temperature exceeds +25 °C.

4. MAINTENANCE



Watch out for mains voltage when handling electric cables!

In planning product maintenance machine utilization degree and circumstances should be considered. Careful use and preventive maintenance help to avoid unnecessary production disturbances and breaks. Check the condition of the welding and connection cables daily. Do not use damaged cables.

4.1. MAINTENANCE

4.1.1. Every sixth months

NOTE! Disconnect the plug of the machine from the mains socket and wait for ca. 2 minutes (capacitor charge) before removing the casing plate.

The following maintenance operations should be carried out at least every sixth months:

- The electric connections of the machine - clean any oxidized parts and tighten any loose ones. NOTE! You must know the correct tension torques before you start to repair the connections.
- Clean the inner parts of the machine from dust and dirt e.g. with a soft brush and a vacuum-cleaner. Do not use pressurized air, because there is the danger that the dirt is packed even more tightly in the gaps of the cooling profiles. Do not use a pressure washing device.



Only an authorized electric shop or electrician may repair the machine.

4.1.2. Service contract

KEMPPI -service workshops make special service contracts with customers about regular maintenance. All parts are cleaned, checked and if necessary, repaired. Also the operation of welding machine is tested.

4.2. ORDERING NUMBERS

MASTER MLS™ 1600	6102160
Welding cable 25mm ² , 5 m	6184201
Earth cable 25mm ² , 5 m	6184211
MASTERTIG MLS™ 2000	6112200
Torches:	
TTC 160 4m	627016004
TTC 160 8m	627016008
TTC 160 16m	627016016
TTC 220 4m	627022004
TTC 220 8m	627022008
TTC 220 16m	627022016
Earth cable 25mm ² , 5 m	6184211
Gas flow meter AR/clock	6265136

Panels

MEL, MMA	6106000
MTL, TIG	6116000
MTX, TIG 4T-LOG	6116005

MTM, MINILOG	6116010
MEX, MMA	6106010

Optional

TIG torch controls	
RTC 10	6185477
RTC 20	6185478
Remote control	
R 10	6185409
R11F	6185407
R11T	6185442
Transport unit	
T100	6185250
T110	6285251
T130	6185222

4.3. TROUBLESHOOTING

Main power on light is not on

There is no power in the machine

- Check mains fuses, replace blown fuses.
- Check mains cable and plug, replace defect parts.

The machine is not welding properly.

There are plenty of spatters during welding. Weld joint is porous, power supply is insufficient.

- Check welding settings and adjust if needed.
- Check gas flow and gas hose connection.
- Check that earth cable is properly fastened and has no defects. Change the position if necessary and replace defect parts.
- Check welding torch cable and connector. Tighten the connection and replace defective parts.
- Check the wear parts of welding torch. Clean and replace defect parts.
- Check mains fuses, replace blown fuses.

Power source overheat signal lamp is lit.

Power source is overheated.

- Check that there is enough free space behind the machine for cooling air circulation.

For further information and assistance, contact your nearest Kemppi service workshop.

4.4. DISPOSAL OF THE MACHINE



Do not dispose of electrical equipment together 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 returned to an environmentally compatible recycling facility. As the owner of the equipment, you should get information on approved collection systems from our local representative.

By applying this European Directive you will improve the environment and human health!

5. TECHNICAL DATA

Master MLS™ 1600, Mastertig MLS™ 2000		
Mains voltage	1~ 50/60 Hz	230 V - 10 %...+ 10 %
Rated power	35% ED MMA	160A / 7,1 kVA
	60% ED MMA	140A / 5,8 kVA
	100% ED MMA	120A / 4,8 kVA
	30% ED TIG	200A / 6,5 kVA
	60% ED TIG	150A / 4,2 kVA
	100% ED TIG	130A / 3,4 kVA
Connection cable/fuse		3 x 2,5S - 3,3 m/16 A delayed *)
Welding current range		
	MMA	10 A/20,5 V...160 A/26,4 V
	TIG	5A/10,0 V...200 A/18,0 V
Max welding voltage		36 V / 160 A
Electrode sizes to be welded		Ø1,5...4,0 mm
Welding current control		stepless
Open circuit voltage		80 V (tai 40 V)
Efficiency		80 % (160 A/26,4 V)
Power factor		0,75 (160 A/26,4 V)
Open circuit power		approx. 10 W
Storage temperature range		-40 ... +60 °C
Operation temperature range		-20 ... +40 °C
Temperature class		H (180 °C / B (130 °C)
Degree of protection		IP 23 C
External dimensions		
	length	410 mm
	width	180 mm
	height	390 mm (body 330 mm)
Weight		
	TIG power source	15 kg
	MMA power source	14 kg

*) With 16 A fuse max. welding current is 150 A. If this exceeded a 20 A fuse and plug are needed.

The products meet the conformity requirements of CE-marking.

6. TERMS OF GUARANTEE

Kemppi Oy provides a guarantee for products manufactured and sold by them if defects in manufacture and materials occur. Guarantee repairs must be carried out only by an Authorised Kemppi Service Agent. Packing, freight and insurance costs to be paid by orderer. The guarantee is effected on the date of purchase. Verbal promises which do not comply with the terms of guarantee are not binding on guarantor.

Limitations on guarantee

The following conditions are not covered under the terms of guarantee: defects due to natural wear and tear, non-compliance with operating and maintenance instructions, connection to incorrect or faulty supply voltage (including voltage surges outside equipment spec.), incorrect gas pressure, overloading, transport or storage damage, fire or damage due to natural causes i.e. lightning or flooding.

This guarantee does not cover direct or indirect travelling costs, daily allowances or accommodation.

Note: Under the terms of guarantee, welding torches and their consumables, feeder drive rolls and feeder guide tubes are not covered. Direct or indirect damage due to a defective product is not covered under the guarantee. The guarantee is void if changes are made to the product without approval of the manufacturer, or if repairs are carried out using non-approved spare parts.

The guarantee is also void if repairs are carried out by non-authorized agents.

Undertaking guarantee repairs

Guarantee defects must be informed to Kemppi or authorised Kemppi Service Agents within the guarantee period. Before any guarantee work is undertaken, the customer must provide proof of guarantee or proof of purchase, and serial number of the equipment in order to validate the guarantee.

The parts replaced under the terms of guarantee remain the property of Kemppi.

Following the guarantee repair, the guarantee of the machine or equipment, repaired or replaced, will be continued to the end of the original guarantee period.

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