

AUTOMIG² 183i

AUTOMIG² 223i/273i

AUTOMIG² 223i/273i Boost

AUTOMIG² 223i/273i DUO

AUTOMIG² 223i/273i DUO Boost

Brugsanvisning
Instruction manual
Betriebsanleitung
Manuel d'instruction
Bruksanvisning
Käyttöohje
Gebruikershandleiding
Manuale d'istruzione
Kezelési útmutató
Instrukcja obsługi
Návod k obsluze

MICATRONIC

EC DECLARATION OF CONFORMITY



MIGATRONIC A/S
Aggersundvej 33
9690 Fjerritslev
Denmark

hereby declare that our machine as stated below

Type: AUTOMIG² i
As of Week 02 2013

conforms to directives 2006/95/EC
2004/108/EC
2011/65/EU

European Standards: EN/IEC60974-1
EN/IEC60974-5
EN/IEC60974-10 (Class A)

Issued in Fjerritslev on 7 January 2013.


Anders Hjørnø Jørgensen
CEO



WARNING



Arc welding and cutting can be dangerous to the user, people working nearby, and the surroundings if the equipment is handled or used incorrectly. Therefore, the equipment must only be used under the strict observance of all relevant safety instructions. In particular, your attention is drawn to the following:

Electricity

- The welding equipment must be installed according to safety regulations and by a properly trained and qualified person. The machine must be connected to earth through the mains cable.
- Make sure that the welding equipment is correctly maintained.
- In the case of damaged cables or insulation, work must be stopped immediately in order to carry out repairs.
- Repairs and maintenance of the equipment must be carried out by a properly trained and qualified person.
- Avoid all contact with live components in the welding circuit and with electrodes and wires if you have bare hands. Always use dry welding gloves without holes.
- Make sure that you are properly and safely earthed (e.g. use shoes with rubber sole).
- Use a safe and stable working position (e.g. avoid any risk of accidents by falling).

Light and heat emissions

- Protect the eyes as even a short-term exposure can cause lasting damage to the eyes. Use a welding helmet with suitable radiation protection glass.
- Protect the body against the light from the arc as the skin can be damaged by welding radiation. Use protective clothes, covering all parts of the body.
- The place of work should be screened, if possible, and other persons in the area warned against the light from the arc.

Welding smoke and gases

- The breathing in of the smoke and gases emitted during welding is damaging to health. Make sure that any exhaust systems are working properly and that there is sufficient ventilation.

Fire hazard

- Radiation and sparks from the arc represent a fire hazard. As a consequence, combustible materials must be removed from the place of welding.
- Working clothing should also be secure against sparks from the arc (e.g. use a fire-resistant material and watch out for folds and open pockets).
- Special regulations exist for rooms with fire- and explosion hazard. These regulations must be followed.

Noise

- The arc generates acoustic noise according to welding task. In some cases, use of hearing aids is necessary.

Dangerous areas

- Fingers must not be stuck into the rotating gear wheels in the wire feed unit.
- Special consideration must be taken when welding is carried out in closed areas or in heights where there is a danger of falling down.

Positioning of the machine

- Place the welding machine so there is no risk that the machine will tip over.
- Special regulations exist for rooms with fire- and explosion hazard. These regulations must be followed.

Use of the machine for other purposes than it is designed for (e.g. to unfreeze water pipes) is strongly deprecated. If the occasion should arise this will be carried out without responsibility on our part.

**Read this instruction manual carefully
before the equipment is installed and in operation**

Electromagnetic emissions and the radiation of electromagnetic disturbances

This welding equipment for industrial and professional use is in conformity with the European Standard EN/IEC60974-10 (Class A). The purpose of this standard is to prevent the occurrence of situations where the equipment is disturbed or is itself the source of disturbance in other electrical equipment or appliances. The arc radiates disturbances, and therefore, a trouble-free performance without disturbances or disruption, requires that certain measures are taken when installing and using the welding equipment. **The user must ensure that the operation of the machine does not occasion disturbances of the above mentioned nature.**

The following shall be taken into account in the surrounding area:

1. Supply and signalling cables in the welding area which are connected to other electrical equipment.
2. Radio or television transmitters and receivers.
3. Computers and any electrical control equipment.
4. Critical safety equipment e.g. electrically or electronically controlled guards or protective systems.
5. Users of pacemakers and hearing aids etc.
6. Equipment used for calibration and measurement.
7. The time of day that welding and other activities are to be carried out.

8. The structure and use of buildings.

If the welding equipment is used in a domestic establishment it may be necessary to take special and additional precautions in order to prevent problems of emission (e.g. information of temporary welding work).

Methods of reducing electromagnetic emissions:

1. Avoid using equipment which is able to be disturbed.
2. Use short welding cables.
3. Place the positive and the negative cables close together.
4. Place the welding cables at or close to floor level.
5. Remove signalling cables in the welding area from the supply cables.
6. Protect signalling cables in the welding area, e.g. with selective screening.
7. Use separately-insulated mains supply cables for sensitive electronic equipment.
8. Screening of the entire welding installation may be considered under special circumstances and for special applications.

PRODUCT PROGRAMME

180/220/270A welding machine for MIG/MAG welding. The machine is air-cooled and is supplied with built-in wire feed with 4-roll drive.

Welding hoses and cables

MIGATRONIC's product range can provide MIG/MAG torches and hoses, return current cables, intermediary cables and wear parts etc.

Accessories

Please contact your Migatronik dealer for further information on accessories.



Dispose of the product according to local standards and regulations.
www.migatronik.com/goto/weee

Mains connection

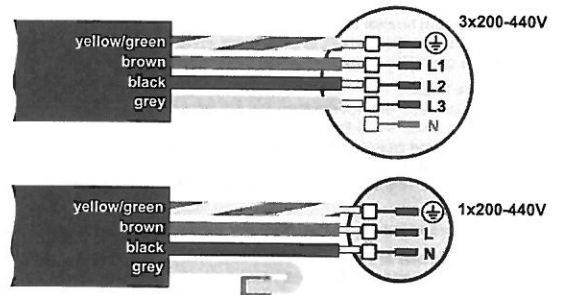
Before connecting the power source to the mains supply, ensure that the power source is of the same voltage as the mains voltage provided and that the fuse in the mains supply is of the correct size. The mains cable (1) of the power source must be connected to the correct three-phase alternating current (AC) supply of 50 Hz or 60 Hz and with earth connection. The sequence of the phases is not of significance. The power source is switched on with the mains switch (2).

Mains connection AUTOMIG² Boost

Please note: AUTOMIG² 183i is not available in Boost version

The AUTOMIG² Boost can be connected to single-phase and three-phase mains supply from 200 to 440V. The machine automatically adjusts itself to the present mains voltage.

The mains plug must be mounted by an electrician. The machine is equipped with a four-wire mains cable and must be mounted as shown below:



CONNECTION AND OPERATION

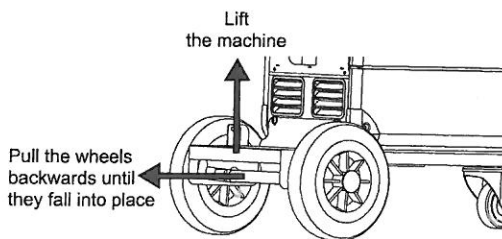
Permissible installation

The following sections describe how the machine is made ready for use and then connected to mains supply, gas supply etc. The numbers in parentheses refer to the illustrations in this paragraph.

Unpacking the AUTOMIG² 223i/273i

After unpacking and prior to using the AUTOMIG² 223i/273i, proceed as follows (see drawing):

Please note: AUTOMIG² 183i has a permanently fixed trolley.



Configuration

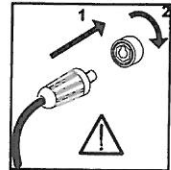
MIGATRONIC disclaims all responsibility for damaged cables and other damages related to welding with undersized welding torch and welding cables measured by welding specifications e.g. in relation to permissible load.

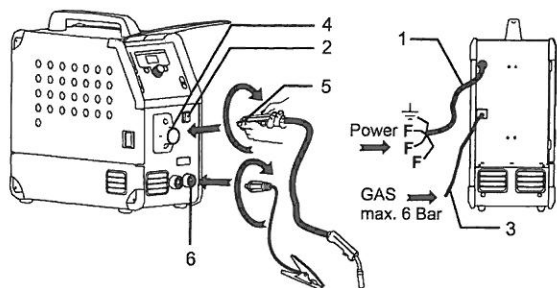
Generator use

This welding machine can be used at all mains supplies providing sine-shaped current and voltage and not exceeding the approved voltage tolerances stated in the technical data. Motorised generators observing the above can be used as mains supply. Consult your supplier of generator prior to connecting your welding machine. MIGATRONIC recommends use of a generator with electronic regulator and supply of minimum 1.5 x the maximum kVA consumption of the welding machine. The guarantee does not cover damage caused by incorrect or poor mains supply.

Important!

In order to avoid damage to plugs and cables, good electric contact is required when connecting the work return cable and welding torch to the machine.





Connection of shielding gas

The shielding gas hose is fitted to the back panel of the power source (3) and is connected to a gas supply with a pressure reduction to max. 6 bar. One gas cylinder can be mounted on the bottle carrier on the back of a trolley if any.

Note: Use only gas bottles with a max. weight of 20 kg for AUTOMIG² 183i. If larger bottles are used the machine may tip over.

Connection of torch for MIG/MAG welding

The welding hose assembly is pushed into the central connector coupling (4) and the nut (5) is tightened by hand. The return lead is connected to the negative pole (6).

Connection of torch 1 (7) and torch 2 (8) for MIG/MAG-welding AUTOMIG² i DUO

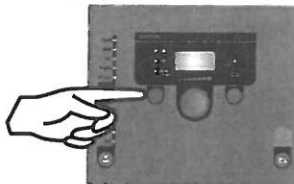
Push the welding hose assembly into the central connector coupling (7 and 8) and tighten the nut (5) by hand. Use the reverser (9) to switch between welding torches 1 and 2 and motor and gas valves 1 and 2. Connect the return lead to the negative pole (10).

Torch adjustment (Dialog torch)

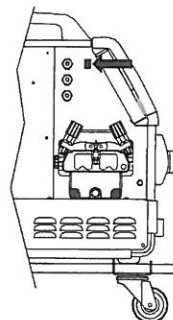
The current size can be adjusted both from the machine and the welding torch if a welding hose with dialog torch is in use. The torch adjustment is passive without Dialog torch.

Inching AUTOMIG² 183i

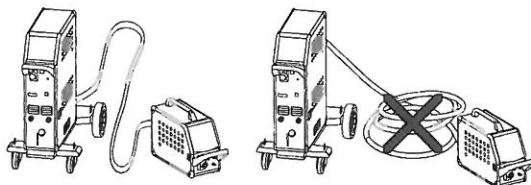
The function is used for wire inching e.g. after change of wire. Wire inching starts by pressing the green key pad and simultaneously triggering the torch trigger. Wire inching continues even though the green key pad has been released. It does not stop until the torch trigger has been released again.



Inching AUTOMIG² 223i/273i
The function is used for wire inching e.g. after change of wire.



Important: stretch out welding hose, earth cable and interconnecting cable, as necessary, as shown in the figure to avoid affecting the welding performance and at worst destructing the welding machine.



Lift instructions

Lifting hooks can be used at the sack barrow for lifting with a crane (figure 1). The trolley with four wheels cannot be lifted with a crane but only manually using the handle (figure 2). The machine must not be lifted with mounted gas bottle!

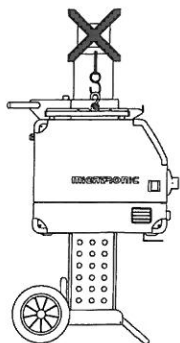


Fig. 1

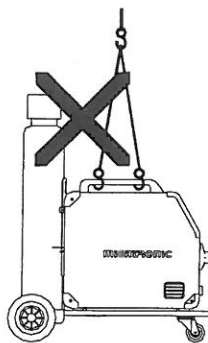
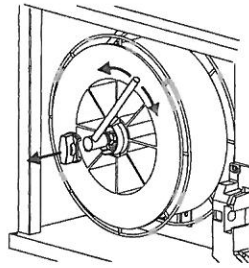


Fig. 2

Adjustment of wire brake

The wire brake must ensure that the wire reel brakes sufficiently quickly when welding stops. The required brake force is depending on the weight of the wire reel and the maximum wire feed speed. A brake torque of 1.5-2.0 Nm will be satisfactory for most applications.



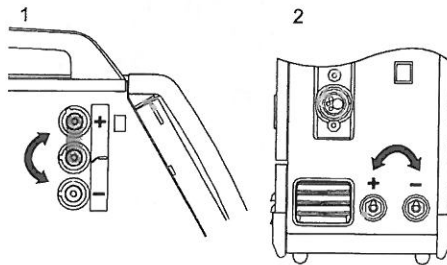
Adjustment:

- Dismount the control knob by placing a thin screw driver behind the knob and thereafter pull it out
- Adjust the wire brake by fastening or loosening the self-locking nut on the axle of the wire hub
- Remount the knob by pressing it back into the groove.

Selecting welding polarity

Polarity reversal is recommended for certain types of welding wire, in particular Innershield welding wire. For recommended polarity, please refer to the welding wire packaging.

Please note: AUTOMIG² 183i does not feature reversed polarity.



Change of polarity:

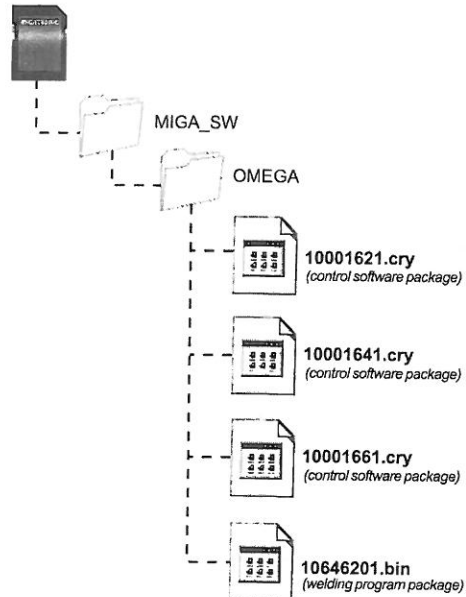
1. Disconnect the machine from the mains supply.
2. Dismount screws in the wire chamber with a wrench (picture 1).
3. Exchange brass plate from plus to minus (picture 1)
4. Mount screws in the wire chamber with a wrench (picture 1)
5. Exchange earth cable from minus to plus (picture 2)
6. Connect the machine to the mains supply.

SOFTWARE

In case of exchange of the control unit, software must be reloaded, using an SD card.

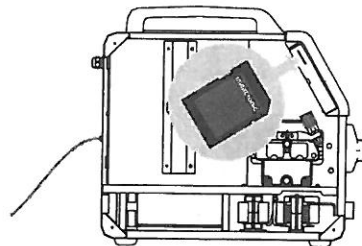
Latest software can be downloaded under Product software at www.migatron.com/login. Save the software on an SD card containing the folders and one or more of the files shown below.


To order SD card, use item no. 12646000.



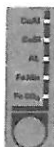
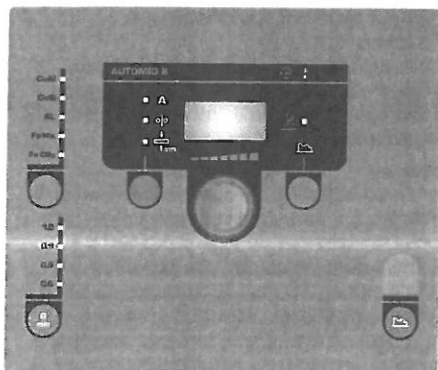
Software reading

- Insert the SD-card in the slide in the right side of the machine.
- Turn on the machine.
- The display flashes shortly with three lines.
- Wait until the set current is displayed.
- Turn off the machine and remove the SD card.
- The machine is now ready for use.



 **All machine user settings are deleted when new software has been inserted. Therefore, always remove the SD-card from the machine after the software update. Thereby, continuous software update is avoid each time the machine is turned on.**

AUTOMIG II CONTROL PANEL



Selection of material type

Press the -key pad until the indicator for the required material is switched on.



Selection of wire dimension

Press the -key pad until the indicator for the required diameter is switched on.

Not all wire dimensions can be used for all materials.

Reset to factory settings:

Factory settings for the selected wire dimension will be reloaded when pressing the key pad until the indicator gives a short flash.



Current/wire feed speed/material thickness:

When the machine is not welding, the set current/ wire feed speed/material dimension is displayed. During welding the measured current is displayed.

Material thickness:

The function helps adjusting the current according to material thickness (in mm). When selecting material thickness an automatically setting of current is calculated. Thereafter, the current can be further adjusted. The material thickness function can be seen as a good starting point in the selection of correct current and voltage. A trimming of these parameters will be required in almost every welding task in order to obtain the most optimum result.



Arc length

If necessary, the arc length can be adjusted by trimming the voltage. The measured voltage is shown during welding. Press the -key pad and adjust from -9,9 to +9,9.



Control knob

This knob is used for adjusting welding current, wire feed speed, material thickness, arc length or secondary parameters. Inching speed is adjustable during wire inching. Max. wire feed speed is 18.0 m/min.



Setting of secondary parameters

Press the control knob until the requested parameter is displayed. To return to normal display the key pad for arc length or current/wire feed speed/material thickness is to be pressed briefly.



Arc adjust:

Arc-adjust (electronic choke) makes it possible to adjust the speed of reaction to short-circuits. Arc-adjust can be set in steps from -5.0 to +5.0.



Gas pre-flow:

Gas pre-flow ensures that the arc is fully protected from atmosphere before an arc is established. Gas pre-flow time is the time from activating the torch trigger until the wire feed starts. The gas pre-flow time can be set between 0.0 sec. and 10.0 secs.



Soft start:

Soft start improves the ignition characteristics. Here speed with which the wire shall start is set. The speed is set between 1.5-18.0 m/min. The soft start function is disengaged when displaying ---.



Hot-start time :

Hotstart is a function which help creating the right temperature in the weld pool at the beginning of the welding. Hot-start time determines the time in which welding in hot-start takes place. The time can be set between 0 and 10 secs



Slope-down:

The time of the current slope-down is set. By activating the trigger, the slope down begins in order to make a crater filling. The current reduces from the adjusted current to stop amp.



Burn back:

The burn back function prevents the welding wire sticking to the workpiece at the end of a weld. Burn-back can be adjusted between 1 and 30.



Gas post-flow:

Gas post-flow time ensures protection of the molten pool after welding and cools off the torch. The gas post-flow time is the time from which the arc extinguishes to the gas flow being disconnected. The time can be set between 0.0 and 10.0 secs



Remote control

Choose between internal and external adjustment.

0 = internal

1 = torch control

When the machine is switched off, the adjusted parameters are saved internally in the machine.

Simultaneously, the number of the most recently used program is saved so that the machine will start up in this.

Please note: Automig² i DUO saves the number of the most recently used program separately for each wire feed unit.



Welding voltage indicator

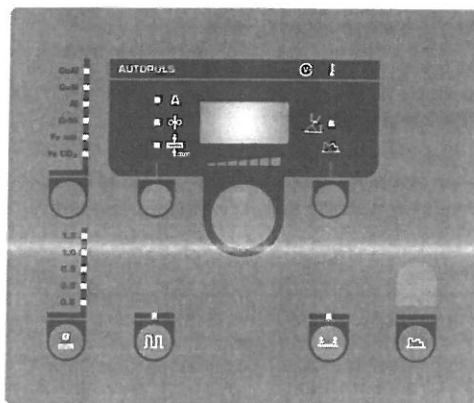
The welding voltage indicator is illuminated for reasons of safety and in order to show if there is voltage at the electrode or torch.



Temperature fault

The indicator is switched on, when the power source is overheated.

AUTOPULS CONTROL PANEL



Selection of material type

Press the -key pad until the indicator for the required material is switched on.



Selection of wire dimension

Press the -key pad until the indicator for the required diameter is switched on.

Not all wire dimensions can be used for all materials.

Selection of AlMg5/AlSi programs:

1. Select material the material type "Al".
2. Select material type 1.0 or 1.2mm.
3. Keep the material key pressed for 5 sec until the "Al" LED is switched off as indication of entrance to set-up mode. The display shows 352 (1.0 mm AlSi ER4043) or 312 (1.0 mm AlMg5 ER5356) if 1.0 mm wire has been selected, or 353 (1.2 mm AlSi ER4043) or 313 (1.2 mm AlMg5 ER5356) if 1.2 mm wire has been selected.
4. Turn the encoder back and forth until the correct program is displayed
5. The program is selected by one more press on the material key knob, and the machine will return to normal mode.

Reset to factory settings:

Factory settings for the selected wire dimension will be reloaded when pressing the key pad until the indicator gives a short flash.



Current/wire feed speed/material thickness:

When the machine is not welding, the set current/ wire feed speed/material dimension is displayed. During welding the measured current is displayed.

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Trigger mode

When the indicator is on, 4-times has been selected and when the indicator is off, 2-times has been selected. Trigger mode cannot be changed during welding.

2-times:

Welding starts when the torch trigger is held down. To end welding, the torch trigger is released and burn back starts. It is possible to trigger the machine again during post flow.

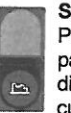
4-times:

Welding starts when the torch trigger is held down. The trigger can then be released and welding continues. To end welding the torch trigger is held down again and burn back starts.



Pulse welding

MIG pulse welding on/off.



Setting of secondary parameters

Press the control knob until the requested parameter is displayed. To return to normal display the key pad for arc length or current/wire feed speed/material thickness is to be pressed briefly.



Arc adjust:

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0 = internal

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When the machine is switched off, the adjusted parameters are saved internally in the machine. Simultaneously, the number of the most recently used program is saved so that the machine will start up in this.

Please note: Automig² i DUO saves the number of the most recently used program separately for each wire feed unit.



Welding voltage indicator

The welding voltage indicator is illuminated for reasons of safety and in order to show if there is voltage at the electrode or torch.



Temperature fault

The indicator is switched on, when the power source is overheated.

ERROR CODES

One of the below mentioned error codes will be displayed if an error occurs during software update.

Error codes for control software

10001621.cry/10001641.cry/10001661.cry

Error code	Cause and solution
E20-00	There is no software present in the control unit. • Insert a SD card with software in the control unit and turn on the machine.
E20-01	SD card is not formatted. • The SD card must be formatted in a PC as FAT and place the files down on the card or use another SD card.
E20-02	SD card contains no software. • See page 18.
E20-03	SD card has more files of the same name. • See page 18.
E20-04	The control unit has tried to read more data than is accessible in the memory. 1. Insert the SD card again. 2. Replace the SD card. 3. Contact MIGATRONIC Service.
E20-05	Software on the SD card is locked for another type of control unit. • Use a SD card with software that matches your control unit.
E20-06	Software on the SD card is locked for another control unit with another serial number/ bar code. • Use a SD card with software that matches your control unit.
E20-07	The internal copy protection does not allow access to the microprocessor. 1. Insert the SD card in the machine again. 2. Contact MIGATRONIC Service.
E20-08	The memory circuit is defective in the control unit. • Contact MIGATRONIC Service.
E20-09	The memory circuit is defective in the control unit. • Contact MIGATRONIC Service.
E20-10	The file has an error. 1. Insert the SD card in the machine again. 2. Exchange the SD card.

E02-04	CAN communication error • Check intermediary cable/plug
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E11-20	Current sensor error 1. Check the current sensor 2. Contact MIGATRONIC service
E11-42	Probe voltage 1. Check if welding wire is sticking in the weld pool 2. Contact MIGATRONIC service
E11-28	Phase/voltage error 1. Check all three phases 2. Check for under-voltage 3. Contact MIGATRONIC service

Error codes for welding program package

10646201.bin

Error code	Cause and solution
E21-00	There is no welding programs present in the control unit • Insert a SD card with software in the control unit and turn on the machine. See page 18.
E21-01	SD card is not formatted. • The SD card must be formatted in a PC as FAT or use another SD card.
E21-02	It is only possible to have one file with welding programs. • Make sure that there is only one file with the number 106462xx.bin on the SD card. See page 18.
E21-03	The welding program package does not match this control unit. • Use a SD card with software that matches your control unit.
E21-04	The welding program package is locked for another control unit with another serial number/ bar code. • Your software package is copy protected and cannot be used for a control unit without the correct license.
E21-05	The control unit is defective • Contact MIGATRONIC Service.
E21-06	The file 106462xx.bin is not present on the SD card. • See page 18.
E21-07	The file has an error. 1. Insert the SD card in the machine again. 2. Exchange the SD card.
E21-08	The Omega folder with files are not present at the card or are saved incorrectly. 1. Make a folder MIGA_SW / OMEGA as described on page 18 and save the files in the folder. 2. Exchange the SD card

MAINTENANCE

Error code	Cause and solution
22-01	The file 10001641.cry has an error. 1. Insert the SD card in the machine again. 2. Exchange the SD card.
22-02	SD card is not formatted. • The SD card must be formatted in a PC as FAT. Or use another SD card.
22-03	The software does not match this control unit. • Use a SD card with software that matches your control unit.
22-04	Power control PCB is defective • Contact MIGATRONIC Service
22-05	Data transmission error • Turn on and off the machine. Exchange the SD card if the error is displayed again. Contact your dealer if necessary.
22-06	The file 10001641.cry has an error. 1. Insert the SD card in the machine again. 2. Exchange the SD card.
22-07	Power control PCB is defective • Contact MIGATRONIC Service
22-08	The SD card contains too many files with 10001641.cry-data

The machine requires periodical maintenance and cleaning in order to avoid malfunction and cancellation of the guarantee.

WARNING !

Only trained and qualified staff members can carry out maintenance and cleaning. The machine must be disconnected from the mains supply (pull out the mains plug!). Thereafter, wait around 5 minutes before maintenance and repairing, as all capacitors need to be discharged due to risk of shock.






Wire cabinet

- Regularly, clean the wire cabinet with compressed air and check if the grooves and teeth on the wire drive rolls are worn out.

Power source

- Clean the fan blades and the components in the cooling pipe with clean, dry, compressed air as required.
- A trained and qualified staff member must carry out inspection and cleaning at least once a year.

TECHNICAL DATA

Power source:	AUTOMIG ¹ 183i	AUTOMIG ² 223i/223i DUO	AUTOMIG ² Boost 223i/223i DUO	AUTOMIG ² 273i/273i DUO	AUTOMIG ² Boost 273i/273i DUO
Mains voltage (50Hz-60Hz)	3x400V ±15%	3x400V ±15%	3x230/400V ±15%	3x400V ±15%	3x230/400V ±15%
Mains voltage (50Hz-60Hz)			1x230V		1x230V
¹ Minimum short-circuit power S _{sc}	0,47MVA				
Fuse	10A	10A	16A	10A	16A
Mains current, effective	4.4A	6.0A	7.1A	7.6A	10.5A
Mains current, max.	7.5A	10.1A	29.9A	13.2A	42.0A
Power, (100%)	3.1kVA	4.2kVA	1.6kVA	5.3kVA	2.4kVA
Power, max	5.2kVA	7.0kVA	6.9kVA	9.1kVA	9.7kVA
Open circuit power	15/10** W	20W	30W	20W	30W
Efficiency	0,86	0,90	0,84	0,88	0,84
Power factor	0,93	0,87	0,99	0,93	0,99
Current range	15-180A	15-220A	15-220A	15-270A	15-270A
Duty cycle 100% at 20°C	160A	180A	115A (140A)*	230A	150A (180A)*
Duty cycle 40% at 20°C	180A	220A	150A (175A)*	245A	180A (200A)*
Duty cycle 100% at 40°C	115A	145A	70A (88A)*	175A	107A (135A)*
Duty cycle 60% at 40°C	125A	170A	86A (108A)*	195A	130A (170A)*
Duty cycle max. at 40°C	25%	30%	14% (16%)*	25%	18% (25%)*
Open circuit voltage	45V	52V	52V	52V	52V
² Sphere of application					
³ Protection class	IP 23S ⁴	IP 23	IP 23	IP 23	IP 23
Norm			EN/IEC60974-1 EN/IEC60974-5 EN/IEC60974-10 (Class A)		
Dimensions (hwxwd)	66x38x79 cm	55x25x64 cm 96x57x87 cm (DUO)	55x25x64 cm 96x57x87 cm (DUO)	55x25x64 cm 96x57x87 cm (DUO)	55x25x64 cm 96x57x87 cm (DUO)
Weight	26,2 kg	25 kg 54 kg (DUO)	27 kg 56 kg (DUO)	26 kg 55 kg (DUO)	28 kg 57 kg (DUO)

* Data for Boost-version are stated at 1x230V mains supply

Data in parenthesis are stated at 3x400V mains supply

**= Power save function. The machine will enter the power save function 7.5 minutes after finalising the welding operation

WARRANTY REGULATIONS

Migatron welding machines are quality-tested continuously throughout the production process and undergo a thorough, quality-assured final function test as assembled units.

The warranty period is 12 months for new welding machines if no registration is carried out. Upon registration of new welding machines within 6 weeks from invoicing, the warranty period is extended to 24 months.

Registration must be made on the online address: www.migatron.com/warranty. The certificate of registry is proof of the registration and will be sent by e-mail. The original invoice and the certificate of registry will document to the buyer that the welding machine falls within the scope of a 24 months warranty period.

If registration is not made, the standard warranty period is twelve months for new welding machines, as from the date of invoicing to end user. The original invoice is documentation for the warranty period.


Migatron provides warranty according to the warranty conditions in force through remedying defects in the welding machines that can be proved to be caused by improper materials or workmanship in the warranty period.

As a main rule, warranty is not provided for welding hoses as they are considered to be wear parts; defects that occur within 6 weeks after putting into operation and which are caused by improper materials or workmanship will, however, be considered warranty claims.

All forms of transport in connection with a warranty claim fall outside the scope of Migatron's warranty and will take place for buyer's own account and risk.

We refer to Migatron's warranty conditions at www.migatron.com/warranty

¹ This equipment complies with IEC 61000-3-12 provided that the short-circuit power S_{sc} of the grid at the interface point is greater than or equal to the stated data in the abovementioned table. 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 the stated data in the abovementioned table.

²  This machine meets the demand made for machines which are to operate in areas with increased hazard of electric shocks

³ Equipment marked IP23 is designed for indoor and outdoor applications

⁴ Equipment marked IP23S is designed for indoor and outdoor applications.