

# INSTRUCTION MANUAL NAVIGATOR



# INTRODUCTION

**MIGATRONIC** welding equipment has a good reputation - and we know how important it is to live up to the standards we have set ourselves.

The welding machine you have purchased is the result of years of **MIGATRONIC's** experience in the field of welding machine manufacture. This experience, combined with correct operation and maintenance of your machine, provides a guarantee of excellent performance in the years ahead.

Thank you for buying a **MIGATRONIC** machine.

## **MIGATRONIC A/S**

### **EC DECLARATION OF CONFORMITY**

MIGATRONIC A/S  
Aggersundvej 33  
9690 Fjerritslev  
Denmark

hereby declare that our machine as stated below

Type: NAVIGATOR  
as of: week 47 1995, step 4

conforms to directives 73/23/EEC and 89/336/EEC.

European Standards: EN60974-1  
EN50199

Issued in Fjerritslev on 20th November 1995.

Peter Roed  
Managing director

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## 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.
- 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).
- 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.

### **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).

### **Noise**

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

Use of the machine for other purposes than it is designed for (e.g. to unfreeze water pipes) is strongly deprecated. If 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 EN50199. 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).

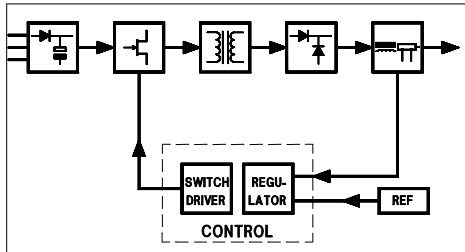
Methods of reducing electromagnetic emissions:

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.

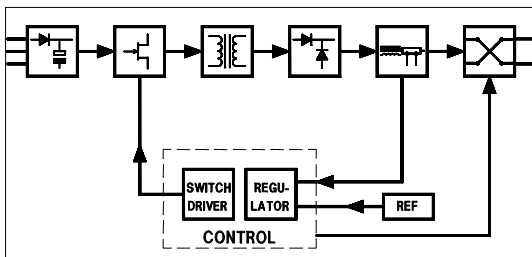
## GENERAL DESCRIPTION

The NAVIGATOR is a three-phase welding machine based on *inverter technology*.

### Block diagram NAVIGATOR DC



### Block diagram NAVIGATOR AC/DC



There are several versions of the machine: *MMA, TIG DC and TIG AC/DC*.

All versions are designed for welding with coated electrodes and are equipped with *Hot-start, Arc Power and Antifreeze*. In addition, all versions can be fitted with all types of remote control included in **MIGATRONIC's** standard range of accessories.

The TIG NAVIGATOR machine is also designed for TIG welding, and features functions such as:

- variable slope-down
- fixed gas pre-flow time
- variable gas post-flow time
- option of 2-times or 4-times operation
- LIFTIG
- HF-TIG
- current control from the TIG torch handle-remote control facility
- AC balance
- AC welding frequency
- Digital display

In LIFTIG ignition the TIG arc is ignited after making contact between the workpiece and the tungsten electrode, after which the trigger is activated and the arc established by lifting the electrode away from the workpiece.

In HF-TIG ignition the TIG arc is ignited without contact. A high-frequency (HF) impulse initiates the arc when the trigger is activated.

## INITIAL OPERATION

### Mains connection

After the mains cable has been connected, the machine is ready for use. Please note that connection must be made by an authorised electrician.

Once the mains supply cable has been connected then machine is ready for use. Please note that this connection must be made only by a qualified and authorised electrician.

As standard, machines are supplied for connection to a 3X400 V supply. However, machines with an auto-transformer unit can be connected to other voltages.

Connection is made by moving the wires on the top of the auto-transformer. All three phases have to be connected similarly and in accordance with the wiring diagram on the top of the auto-transformer unit and/or the circuit diagram on page 26. Only machines up to 400 A output can be supplied with an auto-transformer, and a 230V connection can only be used on machines of up to 320 A output.

*Warning:* When making input voltage connection it is essential that the machine is disconnected from the mains supply, as this work can be extremely dangerous because of the high voltages across the connection terminals.

Fuse and mains voltage - see the type plate and technical data.

### Configuration

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

### Connection of welding cables

Connect the welding cables to the front of the machine. Please note that the plug must be turned 45 degrees after inserting the cable into the socket - otherwise the plug can be damaged due to excessive contact resistance.

### Cooling liquid

Before the machine is switched on, the water-cooling module must be filled up with MIGATRONIC coolant. (This applies only to water-cooled machines).

### Use of the machine

During welding a heating of various components of the machine takes place and during breaks these components will cool down again. When using current settings above a set value, the machines need periods when they can cool down.

The length of these periods depends on the current setting and the machine should not be switched off in the meantime.

If the periods for cooling down during use of the machine are not sufficiently long, the overheating protection will automatically stop the welding process and the yellow light will come on.

The yellow light switches off when the machine has cooled down sufficiently and the machine is ready for welding. Max. load can be seen in the Technical data.

*Definition:*

60% max. load by welding means that a cooling period of 4 minutes is required after welding for 6 minutes at a current setting of the value of 60% variable intermittent duty; 10 minutes between start of each welding period must be calculated.

## INITIAL INSTRUCTIONS, BOX 1

### **General instructions for use**

All "parameters" are set by the use of only one control knob. These parameters include current, slope-up time, etc.

This control knob is positioned below a digital display which shows the value of the parameter being set. The unit of measurement of the parameter is shown at the right hand side of the digital display.

In order to display or adjust the parameters of a particular function, the keypad in the section concerned with that function is pressed repeatedly until the indicator light below or next to the relevant symbol is indicated by a bright light. Adjustment of setting is then made with the control knob.

Welding current is set by pressing keypad marked **A** and then using the control knob.

Welding parameters e.g. pulse frequency can be adjusted during the welding process.

Briefly: Keypads select the functions, the control knob sets the parameters.

### **Function selection**

As above, selection of a function, e.g. HF-TIG or LIFTIG, is by means of the keypad in the relevant section.

The function selected is indicated by a bright light below or next to the relevant symbol.

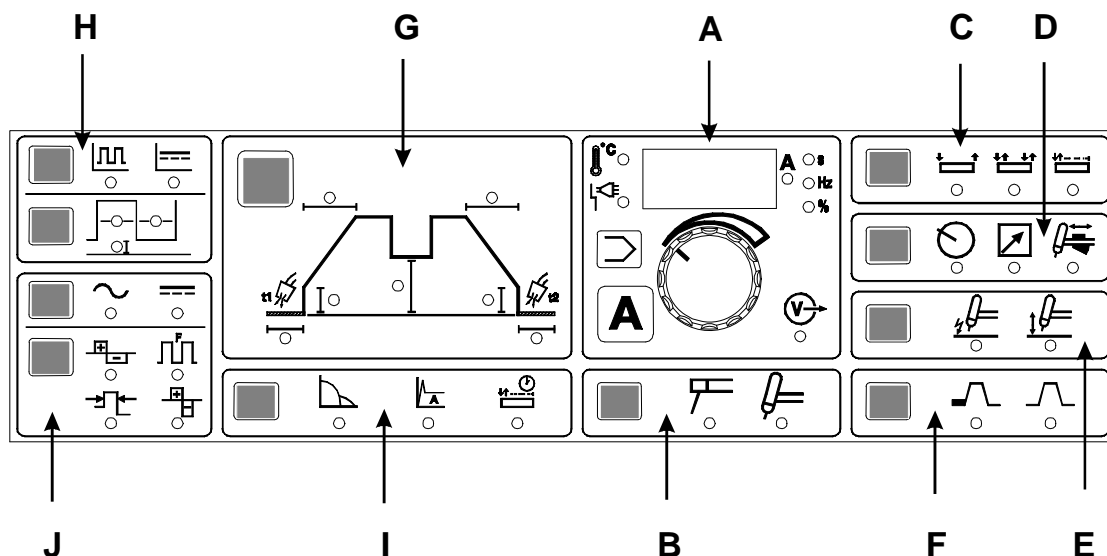
### **CHANGE OF FUNCTION SETTING IS NOT POSSIBLE DURING THE WELDING PROCESS.**

### **Storage of parameters**

The machine memorises all settings when the mains input voltage is switched off, thus ensuring that the same machine settings are available when the machine is switched on again.

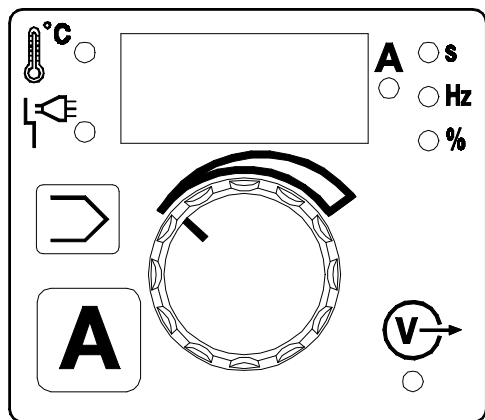
The exact adjustments in the two welding processes (MMA electrode and TIG) are stored as well so that shifting from one welding process to another does not require a new current setting.

# FUNCTION SELECTION AND PARAMETER SETTING



This chapter describes the operation of the machine in detail and includes references to the three different control panels illustrated at the end of the chapter.

## A



**Overheating**  
The overheating indicator is illuminated if welding is interrupted due to overheating of the machine. The indicator remains illuminated 3 seconds after the overheating error is removed.

**Mains error**  
The mains error indicator is illuminated if the mains voltage is too high or low. The indicator remains illuminated 3 seconds after the mains error is corrected/removed.

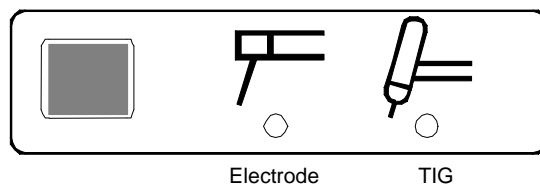
On pressing this keypad the control knob can be used to set the welding current.

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

Units of measurement of the parameter shown in the digital display.

**Setting of welding jobs**  
This function enables storage of often-used machine settings and shift from one complete setting to another. By pressing the keypad the display shows a "P" and a number: "1", "2" etc. Each number is a setting of all parameters and functions of the machine. It is therefore possible to have one setting for each welding job for which the machine is used. The control knob is used for shifting between these settings. During shifting it is possible to see both process and the other on/off-functions in each setting. Change of setting is not possible during the welding process. The setting selected is effected by releasing the keypad.

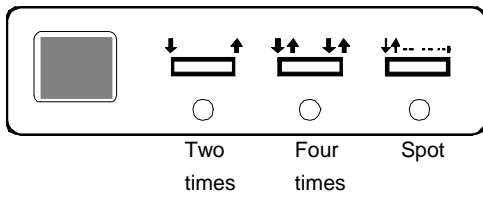
## B Welding process



This display is used to select the welding process to be used, e.g. MMA electrode or TIG.

## C

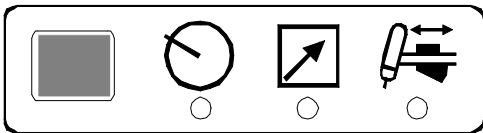
### The trigger method



This display is used to decide if the start/stop method of the TIG welding process is to be two-times, four-times (latching), or spot.

It is not possible to change to another method of trigger control during the welding process.

## D



### AMP Setting function

The AMP keypad is used to select the method by which the required welding current shall be established. This welding current is then shown in the digital display.

The three options are as follows:

#### D1



Internal

The control knob positioned below the digital display is used to set the current.

#### D2



External:

Current setting to be by means of a MIGATRONIC remote control unit. The remote control unit is connected to a plug positioned on the rear of the machine (not standard equipment).

#### D3



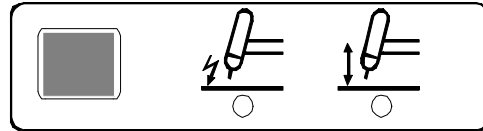
**Torch:**

Torch adjustment

Current setting to be by means of the current control knob located in the handle of a MIGATRONIC dialog torch, if a dialog torch is used.

With regard to torch handle current control, it should be noted the maximum current is set with the control knob on the front panel. The torch control is used to reduce the current from the maximum set current. The adjustment of the machine must not be at the maximum setting by low current. (From software version 2.20 it is only possible to adjust 100 Amp lower than maximum current).

## E



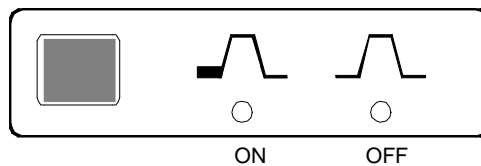
### HF

### LIFTIG

### Ignition of TIG welding

It is possible to choose between two different methods of ignition for TIG welding: High-frequency (HF) and Liftig ignition.

## F



### Pilot arc

Used only in the TIG welding process, a pilot arc is a weak arc which illuminates the workpiece, and thereby makes it easier to find the starting point of the actual welding process. The pilot arc function is 5% of the chosen welding current, but 5 A is set as a minimum.

The pilot arc can be ignited by briefly activating the torch switch (less than 0.3 seconds). If activation is longer, the machine switches automatically to ordinary welding.

Switch from pilot arc to ordinary welding by keeping the torch switch activated when two-times TIG welding, or by long activation (> 0.3 seconds) when four-times TIG or spot welding.

The welding process then continues in normal fashion, with current slope-up and current slope-down. However, after slope-down the machine does not switch directly to post-flow but to pilot arc again. This is true whether or not welding is initiated by the pilot arc.

It is now possible to continue with a new welding process by a lengthy activation of the torch switch (>0.3 seconds), or to go to standby automatically by a brief activation (<0.3 seconds).

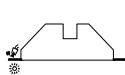
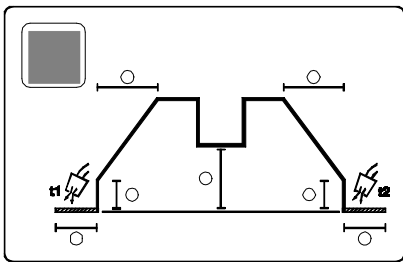
The machine will also go to standby automatically if the arc has been extinguished for more than 2 seconds.

To summarise, the pilot arc is switched on and off by brief activation of the torch switch, and actual welding is started and stopped by longer activation.



## G

The parameters that can be adjusted are illustrated in the figure below:



### Pre-flow

Pre-flow is the period of time for which gas flows after the torch switch is pressed and before the HF arc is established, or until the torch is lifted away from the workpiece in the LIFTIG process. Variable 0-10 secs.



### Start Amp

Immediately after the arc has been established, the machine regulates the welding current to the value stated in the Start Amp parameter. Start Amp is set as a percentage of the required welding current and is variable between 0-100% of the welding current with a minimum value of 5 amps.



### Slope-up

Once the arc has been established, the welding process enters a slope-up stage during which the welding current is increased in linear fashion from the value stated in the Start Amp parameter to the required welding current. The duration of this slope-up time is variable 0-10 secs.



### Slope-down

When welding has stopped by activating the trigger, the machine enters a slope-down stage. During this stage current is reduced from welding current to Stop Amp over a period of time called the slope-down time and variable 0-10 secs.



### Stop Amp

The slope-down stage is completed when the current level has fallen to the value stated in the Stop Amp parameter. Stop Amp is stated as a percentage of the required welding current and is variable between 0-100% of the welding current with a minimum value of 5 Amps.



### Post flow

Post-flow is the period of time for which gas flows after the arc is extinguished and is variable 3-20 secs.



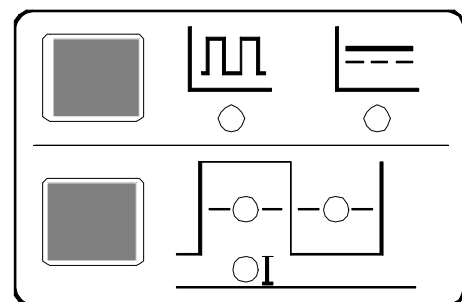
### Reduced current

When four-times welding a reduced current is activated by pressing the trigger briefly. This reduced current is set to a percentage value of the welding current and is variable between 0-100% of the welding current.

## H

### Pulse welding

This panel controls the setting of the conditions for pulse welding. The panel is divided into two sections: the upper section being used for the selection of the pulse welding function and the lower section for the setting of parameters.



It is not possible to introduce or discontinue the use of the pulse welding function during the actual welding process.



### Pulse:

Pulse welding function is operational.

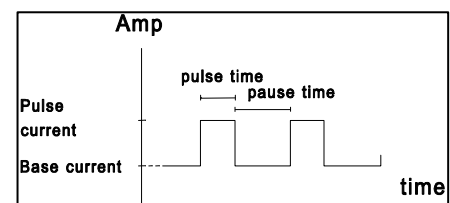


### No pulse:

Pulse welding function is not in operation and it is not possible to set pulse-welding parameters.

### Pulse parameters

If the pulse welding function is in use then it is possible to select and change the pulse parameters during the welding process. The importance of the pulse parameters can be seen from the illustration below.



 **Pulse time**

The pulse time reflects the time the machine is welding with the pulse current. The pulse current in the pulse frequency is the set welding current. Time is given in seconds.

 **Pause time**

The pause time reflects the time the machine is welding with base (background) current. Time is given in seconds.

 **Base amp**

Base (background) current is set as a percentage value between 1 and 100% of the current level set on the display (that is, pulse current), though it cannot be less than 5 Amps.

Note 1: If the pulse function is used during AC-welding the pulse times can be reduced in proportion to the AC frequency as the pulse frequency must be 5 times higher than the AC frequency. If the pulse times are too short the indicator for AC frequency will flash on and off for 5 seconds.

**I**

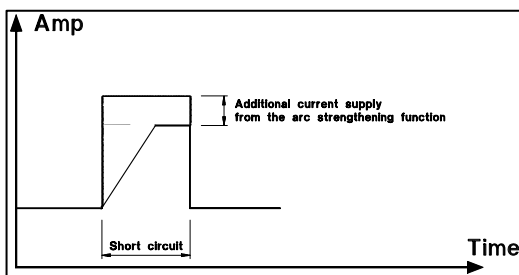
**Arc power** Used on the MMA welding process only, the arc power function is used to stabilise the arc.

**I1**



Arc power

This can be achieved by increasing welding current by a percentage value when metal droplets are short-circuited.



The additional current ceases when the short circuit is no longer present.

The arc power value is a percentage value, and can be set between 0 and 150% of the welding current setting.

E.g. if the welding current is set to 40 A and Arc power to 100% the additional current is 40 A equals 80 A when doing Arc power. If the Arc power is set to 150% the additional current is 60 A equals 100 A when doing Arc power.

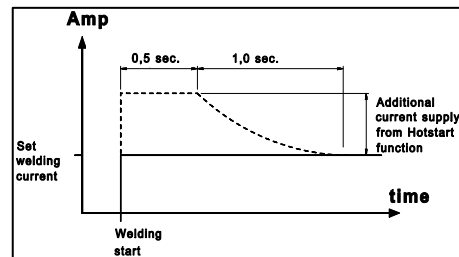
**I2**



Hot start

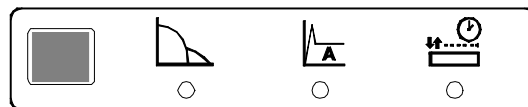
**Hot start** Hot start is a function that helps to establish the arc during MMA welding.

This can be achieved by increasing welding current (when the electrode is applied to the workpiece) by a certain percentage value in relation to the set value. This increased start amp is maintained for half a second, after which it decreases exponentially over a period of one second to the set value of welding current.



The hot start value reflects the percentage value by which initial current is increased, and can be set between 0% and 100%.

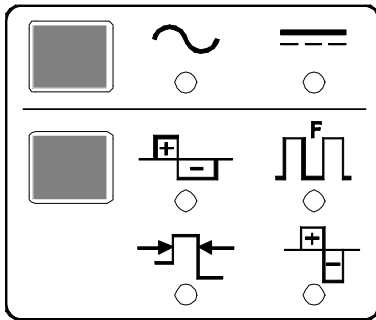
**I3**



Spot time

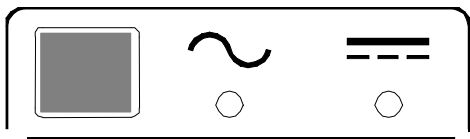
**Spot time** Spot time is the time for the production of a spot-weld and can only be used with the TIG process. Variable from 0-50.0 secs., the time includes any slope-up and slope-down times and can be set only after spot trigger mode has been selected on the TRIG keypad.

J



### AC-welding

This panel is divided into two sections, with the function current type at the top, and the setting of conditions for special AC-functions at the bottom.



### Current type

It is possible to select either AC (alternating current) or DC (direct current). In the TIG-welding process, AC is used for the welding of aluminium and its alloys, while DC is used for the welding of other materials. When TIG welding aluminium or its alloys the positive part of the AC-wave removes the oxide film covering the surface of the workpiece, and the negative part of the wave melts the material.

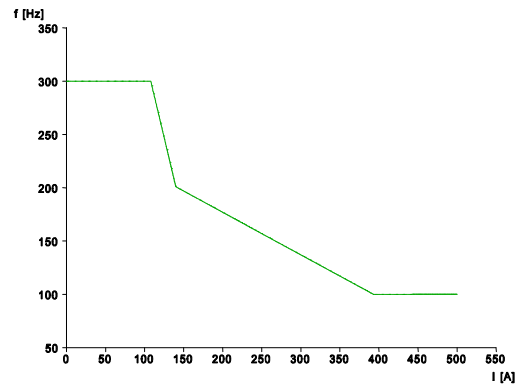


### AC frequency

The AC frequency can be adjusted from 1 to 300 Hz for TIG welding and from 1 to 100 Hz for MMA-welding. A low frequency during TIG welding increases the tendency for the formation of a large ball at the end of the tungsten electrode. This tendency will be reduced by increasing the frequency.

Note 2: The AC frequency and welding current cannot be adjusted to maximum simultaneously during TIG welding - see illustration below. When the limit is reached by adjusting the AC-frequency, the A-lamp will illuminate in "units for parameter" and the machine will reduce the AC frequency automatically.

Note 3: If the frequency limit is exceeded by adjustment of the welding current the AC frequency will be reduced automatically (the indicator for AC frequency flashes on and off for 5 sec.).



Note 4: If the pulse function is used during AC-welding the AC frequency can be reduced in proportion to the pulse times as the pulse frequency must be 5 times higher than the AC frequency. If the AC frequency is too low the indicators for pulse times will flash on and off for 5 seconds.

Note 5: **Pulse adjustment error:** If the pulse function is used during AC-welding an automatic adjustment of the pulse setting may occur. The indicators for pulse times will then flash on and off for 5 seconds. The pulse times change automatically so the pulse time and base time will be 0.03 seconds.



### Electrode preheating (TIG)

On ignition of the AC TIG pilot arc the tungsten electrode is preheated by a direct current with positive polarity. Preheating of an electrode is necessary before starting the AC welding process. The length of the preheat period depends on both the diameter of the electrode and the angle of the point of the electrode, as well as the size of the ball at the end of the electrode. Adjustment is possible from -9 to +9, with -9 being the minimum and +9 being the maximum preheat periods. If the period is too short the pilot arc will extinguish shortly after ignition. The size of the ball at the end of the electrode will increase if the pre-heat period is too long.



### AC-t-balance, based on time (TIG)

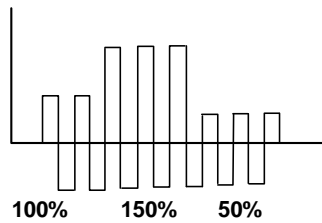
Adjustment of the refinement function during the AC TIG welding of aluminium and its alloys. The function is a balance based on time between the positive and negative halfperiod.

Adjustment is possible between 1 and 100 per cent as the statement in per cent is based on the negative part of the period time. Adjustment continues until a suitable refinement zone is established around the molten pool. When MMA welding the balance can be locked at 50 per cent which means that further regulation is impossible.



### AC-I-balance, based on current intensity (TIG)

The purpose of the function is also adjustment of the refinement zone during AC TIG welding.



However, this balance is based on the current intensity of the positive period proportional to the current intensity of the negative period. A reduction of the positive refinement current may have the effect that dwell time of the tungsten electrode improves.

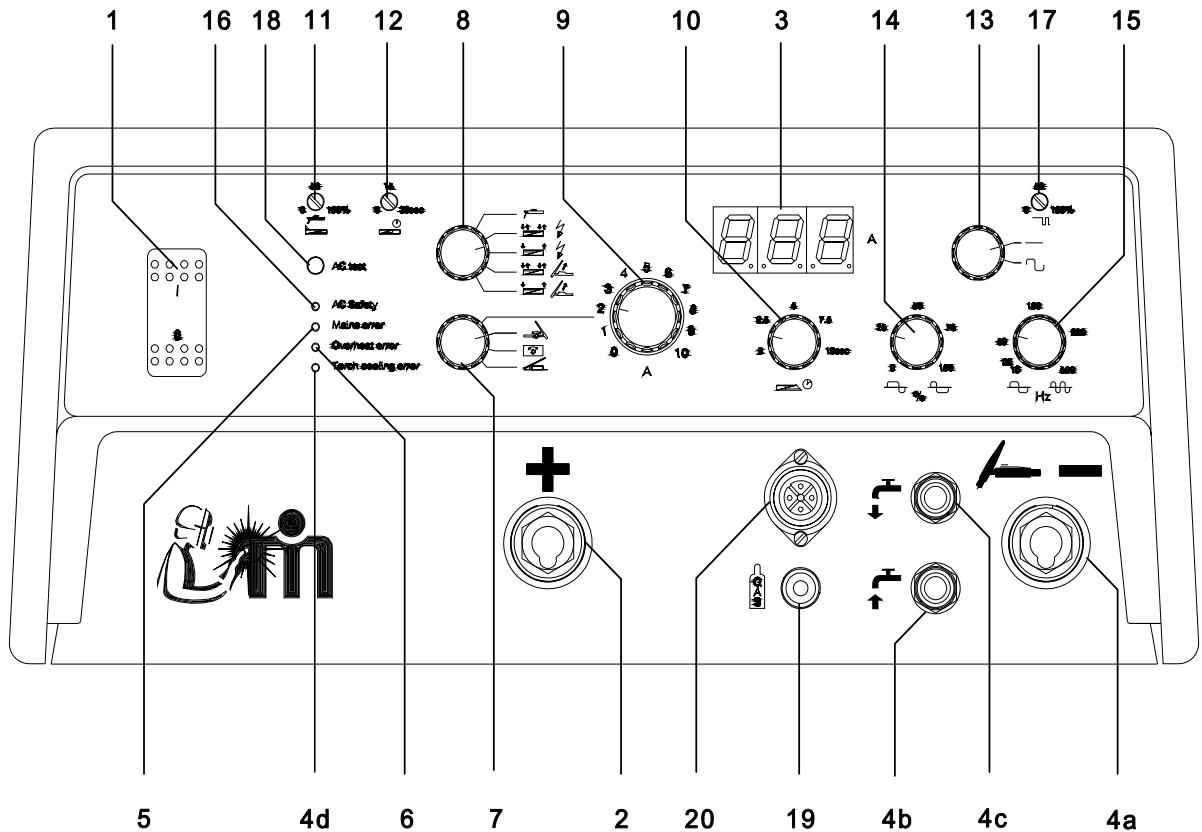
**TIG-DC**

It is also possible to weld in DC TIG with unalloyed tungsten electrodes (green marking). Current is set to AC and both AC-t-balance and AC-I-balance are set at 100 per cent. The machine will then establish the pilot arc by using the preheating function. After finishing the preheating period the welding current will be returned to negative polarity.

# INITIAL INSTRUCTIONS

## BOX 2, (TIG)

General



1. **Main switch**  
This control switches the machine on and off.
2. **Welding cable plug +**  
(MMA + TIG)
3. **Digital display**  
The control panel is fitted with a display which shows the welding current. At stand by the set welding current is shown. When welding the average welding current is shown. Please note that during 'START UP' and when error messages, for instance overheat, are displayed the digital readings may be displayed incorrectly.
- 4a. **Welding cable plug -**  
(MMA + TIG)
- 4b. **Torch cooling**  
Quick release for supply of cooling water for cooling of the welding torch.
- 4c. **Return water**  
Quick release for return of hot water to the water-cooling unit.
- 4d. **Cooling Error**  
Occurs if there is insufficient flow in the hose or if the water module lacks water.
5. **Mains error**  
*Cause:* Excessive or insufficient mains voltage.  
*Symptoms:* The welding stops. This error is indicated by the red light emitting diode and the words "Mains error".  
*Action:* Adjust mains voltage.
6. **Overheating error**  
*Cause:* Overheating of an inverter module due to incorrect use, or fault in inverter module.  
*Symptoms:* The welding process stops and post-flow is activated. This error is indicated by the yellow light emitting diode and the words "Overheating error". This LED switches off after 7 - 10 min. if the error is not corrected. When pressing the trigger, the LED switches on again.  
*Action:* If the error has not been caused by incorrect use, call in service staff.

## 7. INT/Torch control/EXT/Footswitch

This switch enables selection between internal/external or torch control of the welding current.

When in internal position, the current is set on the machine. When in external position, the current is set through a remote control.

Slope- up, pulse welding, welding with reduced current and slope-down are also possible through remote control.

When set at torch control, the maximum current will be determined by the machine's current setting. This means that torch control can be adjusted from the minimum current (5 A) to the level selected when setting the machine's current level.

Foot switch setting is used on when Migatronic FDF footswitch, part no. 78815009 is in use.

When using the MIGATRONIC FDF footswitch, part No. 78815010, the selector switch on the electronic box must be set to EXT (external control), and it should be noted that when used in the maximum current setting, the maximum current output obtainable will be between 210-280 Amps.

## 8. Trigger mode

During TIG welding this switch determines the function of the trigger on the TIG torch:

### *2-times:*

Start welding by pressing the trigger on the torch. Welding continues until the trigger is released again, after which adjustable slope-down is activated.

When activating the trigger once more, the machine returns to ordinary welding. Otherwise slope-down will continue for the set period, after which post-flow will start.

### *4-times:*

Welding starts the first time the trigger is activated, and it is not necessary to keep the trigger depressed. Adjustable slope-down is activated the next time the trigger is activated. If the trigger is released before slope-down time has elapsed, welding stops.

The HF generator is activated in position HF. This switch also enables selection between TIG and MMA welding. When switching from MMA to TIG welding, activate post-flow in order to fill the hose with gas.

## 9. Welding current

Use this knob to control welding current from min. 5 A to maximum welding current, as shown in the digital display (pos. 3).

## 10. Slope-down

TIG-function

When welding is stopped by activating the trigger, the machine starts a process of current reduction.

During this process the current is reduced from the set welding current to the minimum current (5 A). Slope-down time can be set between 0 and 10 seconds.

## 11. Hot-start

MMA-function

Hot-start is a function which can be used to help establish the arc when starting to weld. This can be achieved by increasing the initial current by a certain percentage in relation to the value set when the electrode is applied to the workpiece.

This increased initial current is reduced exponentially in relation to the welding current set within approx. 0.5 seconds. The hot-start value is the percentage value by which the initial current is increased, and can be set between 0 % and 100 %.

## 12. Post-flow

TIG-function

Gas post-flow time

The gas post-flow time is the time that elapses between switching off the arc and cutting off the gas supply. Gas post-flow time can be set between 0 and 30 seconds.

*The following functions only apply to AC/DC machines*

## 13. AC/DC-switch

Use this knob to switch between AC welding and DC welding.

## 14. Balance knob

With this knob the relation between cleaning and penetration when TIG welding aluminium can be adjusted. This is done by adjusting the positive and negative halfwaves. The setting area is 0-100%, thus allowing the possibility of reversed polarity.

## 15. Frequency knob

When AC welding the alternating current (AC) is infinitely variable from 10-500 Hz.

## 16. AC-safety

A green LED indicates that the AC safety circuit is activated. The AC safety circuit ensures that there is no AC voltage on the torch when the machine is on no-load voltage.

### 17. Preheating of TIG-electrodes

Before the AC cycle is initiated, the following adjustment should be made to set the positive ignition period. Traditionally, thin TIG electrodes require a low positive cycle and thick electrodes require a high positive cycle.

If ignition problems are experienced:

If the electrode burns away rapidly or if a bulb is formed on the tip of the electrode during ignition, the preheating should be decreased. If there are problems with arc ignition, the preheating period should be increased.

*The following values are recommended:*

<b>Electrode size</b>	<b>Preheating</b>
< 1,0 mm	0%
1,6 mm	20%
2,4 mm	40%
3,2 mm	60%
> 4,0 mm	80%

### 18. AC test

This trigger is used for testing of the AC safety circuit.

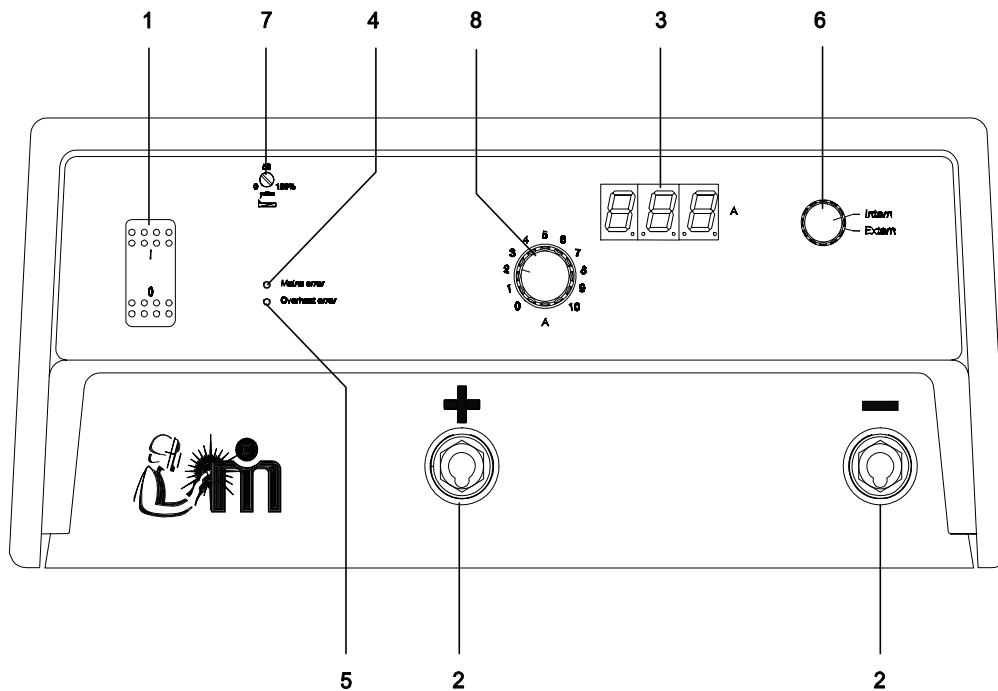
When the machine is set for MMA welding with AC, the LED (AC safety) lights continuously when the machine is on no-load voltage. If the trigger is activated, the LED will go out and remain so as long as the trigger is activated.

Should this not be the case, an authorised service technician should be called.

### 19. Gas connection

20. Plug for torch button, interactive control and coding of air/water-cooling.

# INITIAL INSTRUCTIONS BOX 3, (MMA)



## General

### 1. Main switch

This control switches the machine on and off.

### 2. Welding cable plug

### 3. Digital display

The control panel is fitted with a display which shows the welding current. At stand-by the set welding current is shown. When welding the average welding current is shown. Please note that during 'START UP' and when error messages, for instance overheat, are displayed the digital readings may be displayed incorrectly.

### 4. Mains error

**Cause:** Excessive or insufficient mains voltage.

**Symptoms:** The welding process stops. This error is indicated by the red light emitting diode and the words "Mains error".

**Action:** Adjust mains voltage.

### 5. Overheating error

**Cause:** Overheating of an inverter module due to incorrect use, or fault in the inverter module.

**Symptoms:** The welding process stops. This error is indicated by the yellow light emitting diode and the words "Overheating error". This LED switches off after 7 - 10 min. if the error is not corrected.

When pressing the trigger, the LED switches on again.

**Action:** If the error has not been caused by incorrect use, call in service staff.

### 6. INT/EXT control

This switch enables selection between internal/external control of the welding current. When in internal position, the current is set on the machine.

When in external position, the current is set through a remote control. Slope-up, pulse welding, welding with reduced current and slope-down are also possible through remote control.

### 7. Hot-start

MMA-function

Hot-start is a function which can be used to help establish the arc when starting to weld. This can be achieved by increasing the initial current by a certain percentage in relation to the set value, when the electrode is applied to the workpiece.

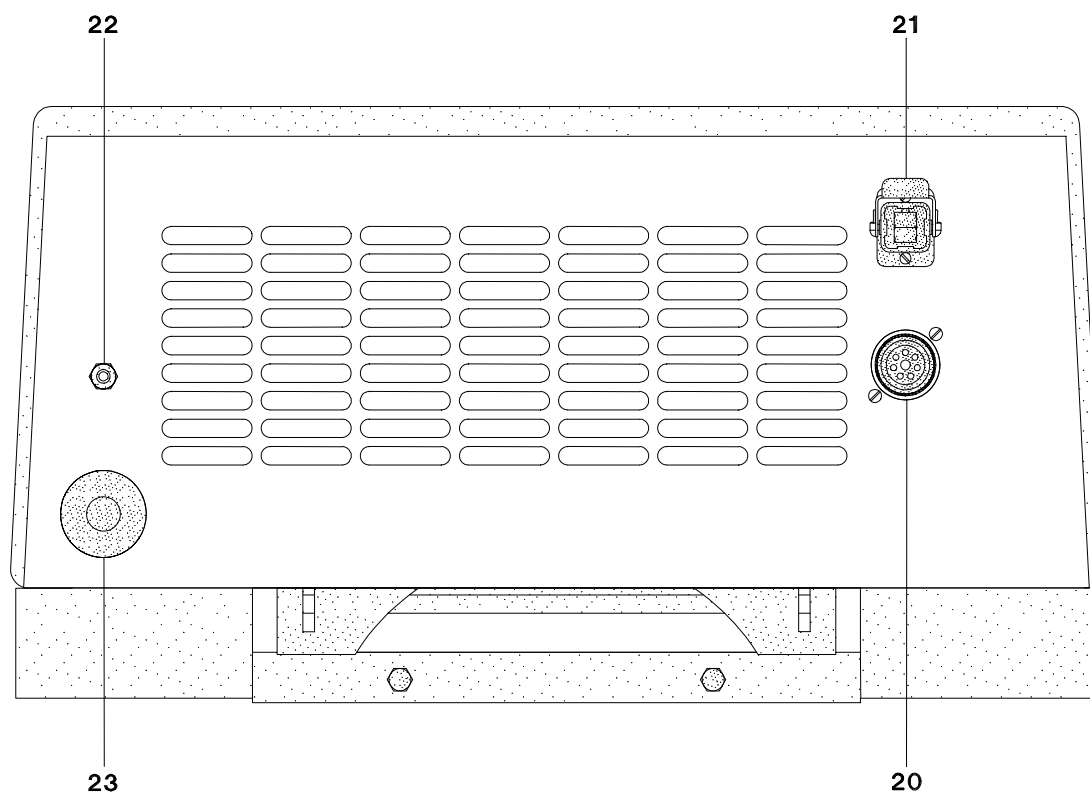
This increased initial current is reduced exponentially in relation to the set welding current within approx. 0.5 seconds. The hot-start value is the percentage value by which the initial current is increased, and can be set between 0 % and 100 %.

### 8. Welding current

Use this knob to control welding current from min. 5 A to maximum welding current, as shown in the digital display (pos. 3).



## INITIAL OPERATION TIG NAVIGATOR DC & AC/DC



- 20. Multiple plug, 8 pole**  
For connection of remote control.
- 21. Multiple plug, 6 pole**  
For connection of footswitch control.
- 22. Gas hose**
- 23. Mains cable**

# INITIAL OPERATION

## *Secondary errors during TIG welding*

### **Safety disconnection**

*Cause:* During 4-times trigger operation, welders sometimes start a welding sequence and then put the torch down by accident. In such circumstances the machine will retain voltage in the torch, and HF and the gas valve will remain active, which is dangerous for the welder concerned.

*Reaction:* If the arc is not initiated within 2 seconds, the welding cycle stops.

### **Torch lift**

*Cause:* During welding the welder may lift the TIG torch away from the workpiece by accident, which results in the extinction of the torch arc.

*Reaction:* The machine is initiated for 2 seconds, after which the welding cycle stops.

## *Fixed functions*

### **Antifreeze**

MMA function

During electrode welding, electrodes sometimes stick to the workpiece. The machine registers the fact that the electrode has stuck onto the workpiece, and will reduce the welding current to 5 A. This leads to the hardening of the pool crater, and the electrode can then be broken off. Welding can then be resumed in normal fashion.

### **Arc Power**

MMA function

The arc power function is used to stabilise the arc during electrode welding. This can be achieved by increasing the welding current during short-circuits. This function is only available when using coated electrodes.

### **Pre-flow**

TIG function - Gas pre-flow time

The gas pre-flow time is the time that elapses between the activation of the torch trigger (which establishes a gas supply) and the establishment of the welding current.

## FAULT IDENTIFICATION

### **Overheating error**

Welding is interrupted due to overheating if the machine is used beyond the specifications mentioned in chapter "Technical Data". The machine must remain turned on and connected to the mains supply as the fan continues until the machine has been sufficiently cooled. Thereafter, the machine is automatically switched in.

An overheating error is more oftenly seen if the machine is used in surroundings with temperatures above 40°C. It is not recommendable to place the machine in direct sun light as this increases the possibility of an overheating of the machine.

### **Mains error**

The mains error arises if the mains voltage is too high or low.

Please make sure that the mains plug is correctly mounted and that all fuses are intact. Moreover, please control that the mains voltage does not exceed the technical specifications and that there are no short-term voltage drops or voltage peaks.

### **Torch cooling error**

This error can be seen by the text "Etc" in the machine display. Turn off the machine if the cooling water does not flow in the water-cooled torch. Make sure that all hoses have a free passage, see chapter "maintenance". Turn on the machine again when a free passage has been established. Welding can then be continued.

### **Other errors shown in the display:**

If other errors arise than those described above, please contact the MIGATRONIC service department.

## MAINTENANCE

Insufficient maintenance may result in reduced operational reliability and in lapse of guarantee.

The NAVIGATOR welding machines require virtually no maintenance. However, exposure to extremely dusty, damp or corrosive air is damaging to welding machines.

### **Periodically maintenance**

In order to prevent problems arising, the following procedure should be observed at least once a year or as required.

- disconnect the machine from the mains supply and wait 2 minutes before removing the front panels.
- clean the fan blades and the components in the cooling pipe with clean, dry, compressed air.
- drain the cooling liquid out of the cooling module and welding hoses. Remove dirt and flush with pure water in the tank and cooling hoses. Fill up with new cooling liquid. The machine is delivered with cooling liquid.

## TECHNICAL DATA

Power source	TIG 240 AC/DC	TIG 240 AC/DC Changeable	TIG 240 MMA
Mains voltage	3x400 V	3x230 V - 25 A 3x400 V - 16 A 3x440 V - 16 A 3x500 V - 10 A	3x400 V
Fuse, slow	16 A		16 A
Consumption, max.	11.7 KVA	11.7 KVA	11.7 KVA
Efficiency	0.85	0.85	0.85
Current range DC	5 - 240 A	5 - 240 A	5 - 240 A
Current range AC	5 - 240 A	5 - 240 A	-
Duty cycle 100%	160 A	160 A	160 A
Duty cycle 75%			
Duty cycle 60%	190 A	190 A	190 A
Duty cycle 30%	240 A	240 A	240 A
Open circuit voltage DC	85 V	85 V	85 V
Max. arc voltage by max. load	44 V	44 V	46 V
Electrode diameter	1.6 - 4 mm	1.6 - 4 mm	1.6 - 4 mm
<sup>1</sup> Sphere of application	S	S	S
<sup>2</sup> Protection class	IP 23	IP 23	IP 23
Standard	EN60974-1 EN50199	EN60974-1 EN50199	EN60974-1 EN50199
<b>Control:</b>	<b>Box 1</b>		<b>Box 2</b>
Anti-stick	5 A		5 A
Pilot arc	4 %, min. 5 A		4 %, min. 5 A
Arc power	0 - 150 %		fixed
Hot-start	0 - 100 %		0 - 100 %
Pulse time	0,01 - 10 secs		-
Pause time	0,01 - 10 secs		-
Base current	1 - 99 %, min. 5 A		-
Gas pre-flow	0 - 10 secs		0.2 sec. (fixed)
Gas post-flow	3 - 20 secs		0 - 30 secs
Slope-up	0 - 10 secs		-
Slope-down	0 - 10 secs		0 - 10 secs
Reduced current	0 - 100 %, min 5 A		-
AC-t-balance, based on time (TIG)	1 - 100 %		0 - 100 %
AC-I-balance, based on current intensity (TIG)	1 - 100%, min 5 A		-
AC frequency (TIG)	1 - 300 Hz		10 - 500 Hz
AC frequency (MMA)	1 - 100 Hz		-
Starting current	0 - 100 %, min. 5 A		-
Stop current	0 - 100 %, min. 5 A		-
Spot welding time	0,1 - 50 secs		-
Dimensions	1050x480x300 mm	1050x480x300 mm	1050x480x300 mm
Weight	81 kg	111 kg	71 kg

<sup>1</sup> S The machine meets the standards which are demanded of machines working in areas where there is an increased risk of electric shock

<sup>2</sup> Equipment marked **IP23** is designed for indoor and outdoor applications

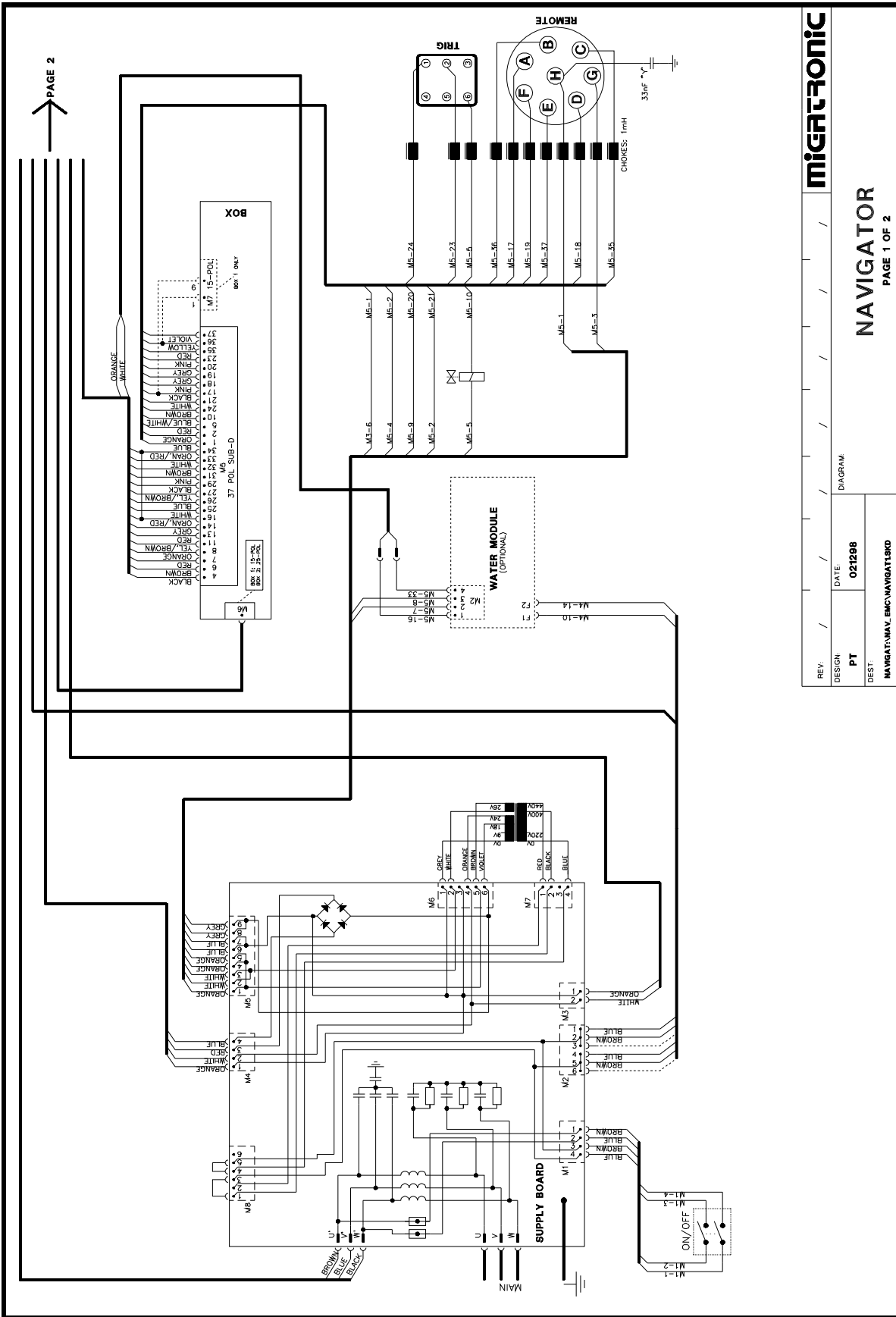
## TECHNICAL DATA

Power source	TIG 320 DC	TIG 320 DC Changeable	TIG 320 MMA
Mains voltage	3x400 V	3x230 V - 50 A 3x400 V - 25 A 3x440 V - 20 A 3x500 V - 20 A	3x400 V
Fuse, slow	25 A		25 A
Consumption, max.	16.0 KVA	16.0 KVA	16.0 KVA
Efficiency	0.85	0.85	0.85
Current range DC	5 - 320 A	5 - 320 A	5 - 320 A
Current range AC	-	-	-
Duty cycle 100%	290 A	290 A	290 A
Duty cycle 75%	320 A	320 A	320 A
Duty cycle 60%			
Duty cycle 30%			
Open circuit voltage DC	85 V	85 V	85 V
Max. arc voltage by max. load	46 V	46 V	46 V
Electrode diameter	1.6 - 5 mm	1.6 - 5 mm	1.6 - 5 mm
<sup>1</sup> Sphere of application	S	S	S
<sup>2</sup> Protection class	IP 23	IP 23	IP 23
Standard	EN60974-1 EN50199	EN60974-1 EN50199	EN60974-1 EN50199
<b>Control:</b>	<b>Box 1</b>	<b>Box 2</b>	
Anti-stick	5 A	5 A	
Pilot arc	4 %, min. 5 A	4 %, min. 5 A	
Arc power	0 - 150 %	fixed	
Hot-start	0 - 100 %	0 - 100 %	
Pulse time	0,01 - 10 secs	-	
Pause time	0,01 - 10 secs	-	
Base current	1 - 99 %, min. 5 A	-	
Gas pre-flow	0 - 10 secs	0.2 sec. (fixed)	
Gas post-flow	3 - 20 secs	0 - 30 secs	
Slope-up	0 - 10 secs	-	
Slope-down	0 - 10 secs	0 - 10 secs	
Reduced current	0 - 100 %, min 5 A	-	
AC-t-balance, based on time (TIG)	1 - 100 %	0 - 100 %	
AC-I-balance, based on current intensity (TIG)	1 - 100%, min 5 A	-	
AC frequency (TIG)	1 - 300 Hz	10 - 500 Hz	
AC frequency (MMA)	1 - 100 Hz	-	
Starting current	0 - 100 %, min. 5 A	-	
Stop current	0 - 100 %, min. 5 A	-	
Spot welding time	0,1 - 50 secs	-	
Dimensions	1050x480x300 mm	1050x480x300 mm	1050x480x300 mm
Weight	88 kg	118 kg	88 kg

<sup>1</sup> S The machine meets the standards which are demanded of machines working in areas where there is an increased risk of electric shock

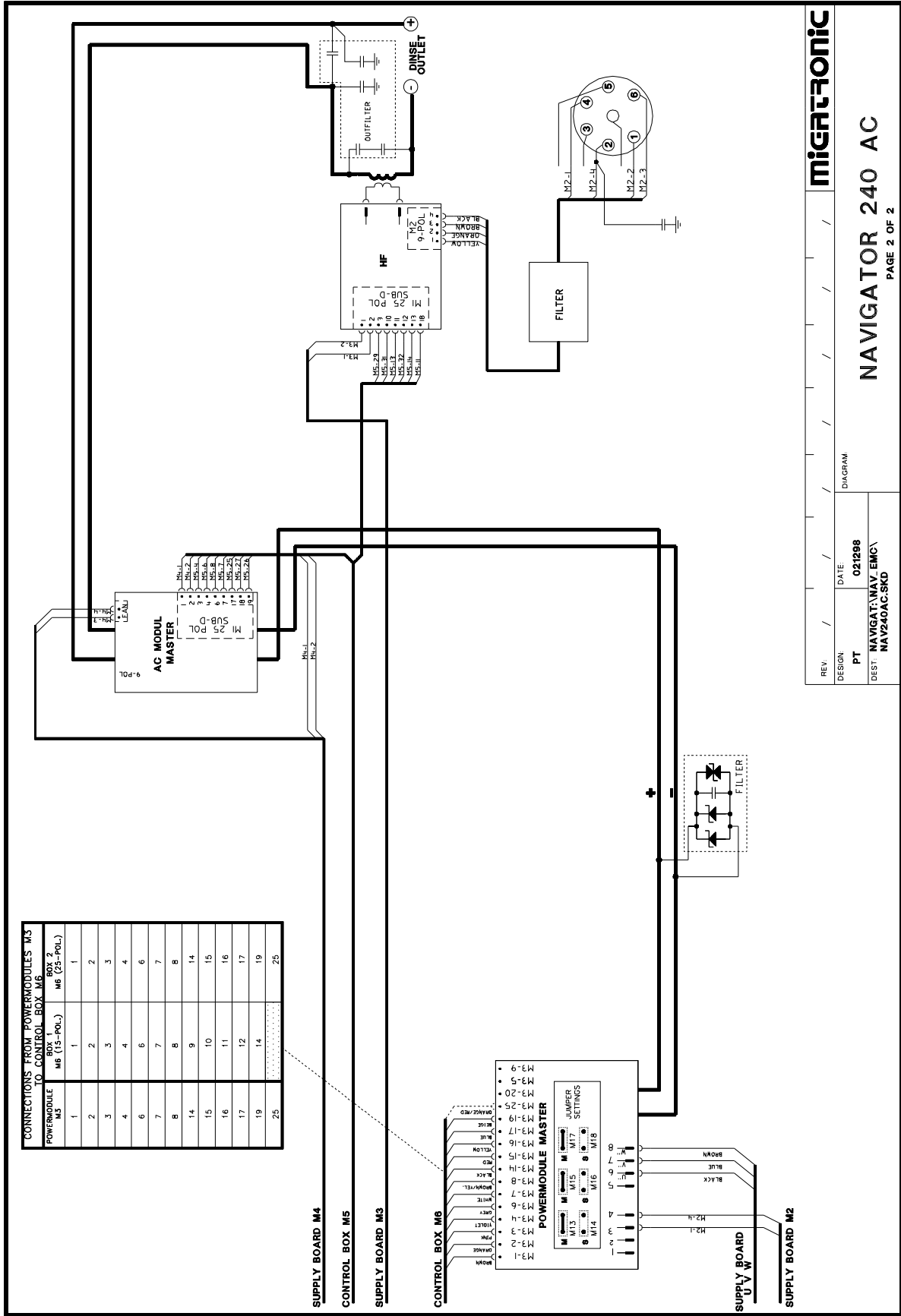
<sup>2</sup> Equipment marked **IP23** is designed for indoor and outdoor applications

# CIRCUIT DIAGRAM NAVIGATOR



<b>MIGATRONIC</b>	
REV. /	DATE /
DESIGN /	DIAGRAM /
<b>PT</b>	<b>021298</b>
DEST	NAVGAT.WAX.EMC.NAVIGATLKD
<b>NAVIGATOR</b>	
PAGE 1 OF 2	

# CIRCUIT DIAGRAM NAVIGATOR 240 AC/DC



**MICRATRONIC**

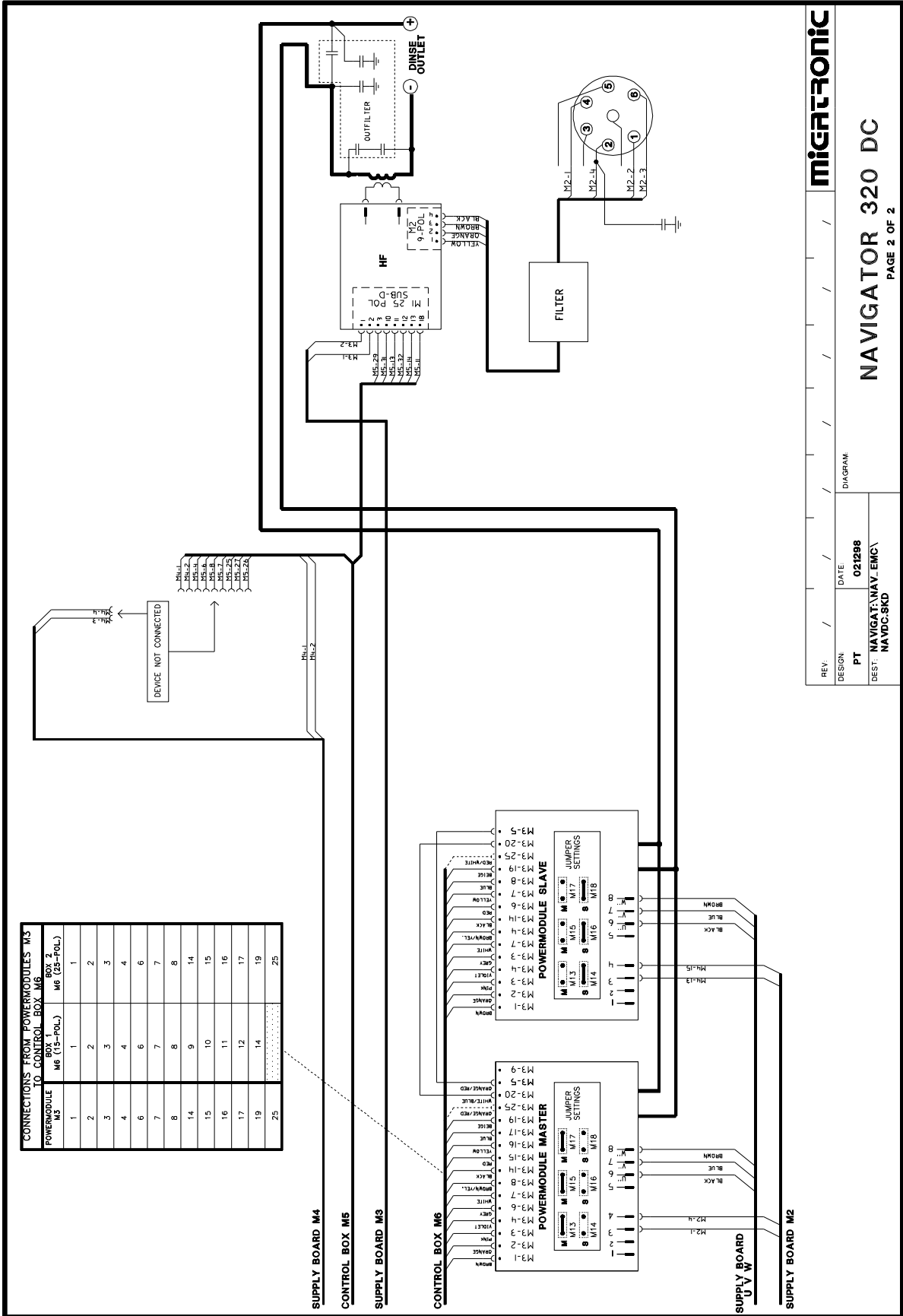
**NAVIGATOR 240 AC**  
PAGE 2 OF 2

REV /	DESIGN /	DATE /	DIAGRAM /
PT	021298		
DEST	NAVIGAT:NAV.EMIC\ NAV240AC:SKD		



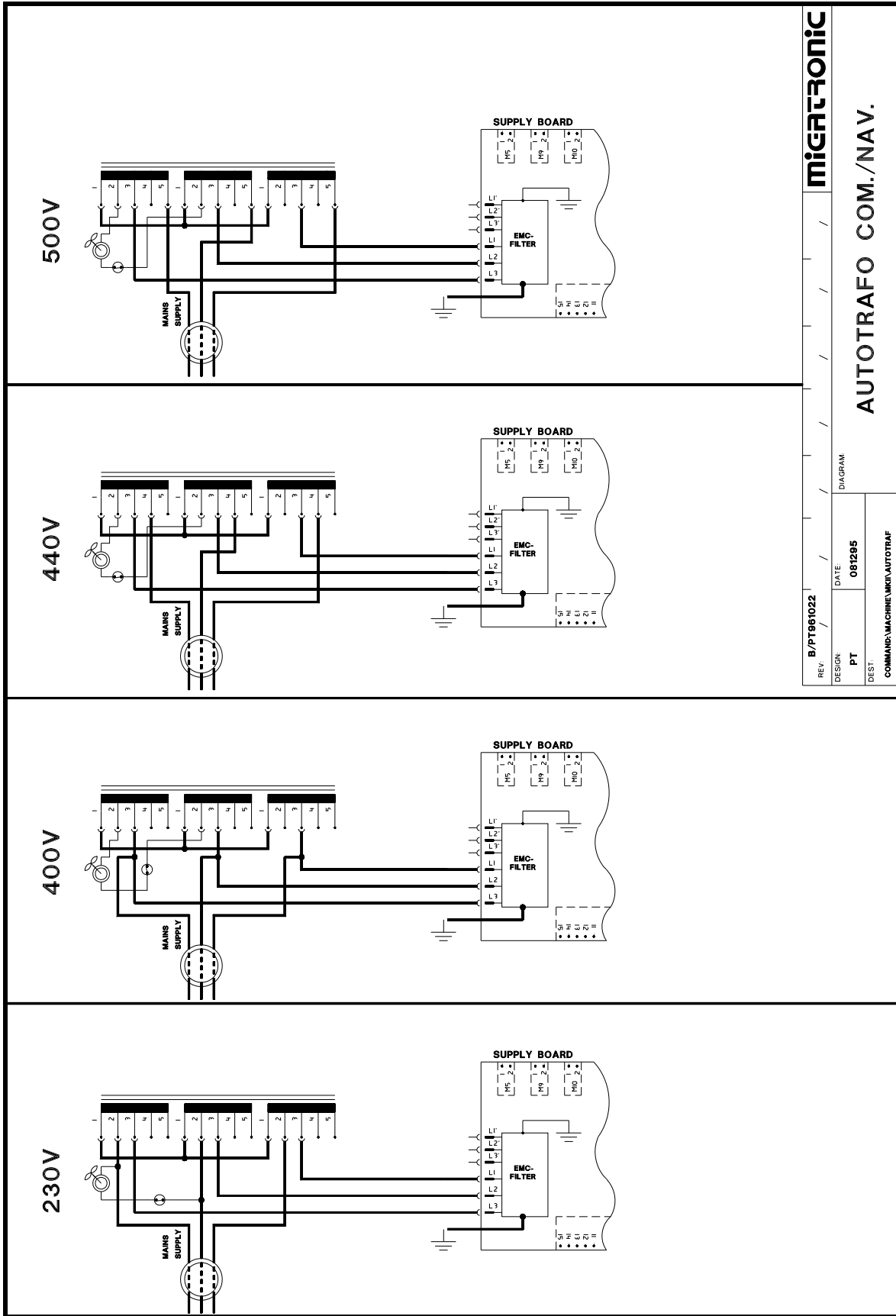


# CIRCUIT DIAGRAM NAVIGATOR 320 DC



REV. /	DATE / /	DIAGRAM	<b>MICRATRONIC</b>
DESIGN	PT	021298	
DEST. NAVIGAT./NAV.EMC\			
NAVIGATOR 320 DC			
PAGE 2 OF 2			

# CIRCUIT DIAGRAM AUTOTRAFO

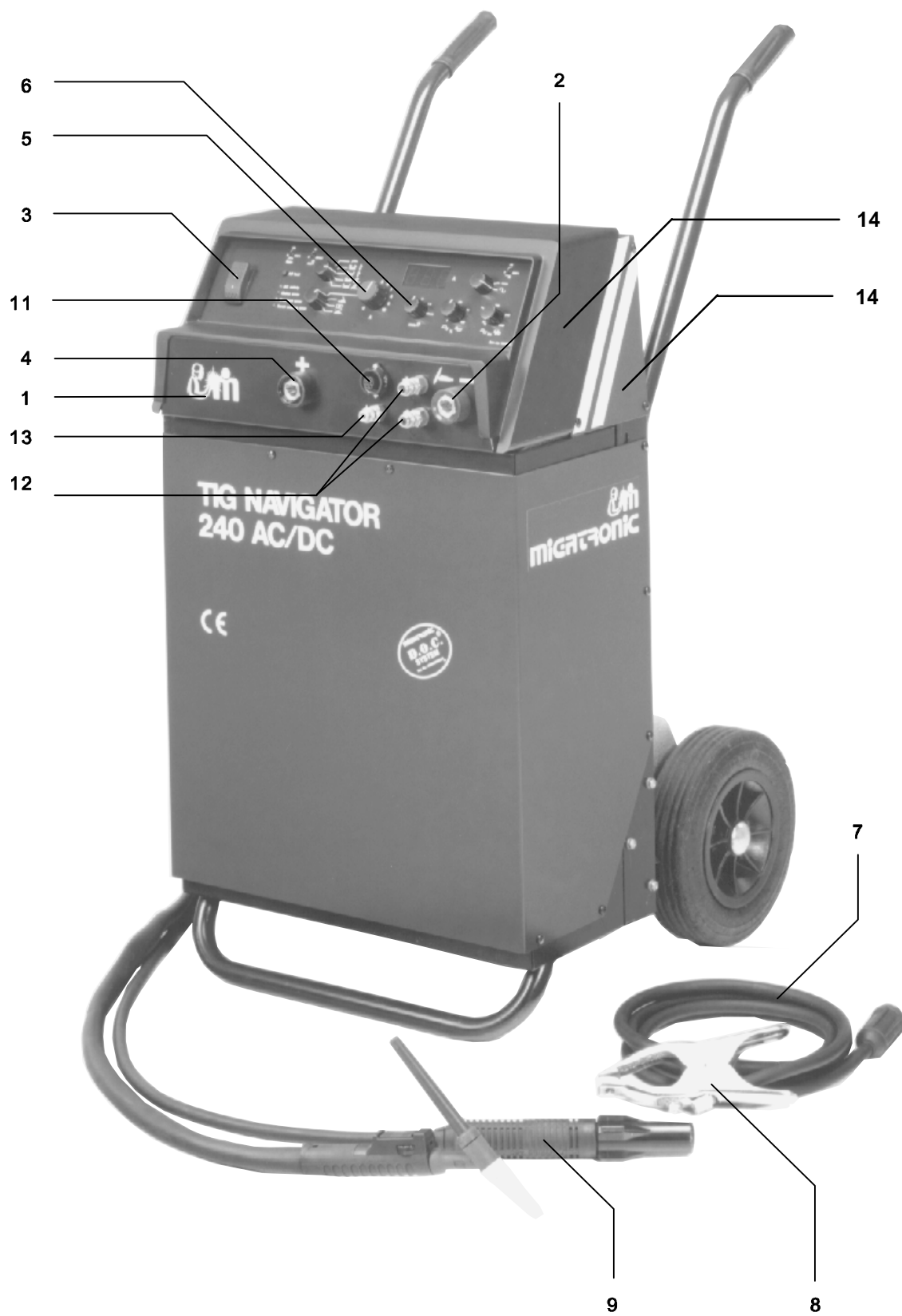


REV: B/PT961022	/ / / / / / / / / /	<b>micrETronic</b>	
DESIGN: PT	DIAGRAM	<b>AUTOTRAFO COM./NAV.</b>	
DATE: 081295			
DEST: COMMAND/MACHINE/NAV/AUTOTRAF			

**Reservedelsliste**  
**Spare parts list**  
**Ersatzteilliste**  
**Liste des pièces de rechange**

**NAVIGATOR**

# NAVIGATOR

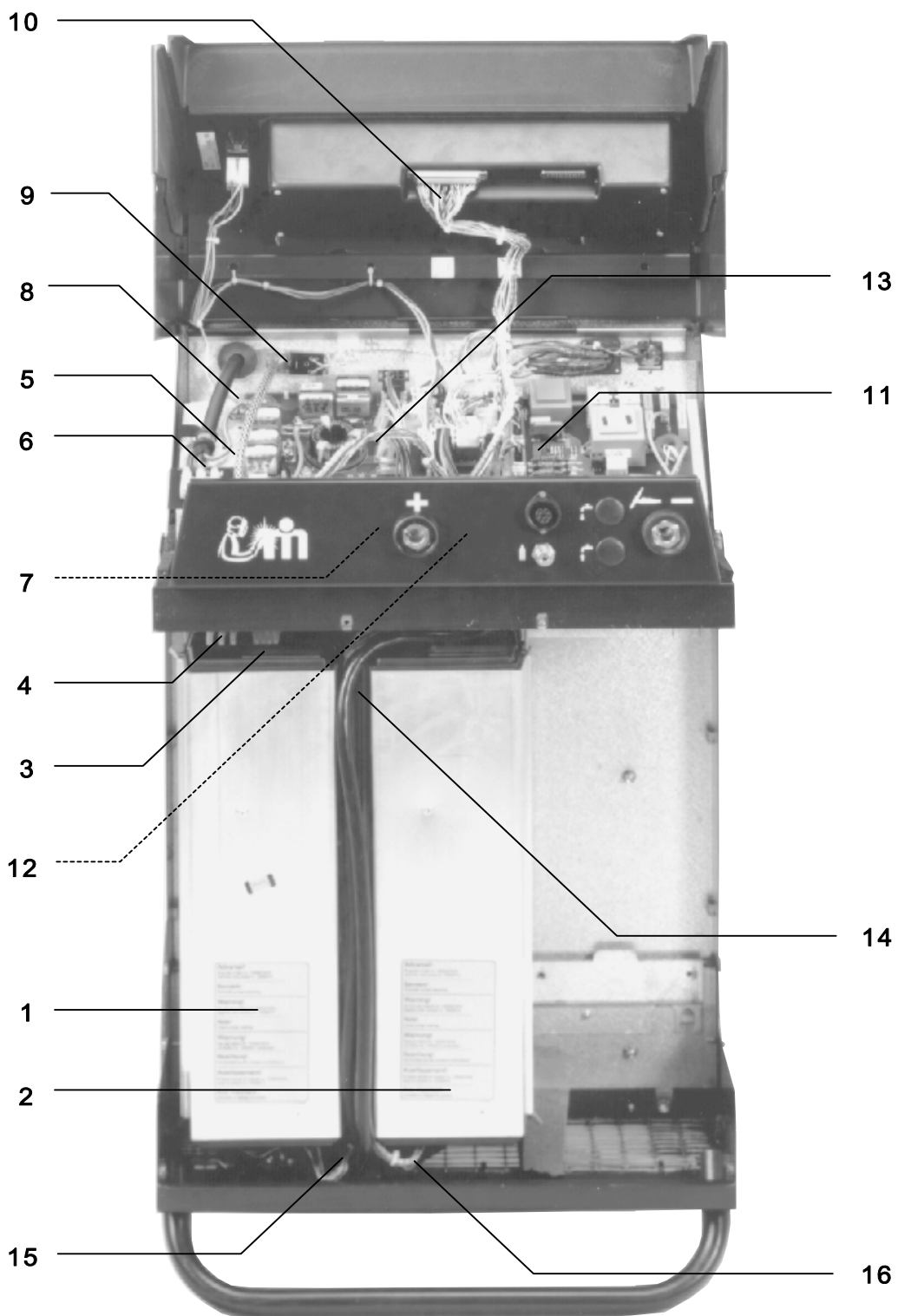


# NAVIGATOR

Pos. No.	Varebetegnelse Warenbezeichnung	Description of goods Désignation des pièces
1	61119193* Tilslutningspanel Anschlußpanel	Connection panel Panneau raccordement
2	18110008 TIG-tilslutning kpl. WIG-Anschluß	TIG-connection Connexion de TIG
3	17110011 Netafbryder Ein-/Ausschalter	Main switch Commutateur
4	18110002 Dinsebøsning Dinsebuchse	Dinse coupling socket Douille de raccordement, type Dinse
5a	18502605 Knap ø28 Knopf ø28	Button ø28 Bouton ø28
5b	18521305 Dæksel for knap ø28 Deckel für den Knopf ø28	Cover for button ø28 Couvercle de bouton ø28
6	18508003 Knap ø21.5 Knopf ø21.5	Button ø21.5 Bouton ø21.5
7	80503503 Stelkabel 3m, 35mm <sup>2</sup> , NAVIGATOR 240 Massekabel 3m, 35mm <sup>2</sup> , NAVIGATOR 240	Earth cable 3m, 35mm <sup>2</sup> , NAVIGATOR 240 Câble de mise à la terre 3m, 35mm <sup>2</sup> , NAVIGATOR 240
7	80503506 Stelkabel 6m, 35mm <sup>2</sup> , NAVIGATOR 240 Massekabel 6m, 35mm <sup>2</sup> , NAVIGATOR 240	Earth cable 6m, 35mm <sup>2</sup> , NAVIGATOR 240 Câble de mise à la terre 6m, 35mm <sup>2</sup> , NAVIGATOR 240
7	80503510 Stelkabel 10m, 35mm <sup>2</sup> , NAVIGATOR 240 Massekabel 10m, 35mm <sup>2</sup> , NAVIGATOR 240	Earth cable 10m, 35mm <sup>2</sup> , NAVIGATOR 240 Câble de mise à la terre 10m, 35mm <sup>2</sup> , NAVIGATOR 240
7	80505003 Stelkabel 3m, 50mm <sup>2</sup> , NAVIGATOR 320 Massekabel 3m, 50mm <sup>2</sup> , NAVIGATOR 320	Earth cable 3m, 50mm <sup>2</sup> , NAVIGATOR 320 Câble de mise à la terre 3m, 50mm <sup>2</sup> , NAVIGATOR 320
7	80505006 Stelkabel 6m, 50mm <sup>2</sup> , NAVIGATOR 320 Massekabel 6m, 50mm <sup>2</sup> , NAVIGATOR 320	Earth cable 6m, 50mm <sup>2</sup> , NAVIGATOR 320 Câble de mise à la terre 6m, 50mm <sup>2</sup> , NAVIGATOR 320
7	80505010 Stelkabel 10m, 50mm <sup>2</sup> , NAVIGATOR 320 Massekabel 10m, 50mm <sup>2</sup> , NAVIGATOR 320	Earth cable 10m, 50mm <sup>2</sup> , NAVIGATOR 320 Câble de mise à la terre 10m, 50mm <sup>2</sup> , NAVIGATOR 320
7	80507003 Stelkabel 3m, 70mm <sup>2</sup> , NAVIGATOR 320 Massekabel 3m, 70mm <sup>2</sup> , NAVIGATOR 320	Earth cable 3m, 70mm <sup>2</sup> , NAVIGATOR 320 Câble de mise à la terre 3m, 70mm <sup>2</sup> , NAVIGATOR 320
7	80507006 Stelkabel 6m, 70mm <sup>2</sup> , NAVIGATOR 320 Massekabel 6m, 70mm <sup>2</sup> , NAVIGATOR 320	Earth cable 6m, 70mm <sup>2</sup> , NAVIGATOR 320 Câble de mise à la terre 6m, 70mm <sup>2</sup> , NAVIGATOR 320
8	80560002 Stelklemme 250A, 35mm <sup>2</sup> , 50mm <sup>2</sup> Masseklemme 250A, 35mm <sup>2</sup> , 50mm <sup>2</sup>	Earth clamp 250A, 35mm <sup>2</sup> , 50mm <sup>2</sup> Prise de masse 250A, 35mm <sup>2</sup> , 50mm <sup>2</sup>
8	80560009 Stelklemme 600A, 70mm <sup>2</sup> Masseklemme 600A, 70mm <sup>2</sup>	Earth clamp 600A, 70mm <sup>2</sup> Prise de masse 600A, 70mm <sup>2</sup>
9	80513503 Elektrodekabel 3m, 35mm <sup>2</sup> , NAVIGATOR 240 Elektrodenkabel 3m, 35mm <sup>2</sup> , NAVIGATOR 240	Electrode cable 3m, 35mm <sup>2</sup> , NAVIGATOR 240 Câble pince électrode 3m, 35mm <sup>2</sup> , NAVIGATOR 240
9	80513505 Elektrodekabel 5m, 35mm <sup>2</sup> , NAVIGATOR 240 Elektrodenkabel 5m, 35mm <sup>2</sup> , NAVIGATOR 240	Electrode cable 5m, 35mm <sup>2</sup> , NAVIGATOR 240 Câble pince électrode 5m, 35mm <sup>2</sup> , NAVIGATOR 240
9	80513510 Elektrodekabel 10m, 35mm <sup>2</sup> , NAVIGATOR 240 Elektrodenkabel 10m, 35mm <sup>2</sup> , NAVIGATOR 240	Electrode cable 10m, 35mm <sup>2</sup> , NAVIGATOR 240 Câble pince électrode 10m, 35mm <sup>2</sup> , NAVIGATOR 240
9	80515003 Elektrodekabel 3m, 50mm <sup>2</sup> , NAVIGATOR 320 Elektrodenkabel 3m, 50mm <sup>2</sup> , NAVIGATOR 320	Electrode cable 3m, 50mm <sup>2</sup> , NAVIGATOR 320 Câble pince électrode 3m, 50mm <sup>2</sup> , NAVIGATOR 320
9	80515005 Elektrodekabel 5m, 50mm <sup>2</sup> , NAVIGATOR 320 Elektrodenkabel 5m, 50mm <sup>2</sup> , NAVIGATOR 320	Electrode cable 5m, 50mm <sup>2</sup> , NAVIGATOR 320 Câble pince électrode 5m, 50mm <sup>2</sup> , NAVIGATOR 320
9	80515010 Elektrodekabel 10m, 50mm <sup>2</sup> , NAVIGATOR 320 Elektrodenkabel 10m, 50mm <sup>2</sup> , NAVIGATOR 320	Electrode cable 10m, 50mm <sup>2</sup> , NAVIGATOR 320 Câble pince électrode 10m, 50mm <sup>2</sup> , NAVIGATOR 320
9	80517003 Elektrodekabel 3m, 70mm <sup>2</sup> , NAVIGATOR 320 Elektrodenkabel 3m, 70mm <sup>2</sup> , NAVIGATOR 320	Electrode cable 3m, 70mm <sup>2</sup> , NAVIGATOR 320 Câble pince électrode 3m, 70mm <sup>2</sup> , NAVIGATOR 320
9	80517006 Elektrodekabel 6m, 70mm <sup>2</sup> , NAVIGATOR 320 Elektrodenkabel 6m, 70mm <sup>2</sup> , NAVIGATOR 320	Electrode cable 6m, 70mm <sup>2</sup> , NAVIGATOR 320 Câble pince électrode 6m, 70mm <sup>2</sup> , NAVIGATOR 320
11	74470908* Ledningssæt, tast Kabelbaum, Taste	Wire harness, button Jeu de câble, gâchette
12	43129007* Lynkoblingssæt rød/blå m/ventil, 8mm Anschlußsatz rot/blau mit Ventil, 8mm	Quick adaptor set red/blue with valve, 8mm Jeu d'accouplement rapide rouge/bleu avec valve, 8mm
13	43120007 Lynkobling gas, ø5mm Schnellkupplung Gas, ø5mm	Quick clutch gas, ø5mm Unité d'accouplement rapide gaz, ø5mm
14	72220001 Komplet låg med front Kompletter Deckel mit Vorderseite	Complete Cover with front Couvercle complet avec face
14	45050174 Front Front	Front plate Pièce avant
14	70210351 Låg Deckel	Cover Couvercle

\* Se sidste side/See last page/Siehe letzte Seite/Voir la dernière page

# NAVIGATOR

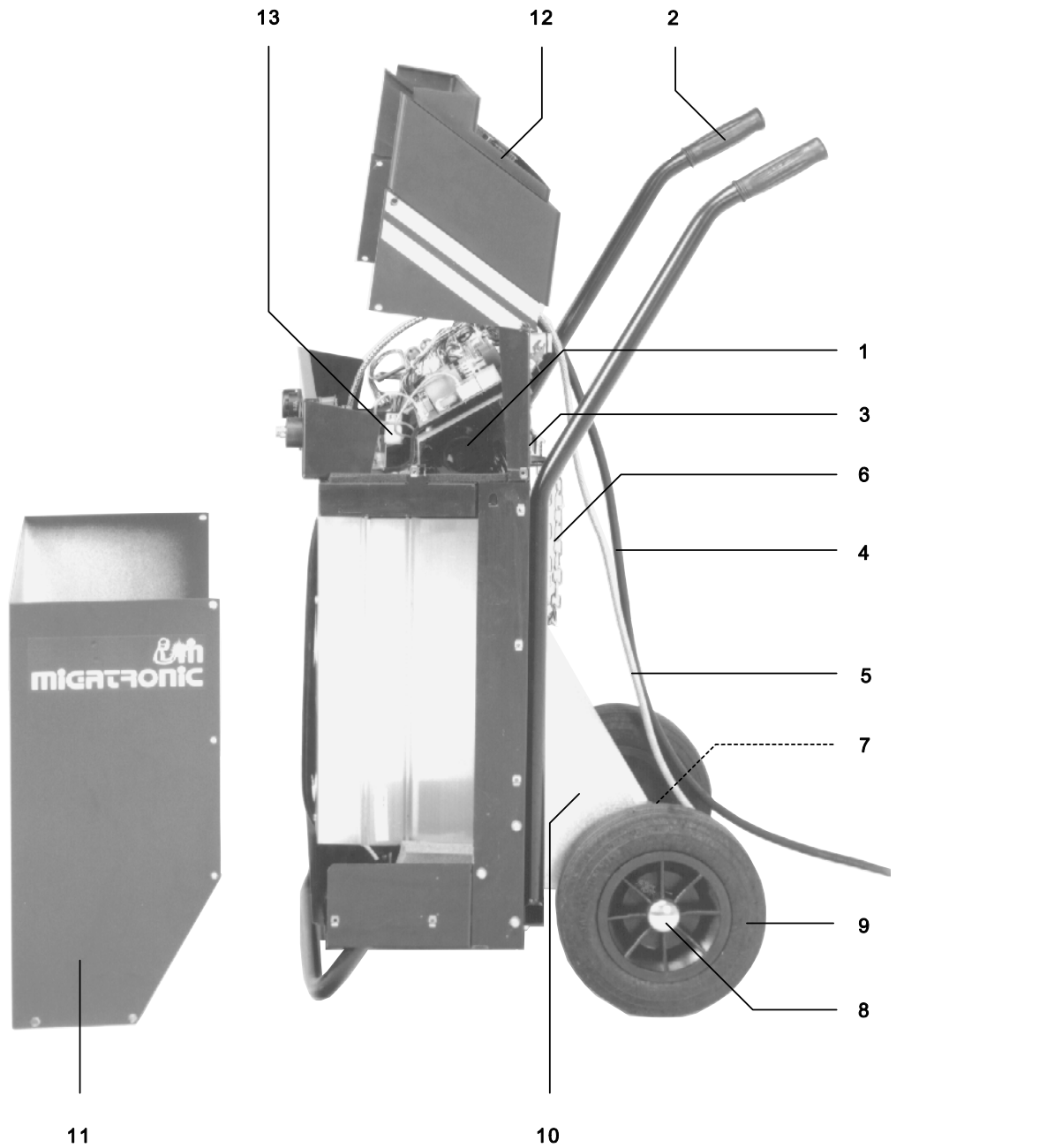


# NAVIGATOR

Pos. No.	Varebetegnelse Warenbezeichnung	Description of goods Désignation des pièces
1	73250022* Powermodul	Power module
	Powermodul	Module de puissance
2	73250019 AC-modul, master	AC-module, master
	AC-Steuermodul	Module CA, maître
3	73250011 Ventilator komplet, powermodul	Fan complete, power module
	Lüfter komplett, Powermodul	Ventilateur complet, source de courant
4	74470804 Ledningssæt HI-power, NAVIGATOR 240	Wire harness HI-power NAVIGATOR 240
	Leitungsbündel Hochspannung, NAVIGATOR 240	Filerie haute puissance NAVIGATOR 240
4	74470805 Ledningssæt HI-power, NAVIGATOR 320	Wire harness HI-power NAVIGATOR 320
	Leitungsbündel Hochspannung, NAVIGATOR 320	Filerie haute puissance NAVIGATOR 320
5	71610021* Supply board med netfilter NAVIGATOR 240	Supply PCB with suppression filter NAVIGATOR 240
	Versorgungsplatine mit Sperrfilter NAVIGATOR 240	Supply board avec filtre d'alimentation NAVIGATOR 240
5	71610027* Supply board med netfilter NAVIGATOR 320	Supply PCB with suppression filter NAVIGATOR 320
	Versorgungsplatine mit Sperrfilter NAVIGATOR 320	Supply board avec filtre d'alimentation NAVIGATOR 320
6	74470796 Ledningssæt, stærkstrøm	Wire harness, power current
	Leitungsbündel, starkstrom	Filerie, courant fort
7	16160101 Styrestrømstrafo	Control transformer
	Steuerstromstrafo	Transformateur de courant de commande
8	74121067 Gasslange 0,67m	Gas hose 0.67m
	Gasschlauch 0,67m	Tuyau de gaz 0,67m
9	73420008 Magnetventil med studs	Solenoid valve with connection piece
	Magnetventil mit Stutz	Vanne solénoïde avec raccord d'extrémité
10	74470779 Ledningssæt, svagstrøm	Wire harness, low current
	Leitungsbündel, schwachstrom	Filerie, courant faible
10	74470965 Ledningssæt, (digital)	Wire harness, (digital)
	Leitungsbündel, (digital)	Filerie, (digital)
11	71613052 Styreprint HF	Controller circuit board HF
	Steuerplatine HF	Platine de commande HF
12	71619106* Monteret dobbelt filterprint	Double filter PCB
	Doppelt Filterprint	Double circuit imprimé filtre
12a	18291008 6,3mm spadestiksudtag	6,3mm connector
	6,3mm Flachstecker	Prise 6,3mm
13	74470799 Ledningssæt, styrestrømstrafo	Wire harness, control transformer
	Leitungsbündel, Steuerstromstrafo	Filerie, transformateur de courant de commande
14	74470797 Ledningssæt powermodul, NAVIGATOR 240	Wire harness power module, NAVIGATOR 240
	Leitungsbündel Powermodul, NAVIGATOR 240	Filerie module de puissance, NAVIGATOR 240
14	74470801 Ledningssæt powermodul, NAVIGATOR 320	Wire harness power module, NAVIGATOR 320
	Leitungsbündel Powermodul, NAVIGATOR 320	Filerie module de puissance, NAVIGATOR 320
14	74470918 Ledningssæt powermodul, NAVIGATOR 240, pulsboks	Wire harness power module, NAVIGATOR 240, pulse box
	Leitungsbündel Powermodul, NAVIGATOR 240, Pulsbox	Filerie module de puissance, NAVIGATOR 240, boîtier de pulsation
14	74470920 Ledningssæt powermodul, NAVIGATOR 320, pulsboks	Wire harness power module, NAVIGATOR 320, pulse box
	Leitungsbündel Powermodul, NAVIGATOR 320, Pulsbox	Filerie module de puissance, NAVIGATOR 320, boîtier de pulsation
14	74470967 EMC-adaptor (digital)	EMC-adaptor (digital)
	EMC-adaptor (digital)	Adaptateur EMC (digital)
15	24540032 Strømskinne NAVIGATOR 240 AC/DC	Current connection NAVIGATOR 240 AC/DC
	Verbindung, Strom NAVIGATOR 240 AC/DC	Joint de courant NAVIGATOR 240 AC/DC
15	24540022 Strømskinne NAVIGATOR 320 DC	Current connection NAVIGATOR 320 DC
	Verbindung, Strom NAVIGATOR 320 DC	Joint de courant NAVIGATOR 320 DC
16	71613206 Filterprint AC	Filter PCB AC
	Filterplatine AC	Circuit imprimé filtre CA
78861113	Ombygningsskit, Navigator MK III	Kit for reconditioning, Navigator MK III
	Kit für Umbau, Navigator MK III	Jeu de rechange, Navigator MK III

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# NAVIGATOR



Pos.	No.	Varebetegnelse Warenbezeichnung	Description of goods Désignation des pièces
1	16419100*	HF-trafo HF-trafo	HF transformer HF transformateur
2	45050033	Håndtag Handgriff	Handle Poignée
3	24611008	Flaskeholder Flaschenhalter	Bottle carrier fitting Support bouteille
4	74234011	Netkabel 4x2,5mm <sup>2</sup> Netzkabel 4x2,5mm <sup>2</sup>	Mains supply cable 4x2,5mm <sup>2</sup> Câble d'alimentation 4x2,5mm <sup>2</sup>
4	74234001	Netkabel 4x4mm <sup>2</sup> NAVIGATOR 320 m/autotrafo Netzkabel 4x4mm <sup>2</sup> NAVIGATOR 320 mit Autotrafo	Mains supply cable 4x4mm <sup>2</sup> NAVIGATOR 320 with autotrafo Câble d'alimentation 4x4mm <sup>2</sup> NAVIGATOR 320 avec autotrafo
5	74120010	Gasslange 2,7m Gasschlauch 2,7m	Gas hose 2.7m Tuyau de gaz 2,7m
6	42410001	Kæde Kette	Chain Chaîne

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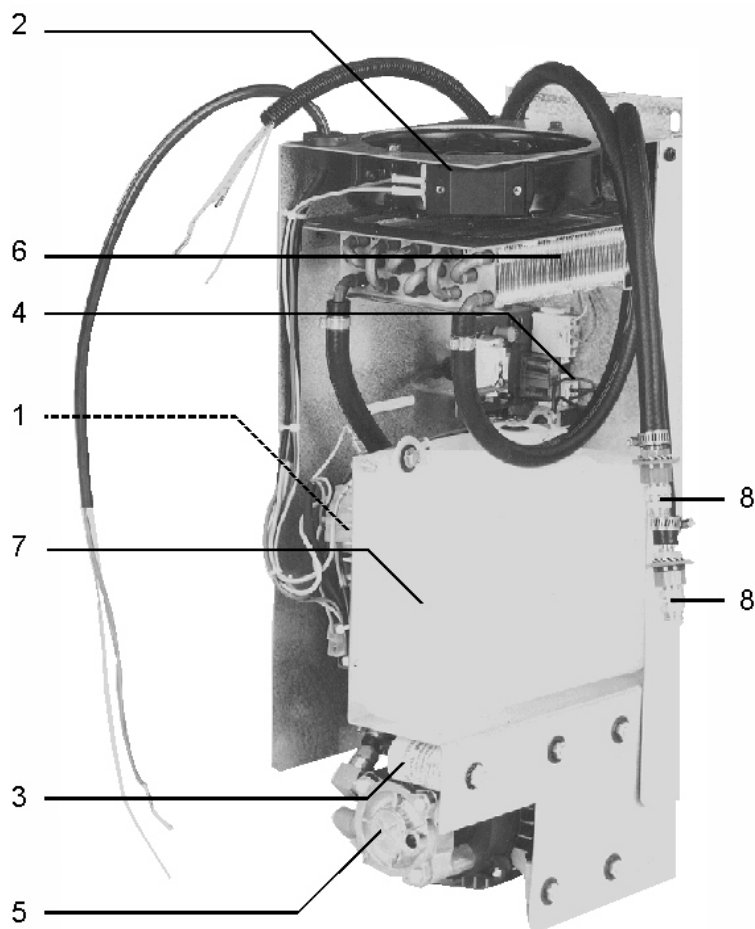
# NAVIGATOR

Pos. No.	Varebetegnelse Warenbezeichnung	Description of goods Désignation des pièces
7	25110072 Aksel for hjulophæng Achse für Räderaufhängung	Axle for wheel suspension Axe pour suspension des roues
8	44610001 Navkapsel Nabendeckel	Wheel cap Couvre-moyeu
9	44210251* Endenavshjul Nabenrad	Wheel Roue d'extrémité moyeu
10	24611001 Flaskebakke Flaschenhalter	Bottle plate Plateau à bouteilles
11	61119158 Svøb NAVIGATOR 240 DC Rahmen NAVIGATOR 240 DC	Frame NAVIGATOR 240 DC Châssis NAVIGATOR 240 DC
11	61119159 Svøb NAVIGATOR 240 AC/DC Rahmen NAVIGATOR 240 AC/DC	Frame NAVIGATOR 240 AC/DC Châssis NAVIGATOR 240 AC/DC
11	61119160 Svøb NAVIGATOR 320 DC Rahmen NAVIGATOR 320 DC	Frame NAVIGATOR 320 DC Châssis NAVIGATOR 320 DC
11	61119165 Svøb NAVIGATOR MMA 320 DC Rahmen NAVIGATOR MMA 320 DC	Frame NAVIGATOR MMA 320 DC Châssis NAVIGATOR MMA 320 DC
11	61119197 Svøb NAVIGATOR 240 DC, vand Rahmen NAVIGATOR 240 DC, wasser	Frame NAVIGATOR 240 DC, water Châssis NAVIGATOR 240 DC, eau
11	61119195 Svøb NAVIGATOR 240 AC/DC, vand Rahmen NAVIGATOR 240 AC/DC, wasser	Frame NAVIGATOR 240 AC/DC, water Châssis NAVIGATOR 240 AC/DC, eau
11	61119196 Svøb NAVIGATOR 320 DC, vand Rahmen NAVIGATOR 320 DC, wasser	Frame NAVIGATOR 320 DC, water Châssis NAVIGATOR 320 DC, eau
12	76115100 Elektronikboks, TIG AC/DC Elektronikbox, TIG AC/DC	Control box, TIG AC/DC Boîtier de commande, TIG AC/DC
12	76115102 Elektronikboks, TIG DC Elektronikbox, TIG DC	Control box, TIG DC Boîtier de commande, TIG DC
12	76115103 Elektronikboks, MMA Elektronikbox, MMA	Control box, MMA Boîtier de commande, MMA
12	76115121 Elektronikboks 1, AC/DC-P, pulsbox Elektronikbox 1, AC/DC-P, Pulsbox	Control box 1, AC/DC-P, pulse box Boîtier de commande 1, AC/DC-P, boîtier de pulsation
12	76115126 Elektronikboks 1, DC-P, pulsbox Elektronikbox 1, DC-P, Pulsbox	Control box 1, DC-P, pulse box Boîtier de commande 1, DC-P, boîtier de pulsation
13	27150041 Støtteklods, HF Stützklötz für Hochfrequenzspule	Supporting block to HF-coil Tacquet pour bobine HF
	<b>Ekstra udstyr: Zusätzliche Ausrüstung:</b>	<b>Special equipment: Equipement spécial:</b>
78858020	Autotrafokit 230/400/440/500V Autotrafokit	Kit for autotrafo Kit autotrafo
78812030	Vandmodul eksternt, komplet Wassermodule extern, komplett	Water module external, complete Module hydraulique externe, complet
78812034	Vandmodul internt, komplet Wassermodule zum Einbauen, komplett	Water module for internal fitting, complete Module hydraulique interne, complet
78861117	Monteringskit for vandmodul 78812034 NAVIGATOR 240AC Montierungskit für Wassermodule 78812034 NAVIGATOR 240AC	Mounting kit for water module 78812034 NAVIGATOR 240AC Kit de montage pour refroidisseur 78812034 NAVIGATOR 240AC
78861118	Monteringskit for vandmodul 78812034 NAVIGATOR 320DC Montierungskit für Wassermodule 78812034 NAVIGATOR 320DC	Mounting kit for water module 78812034 NAVIGATOR 320DC Kit de montage pour refroidisseur 78812034 NAVIGATOR 320DC
78861138	Monteringskit for vandmodul 78812034 NAVIGATOR 240DC Montierungskit für Wassermodule 78812034 NAVIGATOR 240DC	Mounting kit for water module 78812034 NAVIGATOR 240DC Kit de montage pour refroidisseur 78812034 NAVIGATOR 240DC
	<i>Ved montering af internt vandmodul (78812034) skal monteringskit for vandmodul også anvendes (se best.nr. ovenfor)</i>	<i>Mounting kit for water module (please find separate article number) is required when mounting the internal water module (78812034)</i>
	<i>Montierungskit für Wassermodule (bitte separate Artikelnummer finden) is notwendig, wenn das Wassermodule (78812034) montiert wird</i>	<i>Le kit de montage pour le refroidisseur (se referer à la référence) est requis lorsque vous montez un refroidisseur interne (78812034)</i>
	<b>Bemærk:</b> Det er kun muligt at montere enten autotrafokit eller vandmodul	<b>Please note:</b> It is not possible to install both the auto transformer kit and the water module
	<b>Bitte bemerken:</b> Es ist nur möglich entweder das Autotrafokit oder Wassermodule zu montieren	<b>Important:</b> Il est seulement possible d'installer ou un kit d'autotransformateur ou un module d'eau

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# NAVIGATOR

## VANDMODUL WATER COOLING UNIT WASSERMODUL MODULE HYDRAULIQUE



Pos.	No.	Varebetegnelse Warenbezeichnung	Description of goods Désignation des pièces
	78812034	Vandmodul intern, komplet Wassermodul zum Einbauen, komplett	Water module for internal fitting, complete Module hydraulique interne, complet
1	16160112	Autotrafo Autotrafo	Auto transformer Autotransformateur
2	17300033	Ventilator Lüfter	Fan Ventilateur
3	15480500	Motorkondensator, 5 UF, 400/500V Motorkondensator, 5 UF, 400/500 V	Motor condenser 5 UF, 400/500 V Condenseur de moteur, 5 UF, 400/500 V
4	75909101	Flowkontrol 0,2 l/min Kontrollplatine 0,2 l/min	Control PCB 0.2 l/min Circuit imprimé 0,2 l/min
5	17310017	Vandpumpe Wasserpumpe	Water pump Pompe à eau
6	71240017*	Køler Kühler	Refrigerator Refrigerateur
7	45050231	Vandtank Wassertank	Water tank Réservoir à eau
8	43129007	Lynkoblingssæt rød/blå m/ventil, 8mm Anschlußsatz rot/blau mit Ventil, 8mm	Quick adaptor set red/blue with valve, 8mm Jeu d'accouplement rapide rouge/bleu avec valve, 8mm
	17270003	Induktiv føler med stik Induktionsfühler mit Stecker	Inductive sensor with plug Capteur avec prise

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# NAVIGATOR

16419100	HF-trafo Machines until	96.08.12	use	16413009
43129007	Quick adaptor set red with valve, 8mm Machines until	96.08.12	use	43120022
44210251	Wheel Machines until	00.10.01	use	44210250
61119193	Connection panel Machines until	96.08.12	use	45050176 and 61119152
71610021	Supply PCB with suppression filter NAVIGATOR 240 Machines until	95.11.21	use	71613044
71610027	Supply PCB with suppression filter NAVIGATOR 320 Machines until	95.11.21	use	71613044
71619106	Mount. filter PCB Machines until	96.08.12	use	71619105 and 71619101
73250022	Power module Machines until	95.11.21	use	73250018
74470908	Wire harness, button Machines until	96.08.12	use	74470668
71240017	Refrigerator Machines until	98.06.16	use	71240014





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