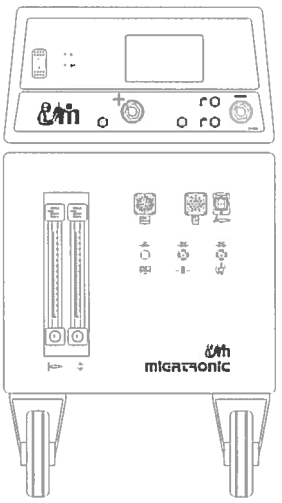
INSTRUCTION MANUAL
ORBITAL COMMANDER
240 - 320 & 400



Version B: June 1998

This manual is subject to alteration

TABLE OF CONTENTS

IMPORTANT SAFETY INSTRUCTIONS

The safety instructions contained in the **PERSONAL SAFETY** should be read and observed when installing and operating the machine.

This manual and the accompanying instructions for use must be accessible at all times to staff engaged in the installation, operation and maintenance of the machine.

Full understanding of this manual requires a skilled welder's knowledge of welding and of the risk involved.

EC Declaration of Conformity

Manufacturer	
Company name:	Migatronic Automation A/S
Address :	Knøsgaardvej 112
	DK 9440 Aabybro
Phone :	(+45) 98 - 24 42 33

Hereby declare that

ORBITAL COMMANDER	
Type :	240 – 320 & 400

is in conformity with the

COUNSIL DIRECTIVES 73/23/EEC and 89/336/EEC

And was manufactured in conformity with the following national standards that implements a harmonised standard:

EN60974-1
EN50199

18/6-1998

Søren C. Jensen

PERSONAL SAFETY

Light and heat emission

A welding arc emits radiation which is damaging to the human eye. Even short term exposure to this radiation can cause lasting damage. Protect your eyes from powerful radiation by infra-red, visible and also ultraviolet light by installing suitable radiation protection glass in your welding helmet. Your skin can also be damaged by welding radiation. Radiation can cause serious burns. Protect your skin by wearing gloves, a welding helmet, and working clothing covering all exposed parts. During welding warn other people in the vicinity of the danger of radiation and sparks. If possible, place a screen between the place of work and the surroundings. The heat emitted from the arc and pool crater – as well as the sparks emitted during welding – represent a fire hazard. Consequently, welding should never be carried out near combustible material. Working clothing must no be made of substances which are easily combustible, and should have no folds or open pockets into which sparks can fall. Wear a fire resistant apron, if necessary.

Welding fumes

The smoke and gases emitted during welding are damaging to the health. Consequently, the air suction ventilator must be effective to remove the damps caused by welding. The result of contact between degreasing compounds and the arc's ultra-violet lights can be the very poisonous phosgene-gas. Therefore remove all degreasing compounds, solvents etc. From the welding area. Inhalation of welding smoke and gases should be avoided. Use tables with air suction ventilator or other suitable preventive measures. Supply of fresh air to welding helmet, if necessary.

Electricity

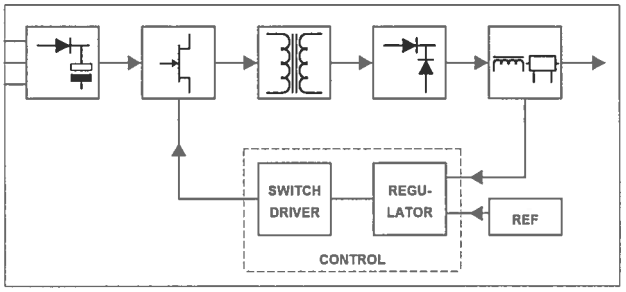
Avoid contact with all live components. The voltage used in welding are not sufficient to represent a danger in themselves. However, if damp clothing is worn, or if working in wet conditions, electric shocks can be caused, representing an indirect source of danger. Considerable electric shocks can be caused by HF high voltage ignition during TIG welding, and may lead to minor burns beneath the skin consequently, all contact with live components should be avoided as far as possible. Make sure that cable insulation, torch, and machine plug connections are intact. Always use dry, leather welding gloves and wear dry working clothing and shoes. Keep cable, torches, and the welding machine itself dry at all times. Make sure that the welding machine's earth connection is properly and safely earthned. Do not open the machine to expose live components. Maintenance and service which require access to live components must be connected to the mains.

GENERAL DESCRIPTION

The Orbital Commander 2097 is a three-phase welding machine based on *inverter technology*.

The machine welds: ***TIG DC***
The machine controls: A *orbital head or a servo drive for turn table etc.*

Block diagram 2097



Features of the **Orbital Commander**:

- **60 programmes**
- **Setting of up to 8 sectors including welding parameters**
- **Rotation controlled by encoder or time**
- **Rotation controlled by sensor or timer**
- **Possibility for searching the rotation sensor by start**
- **Possibility for returning to start point after welding**
- **Variable post-flow time for root gas**
- **Variable post-flow time for root gas**
- **Variable slope up of welding current**
- **Variable slope down of welding current**
- **Variable gas pre-flow time**
- **Variable gas post-flow time**
- **2- or 4-stroke operation by hand torch as option**

INITIAL OPERATION

Mains connection

Once the mains cable has been connected, the machine is ready for use.
Please note that the connection is to be carried out by an authorised electrician.

ORBITAL 240	**Mains voltage:**	**3*400V~**
	Fuse:	**16A**
	Mains cable:	**2,5mm²**

ORBITAL 320	**Mains voltage:**	**3*400V~**
	Fuse:	**16A**
	Mains cable:	**2,5mm²**

ORBITAL 400	**Mains voltage:**	**3*400V~**
	Fuse:	**20A**
	Mains cable:	**4,0mm²**

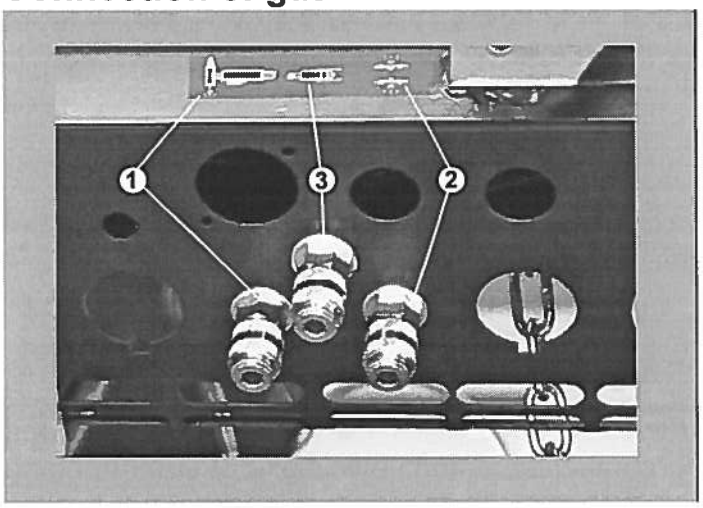
Connection of welding cables

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 might 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 in the ratio of 10% coolant and 90% deionised water.

Connection of gas



Item 1: Connection of shield gas.
Item 2: Connection of root gas.
Item 3: Connection of compressed air for expanding mandrel (not standard for all Orbital Commanders).

Use of the machine

The machine is not intended for continuous use by hard work! When using current settings above 260A* the machine needs periods to 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 light will come on. The light switches off when the machine has cooled down sufficiently, and the machine is ready for welding.

*=Applies to TYPE 320

Maximum load

WELDING PROCESS	COMMANDER 320 TIG
100% load	260 A
60% load	320 A

The above mentioned values are valid for this welding machine only.

60% max load by welding means that a cooling period of 4 minutes is required after welding for 6 minutes is required at a current setting of 320A; 10 minutes between start of each welding period must be calculated in accordance with the diagram above.

In certain types of welding jobs there is an increased risk of getting an electric shock, e.g. in areas where the welder is forced to work in a crouched position and therefore is in contact with the workpiece, in places which are partially or totally surrounded by conductive parts, and in wet, damp, or hot places.

When welding under such conditions it is important that a person trained to render help in case of emergency is nearby and that this person quickly can cut off the current.

It must be ensured that the air intake and outlet are not blocked.

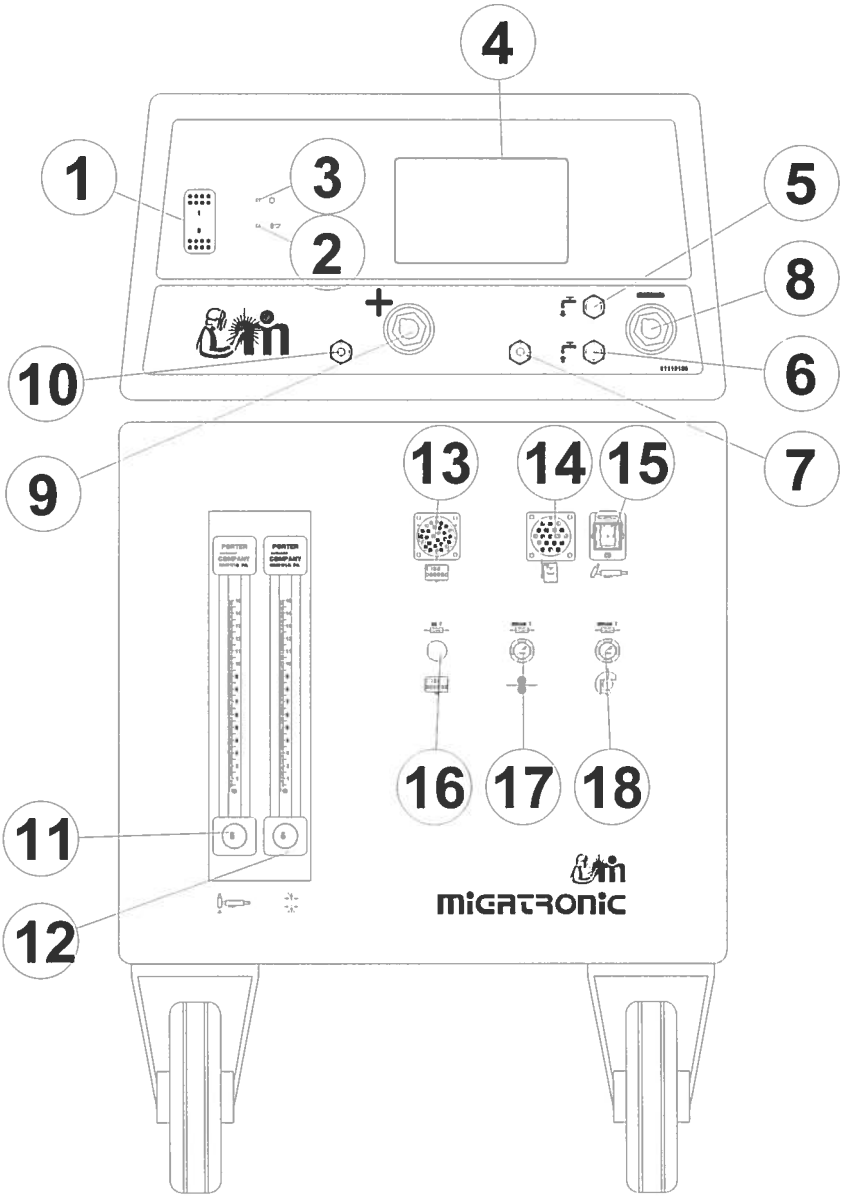


Illustration 1.

IN GENERAL

The following refers to illustration 1.

1. Main switch

This button switches the machine on and off.

2. Error

Light indicating that an error has occurred.
The error might be due to following causes indicated on the machine display:

2a. Mains error

Display indicates " Mains error".

Cause: Excessive or insufficient mains voltage, e.g. phase break or melted fuse.

Reaction: The welding process stops.

Action: Adjust mains voltage, replace fuses if necessary.

2b. Power module overheated

Display indicates " Power module overheated".

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

Reaction: The welding process stops.

Action: If the error has not been caused by incorrect use, call for service back-up.

2c. Water error

Display indicates " Water error"

Cause: Lack of or insufficient flow in the cooling system e.g. due to insufficient water.

Reaction: The welding process stops.

Action: Replace/repair blocked or damaged hoses. Top up with Migatronic coolant in the ratio of 10% coolant and 90% deionised water.

2d. Gas error, shield gas

Display indicates " Lack of shield gas"

Cause: Shield gas may not be connected to the gas cylinder. Check whether the gas is turned off (check also the flow meter on the machine), or if the cylinder is empty.

Reaction: The welding process stops.

Action: Connect a gas cylinder, turn on the gas, or replace the gas cylinder.

2e. Gas error, root gas

Display indicates "Root gas missing"

Cause: As described in part 2d "Gas error, shield gas".

Reaction: The welding process stops.

Action: If root gas is not required this function can be deactivated in the menu system set up – gas – use root gas, or by pressing "use root gas" on the screen.

2f. Arc error

Display indicates "Arc error"

Reaction: The welding process stops.

Action: Check electrode, electrode distance, or earth cables.

2g. Battery error

Display indicates "Battery error – exchange battery"

Cause: Battery in PLC controller is low.

Reaction: Memory will be lost.

Action: Call for service back-up.

3. Diode machine on

Indicates that the machine is switched on.

4. Text display

Editing and setting of data.

5. Water cooling

Flow of cooled water.

6. Water cooling

Return flow of hot water to cooling unit.

7. Shield gas

Connection of shield gas.

8. Welding cable plug

Cable for electrode (MMA).

9. Earth cable

Connection of earth cable.

10. Root gas

Connection of root gas.

11. Flow meter for shield gas

Adjustment and read out of flow 0-15 l/min.

12. Flow meter for root gas
Adjustment and read out of flow 0-15 l/min.

13. Remote control
Connection for remote control.

14. Orbital head
Connection for orbital head.

15. Hand torch
Connection for hand torch (trigger signal on 2&6).

16. Extra

17. Fuse for wire motor

18. Fuse for orbital motor

REMOTE CONTROL AND DESCRIPTION

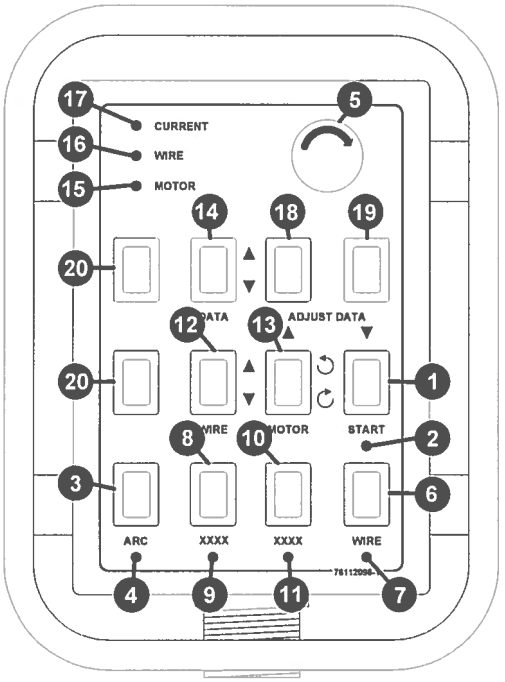


Illustration 2.

The following refers to illustration 2.

1. Starting button. Starts the welding cycle. Press the button again and the welding cycle stops. Note that the welding cycle only can be stopped after the prewelding time has runned out.

2. Light diode / lamp indicating:
- Constant light = The welding cycle is activated
- Flashes = Searching for start point (only when *Search for sensor at start* is chosen)
- Quick flashes = Stop button item 5 is activated. The welding cycle is unable to start when the stop button is activated. Turn the button clockwise until the button pops out.

3. With or without welding. If the welding is disconnected during process, it will not be possible to restart welding until the welding cycle has finished.

4. Light diode / lamp indicating that the welding is active.

5. Process stop. Press the button and the cycle stops immediately. To get the button back into normal position, turn the button clockwise until the button pops out. The light diode / lamp item 2 flashes, if the process stop is activated.

6. Welding with or without wire feeding. The wire feeding can be connected/disconnected at any time.

7. Light diode / lamp indicating that the wire feeding is active.

8. Orbital machines with possibility for connection of internal expanding mandrel.

9. Light diode / lamp indicating that prepressure on expanding mandrel is activated (not available on all types of orbital welding machines).

10. Activates max expanding pressure on expanding mandrel. Can only be activated if button item 8 is activated (not available on all types of orbital welding machines).

11. Light diode / lamp indicating that max expanding pressure on the expanding mandrel is activated (not available on all types of orbital welding machines).

12. Manual button. Welding wire forward and back. Applicable for setting/adjustment.

13. Manual button. Turning of orbital head forward and backwards. Applicable for setting/adjustment.

14. Correcting button. This button has 3 settings. Use the button to choose the parameter to be adjusted.

- Welding current, top position
- Welding wire speed, middle position
- Rotation speed, bottom position

Corrections are to be carried out during the welding process. The programme display indicates the chosen parameter and its current value. The light diode / lamp item 15, 16, and 17 indicate also the chosen parameter, if the programme display is out of reach. Use the buttons item 18 and 19 to correct up or down. Remember to save the changes after welding, if the changes are to be permanent.

15. Light diode / lamp indicating that it is possible to adjust the rotation speed of the orbital motor (see also description item 14).

16. Light diode / lamp indicating that it is possible to adjust the speed of the welding wire (see also description item 14).

17. Light diode / lamp indicating that it is possible to adjust the welding current (see also description item 14).

18. Button: To adjust the parameter up (see also description item 14).

19. Button: To adjust the chosen parameter down (see also description item 14).

20. Stand-by buttons for later applications.

WELDING SEQUENCE

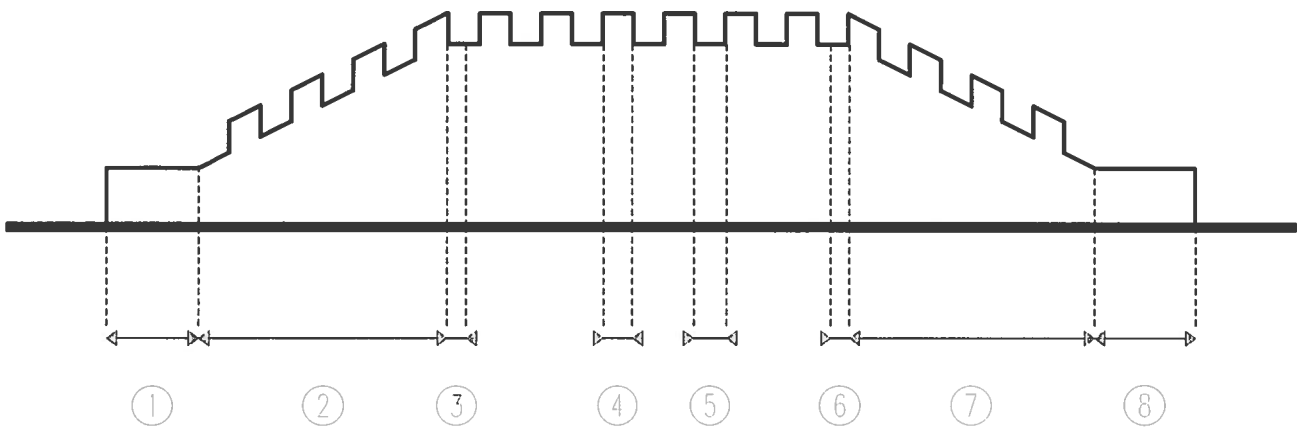


Illustration 3.

The following refers to illustration 3.

Item 1: Starting current, time in seconds before slope up starts.

Item 2: Slope up, time in seconds.

Item 3: Prewelding time in seconds. Time before rotation starts.

Item 4: Pulse current.

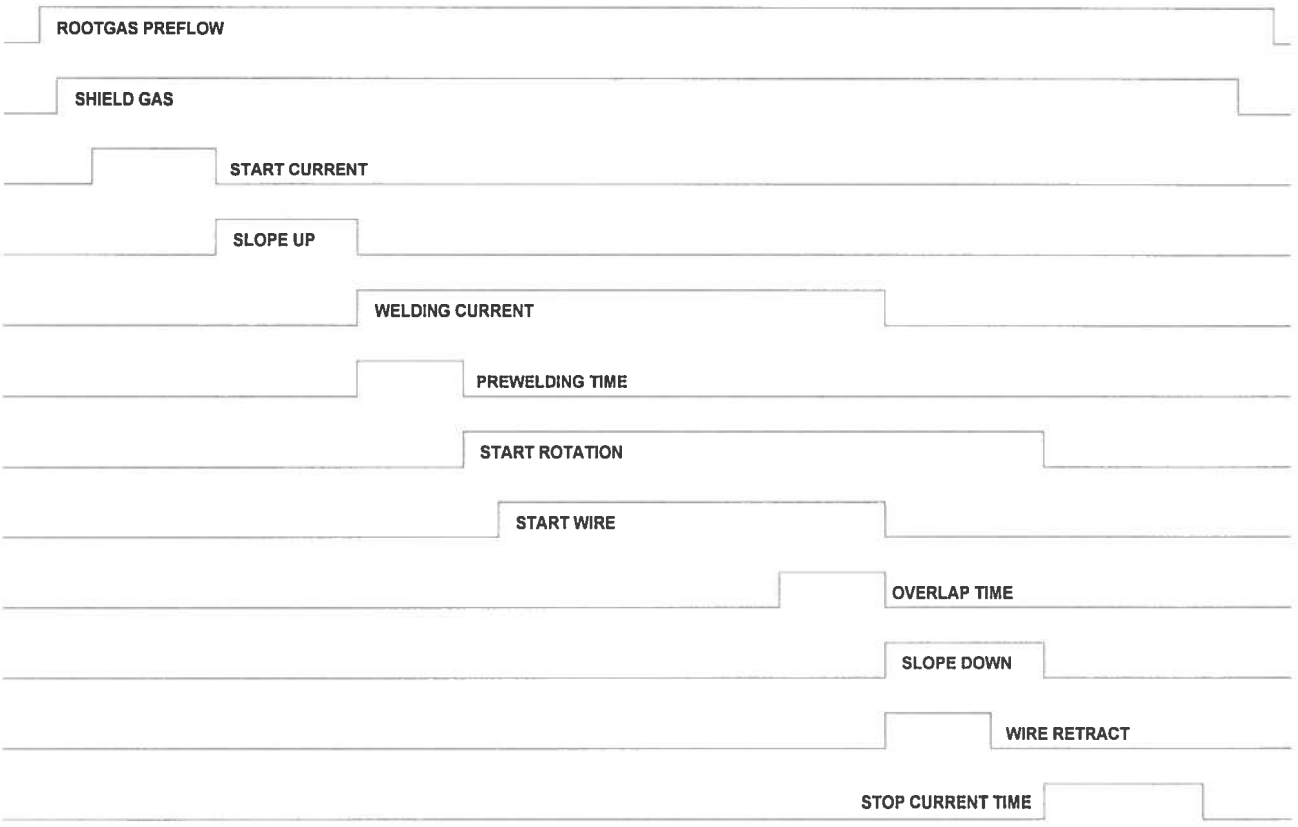
Item 5: Base current.

Item 6: Overlap time in seconds.

Item 7: Slope down time in seconds.

Item 8: Stop current, time before end of cycle.

DIAGRAM OF FUNCTIONS



PROGRAMMING THE ORBITAL COMMANDER

The Orbital Commander stores up to 60 applications, each application can be divided into 8 sectors per rotation.

As the Orbital Commander is turned on, the version number of screen menu and application appears in the display.

Version code:

This information is mainly for service purposes.

The menu is shown for 2 seconds after which the following screen is brought up:

Starting up menu:

Press the button menu

Main menu:

The required data for the welding process must be stored in the controller before start using the machine.

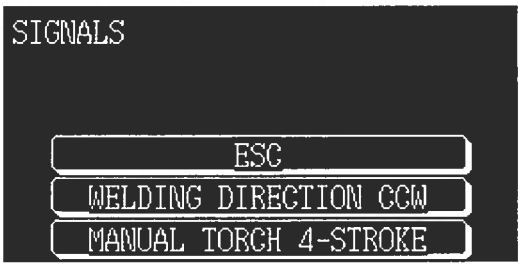
SYSTEM SET UP

The settings are only to be filled in once, or if the equipment is changed. Following menues are available:

Encoder set up:

It the welding head is provided with encoder: Fill in the number of pulses that the encoder gives per rotation. *8-999 pulses/rotation.*
The field "ENCODER" is activated – if the field is blue, the encoder is active.

Signal functions:



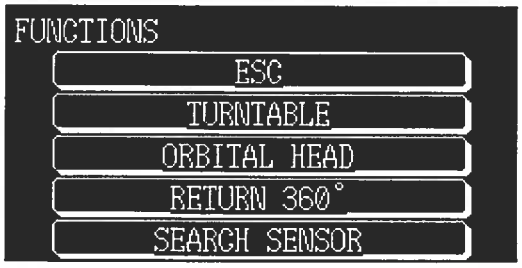
Direction of rotation orbital head:

Direction of rotation on orbital head, clockwise (CW) or counter-clockwise (CCW)

2/4 stroke with hand torch

Choose function. 2 stroke = Hold button when welding. 4 stroke = One press starts the welding, next press stops the welding

Functions:



Servo drive / or orbital head:

Welding head / servo drive. Normal position is "welding head". If servo drive is chosen, a 0-(+10V) signal is sent to the terminals connected to the motor in the welding head.

360° return after welding cycle

360° return. When using a welding head that follows the welding cables during the welding process, it is necessary to activate this function. When the welding is completed the welding head will turn 360° and "twist" the welding cables back.

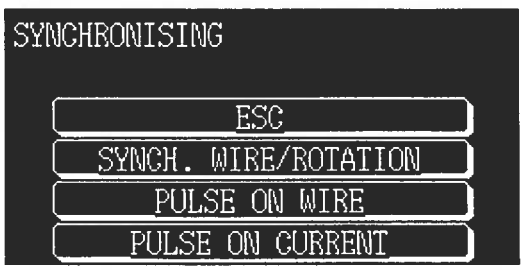
Search sensor at start

Search sensor at start. Activate this function and the orbital head will find its starting point by returning, until the proximity sensor is activated. The starting position will be set. This function is only to be chosen if the orbital head is equipped with a proximity sensor.

Language:

Choice of language. Might vary from machine to machine.

Synchronization:



Synchronization of rotation

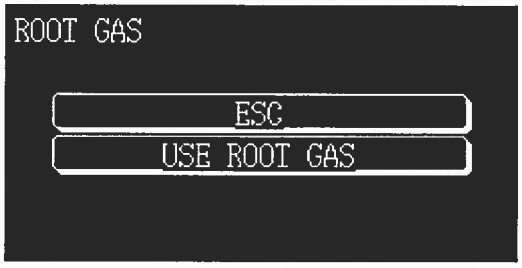
Rotation synchronization. Chose this function, and the rotation of the orbital head will step concurrently with the welding current, meaning that the head will be in operation when welding with high current (pulse current), and that the head will be out of operation when welding with low current (base current).
Pulse current 0/1 has to be active to execute this function.

Synchronization of wire

Wire synchronization. This function enables a synchronization of wire and high current (pulse current), meaning that the wire feeding is only carried out when welding with high current (pulse current). Consequently there will be no wire feed when welding with low current (base current).

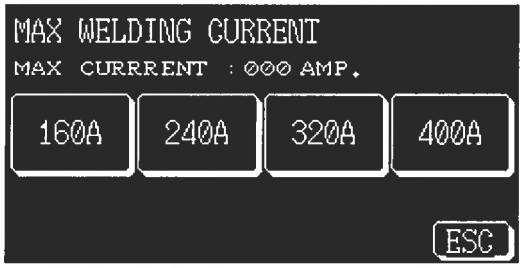
Pulse current 0/1 has to be active to execute this function

Root gas 0/1:



Possibility to use root gas.
Test and adjustment of gas flow (root gas).

Max welding current:



Fill in the max welding current for the machine.

Test of gas:

Press the button " GAS TEST", the gas is active until you repress the button " GAS TEST" .

PROGRAMME SETTINGS – CREATE, OPEN OR EDIT A PROGRAMME

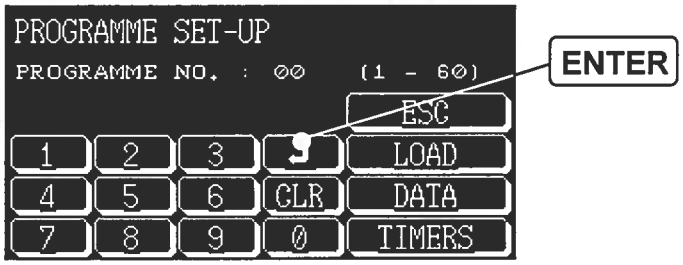
Programme set up

Changing, saving, or opening a programme.

Main menu:

Chose programme set up.

Programme set op:

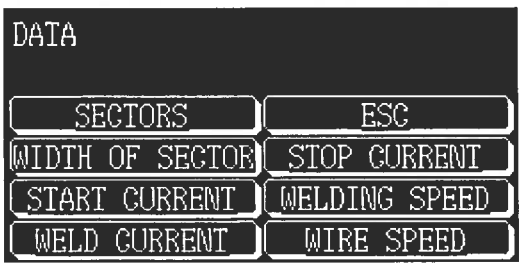


Use the button "CLR" to clear the filled in values. Use the button "ESC" to leave the chosen menu.

Chose programme no. Press "ENTER".
Now you have 2 possibilities:
1.To open a programme: If you want to open a programme, press the button "LOAD" and "ENTER". The programme is now open and ready for use.
2. To edit / create a new programme: If you want to edit / create a new programme, the procedure is the same as when you want to open a programme, you just have to adapt the opened programmed.

Start by correcting / editing data. Press the button "DATA".

Data menu:



Use the button "ESC", if you want to leave the chosen menu.

In the data menu it is possible to edit/create the following:

- Number of sectors
- Width of each sector
- Starting current
- Welding current for each sector
- Stop current
- Welding speed for each sector
- Wire speed for each sector

Press the button " SECTORS"

Sectors:

Use the button "CLR" to clear the filled in values. Use the button "ESC" to leave the chosen menu.

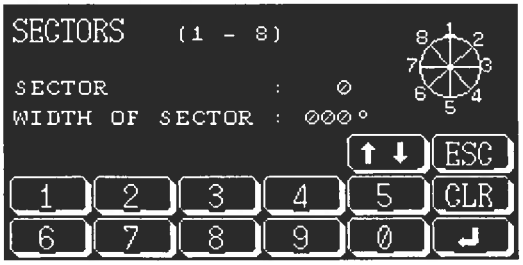
Possibility of dividing the welding progress into 1 – 8 divisions. Each division, in the following named sector, can be programmed individually as regards:

- Width of each sector
- Welding current for each sector
- Welding speed for each sector
- Wire speed for each sector

To create a programme with 5 sectors:
Press "5", and "ENTER". You have now chosen 5 sectors.
Press "ESC" to return to the data menu.

Press the option "WIDTH OF SECTORS"

Width of sector with encoder:



Use the button "CLR" to clear the filled in values. Use the button "ESC" to leave the chosen menu.

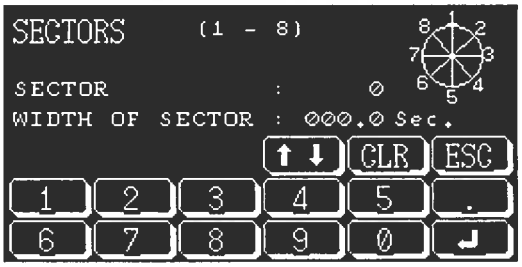
If you have chosen "Encoder" in the system set up menu, the menu above will appear. Press the button "↑↓" until the menu bar marks "number of sector". Press 1 and "ENTER". Move the menu bar to "width of sector" – use the button "↑↓". Fill in the required width for sector 1 (degrees). Remember to confirm by pressing the "ENTER" button.

Use the same procedure to fill in the width for the remaining sectors.

Please note: If you fill in e.g. 45° in sector 1, 90° in sector 2, 45° in sector 3, 22° in sector 4, and 180° in sector 5, the orbital head will rotate the filled in 382°, unless the feature "SEARCH FOR SENSOR AT START" (in the following named rotation sensor), has been chosen in the menu system set up. If you have chosen this feature, the rotation sensor will have priority, this means that sector 5 automatically will be reduced to 168°, and that the orbital head will only rotate 360°. It also has the effect that if the total degree-value filled in is below 360°, the orbital head will extend the last sector so that the orbital head totally rotates 360°.
If the rotation sensor is not activated, the orbital head will rotate the filled in degrees.

Press "ESC" to return to the data menu.

Time width of sector:



Use the button "CLR" to clear the filled in values. Use the button "ESC" to leave the chosen menu.

If you have not chosen "Encoder" in the system set up menu, the orbital head rotates on time. Be aware that when the orbital head rotates on time, the speed of rotation influences the total time of rotation.

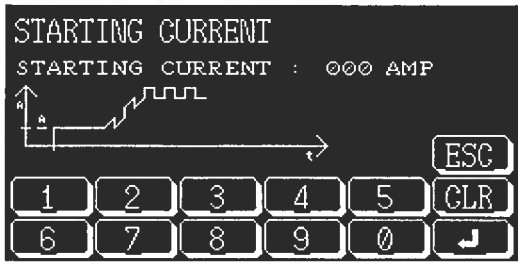
Press the button "↑↓" until the menu bar marks "number of sector". Press 1 and "ENTER". Move the menu bar to "width of sector" – use the button "↑↓". Fill in the required seconds for sector 1. Remember to confirm by pressing the "ENTER" button.

Use the same procedure to fill in the seconds for the remaining sectors.

Please note: If you fill in e.g. 4 sec. in sector 1, 8 sec. in sector 2, 5 sec. in sector 3, 8 sec. in sector 4, and 10 sec. in sector 5, the orbital head will rotate the filled in 35 sec. unless the feature "SEARCH FOR SENSOR AT START" (in the following named rotation sensor), has been chosen in the menu system set up. If you have chosen this feature, the rotation sensor will have priority. Presuming that a rotation last 30 sec. and that the rotation sensor is activated, sector 5 automatically will be reduced to 5 sec. (as 1 rotation last 30 sec.).
Press "ESC" to return to the data menu.

Next step in the data menu is: Setting the starting current.
Press the bottom "START CURRENT"

Setting the starting current:



Use the button "CLR" to clear the filled in values. Use the button "ESC" to leave the chosen menu.

Starting current is the current that the welding cycle starts with. In the menu *programme set up* you can fill in a time in seconds – this is the time the orbital stands still and welds with the filled in time, before the actual welding cycle starts.

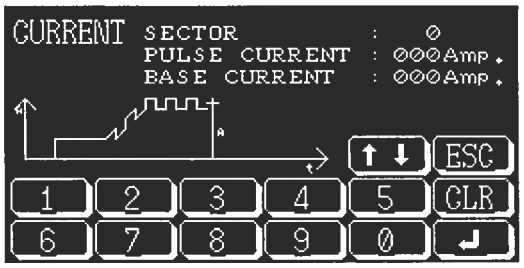
Starting current min. 5A. Max=max base current. Fill in the required starting current and press "ENTER".

Note! The base current MUST be programmed, before the starting current can be programmed. The base current is programmed in the data menu, field " WELD CURRENT". See below.

Press "ESC" to return to the data menu.

Press the button "WELD CURRENT"

Setting the welding current:



Use the button "CLR" to clear the filled in values. Use the button "ESC" to leave the chosen menu.

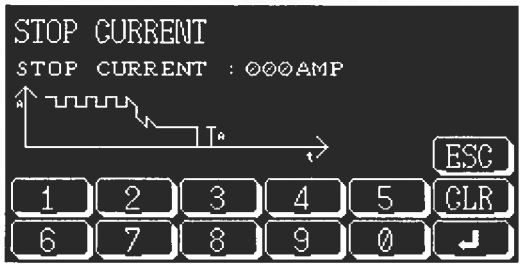
Press the button "↑↓" until the menu bar marks "number of sector". Press 1 and "ENTER". Move the menu bar to "pulse current" – use the button "↑↓". Fill in the required pulse current for sector 1. Remember to confirm by pressing the "ENTER" button. Move the bar to the base current. Fill in the required base current for sector 1. Remember to confirm by pressing the "ENTER" button.

Use the same procedure to fill in pulse and base current for the remaining sectors.
Press "ESC" to return to the data menu.

Point 5 in the data menu is: Setting the stop current.

Press the button: "STOP CURRENT"

Setting the stop current:



Use the button "CLR" to clear the filled in values. Use the button "ESC" to leave the chosen menu.

Stop current is the current that the welding cycle stops with. In the menu *programme set up* you can fill in a time in seconds – this is the time the orbital head stands still and welds with the filled in time, before the welding cycle stops.

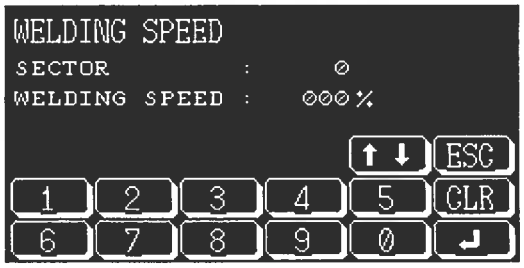
Stop current min. 5A. to max. Fill in the required stop current and press "ENTER".

Press "ESC" to return to the data menu.

Point 6 in the data menu is: Setting the welding speed.

Press the button "WELDING SPEED"

Setting the welding speed:



Use the button "CLR" to clear the filled in values. Use the button "ESC" to leave the chosen menu.

The welding speed is filled in in % of the max speed. As the max speed might vary, depending on type of orbital head, the speed of rotation will not be stated.

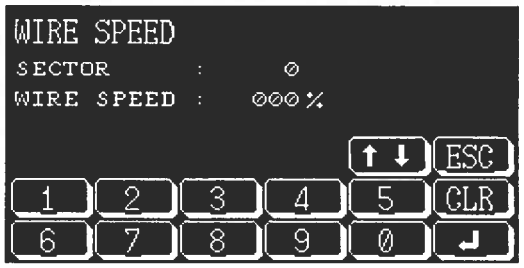
Press the button "↑↓" until the menu bar marks "number of sector". Press 1 and "ENTER". Move the menu bar to "welding speed" – use the button "↑↓". Fill in the required welding speed for sector 1. Remember to confirm by pressing the "ENTER" button.

Use the same procedure to fill in the welding speed for the remaining sectors.
Press "ESC" to return to the data menu.

Last point in the data menu is: Setting the wire speed.

Press the button "WIRE SPEED"

Setting the wire speed:



Use the button "CLR" to clear the filled in values. Use the button "ESC" to leave the chosen menu.

The wire speed is filled in in % of the max speed. As the max speed might vary, depending on type of orbital head, the wire speed will not be stated.

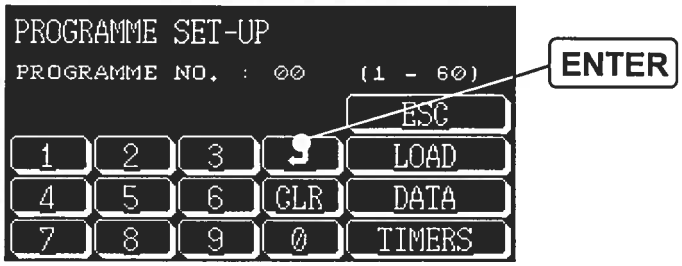
Press the button "↑↓" until the menu bar marks "number of sector". Press 1 and "ENTER". Move the menu bar to "wire speed" – use the button "↑↓". Fill in the required wire speed for sector 1. Remember to confirm by pressing the "ENTER" button.

Use the same procedure to fill in the wire speed for the remaining sectors.

Press "ESC" to return to the data menu. Press "ESC" once again to return to the programme menu.

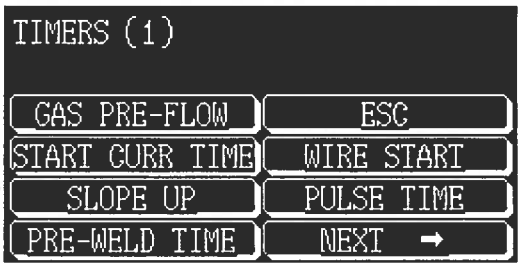
PROGRAMMING TIMERS, TIMER MENU 1

Programme set op:



Press the button "TIMERS"

Timer menu 1:

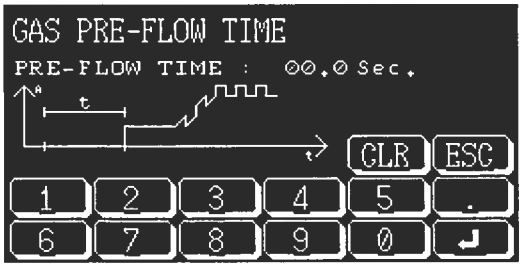


In the timer menu you can edit / create the following:

- Gas pre-flow (root gas) *0,1-99 sec.*
- Starting current time *0,1-9,9 sec.*
- Slope up time *0,1-9,9 sec.*
- Prewelding time *0,1-9,9 sec.*
- Time before wire start *0,1-9,9 sec.*
- Pulse time *0,1-9,9 sec.*
- Base current time *0,1-9,9 sec.*
- Overlap time *0,1-9,9 sec.*
- Root gas pre-flow time *0,1-9,9 sec.*
- Wire return *0,1-9,9 sec.*

Press the button "GAS PRE-FLOW"

Gas pre-flow:



Use the button "CLR" to clear the filled in values. Use the button "ESC" to leave the chosen menu.

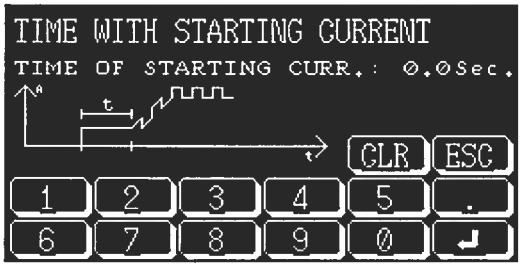
Fill in the gas pre-flow time in seconds and press "ENTER".

The gas pre-flow time is the time of purging with either shield gas or root gas before the welding cycle starts.

Press "ESC" to return to the timer menu 1.

Press the button "Time of starting current"

Time of starting current:



Use the button "CLR" to clear the filled in values. Use the button "ESC" to leave the chosen menu.

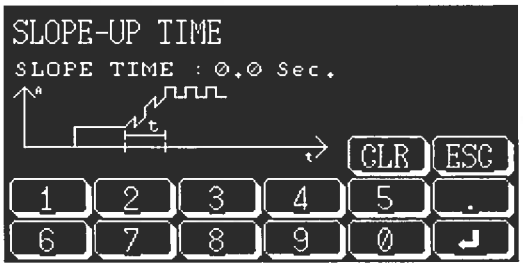
Fill in the time of starting current in seconds and press "ENTER".

The time of starting current is the time from starting welding until the function "slope up" starts.

Press "ESC" to return to the timer menu 1.

Press the button "SLOPE UP"

Slope up time:



Use the button "CLR" to clear the filled in values. Use the button "ESC" to leave the chosen menu.

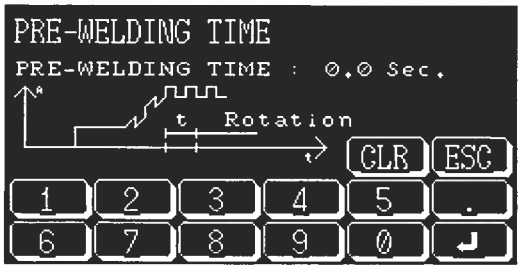
Fill in slope up time in seconds and press "ENTER".

Slope up time is the time the Orbital Commander uses to change from the starting current to the pulse / base current.

Press "ESC" to return to the timer menu 1.

Press the button "PRE-WELDING TIME"

Pre-welding time:



Use the button "CLR" to clear the filled in values. Use the button "ESC" to leave the chosen menu.

Fill in the pre-welding time in seconds and press "ENTER".

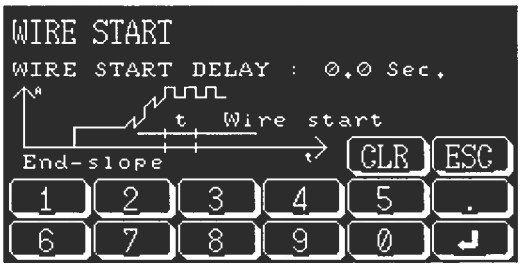
The pre-welding time is the time from the slope up time runs out until the orbital head starts to rotate.

Press "ESC" to return to the timer menu 1.

Next step is wire start.

Press the button "WIRE START"

Wire start:



Use the button "CLR" to clear the filled in values. Use the button "ESC" to leave the chosen menu.

Fill in the time in seconds before wire feeding and press "ENTER".

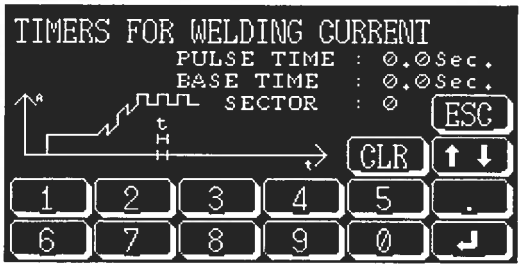
The start feeding wire time is the time from the slope up time runs out until start of wire feeding.

Press "ESC" to return to the timer menu 1.

Last step in timer menu 1 is pulse time

Press the button " PULSE TIME"

Pulse and base current times:



Use the button "CLR" to clear the filled in values. Use the button "ESC" to leave the chosen menu.

Press the button "↑↓" until the menu bar marks "number of sector". Press 1 and "ENTER". Move the menu bar to "pulse time" – use the button "↑↓". Fill in the required pulse time for sector 1. Remember to confirm by pressing the "ENTER" button. Move the bar to the base current time. Fill in the required base current time for sector 1. Remember to confirm by pressing the "ENTER" button.

Use the same procedure to fill in the pulse time for the remaining sectors.

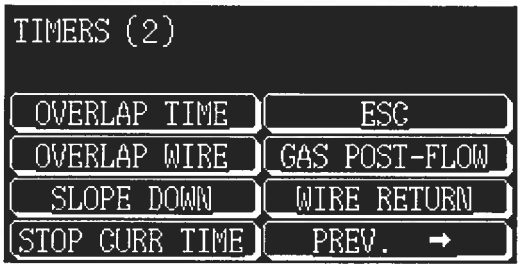
Press "ESC" to return to the timer menu 1.

Timer menu 1 is now programmed.

Press the button "NEXT ➔"

PROGRAMMING TIMERS, TIMER MENU 2

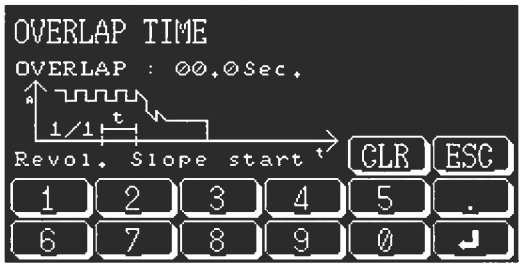
Timer menu 2:



Press "ESC" to leave the menu.

Press the button " OVERLAP TIME"

Overlap time:



Use the button "CLR" to clear the filled in values. Use the button "ESC" to leave the chosen menu.

Fill in the overlap time in seconds and press "ENTER".

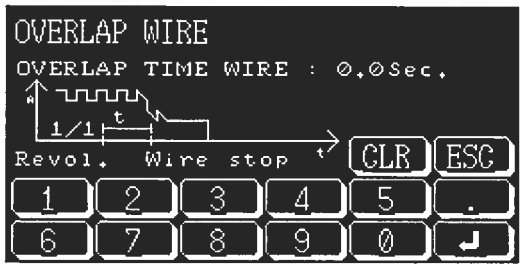
The overlap time is the time from the pre-programmed welding length (degrees) / seconds or the rotation sensor has been activated and until the rotation of the orbital head stops.

Press "ESC" to return to timer menu 2.

Next step is overlap wire.

Press the button " OVERLAP WIRE".

Overlap wire:



Use the button "CLR" to clear the filled in values. Use the button "ESC" to leave the chosen menu.

Fill in the overlap time wire in seconds and press "ENTER".

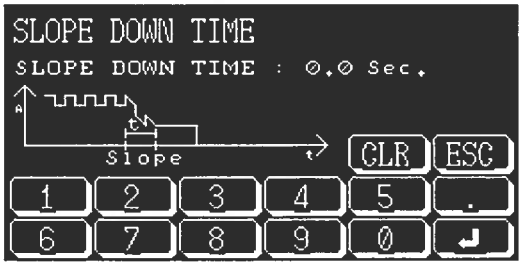
The overlap wire time is the time from the pre-programmed welding length (degrees) / seconds or the rotation sensor has been activated and until the wire stops.

Press "ESC" to return to timer menu 2.

Next step is slope down.

Press the button SLOPE DOWN"

Slope down time:



Use the button "CLR" to clear the filled in values. Use the button "ESC" to leave the chosen menu.

Fill in the slope down time in seconds and press "ENTER".

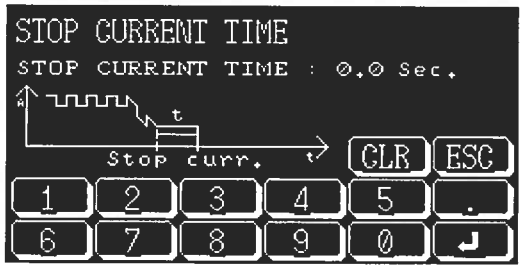
The slope down time is the time the Orbital Commander changes from the pulse / base current to the stop current

Press "ESC" to return to timer menu 2.

Next step is stop current time.

Press the button "STOP CURR TIME"

Stop current time:



Use the button "CLR" to clear the filled in values. Use the button "ESC" to leave the chosen menu.

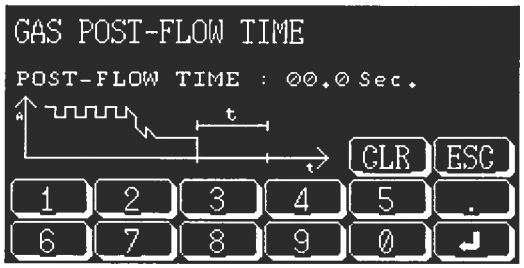
Fill in the stop current time in seconds and press "ENTER".

The stop current time is the time from the slope down time expire until the welding stops.

Press "ESC" to return to timer menu 2.

Press the button " GAS POST-FLOW"

Gas post-flow time:



Use the button "CLR" to clear the filled in values. Use the button "ESC" to leave the chosen menu.

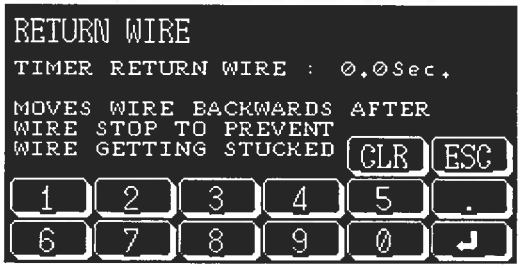
Fill in the gas post-flow time in seconds and press "ENTER".

The gas post-flow time is the time of purging with either shield gas or root gas after end of welding.

Press "ESC" to return to timer menu 2.

Press the button "RETURN WIRE TIME"

Return wire time:



Use the button "CLR" to clear the filled in values. Use the button "ESC" to leave the chosen menu.

Return wire time is the time the wire uses to pull back after the wire feeding has stopped. Wire return prevents the wire from "stocking" in the weld pool.

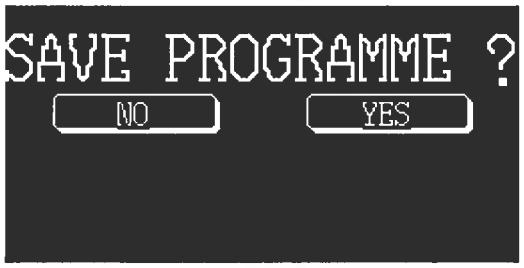
Press "ESC" to return to timer menu 2.

Save programme:

All the welding parameters are now filled in, and you are ready to weld.

It is necessary to resave the programme if you make corrections in the programme after a welding cycle.

Press the button "ESC" several times and you get back in various menues ending up with this menu.



Press the button "YES" and the programme is saved.

ERRORS

The Orbital Commander displays the following errors:

Mains error:

Mains error
Display indicates " Mains error".

Cause: Excessive or insufficient mains voltage, e.g. phase break or melted fuse.
Reaction: The welding process stops.
Action: Adjust mains voltage, replace fuses, if necessary.

Power module overheated:

Power module overheated
Display indicates " Power module overheated".

Cause: Overheating of an inverter module due to incorrect use, or error in the inverter module.
Reaction: The welding process stops.
Action: If the error has not been caused by incorrect use, call for service back-up.

Water error:

Water error
Display indicates "Water error"

Cause: Lack of or insufficient flow in the cooling system e.g. due to insufficient water .
Reaction: The welding process stops.
Action: Replace / repair blocked or damaged hoses. Top up with Migatronic coolant in the ratio of 10% coolant and 90% deionised water.

Gas error, shield gas:

Gas error, shield gas
Display indicates "Lack of shield gas"

Cause: Shield gas may not be connected to the gas cylinder. Check whether the gas is turned off (check also the flow meter on the machine), or the cylinder is empty.
Reaction: The welding process stops.
Action: Connect a gas cylinder, turn on the gas, or replace the gas cylinder.

Gas error, root gas:

Gas error, root gas
Display indicates " Root gas missing"

Cause: As described in part 2d " Gas error, shield gas" .
Reaction: The welding process stops.
Action: If root gas is not required this function can be deactivated in the menu system set up – gas – use root gas, or by pressing " use root gas" on the screen.

Arc error:

Arc error
Display indicates " Arc error"

Reaction: The welding process stops.
Action: Check electrode, electrode distance, or earth cables.

Battery error:

Battery error
Display indicates " Battery error – exchange battery"

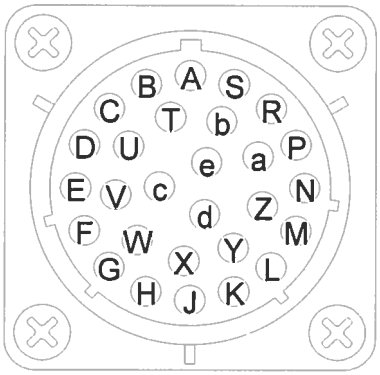
Cause: Battery in PLC controller is low.
Reaction: Memory will be lost.
Action: Call for service back-up.

PLUGS AND CONNECTIONS

The Orbital Commander is equipped with plugs and connectors for respectively remote control, hand torch, and orbital head.

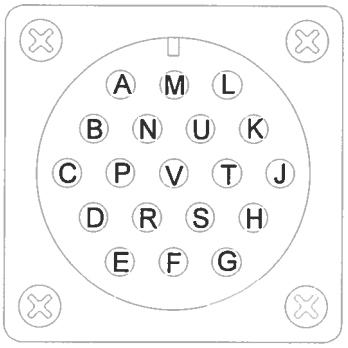
Electrical connections

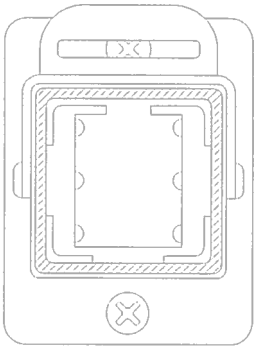
28 POLE CONNECTOR FOR REMOTE CONTROL



A: +24V DC.
B: Gnd.
C: Start/stop welding cycle. +24V = Start/stop.
D: Process stop. +24V = Stopped.
E: Adjust parameter up. +24V = Adjust up.
F: Adjust parameter down. +24V = Adjust down.
G: Free.
H: Free.
J: Earthing cabinet / remote control.
K: Manual rotation of the orbital head clockwise. +24V = Rotation activated.
L: Manual rotation of the orbital head counter-clockwise. +24V = Rotation activated.
M: Wire forward manual . +24V = Wire forward.
N: Wire backwards manual. +24V = Wire backwards.
P: Free.
R: Expanding mandrel (main pressure). +24V = Main pressure activated.
S: Welding 0/1. +24V = Welding activated.
T: Light diode/light: Start. +24V = Start activated. Pulsing = Process stop activated or calibration of the orbital head.
U: Pre-expand mandrel (low pressure). +24V = Pre-expand mandrel activated.
V: Wire during welding. +24V = Wire activated.
W: Parameter choice button: +24V = Adjustment of current activated.
X: Parameter choice button: +24V = Adjustment of rotation speed activated.
Y: Free.
Z: Free.
a: Free.
b: Free.
c: Free.
d: Free.
e: Free.

Electrical connections.





19 POLE CONNECTOR FOR ORBITAL HEAD

A: +24V DC max. 200mA.
B: Gnd.
C: Start /stop input. +24V = Start/stop.
D: Rotation sensor. PNP type. +24V = Activated.
E: Process stop. +24V = Stopped.
F: Orbital motor "+" / 0-10V control voltage for servo drive. (Via fuse at the front).
G: Orbital motor "-" / Gnd for servo drive.
H: Encoder input. +24V = Activated.
J: Wire motor "+".
K: Wire motor "-".
L-V: Free.

6 POLE CONNECTOR FOR HAND TORCH

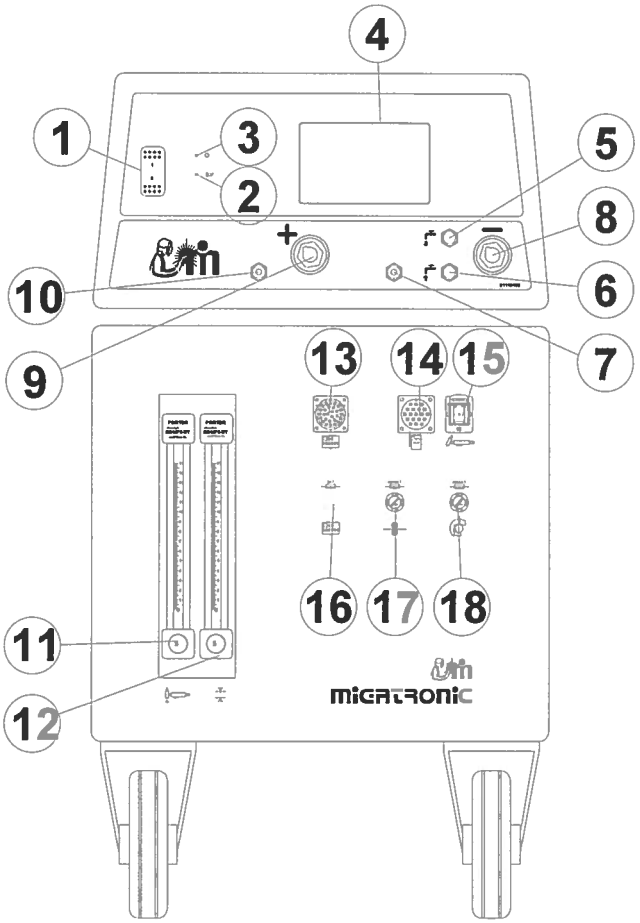
1: Free.
2: Trigger input.
3: Free.
4: Free.
5: Free.
6: Trigger input.

TECHNICAL SPECIFICATIONS

POWER SOURCE	ORBITAL COMMANDER 240	ORBITAL COMMANDER 320	ORBITAL COMMANDER 400
Primary:			
Mains voltage	3 * 400-415V~	3 * 400-415V~	3 * 400-415V~
Mains fuse, slow	16 A	16 A	20 A
Consumption max.	9 KW	12,7 KW	16,4 KW
Efficiency	0,85	0,85	0,85
Secondary:			
Current range DC	5-240 A	5-320 A	5-400 A
Duty cycle 100%	130 A	260 A	340 A
Duty cycle 60%	170 A	320 A	370 A
Open circuit voltage DC	80 V	80 V	80 V
Insulating class	F	F	F
Max arc voltage by max load	46 V	46 V	46 V
Trigger function	2/4 stroke	2/4 stroke	2/4 stroke
Cooling system water	3,5 litre	3,5 litre	3,5 litre
Flow shield gas	0-15 l/min.	0-15 l/min.	0-15 l/min.
Flow root gas	0-15 l/min.	0-15 l/min.	0-15 l/min.
Dimensions and weight:			
Dim. H*W*L	1050*550*700 mm	1050*550*700 mm	1050*550*700 mm
Weight	155 kg	171 kg	171 kg

LIST OF SPARE PARTS

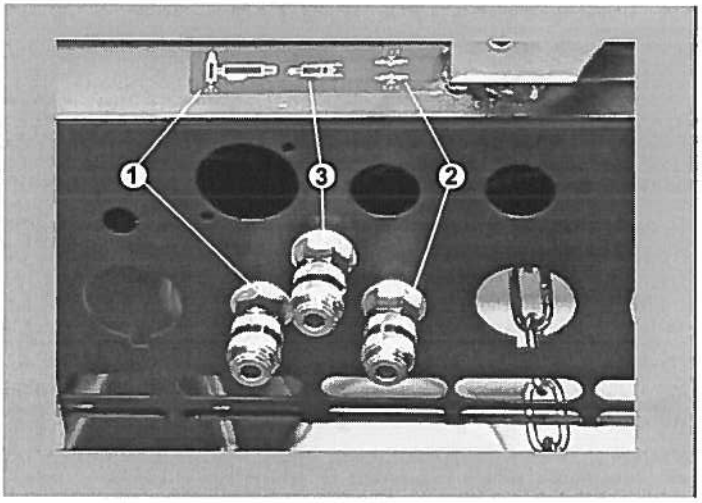
Front side:



1.	0/1 Main switch	17110011-0
2.	Light diode / lamp, red	12242050-0
	PCB for light diode / lamp	17612098-1
3.	Light diode / lamp, green PCB for light diode / lamp	12242052-0 17612098-1
4.	Touch display NT20 Note that this touch display has to be programmed before start using the machine.	76119115-1
5.	Quick release connection, water	43120018-0
6.	Quick release connection, water	43120018-0
7.	Quick release connection, gas	43120203-1

8.	Dinse connector chassis	18110002-0
9.	Dinse connector chassis	18110002-0
10.	Gas quick connector chassis	43120203-1
11.	Flow meter 0-15l/min.	18230403-1
12.	Flow meter 0-15l/min.	18230403-1
13.	28 pole connector without bushing	17200038-1
	Loose bushings for above connector	18200027-1
14.	19 pole connector, complete for soldering	17200026-0
15.	Flange housing chassis without insert	18200102-0
	6 pole insert for above, female	17200001-0
16.	Fuse for remote control	
	Not present on all models.	
	Fuse holder complete without fuse	17160007-0
	Fuse 2,0A.T	17172020-0
17.	Fuse for wire motor. 2 types:	
	automatic fuse and safety fuse	
	Fuse holder complete without fuse	17160007-0
	Fuse 0,4A.T	17173004-0
	Automatic fuse 0,5A.T complete	17110004-1
18.	Fuse for orbital motor. 2 types:	
	automatic fuse and safety fuse	
	Fuse holder complete without fuse.	17160007-0
	Fuse 0,4A.T	17173004-0
	Automatic fuse 0,5A.T complete	17110004-1

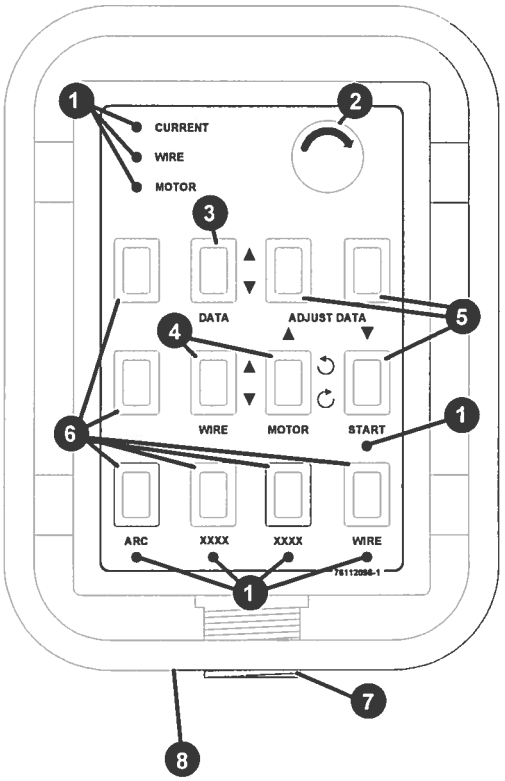
Rear side:



1.	Quick connector, shield gas	43120203-1
2.	Quick connector, root gas	43120203-1
3.	Quick connector, compressed air for expanding mandrel Not standard for all Orbital Commanders.	43120203-1

Remote control:

Complete remote control – German text	76112097-1
Complete remote control – English text	76112098-1
Complete remote control – Danish text	76112099-1



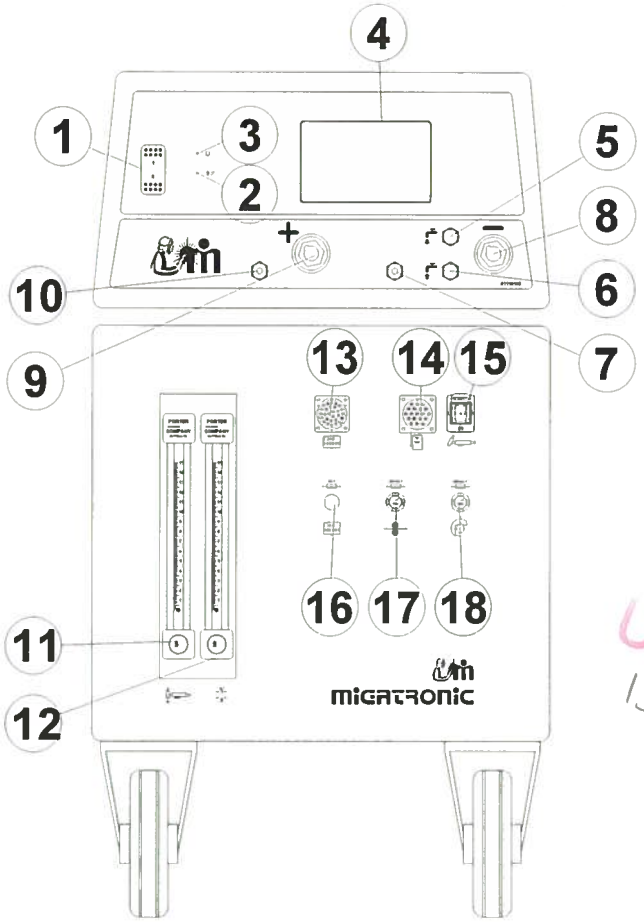
1.	Light diode / lamp: RED	12242050-0
	Light diode / lamp: YELLOW	12242051-0
	Light diode / lamp: GREEN	12242052-0
	Black holder for light diode 3mm.	12249001-1
2.	Stop button without switch	17110206-1
	Switch for stop button	17140027-1
3.	Tumbler switch for choice of parameter	17110143-1
4.	Tumbler switch with middle position	17110141-1
5.	Tumbler switch for spring return	17110145-1
6.	Tumbler switch 0/1	17110142-1
7.	28 pole connector without bushings	17200038-1
	Loose bushings for above connector	18200027-1
8.	Safety bracket for remote control	70606410-0

Not pictured spare parts and accessories:

Interconnecting cable between remote control and the Orbital Commander	74340003-1
Earth cable with clamps 3 meter, 70mm^2	80507003-0
Earth cable with clamps 6 meter, 70mm^2	80507006-0
HF control PCB, complete	71613052-0
Orbital control PCB. Motor controls & power supply	71612097-1
Orbital control PCB. Control PCB for power modules	71612100-1

LIST OF SPARE PARTS

Front side:



UGYLDIG
1999-11-22

1.	0/1 Main switch	17110011-0
2.	Light diode / lamp, red	12242050-0
	PCB for light diode / lamp	17612098-1
3.	Light diode / lamp, green PCB for light diode / lamp	12242052-0 17612098-1
4.	Touch display NT20 Note that this touch display has to be programmed before start using the machine.	76119115-1
5.	Quick release connection, water	43120018-0
6.	Quick release connection, water	43120018-0
7.	Quick release connection, gas	43120201-1