NAVIGATOR 2500 / 3000

使用说明书
Instruction manual

MIGATRONIC

2006年4月生效

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目录

一致性声明

EC DECLARATION OF CONFORMITY

MIGATRONIC A/S
Aggersundvej 33
9690 Fjerritslev
Denmark

hereby declare that our machine as stated below

Type: NAVIGATOR 2500 / 3000
As of week 40, 2001

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

European Standards: EN/IEC60974-1
EN/IEC60974-10

Issued in Fjerritslev on 1st October 2001.

Peter Roed
Managing director

警告

电弧焊设备和电弧切割设备在操作或运用不当时，会对操作的人、工场附近的人、或附近的物品产生危险。因此，必须严格按照相关的安全规则的指示使用设备。您尤其需要注意以下的事项：

电

- 必须根据安全规则安装焊机，并由合格的受过专业培训的人安装。焊机必须接地线。
- 确保焊机受到正确的保养。
- 如若电缆或绝缘层有破损，必须立即停止工作，进行维修。
- 维修和保养须由合格的受过专业培训的人进行。
- 避免裸手接触任何带电的电路或部件，以及带电的电极或焊丝，必须使用无破损的焊接手套。
- 确保与地面绝缘（如：穿上橡胶底鞋子）
- 用安全稳固的地方作工位（如：避免摔跌的危险）

光和热辐射

- 即使是短暂的裸眼暴露于弧光也会对眼睛造成持续性伤害，请使用带防辐射滤镜的头盔保护。
- 因为弧光辐射对会致伤皮肤，请穿着防护服作好防弧光辐射保护。
- 如果可能，工场应使用屏板隔离，并且警示工场区域的人员避免弧光辐射。

焊接烟尘

- 焊接烟尘有害健康，请确保排烟系统能正常工作，并且保证通风良好。

火灾

- 弧光辐射和焊接飞溅可引起火灾；所以，必须将焊接工场的可燃烧物品排除掉。
- 工作服须能承受焊接飞溅，（如：选用防火材料制成的衣服，小心衣服的皱褶卷口和开口的衣兜。）
- 所有现行的室内防火防爆的条例都应严格遵守。

噪音

- 焊接时，电弧会产生噪音，在必要的情况下，请采取措施保护听力。

危险区域

- 送丝机里的送丝轮在转动时，必须避免将手指伸到送丝轮之间。
- 在封闭的场合焊接时须特别注意，或者在高位操作有跌落危险时必须注意。

焊机置放

- 平稳地置放焊机，保证焊机不会倾倒。
- 所有现行的室内防火防爆的条例都应严格遵守。

反对将焊机用于其设计之外的用途（如未解冻的水管）。如果坚持此类不正常使用，我公司不承担任何责任。

在安装和使用本焊机前
请仔细阅读这本使用说明书

电磁泄露和辐射及电磁干扰

本焊机为工业和专业的焊接设备，符合欧洲标准EN/IEC60974-10。该标准的目的是为了防止焊接设备受到干扰或焊接设备自身对其他电子设备和仪器形成干扰。电弧会造成干扰，因此，为了在操作时不受干扰或中断，要求在 安装和使用本焊机时采取一定的措施。**操作者务必保证焊机的操作没有上述提及的干扰。**

工场周围区域应注意下列：

1. 在施工区域里的其他电器设备的供电线和信号线。
2. 无线电或电视转播器和接收器。
3. 电脑和其他任何电控设备。.
4. 关键的保护设备，如电子电器控制的安全保护系统。
5 戴有心脏起搏器的人和戴有助听器的人
6. 校准设备和测量设备。
7. 进行焊接或其他工作的时间。
8. 建筑物的结构和用途。

如果在室内使用焊机，为防止泄露问题，必要加以格外谨慎（如，了解这个焊接工作的情况）。

减少电磁泄露的方法：

1. 避免使用会产生干扰的设备。
2. 用短焊枪
3. 将正负极电缆放在一起。
4. 将焊枪放置于地面或接近地面。
5. 将信号线与供电线分开。
6. 保护好工场内的信号线。
7. 敏感的电器设备应用分离绝缘的供电线。
8. 在特殊情况或特殊用途时，安装焊机可在掩饰下进行。

焊机配置

NAVIGATOR 2500/3000 为一个焊机系列，专为金属薄板和管道行业设计的焊机。

该系列焊机有几种型号：MMA，TIG DC， TIG AC/DC。DC表示直流电，AC表示交流电。

所有机型都适合药皮焊条焊接，具有防粘功能、可调节推力电流和热启动功能。此外，通过设置脉冲时间、停止时间和基值电流实现脉冲焊。

TIG焊具有如下功能：

- 可调节电流缓升缓降
- 可调节提前送气和滞后停气
- 可调节起弧电流和停弧电流
- 可调节降低的电流
- 可选择2-步模式， 4-步模式，点焊
- LIFTIG-接触起弧
- HF-TIG高频起弧
- 启用引导弧，断开引导弧
- AC-时间控制和电流控制
- AC 焊接频率
- 数字显示
- 在TIG 焊枪上控制电流
- 遥控件 (选配)
- 可设置10个焊接程序

LIFTIG/接触起弧

接触/LIFTIG起弧：在TIG焊中，将电极与工件接触，然后打开焊枪开关，随即将电极从工件上抬起，在电极离开工件时电弧引燃。

高频/HF起弧

高频起弧：在TIG焊中无需电极与工件接触的起弧方式。焊枪开关打开时，以高频率冲波引燃电弧。若引弧不成功，而电极接触到工件焊机则停止工作。这时应取下电极，再重新开始。

承载小车

所有机型都配有承载小车。

焊枪

该系列焊机可配备了TIG焊枪。如果使用可调节焊枪，可以在焊枪上调节电流。

遥控调节（选配）

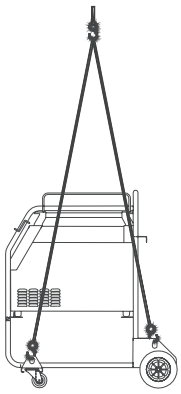
NAVIGATOR 2500/ 3000可选配遥控控制件和脚踏控制件。

焊枪冷却件（选配）

可选配水冷TIG焊枪的焊枪冷却件，TIG焊枪须与该冷却件配备使用。

准备工作

吊装说明



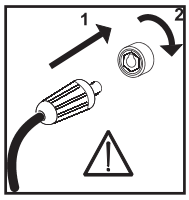
请根据当地法规和标准处理废料。
www.migatronic.com/goto/weee

装配声明

米加尼克拒不承担所有因使用不符合规格的焊枪和电缆而导致的电缆损坏或其他部件的损坏的责任。用户务必使用能承受实际荷载的焊枪和电缆。

重要！

为了避免插头和缆线被破坏，请保证地线连接，焊枪与电源的连接接触良好。



警告

将焊机直接连接到发电机上可损坏焊机。
当把焊机连接到发电机上时，发电机产生的大电压脉冲可烧坏焊机。只能使用频率和电压都稳定的异步发电机。

因直接将焊机连接到发电机上而导致的损坏或故障不在保修之内。

输入电缆连接

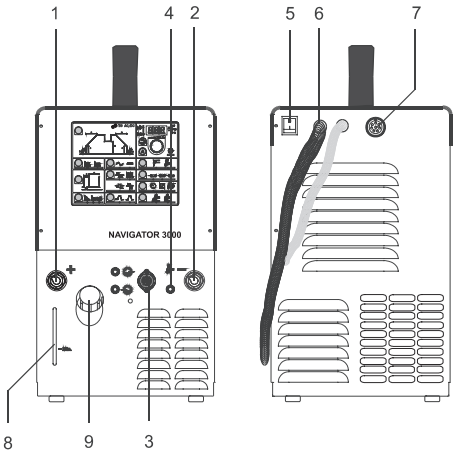
NAVIGATOR 2500/3000只能使用铭牌上标注的额定电流。与供电电缆连接好后，焊机便可使用了。请确保所有的电缆连接必须由指定的合格人员操作。用焊机背面的开关（5）开/关焊机。

保护气连接

用气流计连接气瓶和焊机连接起来。

防扩散导气管

本焊机已装配有PVC导气管，这种导气管满足一般的焊接工作。特殊的焊接工作，对气体纯要求高的情况，我们建议配用防扩散的导气管。防扩散导气管保证湿度低，能保护气体。 这些特殊的导气管可作为特殊部件订购。安装时，应从气瓶直到电磁阀安装。



焊接电缆的连接

将正、负极焊接电缆连接到焊机前方的插座中（1，2）。请注意，在把电极插头插入插座后，往右旋转45度，以保证接触良好。否则，插头可能会因电阻过大而烧坏。
TIG焊焊枪一律接入负极（-）插座（2），而另外的电极接入正极（+）插座（1）。
TIG焊的控制信号是通过7芯航空插座(3)输送到焊机电源的。在将插头接入航空插座时，请确保将插头旋紧。将导气管接入快速插座（4）上。

药皮焊条：焊条的包装上标注有电极。对照该标注，将焊枪接入焊机的正极或负极插座上。

遥控器的连接（选配）

将遥控器连接到焊机后面的8芯插座上。

水冷单元的连接

焊机装配了水冷单元，有必要检查冷却箱中的冷却液的量，可以通过水平计（8）观察。从添加嘴（9）添加冷却液。

焊机用法（NAVIGATOR3000）

在焊接时，有不同的部件会产热，在焊接暂停时，这些部件会得到降温。
请确保空气的输入和排出畅通无阻。
在正常使用的情况下，焊机是不会过载的。将电流设置到190安培也无需暂停下来让焊机冷却。如果设置更高的电流，就需要一段时间来冷却焊机。

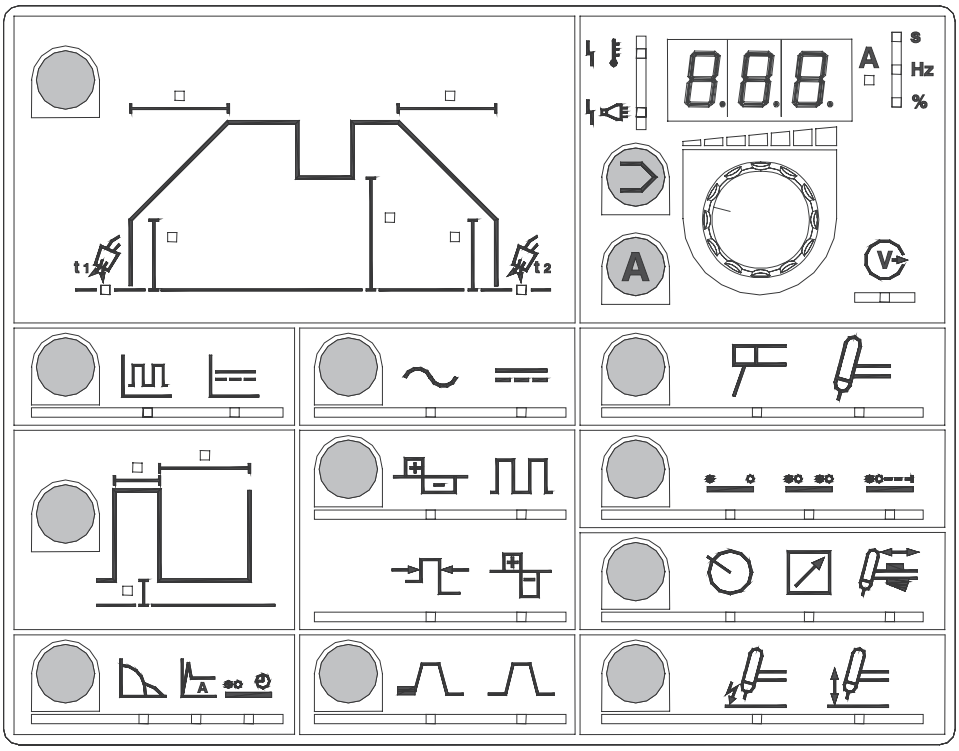
这段时间的长短取决于设置的电流，这个时候不需要关掉焊机，以免将风扇关掉了。在使用焊机的过程中，如果这段暂停时间不足，过热保护功能会自动停止焊接工作，前面板上的黄色指示灯随之亮起。该黄色指示灯在焊机充分冷却后熄灭，那么焊机可以继续进行焊接工作了。

最大载荷：

100 % max. load	190 A
60 % max. load	240 A
25 % max. load	300 A

MMA焊60%的最大载荷，就是指在电流设置为240安培时，焊接6分钟后就要暂停4分钟，以冷却焊机。用这个方法，基于上表，以10分钟来推算。

控制面板



所有的参数都在这个控制旋钮上设置，这些参数包括：电流，脉冲时间，电流缓升时间，等等。

控制旋钮在数字显示屏下面。数字显示屏可以显示 所设置的参数质，所显示的参数的单位符号在显示屏的右边。

若要改变或者读取所设置的参数，请点按控制旋钮，直到你所要的参数的单位符号旁边的指示灯亮。

参数也可以被开或者关，比如：TIG起弧方法，可以用控制旋钮来选择，被选的功能的指示灯会亮起。

储存参数

在关掉焊机电源时，焊机能记忆所有的参数，能保证在下次开机时能再次使用这些参数。

两中焊接方法（MMA和TIG）各自的参数也会确切地记录下来，所以，在两个焊接方法间转换时不需要重新设置电流。

焊机的设置

下面的内容将详细叙述焊机的操作。

焊接电流

按此键，就可使用控制旋钮来设置电流了（除非焊机已设置为遥控调节）。

焊接停后，显示屏上显示设置的焊接电流，而在焊接过程中，则显示实际焊接电流。在脉冲焊中，显示的是平均焊接电流，因为焊接电流与基值电流之间的快速转换，超过了视力所及。

储存参数为程序

这个功能可以把焊接工艺程序（即常用的参数）储存起来，还可从一个程序转换到另一个程序。点按此键，显示屏上显示字母“P”和一个数字，如“1”，“2”等。一个数字包含了一个程序的全部参数和它们在焊机上实现的功能。因此，每一个焊接工作都可以有一个焊接工艺程序。转动控制旋钮可以在这些程序间切换。在焊接过程中不能切换程序。放开这个按键便接受所选的程序。MMA和TIG可以各储存10套程序。

焊接电压

电压指示灯会在焊接启动时亮起，起安全警示的作用。

参数单位

A m s Hz %

图标显示了参数的测量单位。

过热报警

过热报警指示灯在焊机因过热而中断焊接工作时变亮。在过热错误消除5秒钟，指示灯熄灭。请阅读“错误与故障显示”一章。

输入电源错误：

输入电压过高时出现该错误指示图标。在错误消除5秒钟后指示灯熄灭。因此，这种短暂的错误能提醒焊接师。请参看“错误与故障显示”的章节。

选择焊接方法

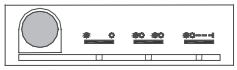
该键用于选择MMA 或TIG。在焊接时所用的焊接方法是固定下来的，MMA 和TIG的转换只能在滞后停气结束后才可能进行。

MMA /手工焊

这个键表示MMA/手工焊。

TIG/钨极氩弧焊

这个键表示TIG/钨极氩弧焊。



选择焊接模式2-步/4-步

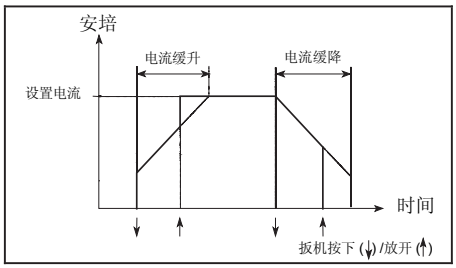
这个界面用以选择TIG焊的开/关是2-步模式还是4-步模式（4-步时灯亮），或者是点焊。焊接有三个阶段：提前送气，电流缓升；以设置的电流进行焊接，降低的电流进行焊接（如果需要）；电流缓降，滞后停气。在焊接过程中不能切换焊接模式。

2-步模式

按下焊枪扳机便开始进行焊接，焊接会一直持续直到扳机被放开，放开扳机便进入电流缓降阶段，反烧完成焊接就结束。在电流缓降和保护气滞后停气阶段，可以重新按下扳机开始焊接。

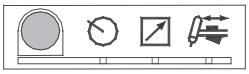
4-步模式

按下焊枪扳机则开始焊接，在提前送气阶段放开扳机，进入电流缓升期；如果在电流缓升期放开焊枪扳机，焊机就以设置的电流进行焊接。若要停止焊接，必须再次按下扳机。按下扳机后，进入电流缓降期；若在缓降期放开扳机，那么缓降随之停止。



点焊

按下焊枪扳机则启动焊接，根据所设置的点焊时间，焊接会自动停止。



电流调节功能

这个界面用来选择调节电流的方式。在焊接过程中，电流调节的方式是不能改变的。

控制面板调节电流

用控制面板上的控制旋钮设置/调节电流。

遥控调节

用米加尼克的遥控盒控制电流。遥控盒连接到焊机后面的插座上（非标准配置）。

焊枪调节

电流调节通过米加尼克的遥控调节焊枪进行（转动焊枪上的旋钮），如果使用的焊枪是遥控调节焊枪。最大的电流在控制面板上设置，在焊枪上只能在这个电流范围内调节。

TIG焊起弧方式

TIG可以选择起弧方式：HF-高频起弧， LIFTIG接触起弧方式。在焊接过程中不能切换起弧方式。

2T **2-**步模式

这个图标表示无接触起弧，电弧通过下列途径建立：

1) 钨极置放在离焊接点很近的地方（1-2毫米）。
2) 按下焊枪扳机，焊机产生高压脉冲引燃电弧，开始焊接；放开扳机则焊接停止。电弧在电流缓降期后熄灭。保持焊枪不动，直到滞后停气结束，以便保护熔池不产生氧化。

4T **4-步模式**

这个图标表示无接触起弧，电弧通过下列途径建立：

1) 钨极置放在离焊接点很近的地方（1-2毫米）。
2) 按下焊枪扳机，焊机产生高压脉冲引燃电弧，开始焊接；然后放开扳机。当再次按下扳机则焊接停止。电弧在电流缓降期后熄灭。保持焊枪不动，直到滞后停气结束，以便保护熔池不产生氧化。

2T **2-步模式**

这个图标表示LIFTIG-接触起弧方式，电弧通过下面的途径建立：

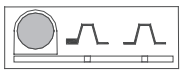
1) 钨极置放在焊接点上，与工件接触（1-2毫米）。
2）将扳机一直按下。
3) 将钨极从工件上抬起，即引燃电弧，开始焊接。若要停止焊接，则放开扳机。电弧在电流缓降期后熄灭。保持焊枪不动，直到滞后停气结束，以便保护熔池不产生氧化。

4T **4-步模式**

这个图标表示LIFTIG-接触起弧方式，电弧通过下面的途径建立：

1) 钨极置放在焊接点上，与工件接触（1-2毫米）。
2）将扳机一直按下并将钨极从工件上抬起，即引燃电弧。若要停止焊接，则再次按下扳机。电弧在电流缓降期后熄灭。保持焊枪不动，直到滞后停气结束，以便保护熔池不产生氧化。

请注意！高频起弧和接触起弧两种方式都可在滞后停气结束前重新引燃弧。



引导弧

在这个界面上可以选择是否启用引导导弧。在焊接过程中不能启动或者关闭该功能。

该图标表示引导弧不能启用

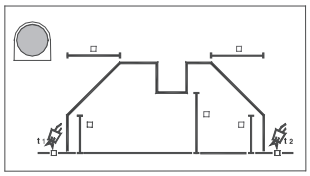
该图标表示引导弧可以启用

只有在TIG焊时，引导弧只起照亮工件的作用，仅是为了帮助找到焊接的起始点而已。

可以快速地按压扳机来点燃引导弧，按压时间不超过0.3秒钟；如果按压超过0.3秒钟，焊机会自动地转到普通焊接。

在TIG焊2-步模式时，可将扳机一直按下，引导弧便转到普通焊接；在TIG焊4-步模式或点焊中，可将扳机按下超过0.3秒钟。这样焊接便以普通方式进行。

但是，在电流缓降结束后，焊机并不是直接过渡到滞后停气阶段，而是再形成引导弧。这样便能接着进行下一个新的焊接工作，是通过较长时间按压扳机（大于0.3秒钟），或快速按压扳机（小于0.3秒钟）自动转到备用状态。



TIG 焊接

这些参数，可以在焊接过程中选择和调节。

提前送气时间

提前送气时间是在焊枪开关按下后，高频起弧开始之前的一段送气时间；在接触起弧方式中，这段时间是电极离开工件前的一段时间。可在0-10秒之间设置。

起弧电流

在弧引燃后，焊机立即将焊接电流调节到设置的起弧电流。起弧电流以焊接电流的百分值计算，可在0-100%之间设置，最小值为5安培。

电流缓升

在弧引燃后，焊接过程进入到电流缓升阶段，在电流缓升中，电流从起弧电流逐渐上升到焊接电流。电流缓升的时间可在0-10秒间。

电流缓降

在按下焊枪开关停止焊接时，焊机进入电流缓降阶段。在电流缓降阶段中，焊接电流降到收弧电流，这段时间较电流缓降时间。可在0-10秒间设置。

收弧电流

在焊接电流降到收弧电流水平时，电流缓降便完成。收弧电流是以焊接电流的百分值计算，可在1-100 %间设置，最小值为5安培。

滞后停气

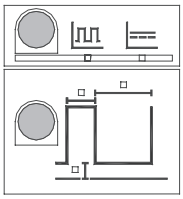
滞后停气是在电弧熄灭后气体继续输送的一段时间，在3-30秒之间设置。

低电流

在4-步模式时，快速按压扳机，激活设置的低电流。这个低电流以焊接电流的百分值来计算，可在0-100%间设置，最小值为5安培。

焊接过程的显示

如果电流的调节是通过按A-键（电流键）来激活的，那么就可以在焊接过程中看到焊接过程的实际阶段。



脉冲焊

这个界面是脉冲的按键区，它分成两个部分：上面是启用或关闭脉冲焊，下面是不同的脉冲参数。

在焊接过程中不可以启用或关闭脉冲功能。

脉冲

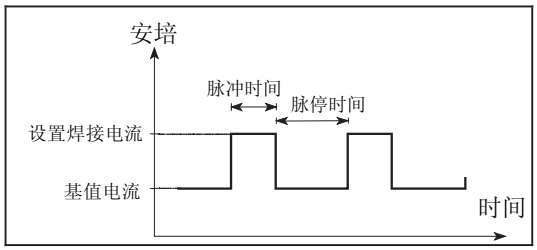
已选择了脉冲焊。

无脉冲

选择无脉冲焊接，所有脉冲参数都不能激活。

脉冲参数

在脉冲焊接时，参数可以被选中，对它作变动。下面这个图显示出三个脉冲参数的含义。



脉冲时间

反映焊接在用脉冲电流下焊接的时间。脉冲电流是设置的电流，脉冲时间可在0.01-10秒钟间设置。

脉停时间

反映焊机在基值脉冲下焊接的时间。脉停时间可在0.01-10间设置。

基值电流

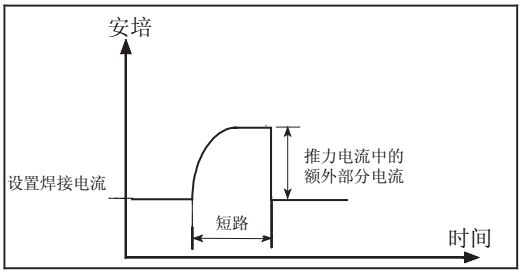
基值电流以设置焊接电流的百分值计算，可以在焊接电流的1–99%间设置。基值电流不能低于5安培。

MMA和TIG焊的参数

在焊接过程中，这些参数可以被选中并作调节。

推力电流

推力电流的作用是在MMA焊时稳定电弧，这可以通过增加短路电流量来实现。短路停止后，增加的那部分电流则停止。

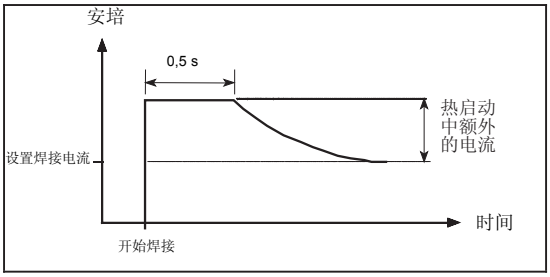


推力电流可以在设置焊接电流的0-150% 间设置。

如：焊接电流设置为40A，推力电流设置为100%，额外部分电流就为40 A，那么推力电流值就为80 A。如果推力设置为150%，那么额外部分电流为60A，推力电流值便是100A。

热启动

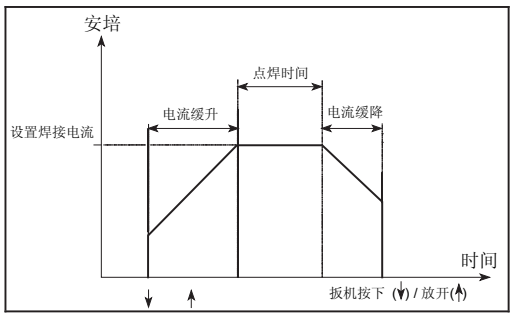
在手工焊时，这个功能可辅助起弧。当焊条在接触工件时，通过增加设置焊接电流值便可实现热启动。这个增加的起弧电流持续半秒，然后降低到设置的焊接电流值。



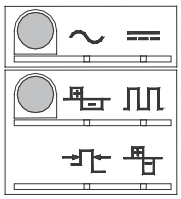
热启动值是在起弧时，以设置电流的百分比计算的增加值，可以在0-100%间设置。

点焊时间

在TIG中点焊时间是电流缓升结束到电流缓降开始之间的一段时间。因此，点焊中的电流为设置的焊接电流。该功能激活时，指示灯闪烁。



如果在焊接过程中改变了点焊时间，这个改变要在下一个焊接中才生效。放开焊枪扳机能中断点焊。



AC/交流电焊

这部分界面分成两个部分，上面的是显示电流类型，下面显示交流电特殊功能的设置。

电流类型

可以选择交流电或直流电。在TIG焊中，焊铝和铝合金时用交流电；焊接其他材料时用直流电。

TIG焊铝及铝合金时，交流电的正半波能破除工件上的氧化膜，负半波熔化材料。

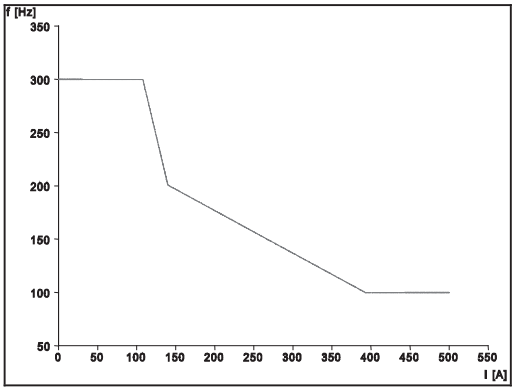
交流电频率

在TIG焊中，交流电的频率可以在1-300赫兹间调节；在MMA中，可以在1-100赫兹间调节。TIG焊中，低频率会增大钨极尖端形成小球的可能，提高频率则减小这种可能。

注意:

1 在TIG焊中，交流电频率和电流量不能同时调节到最大限度，请参看下面的坐标图。当交流电频率调节到最大时，控制面板上“电流指示灯”会亮起，焊机会自动地降低交流电频率。

2 如果因过度调节电流而使交流电频率超出限制，那么焊机会自动地降低频率，交流电频率的指示灯会闪烁5秒钟。



3 如果在交流电焊中使用了脉冲功能，那么交流电频率可以跟脉冲时间成比例地降低。如果在脉冲时的频率太低，那么指示灯也会闪烁5秒钟。

4 脉冲调节错误：如果在交流电焊中使用脉冲功能，可能会发生自动地调节脉冲设置的情况；那么，脉冲时间的指示灯会闪烁5秒钟。脉冲时间自动地改变，那么脉冲时间和基值时间都会变成0.03秒钟。

电极预热(TIG)

交流电TIG焊的引导弧可预热钨极。在开始进行交流电焊接前有必要对钨极预热处理。预热的时间由钨极的直径、尖端的角度和尖端上小球的大小决定。

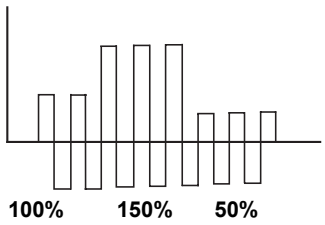
预热时间可在-9到+9之间调节，-9为最低预热时间，+9为最大预热时间。如果预热时间太短，引导弧会在起弧后很快消失；如果预热时间过长，钨极尖端的小球会增大。

交流电-时间控制（TIG焊）

这是交流电TIG焊焊铝及铝合金的精确氧化膜破除功能的调节，这个功能是正负半波之半周期的时间动态控制，调节负半波的时间长短。其调节值的范围是按一个周期的百分值计算，在1-100%之间。调节连续不停，直到熔池周围形成适合的阴极雾化带。在MMA焊中，这个调节只能在50%之内，就是说不能做更大的调节。

交流电-电流控制（仅TIG焊）

这个功能也是对交流电TIG焊时对焊接区域氧化膜破除功能的精确的调节。但是，这个电流控制是对正半波电流与负半波电流之间的比例进行动态控制，基于负半波，调节正半波的比例。正半波减少会产生一个效应，能增加钨极的使用寿命。



直流电TIG焊

也可以用非合金的钨极（绿色标注）作直流电TIG焊，电流设置为交流电，交流电时间控制和交流电电流控制都设置为100%。焊机会使用预热功能来形成引导弧。在预热结束后，焊接电流会返回到负极。

固定功能

下面的是固定功能，是不能在显示屏上作选择的。

防粘功能

防粘功能总是处于激活状态。在MMA和TIG 中，电极可能粘着于工件。焊机会自动记录并把电流降低，熔池会冷凝，电极也能移开，使能继续焊接。

焊枪冷却功能

如果焊机已配备了冷却单元和米加尼克的水冷焊枪，那么焊机会在电弧引燃时自动开启冷却功能。冷却功能会焊接停止后持续。2.5分钟。

交流电TIG焊的起弧功能

在交流电TIG焊的起弧过程中如果使用低起弧电流（如25%）和电流缓升（如0.1秒），有利于避免钨极上的钨渗透到工件上。

错误/故障显示

过热

焊接因电源过热而中断时会出现该错误指示图标。必须保持开启焊机，以使经风扇能有效地冷却焊机。有效冷却后焊机自动转到可用状态。

如果焊机在40度以上的环境下使用，过热错误会更常发生。建议不要将焊机暴露在太阳直射下，因为阳光照射会增加过热的可能。

输入电源错误

输入电压过高时出现该错误指示图标。请确保电源输入插头连接正确，保险丝完好。此外，请控制输入电压不超规定的额定电压，并且不存在短期的电压的高低波动。

Etc 焊枪冷却错误

这个错误指示代码会出现在显示屏上“省略号”的部分中。如果冷却液流不到焊枪上，请关掉焊机，检查导管是否畅通（见“维护章节”）。确认导管畅通后再开启焊机，可以继续进行焊接。

显示屏上显示的其他错误

如果出现上述之外的错误，或显示出其他错误代码，请与米加尼克公司的服务部门联系。

技术参数

	NAVIGATOR 2500 AC/DC	NAVIGATOR 3000 DC	NAVIGATOR 3000 AC/DC
电源型号			
输入电压	3x400 V ±15%	3x400 V ±15%	3x400 V ±15%
保险丝容量	16 A	16 A	16 A
负载持续率：			
- 25%	250 A / 32 V	300 A / 32 V	300 A / 32 V
- 60%	220 A / 30 V	240 A / 29.6 V	240 A / 29.6 V
- 100%	170 A / 27.6 V	190 A / 27.6 V	190 A / 27.6 V
最大电弧挺度	38 V / 250 A	38 V / 250 A	38 V / 250 A
空载电压	95 V	95 V	95 V
输出电流范围 AC	5 – 250 A		5 – 300 A
输出电流范围 DC	5 – 250 A	5 – 300 A	5 – 300 A
[1]运用等级	S	S	S
[2]防护等级 (IEC 529)	IP 23	IP 23	IP 23
执行标准	EN/IEC60974-1 EN/IEC60974-10	EN/IEC60974-1 EN/IEC60974-10	ENIEC60974-1 EN/IEC60974-10
外形尺寸(H- W-L) (mm)	563x300x698	563x300x698	563x300x698
重量（含焊枪冷却件）	37 kg	39 kg	43 kg
重量（不含焊枪冷却件）	31 kg	33 kg	37 kg
焊枪冷却:			
冷却功率	0.71 kW	0.71 kW	0.71 kW
冷却液缸容积	4 liters	4 liters	4 liters

功能	焊接方法	NAVIGATOR 2500 / 3000
推力电流	Electrode	0-150 %, max. 250/300 A
热启动	Electrode	0-100 %, max. 250/300 A
防粘功能	TIG/Electrode	always on
引导弧	TIG	5 %, min. 5 A
起弧电流	TIG	0-100 %, min. 5 A
收弧电流	TIG	0-100 %, min. 5 A
电流缓升	TIG	0-10 secs
电流缓降	TIG	0-10 secs
提前送气	TIG	0-10 secs
滞后停气	TIG	3-30 secs
点焊时间	TIG	0.1-50 secs
脉冲时间	TIG/Electrode	0.01-10 secs
脉停时间	TIG/Electrode	0.01-10 secs
基值电流	TIG/Electrode	1-99 %, min. 5 A
低电流	TIG	0-100 %, min. 5 A
交流电时间控制	1-100 % (仅 AC)	1-100 % (only AC)
交流电电流控制	1-200 % (仅 AC)	1-200 % (only AC)
交流电频率	1-300 HZ (仅 AC)	1-300 HZ (only AC)
TIG-起弧	TIG	HF / LIFTIG
2/4-步焊接模式	TIG	2/4-stroke
设置焊接工作	TIG/Electrode	10

[1] S 焊机达到在触电危险高的环境下工作的要求。

[2] 有IP23标志的设备可在室内、室外使用。

维护

焊机的维护不足可能降低焊机的操作可靠性，进而超出保修范围。

NAVIGATOR 2500/3000 焊机事实上不要求作维护，但是，在严重多尘，潮湿和空气腐蚀性强的环境中使用可导致焊机损坏，因此，在这种情况下需作必要的维护。

定期维护

为了避免发生故障，请一年至少一次进行下列的处理，或按要求处理：

- 将焊机与供电电源断开，稍等2分钟，然后卸下前面板。
- 清理风扇叶片，并用干净、干燥的压缩空气清理冷却管的部件。
- 抽出缸里和焊枪里的冷却液，祛除里面的沉积物，并用清洁水冲洗。重新加入冷却液。焊机在出货时已装有1：3的丙二醇液，可以在-10度防冻。

保修条款

针对潜在的缺陷，所有米加尼克的焊机都有12个月的保修期。这些缺陷必须在发现两个月内通报。本保修期从向终端用户开具发票起的12个月。

本保修条款不包括：由于错误安装、异物、运输损坏、水或火志损坏，闪电袭击、与同步发电机连接或在产品说明之外的非正常条件下使用造成的错误。

缺少维护

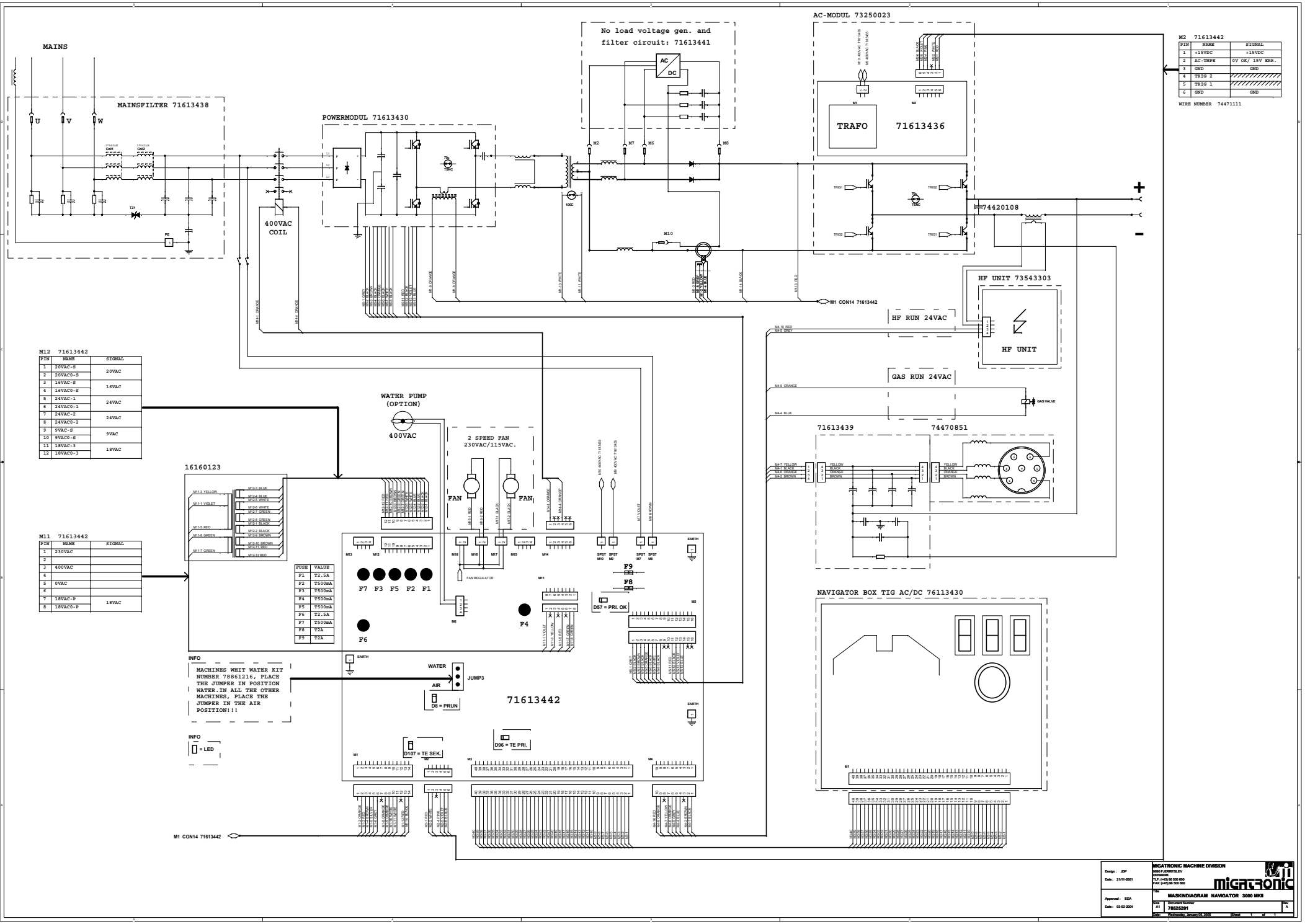
如果没有对焊机进行适当的维护，则不在保修条款之内，如严重极垢没，影响冷却。保修条款也不覆盖由可查明的未授权的或不正确的维修导致的损坏。

耗材耗件

本保修条款不覆盖耗材耗件（焊枪，焊接电缆和送丝轮）。

继发性损坏

在发现有缺陷时应立即停止使用焊机，以避免进一步的损坏。本保修条款不覆盖已知损坏引起的继发损坏。此外，本保修条款也不覆盖该焊机的已知错误引起的其它物件的损坏。



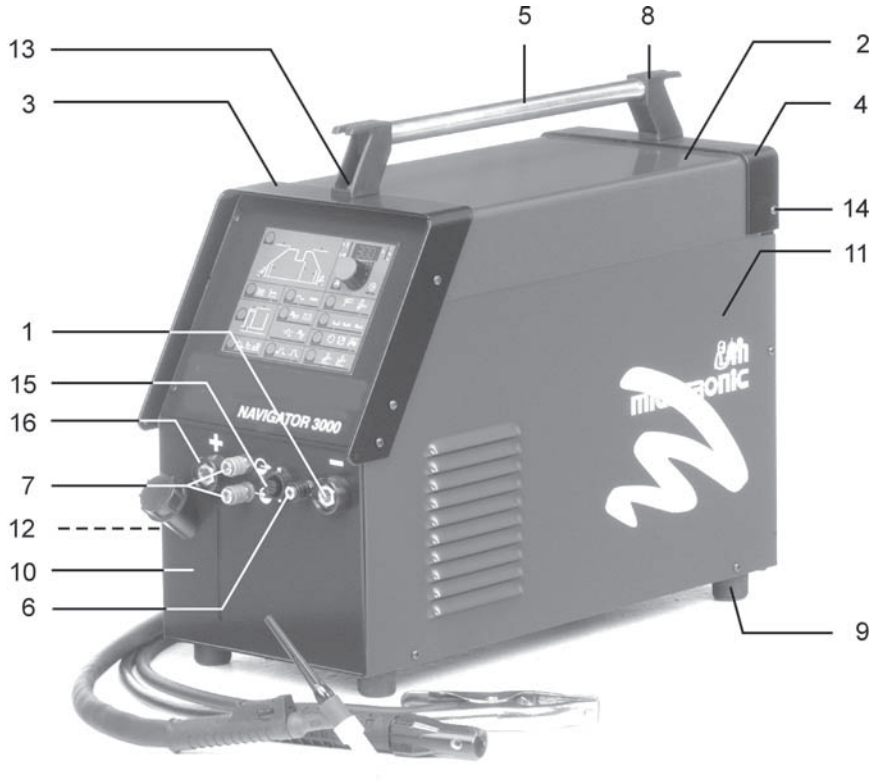
Design: JDP	MIGATRONIC MACHINE DIVISION
Date: 21/11-2001	
Approved: EGA	Title: MASKINDIAGRAM NAVIGATOR 3000 MKII
Date: 03-02-2004	Size A1 — Document Number 78525201 — Rev A
	Date: Wednesday, January 04, 2006 — Sheet 1 of 1

备用零件表

Spare parts list

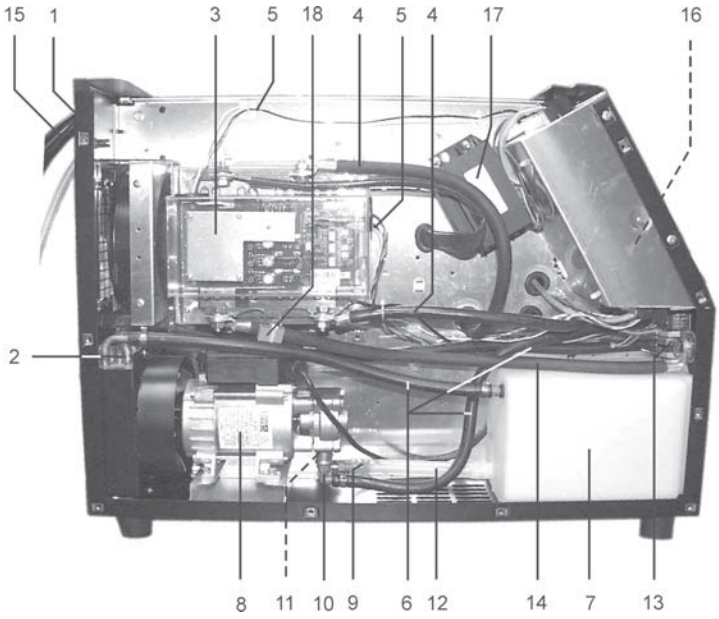
NAVIGATOR 2500/3000

NAVIGATOR 2500/3000



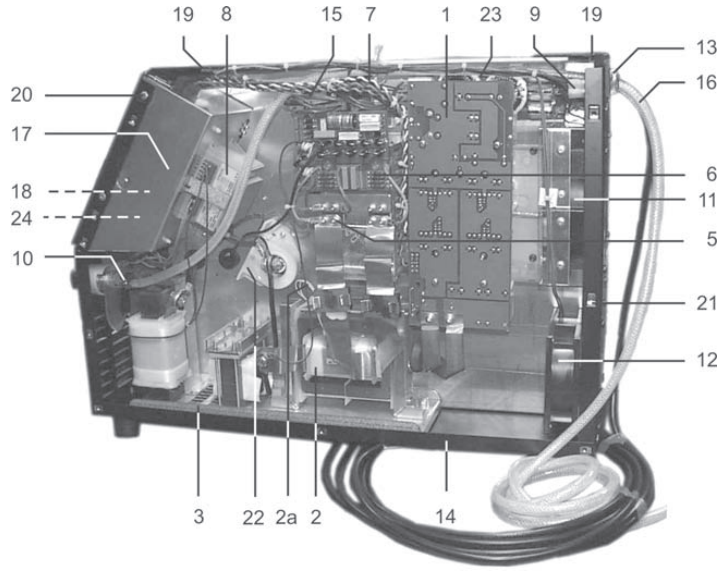
示图	代码	零件描述	**Description of goods**
1	18110008	TIG焊枪插座，整件	TIG central adaptor complete
2	24433602	顶盖	Cover
3	24630158	顶盖前面固定板	Front strap
4	24630160	顶盖后面固定板	Rear strap
5	26330010	钢制提手	Steel handle
6	43120012	气体快速插座1/8"	Quick clutch gas, 1/8"
7	43129007	红色，冷却液软管接头 8mm	Quick adaptor set red with valve, 8m$_m$
7	43129008	兰色，冷却液软管接头 8mm	Quick adaptor set blue with valve, 8mm
8	45050206	提手座	Holder for handle
9	45070004	橡胶垫脚	Rubber foot
10	61113673	前面板，水冷	Front plate, water cooling
10	61113687	前面板，无水冷	Front plate without water cooling
10	61113686	MMA前面板	Front plate MMA
11	61113674	左侧板	Side panel, left
12	61113675	右侧板	Side panel, right
13	40060625	内六角螺丝M6x25	Flange head allen screw M6x25
14	40111516	自攻螺丝5X16	PH screw 5x16
15	74470851	按键线束	Wire harness, button
16	18110002	插座外圈	Dinse bush

NAVIGATOR 2500/3000



示图	代码	零件描述	**Description of goods**
1	18481014	电源线箍	Cable lead-in
2	71240018	风扇	Cooler
3	73250023	交流模块，整件（2004年12月前）	AC-module, complete (Machines before Dec. 2004)
3	73250024	交流模块，整件（2004年12月后）	AC-module, complete (Machines after Dec. 2004)
4	74223546	电线0.46米，35mm²	Rubber cable 0.46m, 35mm²
5	74471111	交流线束	Wire harness supply AC
6	74124568	橡胶软管ø8x0.86m	Rubber hose ø8x0.68m
6	74124539	橡胶软管ø8x0.39m	Rubber hose ø8x0.39m
6	74124550	橡胶软管ø8x0.5m	Rubber hose ø8x0.5m
7	45050287	冷却液缸	Water tank
8	17310022	水泵	Water pump
9	43350011	冷却液管接头φ12/X1/4″	Hose nipple ø12x1/4" plastic
10	43350014	冷却液管转角接头φ8x1/4″	Angle hose nipple ø8x1/4" plastic
11	43620024	三角板1/4"x1/4"	Triangle 1/4"x1/4"
12	74120070	吸入管，ø10, ø18x160mm	Suction hose ø10, ø18x160mm
13	71613439	滤波板	Decoupling PCB
14	74223551	电线0.51米，35mm²	Rubber cable 0.51m, 35mm²
15	74234036	输入电缆4X1.5	Mains supply cable 4x1.5
16	74471112	线束	Wire harness HF/GAS
17	16160123	主变压器	Control transformer
18	74420108	电容器接头MK I & II	Capacitor link MK I & II
	74420106	交流模块MK I 的RC保护	RC-protection for AC-module MK I

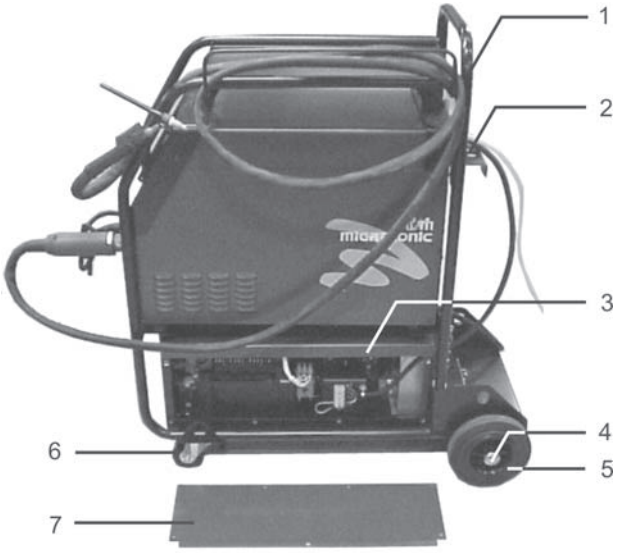
NAVIGATOR 2500/3000

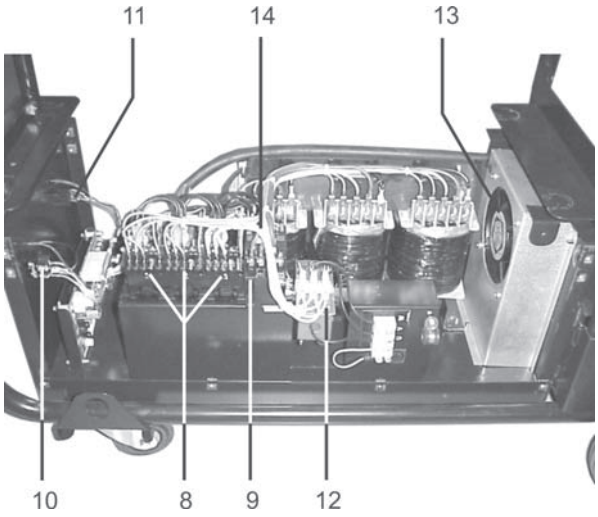


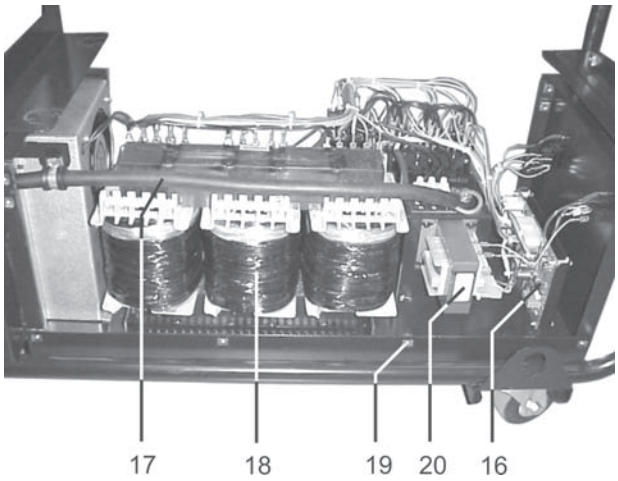
示图	代码	零件描述	**Description of goods**
1	73253440	整流逆变单元NAVIGATOR 2500	Power module NAVIGATOR 2500
1	73253430	整流逆变单元NAVIGATOR 3000	Power module NAVIGATOR 3000
2	16113431	变压器，整件	Transformer, complete
2a	74420103	温度开关	Thermal fuse
3	73211020	变压器/电抗器/HF， TIG	Transformer/choke/HF-unit, TIG
3	73211021	变压器/电抗器/HF， MMA	Transformer/choke/HF-unit, MMA
5	12220209	输出指示灯	Output LED
6	71613437	滤波板 MKI	Filter PCB MK I
6	71613441	滤波板 MKII	Filter PCB MK II
7	17140038	接触器	Contactor
8	73543301	HF-件，MKI	HF unit MK I
8	73543303	HF-件，MKII	HF unit MK II
9	17110015	防水开关	Waterproof switch
10	17230006	电磁阀	Solenoid valve
11	17300035	风扇	Fan
12	17300039	风扇	Fan
13	18481014	线箍	Cable lead-in
14	24333602	送丝机底板	Bottom plate
15	12260008	整流桥3相，35A	Rectifier bridge 3-phase, 35A
15a	26150048	绝缘件	Insulating bush
16	74120010	气体导管	Gas hose
17	76113430	控制面板TIG AC/DC, NAVIGATOR 3000	Control box, TIG AC/DC, NAVIGATOR 3000
17	76113431	控制面板TIG DC HP, NAVIGATOR 3000	Control box, TIG DC HP, NAVIGATOR 3000
17	76113433	控制面板MMA, NAVIGATOR 3000	Control box, MMA, NAVIGATOR 3000
17	76113440	控制面板TIG AC/DC, NAVIGATOR 2500	Control box, TIG AC/DC, NAVIGATOR 2500
18	17200154	扁型电缆 40芯， 290mm	Flat cable 40-pole, 290mm
19	41318406	螺拴M6	Clip nut M6
20	42630002	空心铆钉	Blind rivet
21	41318405	螺拴M5	Clip nut M5
22	16170013	传感器 700A，MKI	Current sensor 700A, MK I
22	16170016	传感器 400A，MKII	Current sensor 400A, MK II
23	71613438	滤波板	Mains filter
24	71613433	主控板 MKI	Mounted PCB CTRL, MK I
24	71613442	主控板 MKII	Mounted PCB CTRL, MK II

NAVIGATOR 2500/3000

自动网压补偿器
AUTOTRANSFORMER







NAVIGATOR 2500/3000

自动网压补偿器
AUTOTRANSFORMER

示图	代码	零件描述	**Description of goods**
	78858026	自动网压补偿器，整	Trolley autotransformer, complete
1	70613634	小车基架	Welded trolley, black
2	42410001	链子	Chain
3	24413645	变压器盖	Cover. autotransformer
4	44610001	后轮轴盖	Wheel cap
5	44210251	后轮毂	Wheel for end hub
6	44220125	旋转式前轮	Swivelling wheel
7	24413647	侧板	Side panel
8	17140015	接触器12A	Contactor 12 A
9	17140018	接触器25A	Contactor 25 A
10	17110015	开关	Switch
11	17110101	按键	Press button
12	71613604	自动网压补偿器控制板	Mounted PCB
13	17300030	风扇	Fan
14	74471151	线束	Wire harness
16	78861247	自动网压补偿器服务组件	Service kit for autotrafo
17	74234039	输入电缆，8.5 米，4X4 mm2	Mains supply cable 8.5m 4x4mm²
18	16650005	自动网压补偿器的变压器	Autotransformer
19	41318405	螺栓M5	Clip nut M5
20	16160119	230-400-440-500V 或24V 变压器	Transformer 230-400-440-500 V and 24 V

ENGLISH

WARNING

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

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

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

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

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

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

Dangerous areas
- Special consideration must be taken when welding is carried out in closed areas or in heights where there is a danger of falling down.

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

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

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

Electromagnetic emissions and the radiation of electromagnetic disturbances

This welding equipment for industrial and professional use is in conformity with the European Standard EN/IEC60974-10. 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.

MACHINE PROGRAMME

NAVIGATOR 2500/3000 is a line of welding machines, especially designed for welding in e.g. the sheet metal and tube industries.

There are several versions of the machine*: MMA, TIG DC and TIG AC/DC*. DC stands for welding with direct current. AC stands for welding with alternating current.

All versions are designed for welding with coated electrodes and are equipped with antifreeze, adjustable arc power and hot-start. Moreover, the machine can be used for pulse welding with the possibility of setting of pulse time, pause time and base amp.

In TIG welding the following functions are included:

- adjustable slope up and slope-down
- adjustable gas pre-flow and gas post-flow time
- adjustable start Amp and stop Amp
- adjustable reduced current
- choice of 2-times-, 4-times- and spot welding
- LIFTIG
- HF-TIG
- connection and disconnection of pilot arc
- AC-balance
- AC welding frequency
- digital display
- current control from the TIG torch handle
- remote control facility (option)
- programming of up to ten welding settings

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.

Transportation equipment
The MIGATRONIC programme includes a transport trolley which can be used for all versions.

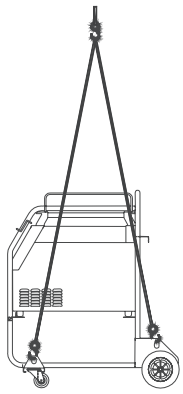
Welding hoses
The machine can be equipped with TIG welding hoses, electrode holders and return current cables from the MIGATRONIC programme. If an adjustable TIG torch is used, the welding current can be adjusted from the torch.

External adjustment (option)
Remote control and foot control units can be delivered to NAVIGATOR 2500/ 3000.

Torch cooling module (option)
An integrated torch cooling module can be delivered which enables use of watercooled TIG welding torches from the MIGATRONIC programme.

CONNECTION AND OPERATION

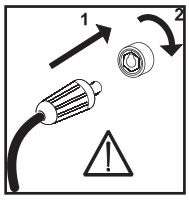
Lift instructions



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

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

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

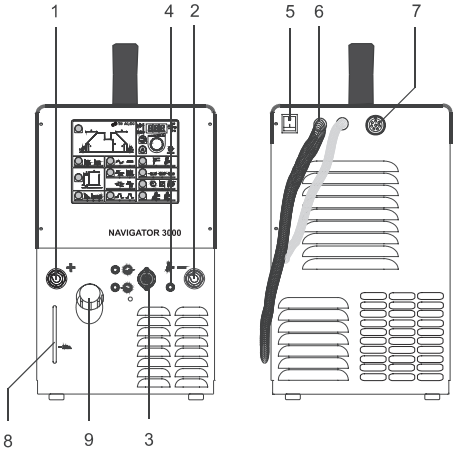


Warning
Connection to generators can damage the welding machine.
When connected to a welding machine, generators can produce large voltage pulses, which can damage the welding machine. Use only frequency and voltage stable generators of the asynchronous type.
Defects on the welding machine arisen due to connection of a generator are not included in the guarantee.

Mains connection
NAVIGATOR 2500/3000 is designed for connection to the mains voltage mentioned on the type plate. After the mains plug has been connected to the mains cable (6) the machine is ready for use. Please note that all cable connections must be made by authorised and qualified staff. Switch on and off the machine by means of the breaker on the rear of the machine (5).

Gas connection
Connect the machine to the gas system by means of a gas flow control.

Diffusion-free gas hoses
This welding machine has been mounted with a PVC gas hose, which is sufficient for general welding tasks. We recommend that the machine is equipped with diffusion-free gas hoses in these special cases where large demands have been made on gas purity. Diffusion sealed gas hoses result in less moisture to the protection gas. These special gas hoses can be ordered as special equipment and should be mounted on the supply side out to the solenoid valve.



Connection of welding cables
Connect the welding cables and the return current cable to the front of the machine (1 and 2). Please note that the plug must be turned 45 degrees after insertion into the socket - otherweise the plug can be damaged due to excessive contact resistance. Connect always the TIG connection in the minus (-) tap (2) and the return current cable in the plus (+) tap (1).

The control signals from the TIG torch are transformed to the machine through the circulary 7-poled plug (3). When the plug has been assembled please secure it by turning the "circulator" clockwise. Connect the gas hose to the quick connection (4).

Electrodes are marked with a polarity on the packing. Mount the electrode tongs in accordance with this marking to the plus/minus taps of the machine (1 and 2).

Connection of external adjustment (option)
Connect the remote control unit on the rear of the machine on the circulary 8-poled plug (7).

Control of cooling liquid
If the machine is delivered with an integrated torch cooling module, it will be necessary to inspect the cooling liquid level by means of the level control (8). Refillment of cooling liquid takes place through the filler neck (9).

Usage of the machine (NAVIGATOR 3000)
When welding, heating of various components of the machine takes place and during breaks these components will cool down again.

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

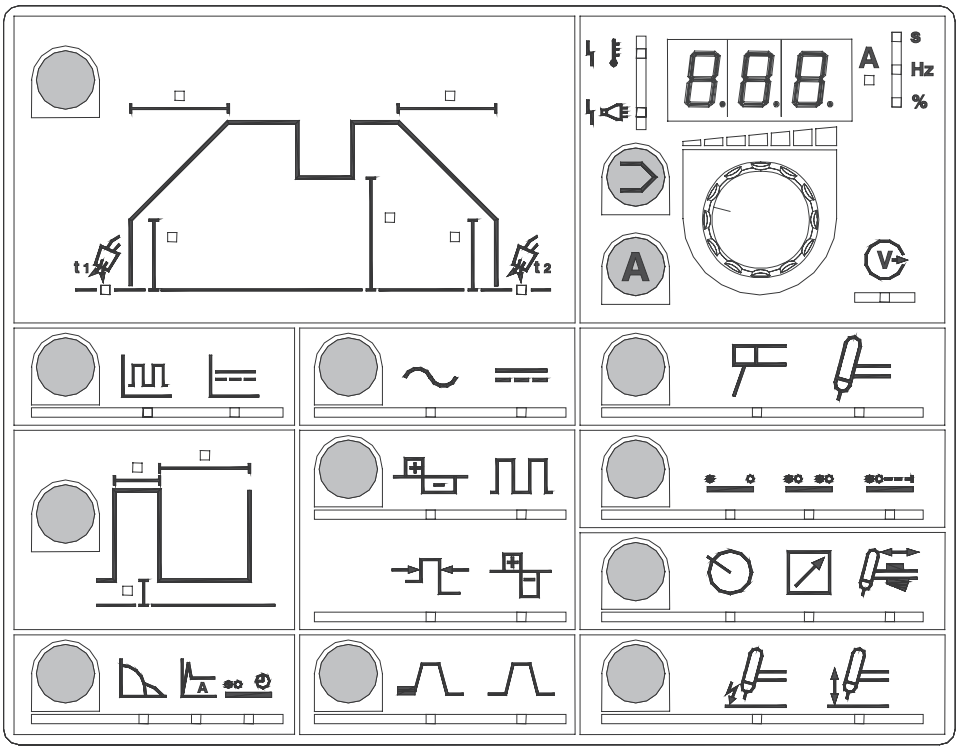
It is not possible to overload the machine in normal use, and there is no need for cooling down periods at current settings up to 190 Amps. When the machine is set for welding currents higher than these, there will be a need for periods during which the machine can cool down.
The length of these periods depends on the current setting, and the machine should not be switched off during cooling to avoid stop of the cooling fan. 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 LED will come on. The yellow LED switches off when the machine has cooled down sufficiently, and the machine is ready for welding.

Max. load is:

100 % max. load	190 A
60 % max. load	240 A
25 % max. load	300 A

60 % max. load when MMA welding means that a cooling period of 4 minutes after welding for 6 minutes is required at a current setting of 240 A, 10 minutes between start of each welding period must be calculated in connection with the above table.

INITIAL INSTRUCTIONS



All "parameters" are set by the use of only one control knob. These parameters include current, pulse time, 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.

Change or view the setting of a parameter by pressing the knob of the parameter in question until the LED at the parameter symbol is lit.

Also the parameters with on/off function, e.g. TIG ignition method, can be chosen by pressing the knob of the parameter in question. The chosen function is shown with a LED.

Storage of parameters
The machine memorises all settings when the mains input voltage is switced 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.

Setting of the machine
The following describes in detail the operation of the machine.

Welding current
On pressing this keypad the control knob can be used to set the welding current unless however that, the machine has been set to external adjustment.

After the welding process has stopped, the adjusted current is shown on the display, during welding, however, the actual welding current is shown. During pulse welding an average welding current is automatically shown when shifting between welding current and base current becomes faster than possible viewing.

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. It is possible to store 10 settings in MMA and 10 settings in TIG.

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

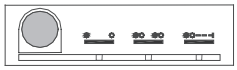
Overheating
The overheating indicator is alight or flashes on and off with a yellow light if welding is interrupted due to overheating of the machine. The indicator remains illuminated 5 seconds after the overheating error is removed. Please read chapter conc. "fault indification".

Mains error
The mains error indicator is illuminated with red if the mains voltage is too high or low. The indicator remains illuminated 5 seconds after the mains error is corrected so short-term errors on the mains voltage can be noticed by the welder. Please see paragraph conc. fault indification.

Welding process
This display is used to select the welding process, e.g. MMA electrode or TIG. The function is fixed during welding, and shift from TIG to MMA is not possible before the post-flow has been finished.

MMA electrode
MMA electrode welding has been selected.

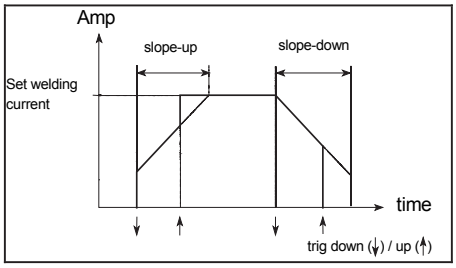
TIG
TIG welding has been selected.



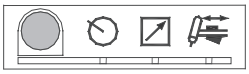
Function of the torch trigger
(The trigger method)
This display is used to decide whether the start/stop method of the TIG welding process is to be two-times, four-times (latching), or spot. Welding process means the phases: pre-flow, slope-up, welding with adjusted current, if necessary, reduced current, slope-down and post-flow. It is not possible to change trigger method during the welding process.

Two-times
The welding process begins by pressing the torch trigger. Welding continues until the trigger is released again which effects the slope-down period. The machine can be reactivated during slope-down and gas post-flow.

Four-times
The welding process begins by pressing the torch trigger. Releasing the torch trigger during gas pre-flow activates the slope-up period. If the torch trigger is released during the slope-up period welding continues with the adjusted welding current. In order to stop the welding process the trigger must be pressed again after which the slope-down period begins. The slope-down period can be stopped by releasing the trigger.



Spot
The welding process begins by pressing the torch trigger. Welding stops automatically, depending on the time set in spot time.



Amp setting function
The keypad is used to select the method by which the required welding current shall be established. This adjustment method cannot be changed during the welding process.

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

External adjustment
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).

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. 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 to the minimum current.

Ignition of TIG welding
It is possible to choose between two different methods of ignition for TIG welding: High-frequency (HF) and LIFTIG ignition. The method of ignition cannot be changed during the welding process.

Two-stroke
This symbol means contact-free striking. The arc is established in the following way:
1) The torch is placed so that the Tungsten electrode is quite close to the welding spot (1 or 2 mm).
2) The torch trigger is activated, and the high voltage generator of the machine will produce a voltage impulse that ignites the arc. The welding process has started. The welding process will stop when the torch trigger is deactivated. The arc will extinguish after the period of slope-down time. The torch is held at the welding spot until after the period of gas post-flow time in order to protect the welding spot against oxidation.

4T **Four-stroke**

This symbol means contact-free striking. The arc is established in the following way:

1) The torch is placed so that the Tungsten electrode is quite close to the welding spot (1 or 2 mm).
2) The torch trigger is activated, and the high voltage generator of the machine will produce a voltage impulse that ignites the arc.
   The torch trigger is deactivated. The welding process will stop when the torch trigger is re-activated. The arc will extinguish after the period of slope-down time. The torch is held at the welding spot until after the period of gas post-flow time in order to protect the welding spot against oxidation.

2T **Two-stroke**

This symbol means LIFTIG ignition. The arc is established in the following way:

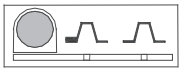
1) The torch is placed so that the Tungsten electrode has contact with the welding spot.
2) The torch trigger must be kept pressed down.
3) The arc is established by lifting the torch, and the welding process has started. In order to stop the welding process, the torch trigger is deactivated. The arc will extinguish after the period of slope-down time. The torch is held at the welding spot until after the period of gas post-flow time in order to protect the welding spot against oxidation.

4T **Four-stroke**

This symbol means LIFTIG ignition. The arc is established in the following way:

1) The torch is placed so that the Tungsten electrode has contact with the welding spot.
2) The arc will be established when the torch trigger is activated and the torch is lifted. In order to stop the welding process, the torch trigger is reactivated. The arc will extinguish after the period of slope-down time. The torch is held at the welding spot until after the period of gas post-flow time in order to protect the welding spot against oxidation.

Please note! Both HF as well as LIFTIG ignition cannot be effected until post-flow is finished.



Pilot arc

In this section it is possible to choose whether the pilot arc should be activated or not. Connection/disconnection of this function cannot be changed during the welding process.

The pilot arc cannot be activated

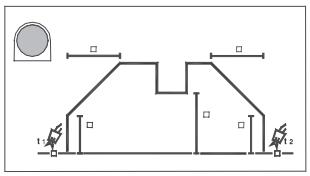
The pilot arc can be activated

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

Switch from pilot arc to ordinary welding by keeping the torch trigger 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.

However, after slope-down the machine does not switch directly to post-flow but to pilot arc again. It is now possible to continue with a new welding process by a lengthy activation of the torch trigger (> 0.3 seconds), or to go to standby automatically by a brief activation (< 0.3 seconds).



The welding process for TIG welding

The parameters can be selected and adjusted during the welding process.

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 A.

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.

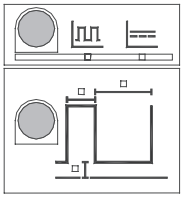
Stop Amp

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 A.

Post-flow
Post-flow is the period of time for which gas flows after the arc is extinguished and is variable 3-30 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 with a minimum value of 5 A.

Indication of a welding process
During welding, when adjustment of current is activated by means of the A-keypad, it is possible to see the actual phase of the welding process.



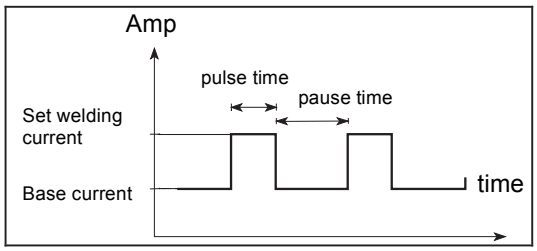
Pulse welding
This section contains functions for pulse welding. The section is divided in two: the above connects or disconnects pulse welding, the below contains the diffent pulse parameters.

Pulse cannot be connected or disconnected during the welding process.

Pulse
Pulse welding has been selected.

No pulse
Welding without pulse has been selected. The pulse parameters cannot be activated.

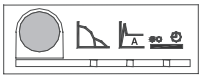
Pulse parameters
The pulse parameters can be both selected and changed during pulse welding. The figure below illustrates the meaning of the three pulse parameters.



The pulse time
Reflects the time the machine is welding with the pulse current. The pulse current is the adjusted welding current. Time is adjustable between 0.01 and 10 seconds.

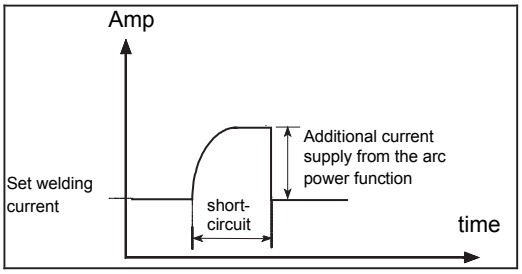
Pause time
Reflects the time the machine is welding with base current. Time is adjustable between 0.01 and 10 seconds.

Base Amp
Is set as a percentage value between 1 and 99% of the current level set on the display (= pulse current), although this percentage cannot be less than a value that corresponds to 5 A.



Parameters for MMA welding and TIG spot welding
Parameters can be both selected and adjusted during welding.

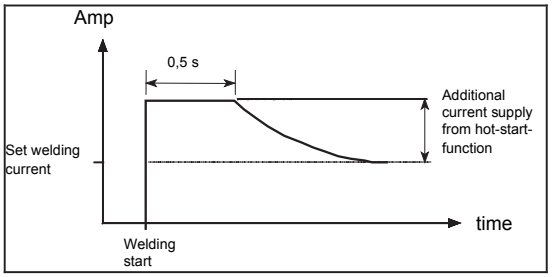
Arc-power
The arc power function is used to stabilise the arc in MMA welding. This can be achived by increasing welding current during the short-circuits. The additional current ceases when the short circuit is no longer present.



Arc power can be adjusted between 0 and 150% of the welding current setting.

E.g. If the welding current is set to 40A 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.

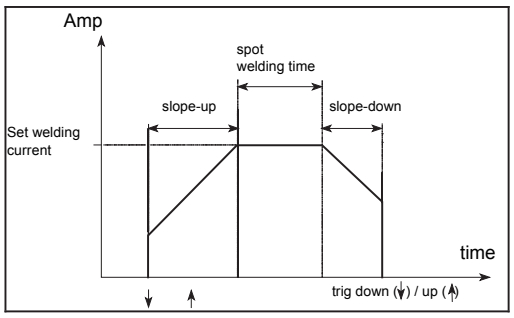
Hot start
Hot start is a function that helps to establish the arc at the beginning of MMA welding. This can be achieved by increasing welding current (when the electrode is applied to the workpiece) in relation to the set value. This increased start amp is maintained for half a second, after which it decreases to the set value of welding current.



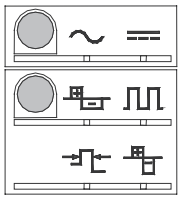
The hot start value reflects the percentage value by which initial current is increased, and can be set between 0% and 100%.

Spot time

The spot time in TIG is the time from the end of slope up to beginning of slope down. Therefore, the spot time is welding with the adjusted current. The time with the arc and torch trigger activated is the spot time plus slope up time and slope down time.

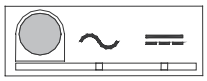


If spot time is changed during welding, this change will not be carried into effect until next welding process. It is possible to interrupt the spot welding time by releasing the torch trigger.



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.

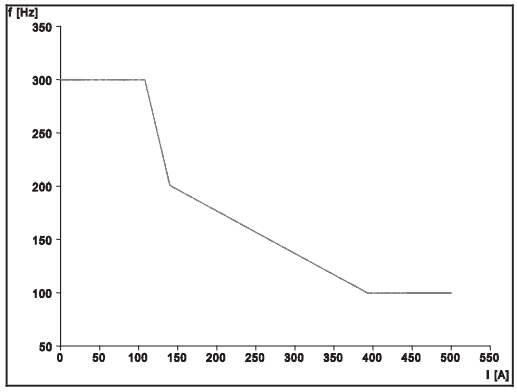
When TIG welding aluminium or its alloys the positive part of the AC-wave removes the oxide film covering the surface of the workpiece, and the negative part of the wave melts the material.

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 1: The AC frequency and welding current cannot be adjusted to maximum simultaneously during TIG welding - see the following illustration. 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 2: 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 3: If the pulse function is used during AC-welding the AC frequency can be reduced in proportion to the pulse times. If the AC frequency is to low the indicators for pulse times will flash on and off for 5 seconds.

Note 4: 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.

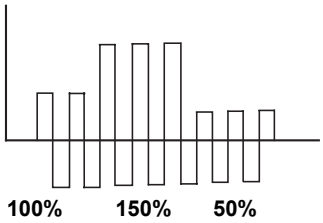
AC-t-balance, based on time (TIG)

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.

Fixed functions
The functions below are fixed and cannot be connected and disconnected from the display:

Anti-freeze
The anti-freeze-function is always on. During MMA and TIG welding the electrode sometimes sticks onto the workpiece. The machine will register that the electrode has stuck onto the workpiece, and will then reduce the welding current so that the area of the workpiece which has melted will harden, making it possible to break off the electrode. Welding can then continue in the usual way.

Torch cooling
The machine will automatically start cooling when establishing the arc if the machine has been mounted with a cooling module and a Migatronic water-cooled torch. Cooling continues until 2½ min. after the welding process has stopped.

Ignition of the arc in AC/TIG welding
It can be advantage to use reduced start current (e.g. 25%) and slope up (e.g. 0.1 sec.) during ignition of the arc in AC/TIG welding as wolfram from the electrode pin can be avoided on the work piece. This method is especially recommendable during welding with large currents.

FAULT IDENTIFICATION

Overheating error
Welding is interrupted due to overheating if the machine is used beyound 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.

Etc 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 decribed above, please contact the Migatronic service department.

TECHNICAL DATA

	NAVIGATOR 2500 AC/DC	NAVIGATOR 3000 DC	NAVIGATOR 3000 AC/DC
Power source:			
Mains voltage	3x400 V ±15%	3x400 V ±15%	3x400 V ±15%
Fuse	16 A	16 A	16 A
Consumption max.			
Efficiency			
Permitted load			
- 25% duty cycle	250 A / 32 V	300 A / 32 V	300 A / 32 V
- 60% duty cycle	220 A / 30 V	240 A / 29.6 V	240 A / 29.6 V
- 100% duty cycle	170 A / 27.6 V	190 A / 27.6 V	190 A / 27.6 V
Max. arc voltage	38 V / 250 A	38 V / 250 A	38 V / 250 A
Open circuit voltage	95 V	95 V	95 V
Current range AC	5 – 250 A		5 – 300 A
Current range DC	5 – 250 A	5 – 300 A	5 – 300 A
[1]Application class	S	S	S
[2]Protection class (IEC 529)	IP 23	IP 23	IP 23
Standards	EN/IEC60974-1 EN/IEC60974-10	EN/IEC60974-1 EN/IEC60974-10	ENIEC60974-1 EN/IEC60974-10
Dimensions (H- W-L) (mm)	563x300x698	563x300x698	563x300x698
Weight with torch cooling	37 kg	39 kg	43 kg
Weight without torch cooling	31 kg	33 kg	37 kg
Torch cooling:			
Cooling capacity	0.71 kW	0.71 kW	0.71 kW
Tank capacity	4 liters	4 liters	4 liters

Functions:	**Process**	**NAVIGATOR 2500 / 3000**
Arc power	Electrode	0-150 %, max. 250/300 A
Hot-start	Electrode	0-100 %, max. 250/300 A
Anti-freeze	TIG/Electrode	always on
Pilot arc	TIG	5 %, min. 5 A
Start AMP	TIG	0-100 %, min. 5 A
Stop AMP	TIG	0-100 %, min. 5 A
Slope up	TIG	0-10 secs
Slope down	TIG	0-10 secs
Gas pre-flow	TIG	0-10 secs
Gas post-flow	TIG	3-30 secs
Spot welding time	TIG	0.1-50 secs
Pulse time	TIG/Electrode	0.01-10 secs
Pause time	TIG/Electrode	0.01-10 secs
Base Amp	TIG/Electrode	1-99 %, min. 5 A
Reduced current	TIG	0-100 %, min. 5 A
AC-balance	1-100 % (only AC)	1-100 % (only AC)
AC-balance, Ampere	1-200 % (only AC)	1-200 % (only AC)
AC-frequency	1-300 HZ (only AC)	1-300 HZ (only AC)
TIG-ignition	TIG	HF / LIFTIG
Triggerfunction	TIG	2/4-stroke
Setting of welding jobs	TIG/Electrode	10

[1] S The machine meets the standards which are demanded of machines working in areas where there is an increased risk of electric shock

[2] Equipment marked IP23 is designed for indoor and outdoor applications

MAINTENANCE

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

The NAVIGATOR 2500/3000 welding machines require virtually no maintenance. However, exposure to extremely dusty, damp or corrosive air is damaging to welding machines.

Periodical 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 a cooling liquid of type propylene glycol in the ratio 1:3 which provides an anti-freeze solution up to -10oC.

WARRANTY REGULATIONS

All MIGATRONIC machines carry a twelve month guarantee against hidden defects. Such defects must be notified no later than two months after it has been noticed. The warranty runs for twelve months after invoicing to end customer.

The warranty becomes void by faults that can be attributed to incorrect installation, pests, transport damages, water- and fire damages, strokes of lightning, use in connection with a synchronous generator and use under abnormal conditions, which lies beyond the product specification.

Lack of maintenance

There is a lapse of warranty if the product is not properly maintained. E.g. if the product is dirty to such a degree that cooling is hindered. The warranty does not cover damages, which can be traced back to unauthorised and incorrect repairs of the product.

Wear parts

The warranty does not cover wear parts (welding hoses, welding cables and wire drive rolls)

Resulting damages

Use of the product must stop immediately after acknowledgement of a defect in order to avoid further damage of the product. The warranty does not cover resulting damages due to use of the product after acknowledgement of a defect. Moreover, the warranty does not cover resulting damages on other items due to product defect.

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