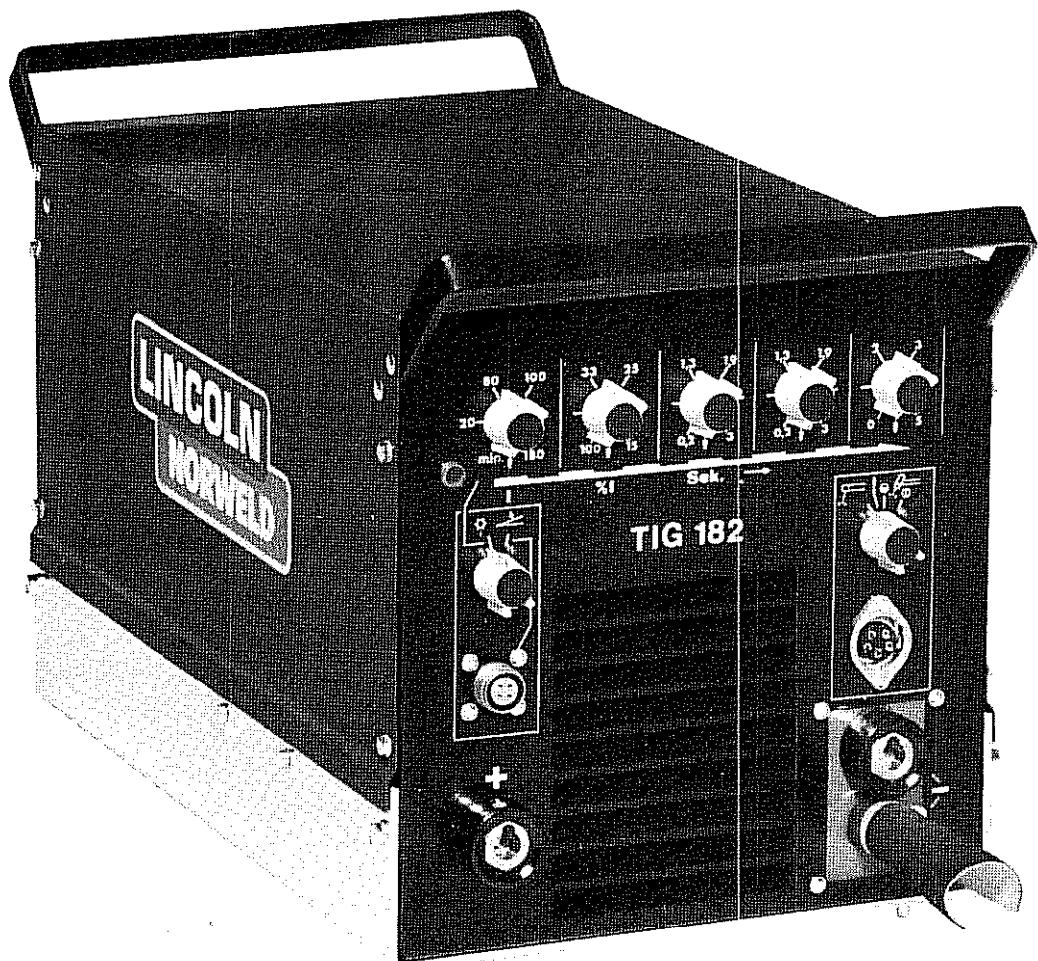


User manual

# Welding rectifier TIG-182

For TIG-welding (GTAW) with contactless start and  
stick welding with covered electrodes (SMAW)



**LINCOLN**  
**NORWELD**

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**Description**

TIG-182 is designed for TIG-welding of stainless steel plates, sheets and tubes, and for stick welding with electrodes up to 5mm dia.

TIG-182 is a three phase thyristor controlled rectifier. It has a line switch on the back panel, is overload protected and fan cooled. The easily accessible electronic parts are well protected against dirt and moisture.

TIG-182 is designed for 220V and 380V lines, 50 or 60Hz. It has an outlet for remote control of the TIG-welding current by a hand or foot regulator.

In the pulsation mode the metal is melted during periods of high current and cooled while low, providing good control of the weld pool.

High and low pulsed current and time can be adjusted by means of potentiometers on the front.

TIG-182 has adjustable crater filling (down slope). The gas afterflow function is not adjustable. The torch switch can be used in the "push" or in the "push-push" mode. The "push-push" mode means that you do not need to keep the torch switch pressed while welding.

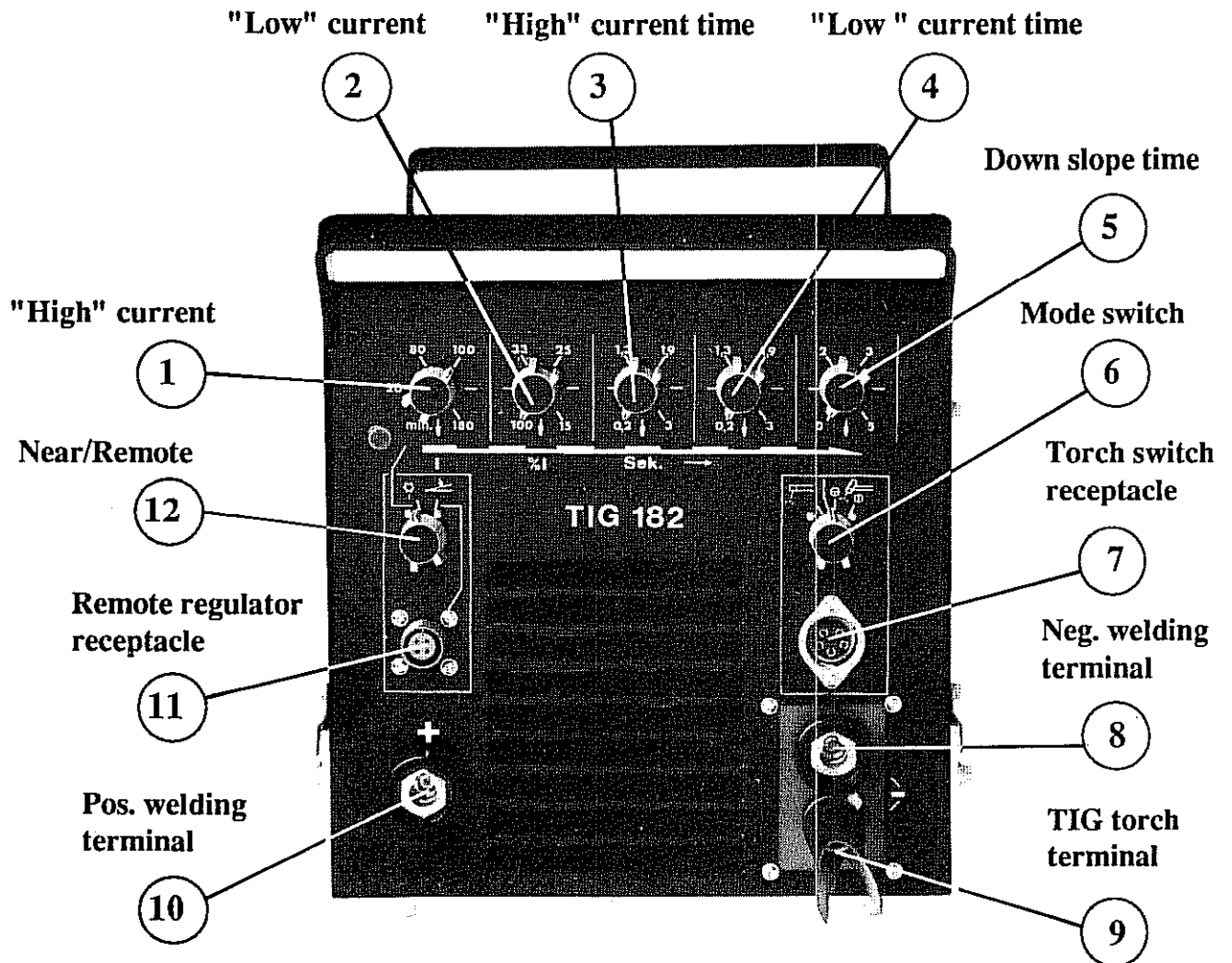


Fig.1. Front

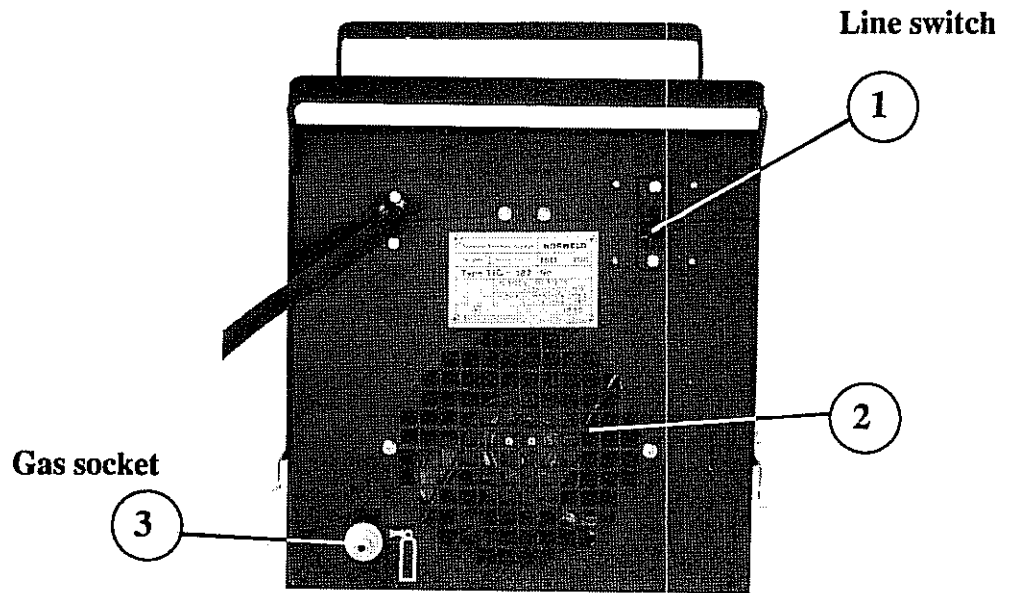


Fig.2. Rear

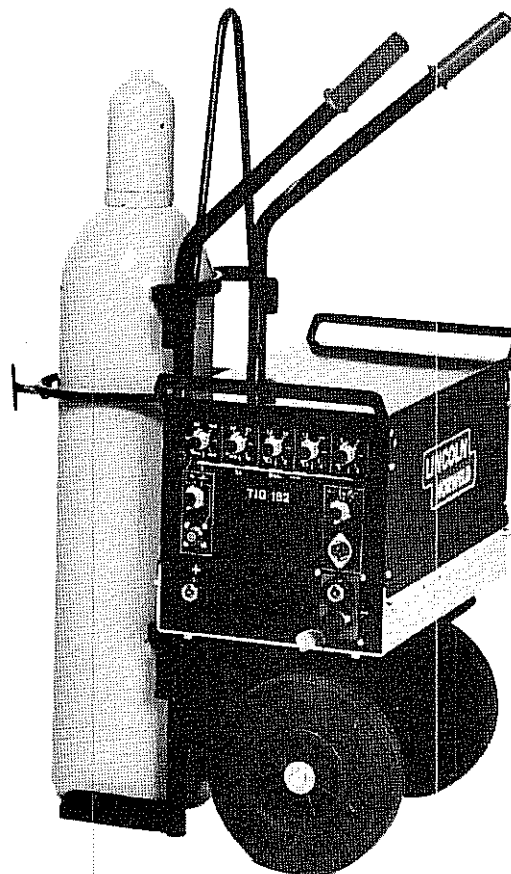


Fig.3. Trolley

### Knobs and contacts on the front panel

- Pos. 1 Sets the "High" current puls value in the TIG mode. Range 10-180A.  
Sets the steady current value in the stick welding (SMAW) mode.
- Pos. 2 Sets the "Low" current puls value in % of the "High" current. Range 15 -100%.  
Has no function in the stick welding mode.
- Pos. 3 Sets the duration of the "High" current puls. Range 0.2-3sec.  
Has no function in the stick welding mode.
- Pos. 4 Sets the duration of the "Low" current periode. Range 0.2-3sec.  
Has no function in the stick welding mode.
- Pos. 5 Sets the duration of the down slope in the TIG mode. Range 0-5sec.  
Has no function in the stick welding mode.
- Pos. 6 In the two rightmost switch positions two types of torch control can be selected:



"Push". The torch switch must be pressed to start welding and released to start down slope and end the weld pass.



"Push-Push". The torch switch must be pressed to start welding and released during welding. Saves the welder the trouble of keeping the switch pressed. To stop welding the torch switch is pushed and released again. If the switch is released before the end of the down slope period the weld pass will continue after a short cool down period.

- Pos. 7 Receptacle for torch or foot control switch.
- Pos. 8 Negative terminal for stick welding electrode cable or ground cable.
- Pos. 9 Terminal for TIG torch only. Conducts welding current and shielding gas. TIG welding is always carried out with negative electrode.
- Pos.10. Positive terminal for electrode or ground cable in the stick welding mode. Ground cable terminal for TIG-welding. The polarity of the SMAW electrode depends on electrode and kind of work .
- Pos.11. Receptacle for hand or foot control.
- Pos.12 When TIG welding with the Near/Remote switch in position "Near" the current is set by the potentiometer on the front. In position "Remote" the current is controlled by hand or foot regulator.

*Note: Line cable inlet and a socket for the shielding gas are located on the back panel.*

**Equipment**

Description	Order no.	
TIG-182, without cable	0 425 561	Gas socket adaptor kits for
Hand regulator HG-1	0 398 123	the following markets:
Control cable for HG-1, 10m	0 398 131	Scandinavia
Hand control HGS-1	0 398 503	0 415 695
Extension cable, 10m	0 432 641	Continental
Foot regulator FC-4/2	0 398 602	0 415 703
Trolley for 20 liter gas cyl.	0 398 487	Great Britain
		0 430 520

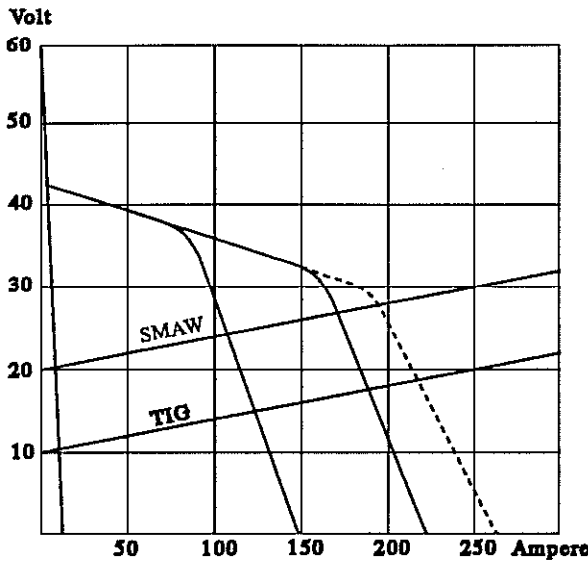


Fig.4. VA-curves

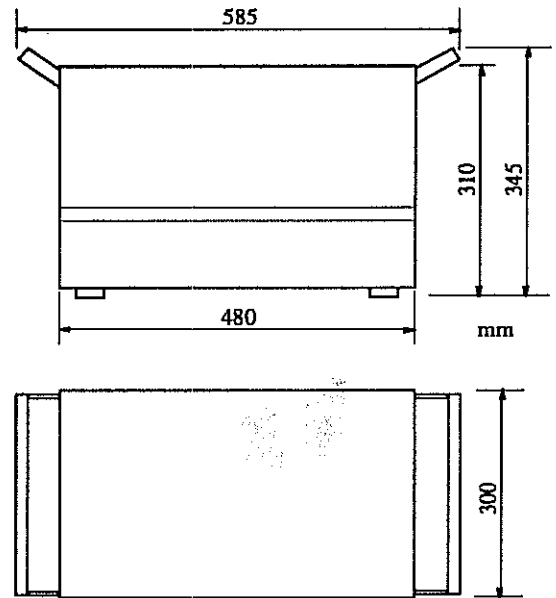


Fig. 5. Dimensions

**Specifications**

<b>Output:</b>					
Duty cycle	%	100	60		35
Current	A	108	140		180
Arc voltage, TIG	V	14,3	15,6		17,2
Arc voltage, SMAW	V	24,4	25,6	27,2	<b>Miscellaneous:</b>
<b>Input (at 180A):</b>					
Current at 220V	A	22.5			
Current at 380V	A	13.0			
Line fuse (slow blow) at 220V	A	16			
Line fuse (slow blow) at 380V	A	10			
Power cable at 220V	mm <sup>2</sup>	3x2.5+p.c.			
Power cable at 380V	mm <sup>2</sup>	3x1.5+p.e.			
Phase		3			
Frequency		50-60Hz			
No load voltage (max.)		53V			
Current range		10-180A			
Insulation class		H			
Protection		IP23			
Weight		54kg			
Demand at 100% (continuous)		5kVA			

### Standards

The rectifier is built according to International Standard ISO 700: "Power sources for manual metal arc welding with covered electrodes and for the TIG-process."

ISO 700 is essentially in accordance with VDE 0542. However, if used in confined spaces the rectifier must be approved and clearly marked with a K framed by a square.

### Line voltage connections

Power cable installation should be done by an electrician or an other suitably trained person.

The standard rectifier is designed for 220 and 380V, 50 and 60Hz lines. Strap as shown on fig. 7. Other line voltages can be delivered upon request.

Pull the line cable through the strain relief on the rear panel and connect it to the primary terminal board.

The yellow-green wire shall be connected to the ground terminal, which is marked as shown on fig. 6. It should be cut a bit longer than the other three wires so that it will be the last one to be pulled out of its terminal if the strain relief fails.

Tighten the strain relief and replace the cover.

Abstracts from ISO700:

- 2.2.2. Max. ambient 40 degr. C  
Daily average ambient 30 degr. C  
Yearly average ambient 20 degr. C  
Minimum ambient -10 degr. C
- 4.8.1. Load voltage at the output terminals for covered electrodes:  
 $U_2 = 20 + 0.04 \times I_2$   
Load voltage at the output terminals for TIG-welding:  
 $U_2 = 10 + 0.04 \times I_2$
- 4.10. Conventional welding duty: 0.6, comprising 3 min. under load and 2 min. no load. (The sum of welding time and no load time during one period is called averaging, or integration time).
- 9. Indication accuracy, +/- 10%.

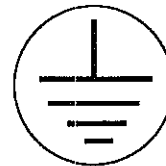


Fig. 6. Ground terminal marking

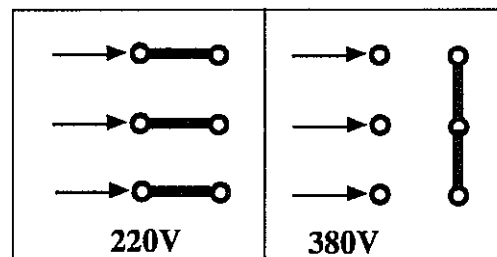


Fig. 7. Line voltage strapping

### Trouble shooting in the stick welding (SMAW) mode

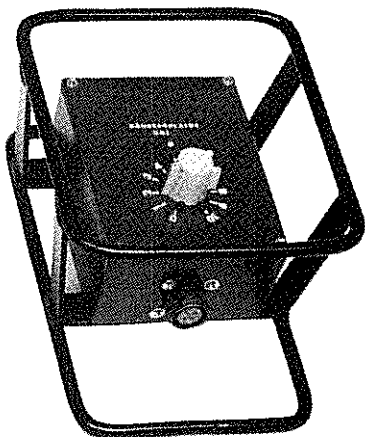
Symptom	Possible cause	Remedy
The rectifier is completely "dead". No ignition sparks between electrode and work. Fan is not running.	Line switch is "OFF"	Switch to " ON"
	No line voltage.	Check line fuses and replace broken fuses. Check and repair the line cord.
Fuse blows when switching on.	Faulty thyristor module(s).	Replace the faulty module(s).
No welding current. Sparks when scratching the electrode on the workpiece.	The Near/Remote switch is in position "Remote", but no hand regulator is connected.	Switch to "Near" or connect a hand regulator.
	Overload thermostat has operated.	Let the rectifier idle about 5 minutes until the thermostat resets.
	Break in the control cable.	Try "Near". Repair the control cable.
	Faulty circuit board.	Replace the circuit board.
Welding is difficult	One phase is dead.	Replace broken line fuse.
	Loose gate connection.	Tighten or reinstall.
	Faulty circuit board.	Replace the circuit board.
Only max. or min. current in "Remote" with regulator connected. OK on "NEAR"	Short circuited control cable.	Repair or replace the control cable.
The rectifier is noisy. Welding impossible and line fuses blow.	Faulty thyristor module(s).	Replace faulty module(s)



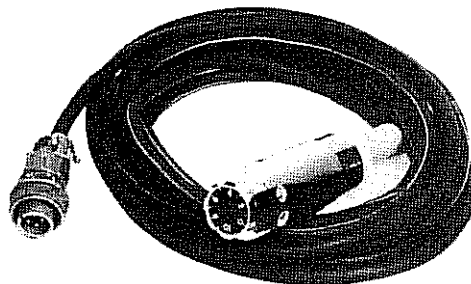
**Trouble shooting in the TIG-welding mode**

Symptom	Possible cause	Remedy
Unsatisfactory welding results.	Faulty thyristor modules or circuit card.	Switch to SMAW and try welding with stick electrode. If still trouble follow the SMAW fault finding procedure.
	Wrong current and time settings	Check and correct settings.
	Badly shaped electrode	Grind the electrode
No welding current when the electrode is scratched against the work piece.	Foot controller connected, but mode switch is in position "push-push".	Switch to "Push"
	Broken line fuses	Check and replace broken fuses.
	Faulty line cord	Check and replace the line cord.
"High" and/or "Low" time differ too much from scale	Faulty pulsation board.	Replace the board.
No ignition sparks, but scratch start is possible.	Faulty ignition board.	Replace the board.

Without control cable



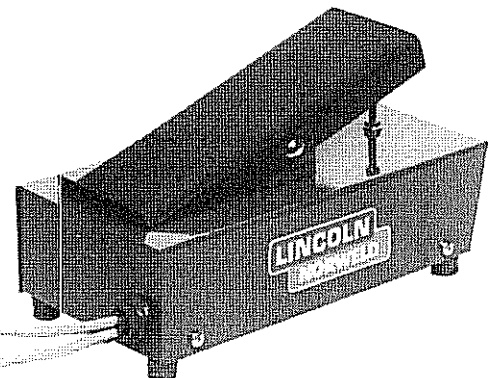
**Fig.8.**  
**Hand regulator HG-1**



With 5m cable

**Fig.9.**  
**Hand regulator HGS-1**

With 6m cable



**Fig.10**  
**Foot regulator FC-4/2**

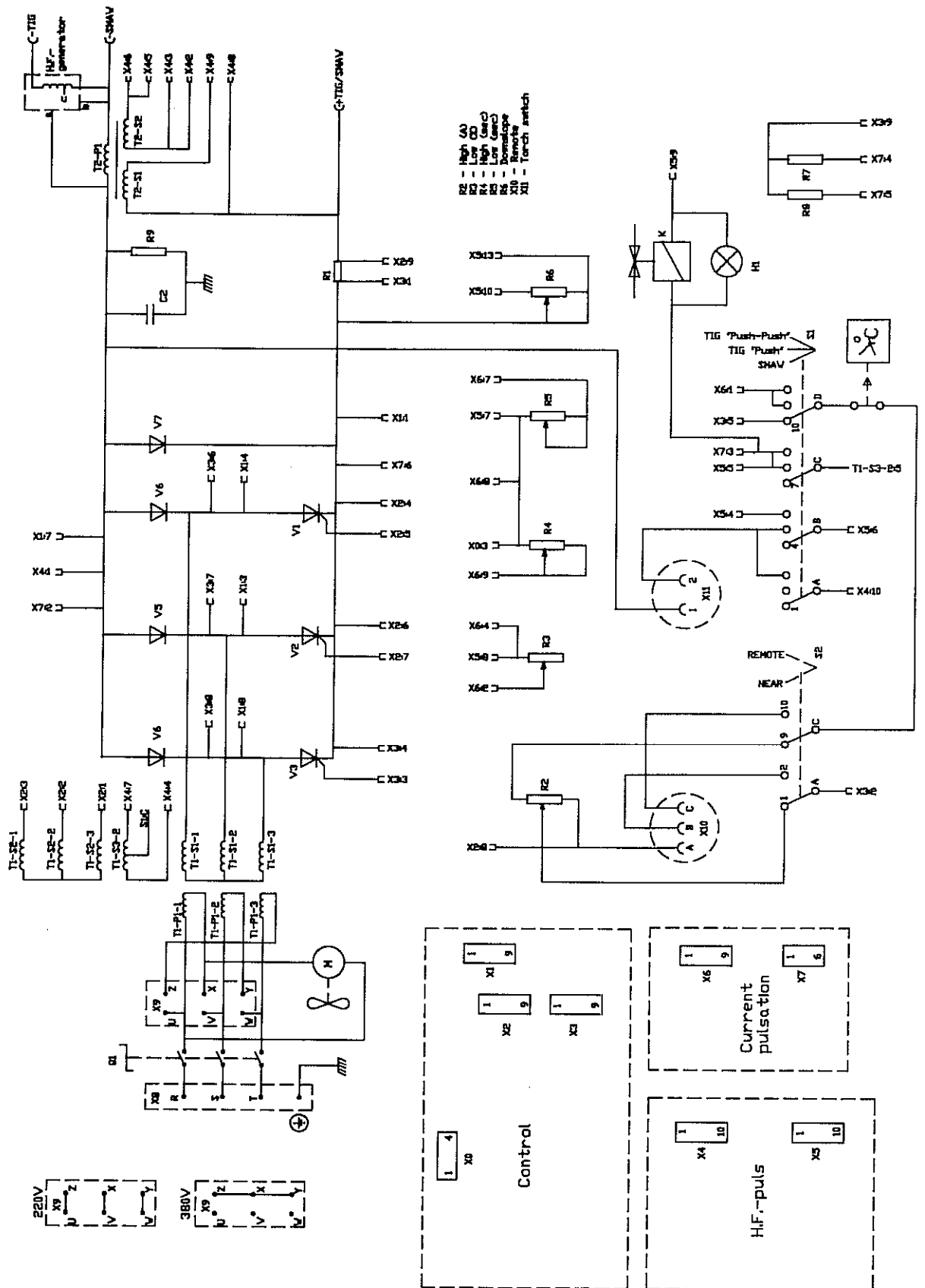


Fig.11.  
Schematic diagram

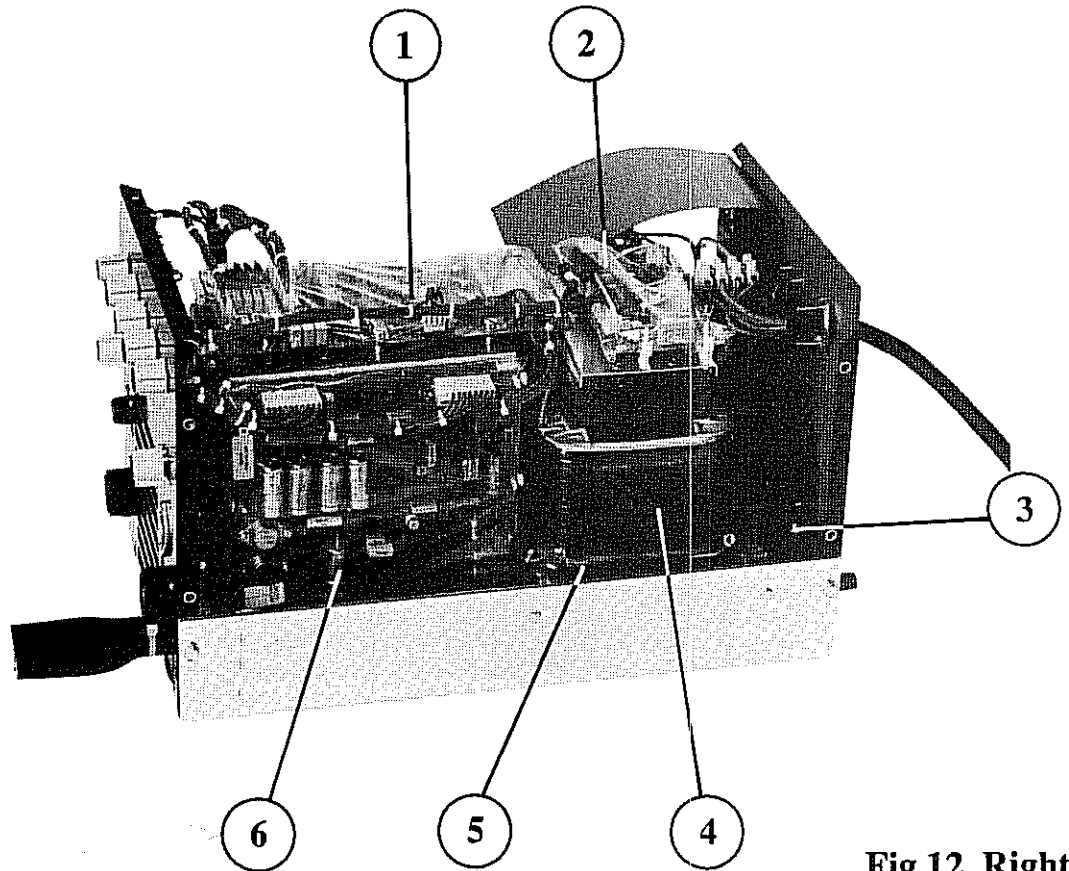


Fig. 12. Right side, cover removed

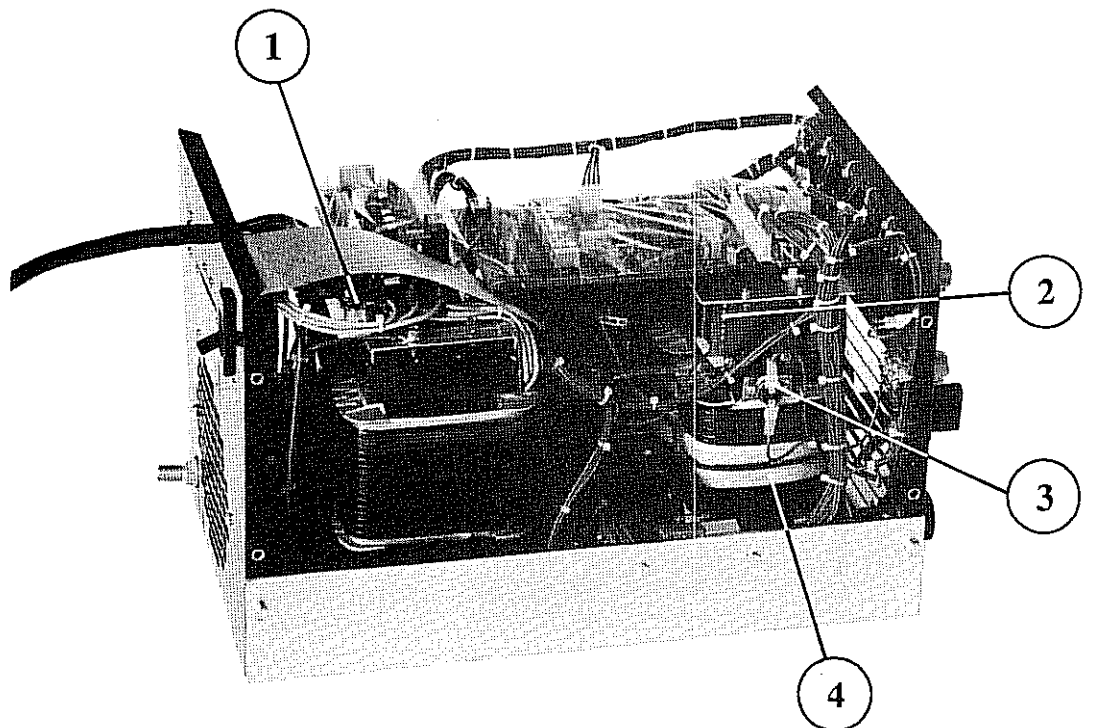


Fig. 13. Left side, cover removed

Spare parts:

Fig.	Pos.	Code	Description	Order no.
1	1	R2	Potentiometer, 10k 3W .....	0 410 308
1	2	R3	Potentiometer, 50k 3W .....	0 410 910
1	3,4	R4,R5	Potentiometer, 470k 3W .....	0 411 058
1	5	R6	Potentiometer, 100k 3W .....	0 411 215
1	6	S1	Switch, 4p (see note) .....	0 422 592
1	7	X11	Contact, Tuchel, female, 5p .....	0 410 357
1	8,10		Contact, DIX BE 50/70 .....	0 410 290
1	9		TIG-terminal .....	0 410 381
1	11		Contact, Amphenol, female 4p .....	0 410 282
1	12	S2	Switch, 3p (see note) .....	0 410 332
<hr/>				
2	1	Q1	Line switch, 15A .....	0 410 258
2	2	M	Fan .....	0 410 241
2	3		Gas socket .....	0 806 188
<hr/>				
12	①		<u>Control card</u> .....	0 410 274
12	②		<u>Current pulsation card</u> .....	0 411 074
12	3	K	Gas valve .....	0 410 464
12	4	T1	Transformer, 220/380V .....	0 410 233
12	5	R7,R8	Resistor, 15 ohm 100W .....	0 424 309
12	5		Resistor unit, 2 x 15 ohm 100W .....	0 410 210
12	⑥		<u>Ignition card</u> .....	0 411 140
<hr/>				
13	1		Voltage changing terminal board .....	0 410 266
13	2		HF generator ..(R.F.AKTOR)..(T.R.A.F.O.) .....	0 428 565
13	3		Thermostat, 160 degr. C .....	0 433 920
13	4	T2	Choke ..ERSÄTTJS AV 470659 .....	0 430 249
<hr/>				
-	-	V1-V6	Thyristor module, 90A 400V .....	0 410 050

Notes: S1 and S2 have endstop rings with a tap which must be inserted in the hole which corresponds to the desired number of positions.

When ordering please use the complete description and order no. (7 digits), and if possible also state machine type and serial number.

**Transport**

Before lifting make sure that the cover fastening screw are in place. If the cover has been taken off, the self tapping screws should be guided into the old threads when reinstalling the cover. Cutting new threads may lead to loss of screw grip.

Do not drop the rectifier abruptly on the floor. This may hurt the base plate which is acting as a cooling fin for the thyristor modules. The thermal resistance between the base and the modul may increase and cause module break down.

If a trolley is used TIG-182 must be fastened to the trolley with four M6 x 20mm screws inserted from underneath.

**Installation**

Power cable installation and connection for the correct line voltage should be done by an authorized electrician.

Avoid installing larger fuses than recommended. Usually the power cable comes fitted with the machine. However, if an other cable than the one provided is necessary, use the recommended cross section, or larger if possible.

Check that the rectifier is built for, or connected for the same nominal voltage as the power line. Check that the rectifier is properly grounded through the power cable. The yellow-green wire must be used for grounding purposes only.

## Maintenance and care

To prevent trouble and poor welding results the rectifier should be handled with care. Make sure that the fan has free passage of air. From time to time remove the cover and take away accumulated dust and dirt. How often this should be done depends upon use and environment.

Also check and tighten the module clamping screws. The six M5 screws are accessible from the base underside. Use 4-6Nm torque when tightening.

Also remember to tighten the thyristor module fastening screws to secure good thermal contact between the modules and the base. The rectifier may otherwise be overheated causing the modules to break down.

Keep the welding cables and torches in good condition.

## Electric shock

When removing the cover for maintenance or repair make sure that the rectifier is disconnected from the power line. Be aware of electric shock if you need to have the rectifier connected to the line to do adjustments. Accidental contact with the lines is very dangerous, and may cause heart fibrillation which is a fatal condition, with no practical first aid treatment known. In an emergency situation switch off the current and remove the victim from the rectifier and try artificial respiration.

## Defective thyristor modules

Do not open defective thyristor modules. The insulation material between the semiconductors and the base is beryllium oxide, which in a pulverized form can be very toxic.

## Stick welding

Check that the line switch on the back panel is in the off position. Set the mode switch (fig.1 pos. 6) in the stick welding position.

Connect the welding cables to the output terminals (fig. 1, pos. 8 and 10). Make sure that the DIX

contacts are in a locked position (twist to the right) and that the work clamp is in good contact with the work piece. Clean the work piece at the contact point if necessary. Bad welding cable connections may lead to burned contacts and unsatisfactory welding results.

Which electrode polarity to be used depends on the electrode type and welding job. Follow the instructions given by the electrode manufacturer.

Set the current potentiometer on the front (fig.1 pos.1) in a position which corresponds to the needed current. The scale is calibrated at nominal line voltage and at standard load voltage, measured on the output terminals. Actual current may differ, and the scale should therefore only be regarded as a guide line.

Plug the rectifier to the line and switch on. The fan shall now rotate and blow air out of the louvers in the front. Check that the rectifier has free passage of cooling air. Start welding and adjust the current if necessary.

Do not operate the line switch while welding. Switch off when finished.

## TIG-welding

Check that the line switch is off and set the mode switch in position "Push" or "Push-Push". Then choose appropriate settings for "High" and "Low" current and time, and select a down slope time. If you want to use a hand regulator it must be plugged into the Remote contact on the front, and the Near/Remote switch set to Remote.

Connect the torch to the TIG terminal on the front panel, and the ground cable to the positive terminal (fig.1 pos. 10). Connect the argon gas supply to the socket on the back panel. Use high purity argon (min 99.8%). An arc burning in an argon atmosphere is smooth and quiet. The inert gas protects the electrode from erosion, and the weld from contamination by the surrounding air. No slag is produced like in stick welding.

In the TIG mode the rectifier has contactless arc start. The arc is initiated by H.F. spikes which jump the gap between electrode and work. The gap should not be wider than approx. 3mm. The spikes are lasting for approx. 5seconds if the arc does not start, then an other try must be made. Tungsten electrodes with 2% thorium and electrode diameters from 0.5 to 1.6mm can be used.

When grinding the electrode should be shaped like a pencil. Grind alongside the electrode and flatten off the point a little bit. This will prolonge electrode life and minimize tungsten contamination of the weld.

The TIG-arc should be terminated by releasing the torch switch. Do not tear off the arc by pulling the torch away.

Gas afterflow protects the tungsten electrode and the weld pool from being contaminated by the surrounding air during the cool down period. Use high purity argon gas (99.8%). An arc burning in argon atmosphere is stable and quiet.

Switch off the rectifier when changing or correcting the tungsten electrode.

### Fire prevention

Fires in connection with welding is often due to carelessness. Fires rarely occur in production work because safeguards usually are adequate. Most fires are caused by portable equipment, and can be prevented by proper precautions.

Do not weld in or near rooms containing flammable vapors, liquids, lint, dust or exposed loose combustible material. When necessary to weld near wooden constructions, or in locations where combustible material cannot be removed or protected, fire extinguishing equipment should be at hand.

### Eye and skin protection

The welder must use shield or helmet to protect eyes and skin from the intense ultraviolet rays. Avoid exposing other parts of the body by using suitable clothes and gloves. This will prevent the skin from being exposed to harmful ultraviolet rays that are present.

### Ventilation

Health hazards from welding operations are few and can be guarded against by simple precautions. Hazards may arise from gases, fumes or dust caused by the material being welded or from electrode coating. Such hazards can normally be avoided by proper ventilation.

### Warranty

*Norweld guarantees this welding rectifier to be free from defects in design, materials and manufacture for 1 year from the date of delivery to the customer.*

*This warranty does not cover damage caused by transport or improper usage, nor does it cover wear from normal use. More detailed warranty information can be obtained upon request ("Warranty terms and procedure for handling claims").*

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