EWM HIGHTEC WELDING GmbH
Dr. Günter - Henle - Straße 8; D-56271 Mündersbach
Phone: +49 (0)2680.181-0; Fax: +49 (0)2680.181-244
Internet: www.ewm.de ; E-mail: info@ewm.de

Instruction Manual

GB

thyristor

MIG / MAG Welding Machines
from 400A - 600A
mobile

These operating instructions must be read before commissioning!
Failure to do so may be dangerous!
Machines may only be operated by personnel familiar with the appropriate safety regulations!

The machines bear the conformity mark and thus comply with the

- **EC Low Voltage Guideline (73/23/EEC)**
- **EC EMV Guideline (89/336/EEC)**

(The CE mark is only required in EC member states)

In compliance with VDE 0544 (EN 60974-1), the machines can be used in environments with an increased electrical hazard.

 Art. no.: 099-004043-EWM01 Revised: 13.12.1994

All *thyristor MIG* machines are available in a lot of models :

- Compact-Machines with a built-in wire-feeder-system
- Decompact-Machines without a wire-feeder-system (with additional wire feeder unit)

  - wire feeder unit ***thyristor 4x4*** **90.4069.xx**
  - wire feeder unit ***thyristor 4x4 S*** (with a reinforced wire feeder unit) **90.4070.xx**

- **All machines water-cooled (400A machines also gas-cooled)**

All welding machines and wire feeder units are fitted with an Euro Central Connector and analoge volts - / ammeter supplied		
	With built-in Wire Feed Unit 4x4 and control. Article no.	**Without Wire Feed Unit and without control. Article no.**
thyristor MIG 400 3 x 400V gas-cooled	**90.4045.XX**	**90.4048.XX**
thyristor MIG 400 3 x 400V water-cooled	**90.4043.XX**	**90.4046.XX**
thyristor MIG 500 3 x 400V water-cooled	**90.4044.XX**	**90.4071.XX**
thyristor MIG 600 3 x 400V water-cooled	**90.4047.XX**	**90.4072.XX**

Wire feeder systems (compact (built-in) and separate)are fitted with 1.0 - 1.2mm rollers as standard.

- **A great variety of options which do not leave any wishes unfulfilled:**

Options from factory:

-	connection voltages other than 3x400V	**on request**
-	other torch connections	**on request**
-	wire feed unit ***4x4S*** built in	**on request**
-	retrofit kit digital voltmeter / ammeter with Hold-Function	
	thyristor MIG 400A	**92.0257.01**
	thyristor MIG 500A	**92.0258.01**
	thyristor MIG 600A	**92.0259.01**
-	whisper cooling fan	**92.0244.01**
-	retrofit kit for variable gas pre- and gaspostflow times	**92.0241.00**
-	whisper cooling fan	**92.0244.01**
-	retrofit kit for the connection of a second wire feed system for compact machines	**92.0245.00**
-	fitted flow guard, alternative to a pressure guard	**94.0232.01**
-	retrofit kit wheel set for wire feeder unit	**90.8035.01**
-	turnplate for wire feeder unit	**90.8048.01**

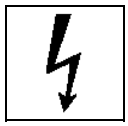
Operator Safety Instructions:

Fatal injury may result if the safety precautions below are not observed!

Observe the following Safety regulations!

- Put on dry protective clothing (e.g. gloves) as specified in the regulations, before carrying out welding work.
- Protect eyes and face with protective mask.

Electric Shock



can cause fatal injury!

- Units must only be connected to sockets earthed in accordance with the local standards regulations.
- Mains power cables must be free from damage, and have earth conductor leads connected to the supply socket, which should also be earthed.
- Damaged insulation on mains power cables, and plugs incorrectly fitted can cause electric shock.
- **The unit must only be serviced by authorised trained personnel.**
- **Withdraw mains plug before working on the unit. Do not rely solely on the mains OFF switch. Wait two minutes before working on equipment, to allow capacitors to discharge a safe voltage.**

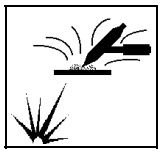
Contact with low voltages may cause sufficient shock to result in an accident. The following precautions should be taken:

- Ensure that personnel cannot fall from platforms or scaffolding.
- Handle earth clamps, torches and workpieces correctly. Use for intended purposes only. Do not allow bare skin to come into contact with live parts.
- Change electrodes with dry gloves.
- Do not use torch or earth cables with damaged insulation, replace immediately if damaged.

Smoke and gas can cause breathing difficulties and may be poisonous!

- Do not breathe in smoke and gas.
- Ensure adequate ventilation.
- Keep solvent vapour out of the arc ray area. Ultraviolet radiation may convert vapour from chlorinated hydrocarbons into poisonous phosgene.

Workpiece, sparks and spatter are hot!



- Keep children and animals well away from the work area. Their behaviour may be unpredictable.
- Keep containers of flammable or explosive liquids away from the work area. Fire or explosion may occur.
  Do not allow explosive liquids, dust or gases to be heated by the welding or cutting process. Explosion may also occur if apparently harmless substances in closed containers build up pressure under heat.

Noise the 70 dBA oversteps can cause lasting damage of the ear!

- Suited earmuffs or -stopper wear.
- Eighths you on it, that other persons, who linger in the operating range, are not bothered by the noise.

Gas cylinder secure!

- protective gas bottle in the for it anticipated cylinder brackets put and with security chains.
- caution in the relation with gas cylinders; do not throw, do not heat, against Around - fall secure! At crane transport the gas cylinder of the welding machine take off.

Interference **may be caused by the electrical and electromagnetic fields generated by the high-voltage pulses from the arc ignition unit.**

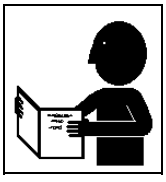
- Heart pacemakers may not operate properly in the area of the welding unit.
- The operation of electronic equipment (e.g. computers) in the vicinity may be impaired!

Welding units must be repaired by authorised and trained personnel only!

Repair and modifications only through authorised and trained technical staff!

Unauthorised repair shall render the guarantee invalid!

Please read the safety instructions carefully before operating this equipment.



Content

Page

1. To this in Thyristor technology built MIG / MAG - welding units

Congratulations!

You have purchased a welding machine. These are in every respect i.e. performance, equipment, flexibility and accessories designed for professional use.

The main advantages of these step switch controlled MIG/MAG welding machines are:

- **User friendly** with clear meaningful symbols on the operating elements, and separation of the function controls means that the machine is easy to use for the operator.
- **Mobile and robust** these machines are easy to move about, stable and robust construction.
- **Serviceability** through robust construction of the power components and electronics.
- **Extremely good ignition** variably creep start speed and a selection of choke settings.
- **Optimum Welding Characteristics** with extremely well matched transformer and choke setting. There is the optimum welding performance produced by the machine.
- **Easy to service** through modular construction.
- @@**Fernregelbar** with remote control FRT 50 for welding voltage and wire feed speed.
- **Robots usefulness in preparation** through a @@leitspannungsfähige control system (0-10V), mains voltage compensation and an interface for the connection at robots machines.

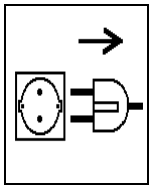
1.1 Areas of use:

- S Welding machines are constructed in accordance with VDE 0544 (EN 60974-1) and can be used in working environments of increased electrical hazards.
- For MIG/MAG seam welding by short- and spray-arc with Argon, mixed-gas or CO2.
- **materials** alloyed and lowalloyed steel, aluminium, non-ferrous metal.
- **Areas of work** chemical industries, engine building, vehicle building, apparatus- and boiler building, ship building, metal fabrication.

2. Transportation and Set Up

Carrying and Lifting

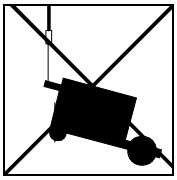
Before moving the unit, withdraw mains plug and place on unit.

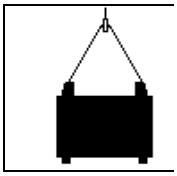


Always secure the high-pressure cylinder with two security chains
Do not roll over the hoses.

Observe the Safety regulations for lifting!

When lifting unit, keep unit horizontal.
Do not lift the unit by the grip,
pull it up at all four lifting Lugs
simultaneously.

wrong 

correct 

Ambient Conditions:

The welding unit can be operated within the following limits:-

- An **ambient temperature** from -10°C to +40°C and
- a **relative Humidity** up to 50% at 40°C and
  up to 90% at 20°C

in non-hazardous areas.

The unit is tested to **IP23** degree of protection, i.e.:

- Protection against ingress of solid foreign bodies ∅ > 12mm;
- Protection against water sprayed up to an angle of 60° from the vertical.

The lifespan of the welding unit will be reduced by unusually high quantities of dust, acid, corrosive gases or other substances in the surrounding air.
Ensure that the air inlet and outlet ducts are unrestricted when setting up the unit.

3. Technical dates

3.1 *thyristor MIG Series*

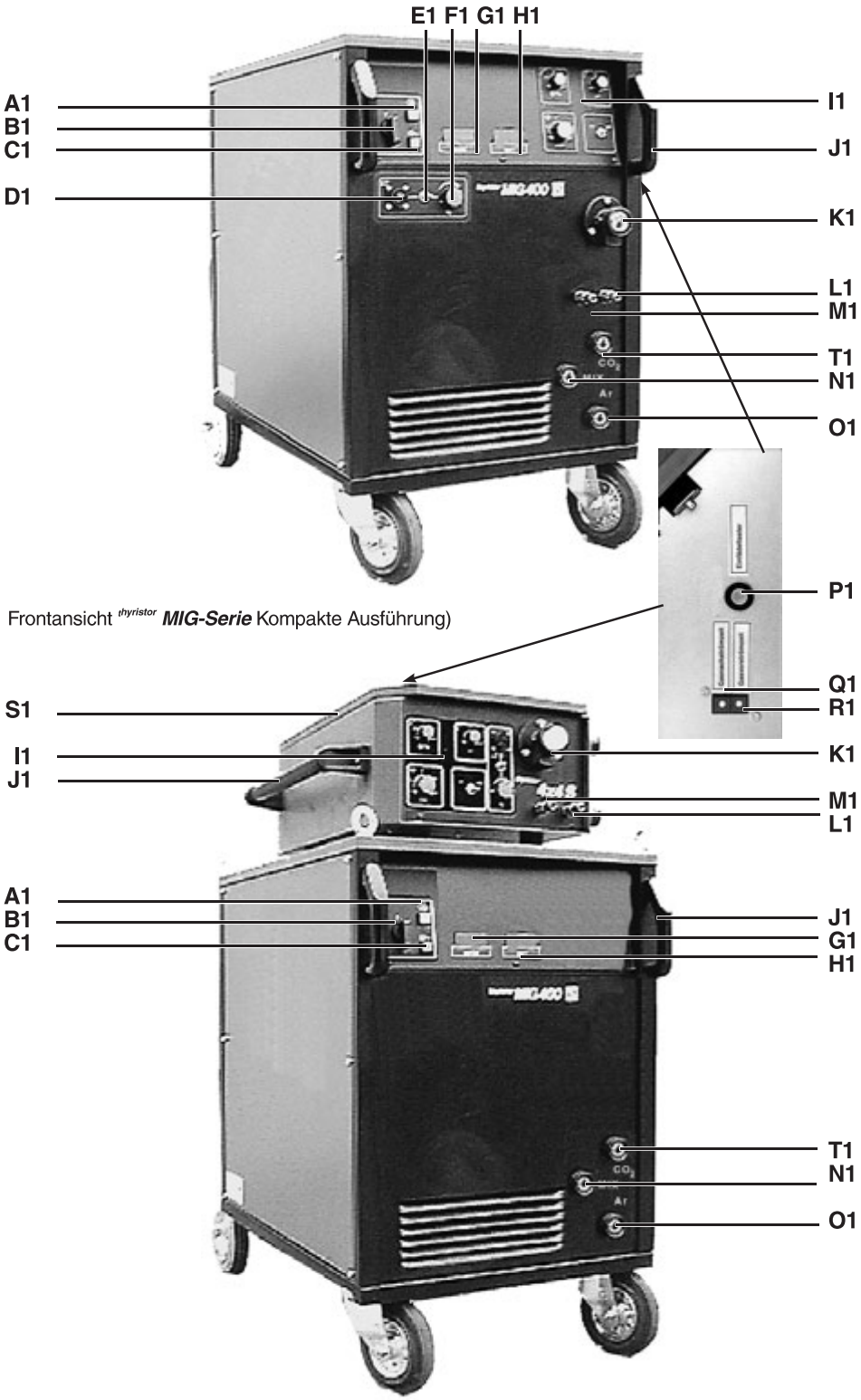
	thyristor MIG 400	*thyristor MIG 500*	*thyristor MIG 600*
Setting Range	40A - 400A	45A - 500A	50A - 600A
Welding Voltage	16V - 34,0V	16V - 39,0V	16,5V - 44V
Mains Current at 45%	400A	500A	600A
Mains Current at 60%	350A	450A	550A
Mains Current at 100%	270A	350A	420A
Duty Cycle Time Duration	10min : (60% ED ≙ 6 min welding, 4min welding pause)		
Open Circuit Voltage	15V - 42V	17V - 45V	17V - 50V
Mains Voltage	3 x 400V		
Mains Frequency	50 / 60Hz		
Mains Fuse (slow blow)	3x20 A	3x25 A	3x35 A
Wire Feed Speed	1m/min - 20m/min (by compact - machines)		
Wire Diameter (standard)	0,6mm - 1,6mm	0,6mm -2,4mm	
Ambient Temperature	-10°°C to +40°°C		
Method of machine cooling	fan		
Method of Torch cooling	gas or water	water	
Tank Contents	7 l		
Euro Connector	yes		
Insulation Classification	H		
Protection Classification	IP 23		
Dimensions without cylinder	1110 x 550 x 890mm		
Weight gas-cooled	135kg	-	-
Weight water-cooled	160kg	205kg	245kg

3.2. *thyristor 4x4* and *thyristor 4x4 S*

	thyristor 4x4	*thyristor 4x4 S*
wire feeder speed	1m/min - 20m/min	1m/min - 20m/min
Max. welding current at 45% Duty Cycle	600A	600A
supply voltage	42V AC	42V AC
roller system	4x4	4x4
Wire Diameter	0,6mm - 2,4mm	0,6mm - 2,4mm
Dimensions **weight (without interconnection hoses packages)**	650mm x 440mm x 265mm (suitable for passing through manholes)	
weight **(without wire spool and hose package)**	18,5kg	
interconnection hose packages (length 5m)		
by 400A air cooled machines	5,2kg	
by 400A water cooled machines	7,2kg	
by 500A water cooled machines	8,0kg	
by 600A water cooled machines	9,5kg	

4. Description:

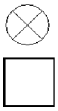
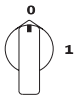
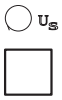
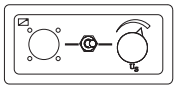
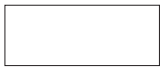
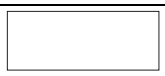
4.1 Elements of the *thyristor* *MIG* and wire feed unit front view



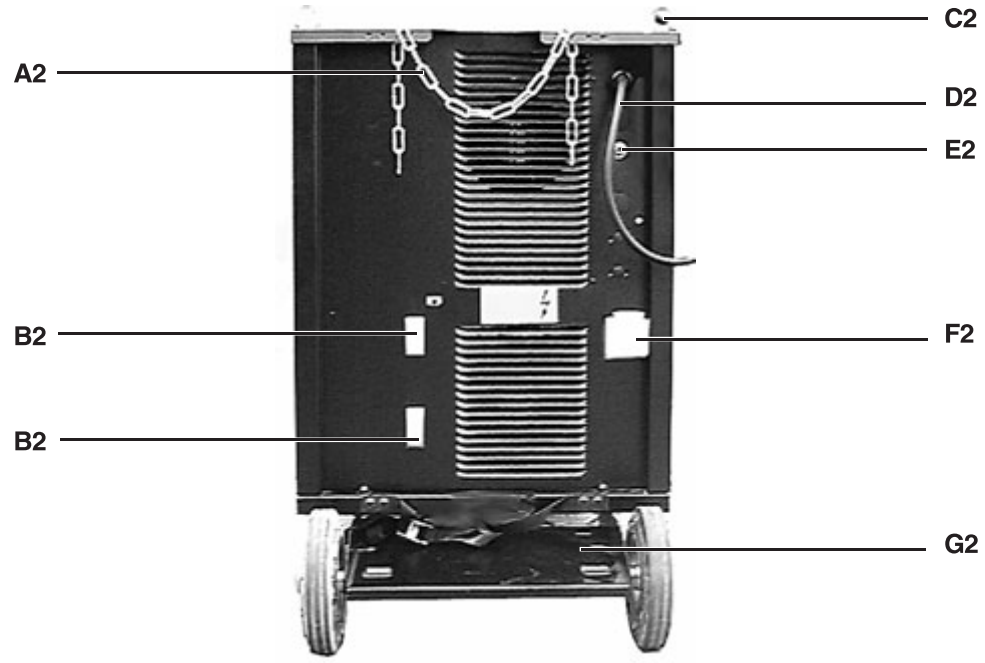
Frontansicht *thyristor* ***MIG-Serie*** Kompakte Ausführung)

Diag. 2 :

Front view ***thyristor MIG - Series*** (with single wire feed)

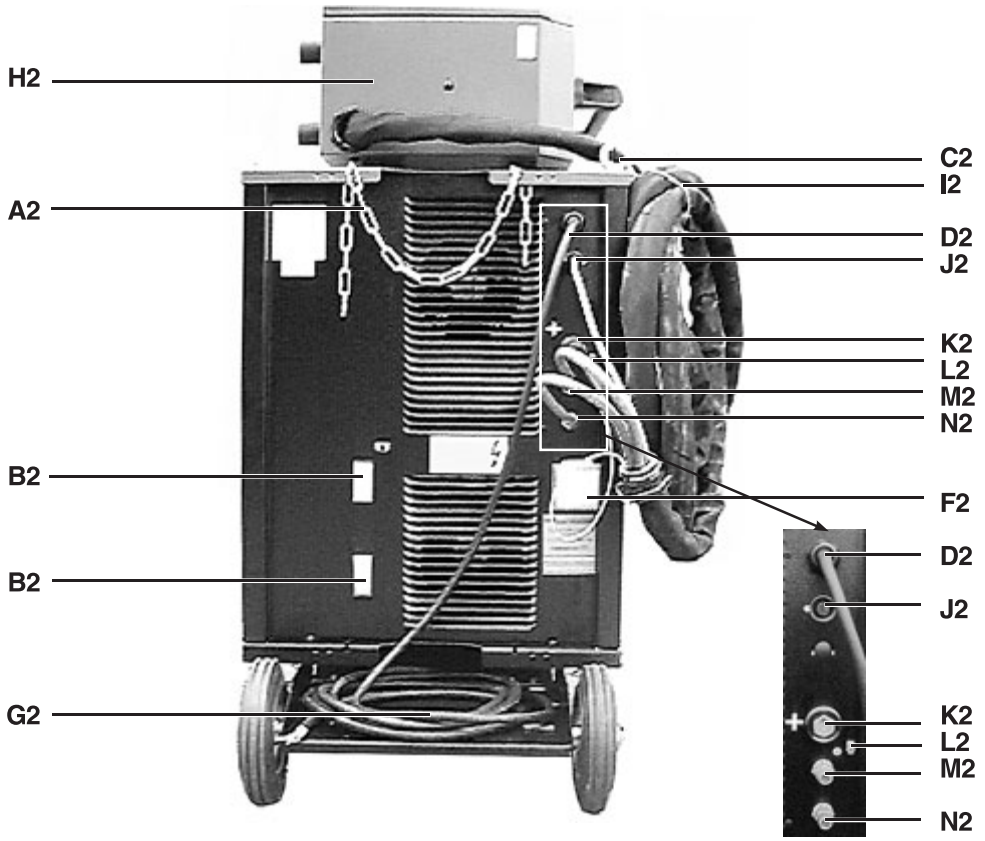
A1		**Status display and collective failure (overtemperature and coolant shortage)**
B1		**Mainswitsch**
C1		**Test button: Dry welding voltage area code**
D1		**Remote control socket for Remote control FRT 50**
E1		**Remote control FRT 50 ON / OFF**
F1		**Potentiometers for welding voltage** (infinitely adjustable)
G1		**Analogue ammeter for welding current or** digital ammeter for welding current with hold-function (option)
H1		**Analogue voltmeter for welding voltage or** digital voltmeter for welding voltage with hold-function (option)
I1		**Operating elements (see also chapter 4.3)**
J1		**Handle**
K1		**Euro Central Connector.**
L1		**Quick release coupling, coolant to welding torch**
M1		**Quick release coupling, coolant return from welding torch**
N1	**MIX**	**Welding current socket -** workpiece "medium" welding choke setting for example for welding under mixed gas (only at 400A - machines)
O1	**Ar**	**Welding current socket** - workpiece "soft" welding choke setting for example for welding under argon
P1		**Wire inching taster (for wire inching without power) (see also chapter 5.1.2)**
Q1		**Gas postflow time 0.3 sec** (Option, infinitely vary from 0.3 - 4 sec.) (see also chapter 5.1.4)
R1		**Gas preflow time 0.1 sec** (Option, infinitely vary from 0.3 - 4 sec.) (see also chapter 5.1.3)
S1		**Wire feeder unit**
T1	**CO_2**	Welding current socket - workpiece "hard" welding choke setting for example for welding under CO_2

4.2 Elements of the *thyristor* *MIG* and wire feed unit back view



Diag. 3 :

Back view ***thyristor*** ***MIG - Series*** (compact type)

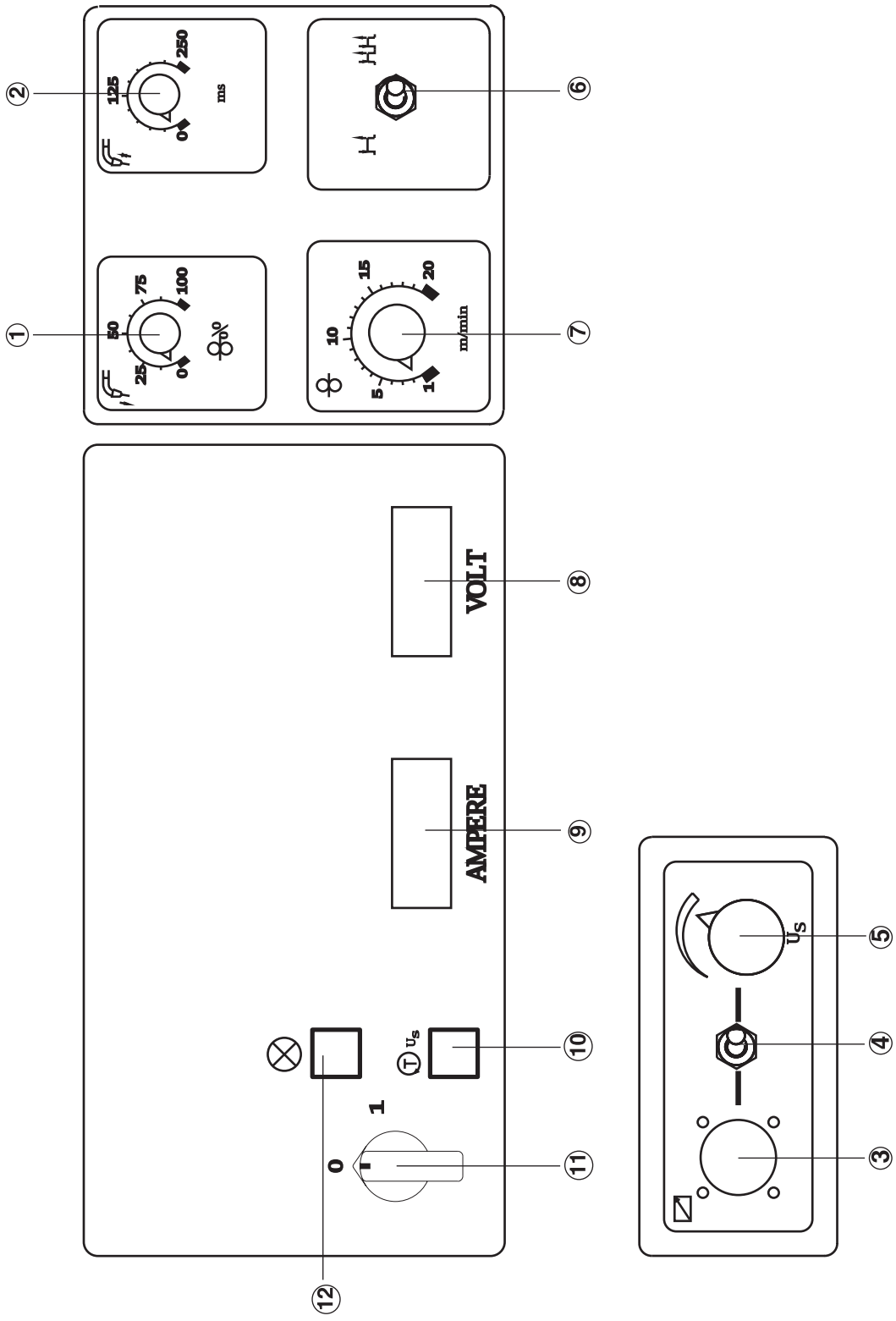


Diag. 4 :

Back view ***thyristor*** ***MIG - Series*** (Decompact type with single wire feeder unit)

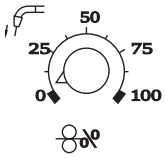
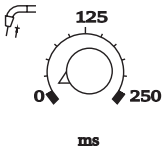
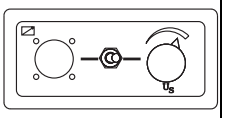
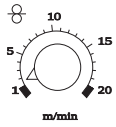
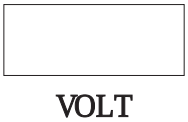
A2		**security chain**
B2		**viewing windows (coolant level)**
C2		**crane-rings lifting lugs**
D2		**Main cable**
E2		**Gasconnection G1/4**
F2		**Filler inlet for coolant (with screwcap lid and sieve)**
G2		**Cylinder holding**
H2		**Wire feeder unit**
I2		**Interconnection hose**
J2		**Connection socket for the control cable of the wire feeder unit**
K2	+	**Welding cable connector „+“**
L2		**Grounding screw for interconnection hose**
M2	 **blue**	**Quick release coupling (blue), coolant to wire feeder unit**
N2	 **red**	**Quick release coupling (red), coolant return from wire feeder unit**

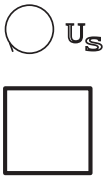
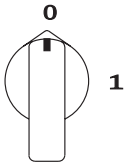
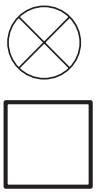
4.3 Functions description of the operating elements



Diag. 5 :

Operating elements ***thyristor MIG - Series***

1		**Adjustment knob for Creep Start speed** In order to achieve optimum ignition performance, even when using high wire feed speeds, the arc is ignited with a reduced wire feed speed, once the arc has struck, the changeover to Main wire feed speed takes place automatically. The Adjustment Knob, adjusts the creep start speed as a percentage of the main wire feed speed (0% - 100%).
2		**Adjustment Knob for wire burn back time** Infinitely variable from 0 - 250ms. At to long discontinued wire burn back time burns the welding wire up to the contact nozzle back, which for the destroy of the contact nozzle leads or at the welding wire develops one to large ball, which for a worse ignition at the next ignition process leads. At to shortly discontinued wire burn back time burns the welding electrode in the welding pool firmly.
3		**Remote control socket** for remote control FRT 50
4		**Change-over switchs:** Wire feed speed and welding voltage adjustable at the machine or over remote control FRT 50.
5		**Rotary knob "welding voltage"** With the potentiometer (5) is discontinued the welding voltage infinitely. Fully anticlockwise of the potentiometer means smallest welding voltage, with fully clockwise of the potentiometer is reached the largest welding voltage.
6		Selector Switch for Torch Operating Control Mode - Non-Latch (2 step) mode - Latched (4 step) mode
7		**Adjustment Knob for Main Wire Feed Speed** Infinitely variable from 1m/min to 20m/min.
8		During the welding, or also during the dry test phase, can be read at the analogous gauge the **welding voltage**. Optional can be installed **digital gauges with Holdfunction**, they store the last welded value.

9		During the welding the **welding current** can be read at the analogous gauge. Optional can be installed **digital gauges with Holdfunction**, they store the last welded value.
10		**Push buttones for welding voltage preset .** Through operating of the push button (T) tension area code can in the dry condition, at the rotary knob "welding voltage" (5) the welding voltage preset and are read at the voltmeter.
11		**Mains switch** **Machine ON/OFF**
12		**Status Display „ready to work“** **contains the following functions:** **Temperature supervision the power unit.** As soon as the maximum permissible temperature the transformer and/or. Rectifier is overstepped, go out the pilot light and the welding current is switched off. After cooling of the power components the machine controls itself independent again in the working condition. **Water circulation cooling with supervision** (at water-cooled plants) The efficacy the water circulation cooling of the welding torch is examined constantly through a pressure guard and indicated through the status display. At insufficient water pressure the welding current is switched off automatically and the status display „ready to work“ organisation readiness go out. Through normalisation of the **water pressure** (for example refill from water or abolition of a leaky place in the hose) the status display lights up again and the welding current is released.

5. Functions

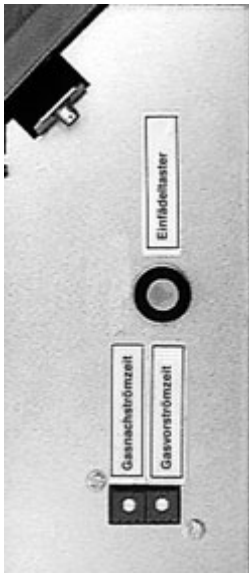
5.1. Setting possibilities and further function

5.1.1 Welding Choke Setting

There are two choke settings which enable the machine to be set up according to material, wire diameter, shielding gas and voltage. When the welding return cable is plugged into the outlet socket **N1** this gives a hard arc setting (this is used when for example welding with CO2). When the workpiece return cable is connected to the socket outlet **O1** this gives a soft arc setting (this is used when welding with aluminium wire).

5.1.2 Wire Inching (without Power)

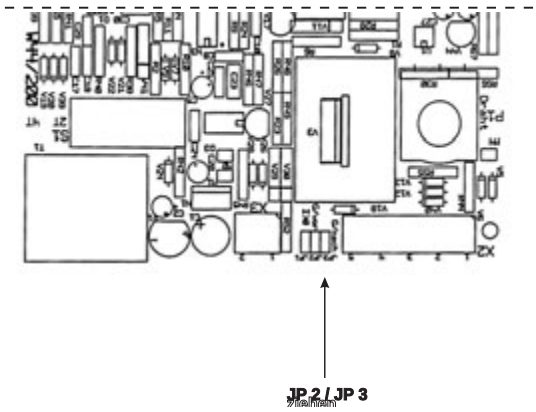
The wire can be fed into the torch hose assembly without power or gas. In order to do this press the wire inch button inside the wire feed unit.



5.1.3. Gas preflow time

When arming consider:

- Jumper JP2 and JP3 on the platinums W44 / 200 remove!



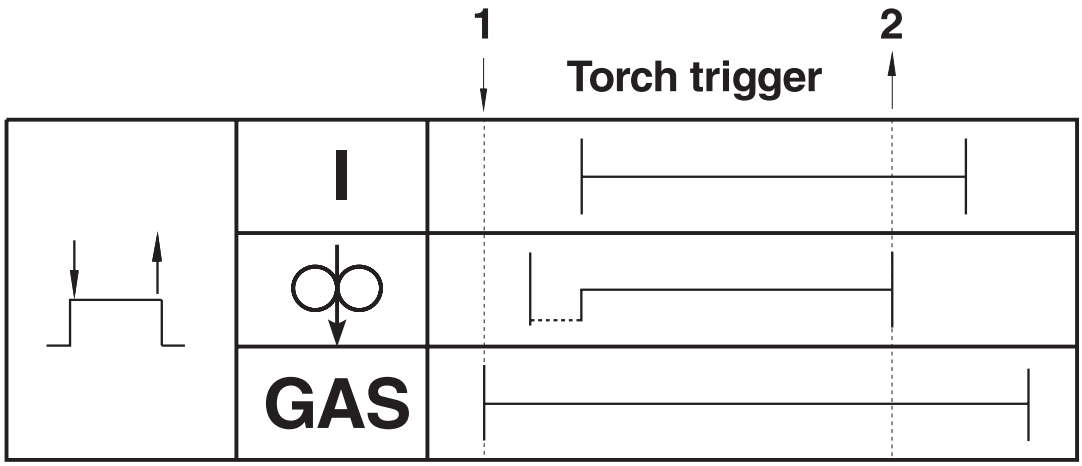
The gas preflow prevents ignition of the arc without shielding gas coverage. The time for the gas preflow is approximately 0.1 secs. (As an option it is possible to have variable gas preflow time of 0.1 - 4 secs).

5.1.4. Gas postflow time

The gas postflow should reach, that the weld metal hardens under protection gas atmosphere and are formed thus no crater pores. The gas postflow time is set at a fixed value of approximately 0.3 seconds. As an option it is available with adjustable gas postflow time from (0.3 - 4 seconds)

5.2 Operation of Functions

5.2.1 Operation of Non - Latched (2 step) mode"



Diag. 6 :

Diagram of operation "non - latched (2step) mode"

- Switch selector switch (6) to the non-latched position

.

- Welding voltage infinitely with potentiometers (5) adjustable.
- The wire feeding speed is (7) regulated with trick button.

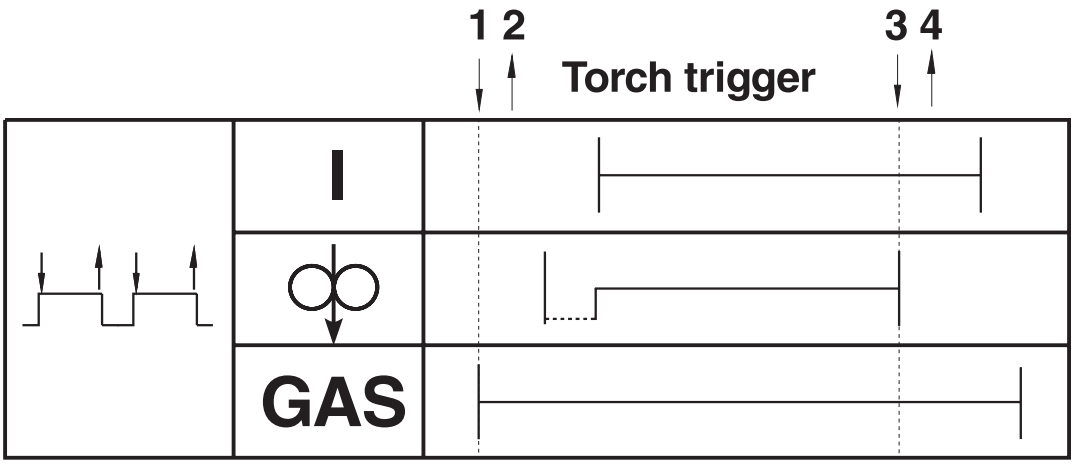
Depress Torch Trigger **(1st step)**

- Gas solenoid valve is opened
- Following the pre flow gas time 0.1 sec, the power source switches on
- Wire feed speed starts at Creep Speed
- Arc ignites, wire feed speed automatically changes to main drive speed setting

Release Torch Trigger **(2nd Step)**

- Wire feed stops
- Arc maintains, until the time set of the wire burn back control has elapsed, and then switches off
- Gas post flow runs until the gas post flow time elapses.
- Gas switches off

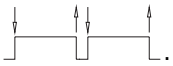
5.2.2 Operation of "Latched (4 step) mode"



Diag. 7 :

Diagram of operation " Latched (4 step) mode "

Advantage: At that latched welding escapes the permanent sensor activity,
thereby the torch can be led also longer time of free of tiredness.

- Switch selector switch (6) to the latched (4 step) position  .
- Welding voltage infinitely with potentiometers (5) adjustable.
- The wire feeding speed is (7) regulated with trick button.

Depress and release torch trigger (**1st and 2nd step**)

- Gas solenoid value opens
- Following the pre flow gas time 0.1 sec, the power source switches on
- Wire feed speed starts at Creep Speed
- Arc ignites, wire feed speed automatically changes to main drive speed setting

Depress and release Torch Trigger (**3rd and 4th step**)

- Wire feed stops
- Arc maintains, until the time set of the wire burn back control has elapsed, and then switches off
- Gas post flow runs until the gas post flow time elapses.
- Gas switches off

5.3 Remote control

There may be connected only remote controls, which are described in this operating instruction.

	Remote control **wire feed spped / welding voltage** **FRT 50**
Functionen	The wire feed speed and the welding voltage can be discontinued and corrected independently of the values predialed at the control panel of the machine at the remote control FRT 50 infinitely.
Starting up	MIG - welding machin switch off, manual remotecontrol FRT 50 at 7 pole remote control socket at the machine (compact completion) or at wire feed units connect. Tumbler switchs (4) at the wire feed unit or at the machine on remote control FRT 50 shift. MIG - welding machin again tune in.
Particularities	-

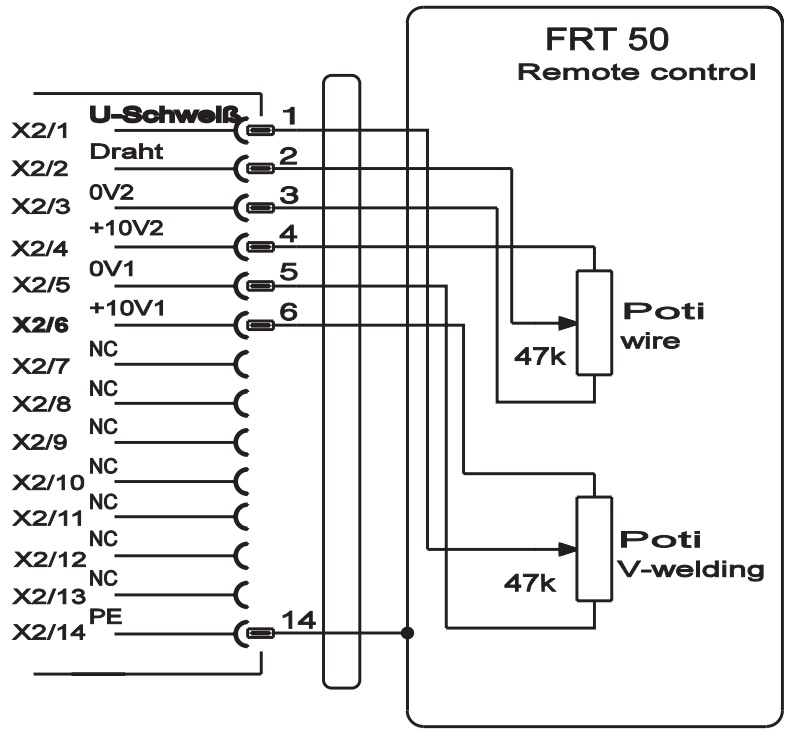


Abb. 6

Anschlußplan Fernsteller FRT 50

6. Commissioning

6.1 Preparation for welding

6.1.1. Installing the welding power source.

Install the MIG/MAG welding unit such that there is sufficient space to fit and service components. The machine should be transported only in accordance with the relevant safety regulations.

6.1.2. Ventilation of the welding power source

T ensure optimum lifespan of working parts the following conditions should be observed:

- The work area should be adequately ventilated.
- Air intake and outlet should not be obstructed
- Metal particles, dust or other foreign bodies should not be allowed to penetrate the machine.

6.1.3. Water-cooling system for welding torch

The machine becomes from factory with a coolant - minimum filling **KF23E-10** delivered.

With the coolant KF23E-10 is guaranteed antifreezes to -10 °C!

Coolant stood examine and if necessary up to the upper shop-window of the tank (**F2**) coolants **KF23E-10** (Article No.: if accessory see) refill.

If the coolant stood examine and if necessary up to the upper shop-window **B2** with Coolants KF23E-10 refill.

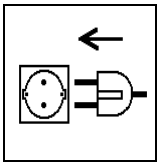
Note: Use only KF23E-10 coolant. The use of any other coolants or liquids is strictly forbidden and will void the manufacturers warranty. The sieve must always be in position when refilling with coolant.

6.1.4. Connecting the machine to the mains supply

Please read the safety information on pages 4 & 5

On all machines the mains cable must be fitted with a suitable connection plug. The connection plug should be fitted by a suitably qualified Electrician and, in accordance with any local electrical regulations. The phase notation for the machines irrelevant and has no influence on the direction of rotation of the water pump or the cooling fan.

Connecting the unit to the mains supply



The technical data on the machine rating plate, which is positioned on the rear of the machine, states the required connection voltage, which must correspond to the available mains supply voltage. The mains fuse size is also stated in the Technical Data, and must be observed. Plug in the mains plug of the machine to the required connection socket.

6.1.5. Connection the interconnecting hose to the power source

- Plug the cooling water connecting tubes (return **N2** red, feed **M2** blue) into the appropriate connecting valves on the rear panel of the current source
- Plug the wire-feed unit control cable into the connection socket **J2** on the rear panel of the welding machine and secure with the retaining nut.
- Plug the welding power cable plug into the +ve socket **K2** and secure it.
- Fix the earth conductor connector into the bolt **L2** on the rear of the unit using the 4mm nut, spring-lock washer and washer.

6.1.6. Exchanging the interconnection hose on the wire feed unit

(for machines with separate wire feed system).

- Open the lid on the wire feed unit.
- Remove the wire spool, if in place

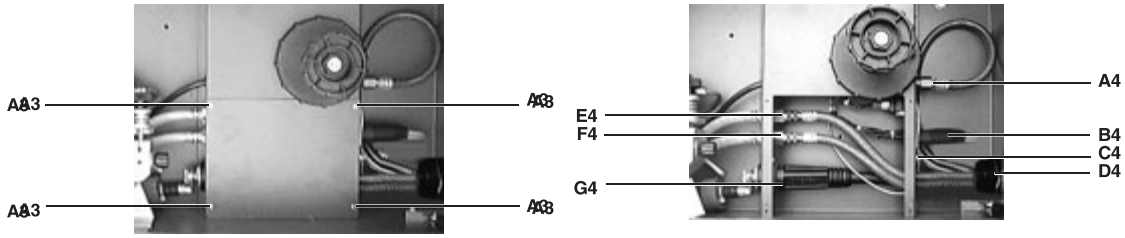


Fig. 8 :

Interconnection hose fittings:

- Remove the 4 screws **A3** from the cover plate.
- Feed the control cable and the hoses into the wire feed one after the other through the cut out..
- Plug in the power socket **G4** and twist to fix in position.
- Connect the Gas hose G1/4 connection to **A4** and tighten to achieve a seal.

Warning: The wire feed nit is supplied as standard with a flow restrictor (**A4**) to limit the flow to 16 lpm. For applications which require higher gas flow rates e.g. Aluminium, then the restrictor must be exchanged for one suitable up to 32 lpm (see accessory).

- Connect the water hoses (where required).
  (return red on **E4** / feed blue to **F4**) to the respective quick release couplings.
- Plug in the control cable to socket **B4** and secure with the retaining nut.
- Connect the terminal on the earth wire to the stud **C4** and fix the spring washer, flat washer and nut.
- Place the hose assembly in the hoseholder and fix with the clamp **D4** .
- Carefully recheck all connections.
- Replace cover and screws.
- To remove carry out above instructions in reverse order.

6.1.7 Connection the MIG/MAG - welding torch to the machine

- Prepare the MIG welding torch for the welding operation.
- Insert the torch **C5** into the central connection **A5** at the front of the machine and screw tight with retaining nut **B5**.
- Connect the hoses for cooling water (if available) to the appropriate quick release (return (red) to **M1** / feed (blue) to **L1**)

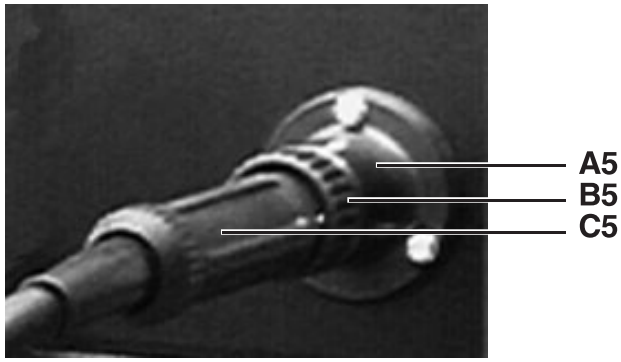
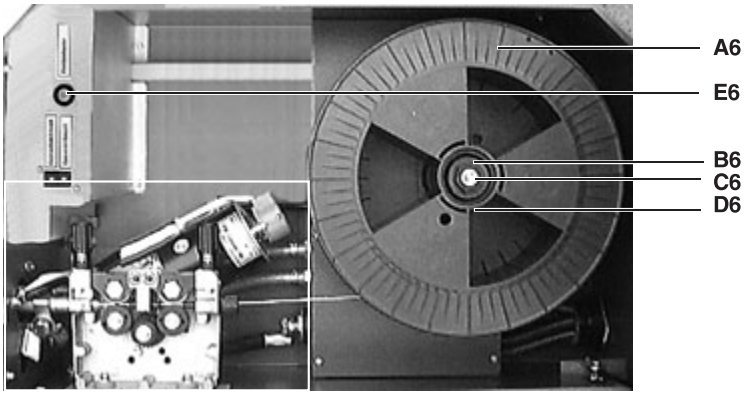


Fig. 9 : MIG welding torch connection

Note:

- **Welding torch with guide spiral:**
- Capillary tube must be installed in the central connection.
- Welding torch with teflon liner:
- There must be no capillary tube in the central connection **A5**.
- Shorten the teflon core and guide tube such that the distance to the drive roller is as small as possible.
- Do nit deform the teflon liner and guide tube when cutting to length. The guide tube should be cleanly trimmed.

6.1.8 Inserting the wire electrode



Diag. 10 :

Installing the wire coil

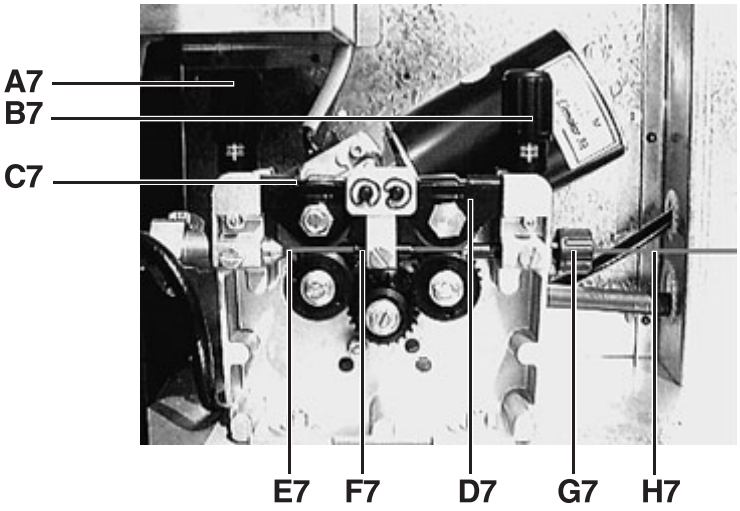


Fig. 11 :

Threading the welding wire

The standard wire spool D300 may be used.
If the standard basket spool (DIN 8559) is to be used,
adaptors are required; see accessories.

- Loosen nut **D6** on the spool holder.
- Place the appropriate welding wire spool on the spool holder **B6** ,
  where the drive pin must engage with the spool locating hole.
- Tighten the wire spool with nut **D6** .

• **Changing the wire drive roller:**

- Wire - feed rollers must match the diameter of the wire electrode being used.
- Changing the driver roller (where necessarily)
- Loosen retraining arms **A7** and **B7** and push outwards to the side.
- The tension stays and counter - pressure rollers **C7** and **D7** flip up.
- Remove the two counter - pressure rollers and the other drive
  and counter - pressure rollers.

- **Threading the wire electrode:**

- Stretch out the torch hose in a straight line.
- loosen nuts **A7** and **B7** and flip them outwards to the side.
- Flip up the tension stays and counter - pressure rollers **C7** and **D7**.
- Welding wire **H7** is unwound clockwise from the wire spool **A6** and fed through the wire insertion point **G7,** over the grooves of the drive roller and the guide pipe **F7** into the capillary tube **E7**, or into the teflon liner with guide tube **E7**.

Warning: Danger of injury from fast-moving wire as it exits the torch. Do not grasp the neck of the torch nor hold it against the body.

- **Setting the Drive Pressure**
  - Push the tension stays and counter - pressure rollers **C7** and **D7** downwards again. (Wire electrode must lie in the groove of the drive roller).
  - Flip the nuts **A7** and **B7** up and inwards to engage the counter - pressure and the drive pressure.
  - The drive pressure is set such that the wire electrode is carried forward, yet slips through when the wire spool **A6** is held.
  - Switch the current source on at switch **B1** "ON / OFF" .
  - Press the inching button **B6** until the wire electrode protrudes at the torch.

- **Setting the spindle brake**
  - Tighten the brake screw **C6** in the spool bar such that the wire spool **A6** does not slip. Do not over-tighten or unnecessary feeding problems will arise.

6.1.9 Connection of the workpiece cable with clamp

Plug the workpiece cable into the welding current socket - **N1** for hard arc setting and **O1** for soft Arc setting - turn anticlockwise to secure. Remove paint, rust and dirt from the clamp and welding point with a wire brush. Attach the workpiece clamp to a good conducting point in the immediate vicinity of the welding point.

Warning:

Structural members, piping, rails etc. must not be used for welding current return unless they themselves from part of the workpiece. Where welding tables and similar equipment is used the current flow must be unimpeded.

6.1.10 Setting up gas connections.

- Set up the shielding - gas cylinder and secure with holding chains.

Note: **Do not allow any impurities to enter the shielding - gas supply, as blockages can result.**

- Before the connection of the pressure regulator to the gas bottle, briefly open the vessels vent to blow out any possible dirt
- **For compact systems:**

  Mount the pressure regulator valve on the gas cylinder, connect the gas pipe to the outlet on the pressure regulator, and screw the other end to the appropriate connection **E2** on the rear panel of the welding tool, making a gas tight seal.
- **For systems with a separate wire - feed box:**

  Screw the gas pipe from the carrier tube set to the cylinder outlet making a gastight seal.

6.1.11 Setting and regulating the shielding gas

Warning: The wire feed unit is supplied as standard with a flow restrictor (**A4**) to limit the flow to 16 lpm. For applications which require higher gas flow rates e.g. Aluminium, then the restrictor must be exchanged for one suitable up to 32 lpm (see accessories).

Shielding gas flow too low: When Hz coverage is insufficient, then air will enter into the weld, creating pores in the seam.

Shielding gas flow too high: Creates turbulance, allowing air to be sucked into the weld creating pores in the seam.

- Open the cylinder valve slowly.
- Open the regulator valve.
- Switch on the machine at the "ON / OFF" switch.
- Set the mode switch to „unlatched mode“ 2 step.
- Release the wire drive tensioning screws **A7** and **B7** and flip up the pressure roll arms **C7** and **D7** .
- Depress the torch trigger and shielding gas will flow.

Warning: **The wire electrode will be live (open circuit voltage). Beware of electric shock, gas will flow torch!**

- Set the shielding gas flow rate according to the application (between 6 - 12l/lpm).
- Reset the wire feed pressure arms into position.

If the shielding flowrate is not high enough despite the reading on the flowgauge, then the restrictor must be removed. There must not be any impurities in the shielding gas supply line.

- **The machine is now ready for welding.**

6.2 General Set up of the MIG/MAG Welding unit

The set up of MIG/MAG welding unit does require some experience. It is largely the relationship of the wire feed speed and the welding voltage which must be correctly matched to each other to ensure successful welding is carried out.

Wire feed speed

When the wire feed speed is increased this also increase the welding current and correspondingly the arc length will be reduced. On the other hand a reduced wire feed sped increases the Arc length and reduces the welding current.

Welding Voltage

An increase in the welding voltage gives a respective lengthening of the arc itself, without a significant alteration in the current level. On the other hand if the arc voltage is reduced a shorter arc is achieved, whilst the current level changes only a small amount.

Alteration of Wire Diameter

A smaller diameter wire requires a larger wire feed speed in order to achieve the same current level.

If particular operating criteria limits are exceeded then a stable welding arc will not be achievable:

Excessive wire feed speed (in comparison to the set welding voltage) this causes a recoil at the welding torch because the wire electrode keeps short-circuiting on the Workpiece as it is not melted fast enough.

Excessive Welding Voltage

This displays itself in the form of large droplets at the end of the wire electrode and a great deal of spatter next to the weld seam.

Select welding filler material according to DIN 8559 and the shielding gas in accordance with DIN 32526:

a) for low alloyed and alloyed steels use limited carbon dioxide or argon mixed gas and
b) for aluminium pure argon is used.

D

Die im Kapitel "Wartung und Pflege" aufgeführten Hinweise, Richtlinien und Normen wurden grundlegend überarbeitet und sind aus diesem Grund nicht mehr gültig!
Die relevanten Hinweise, Richtlinien und Normen finden Sie in den beiliegenden Ergänzungsblättern "Allgemeine Hinweise zu 3 Jahre Garantie", Art. Nr.: 099-000GAR-EWMxx.
Sollten die Dokumente nicht vorliegen, können diese über den autorisierten Fachhändler angefordert werden!
Außerachtlassung kann lebensgefährlich sein!

GB

The instructions, guidelines and standards given in the "Maintenance and Care" chapter have been completely revised and are therefore no longer valid!
The relevant instructions, guidelines and standards can be found in the enclosed supplements "General notes on the 3 year warranty",item no.: 099-000GAR-EWMxx.
If these documents are missing, they can be requested from your authorised specialist dealer!
Not observing these instructions can be potentially fatal!

F

Les consignes, directives et normes indiquées au chapitre « Maintenance et entretien » ont été mises à jour et ne sont donc plus valables !
Vous trouverez les consignes, directives et normes applicables dans les additifs « Consignes générales relatives à la garantie de 3 ans », à l´article : 099-000GAR-EWMxx.
Si vous ne possédez pas les documents, vous pouvez vous les procurer auprès de votre revendeur autorisé !
Le non-respect des consignes peut représenter un danger de mort !

I

Le istruzioni, direttive e norme presenti nel capitolo „Manutenzione e cura” sono state completamente riviste e per questo motivo non sono più valide!
Le istruzioni, direttive e norme rilevanti le trovate nell'aggiornamento qui allegato “Istruzioni generali sui 3 anni di garanzia”, Nr. Art.: 099-000GAR-EWMxx.
Se i documenti non fossero disponibili, possono essere richiesti al rivenditore autorizzato!
L'inosservanza delle istruzioni può comportare pericolo di vita!

according to the

4 - 6

local conditions.

months. The following sh

king on a machine disconnect supply by

switch off, or remove fuse as this is no

Rem

Visually inspect air

If there is a defective mains cable th

nents should be checked as follows.

mpressed air.

Electronics and

Do not blow compressed air

ned gently with a vacuum.

Blow out the wire guide spiral or repl

Wire Drive Rollers

Rollers may be subject to general wear. Wh

should drive at a constant speed. If the pressure roller ma

then the drive roller groove has worn out and the roller must be replaced (p

may be a possible minus tolerance in the welding wire diameter).

Coolant (KF23E-10) and Cooling Control System

Please check the coolant level at regular intervals. As soon as the coolant level is less than three quarters full then the coolant must be refilled. In order to ensure optimum torch cooling, the coolant container and the radiator assembly itself must be flushed out or vacuumed.

Repair work

Repair and maintenance must only be carried out by qualified personnel who have been correctly trained. Please use a distributor who only uses original components when exchanging spare parts. When ordering spare parts for the machine please give the article number of the machine itself, the type of machine and the article number of the component required.

If maintenance repair on this machine is carried out by personnel who are not qualified to do so and have not been authorised to carry out this work then the guarantee of this equipment will be void.

8. Operating problems, possible causes and remedial action

All machines pass through our production and end control however, sometimes things may not function the following items should be checked out in event of failure. However it must be said that the first check which must be done is:-

a) Check mains electricity supply

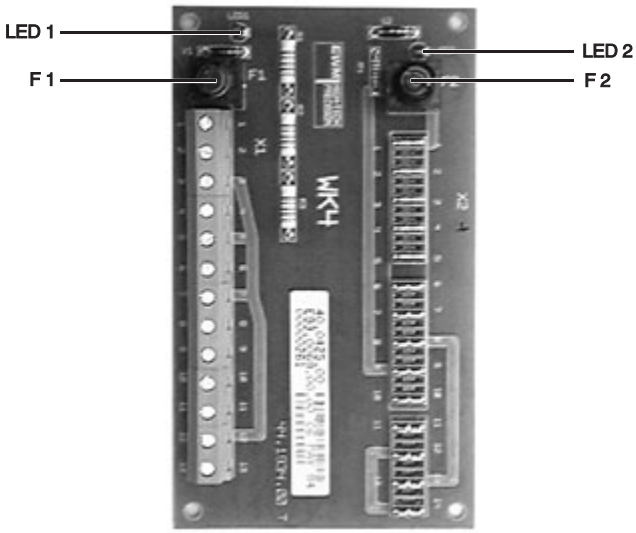
b) Check gas cylinder contents.

Reason	Possible Cause	Remedial Action
Welding wire does not feed	1. Spatter has blocked the opening of the contact nozzle	Clean the contact nozzle and spray with anti spatter
	2. The wire feed rolls rotate, but do not drive	- Check the pressure roller - Worn out drive roll replace with new - The wire has jammed Check and rectify
	3. The wire feed motor does not turn the drive unit	Check the fuse and also check that the main switch is in the ON position.
	4. Kink in the wire prevents the wire from passing through the contact tip.	Remove contact tip and cut off the deformed piece of wire
	5. Wire Feed break is too strongly set	Loosen the brake
	6. Defective Torch	Replace torch
Wire gives off shavings	1. The guide spiral or nozzle is damaged.	Replace or clean
	2. Torch hose assembly is coiled too tightly	Straighten out the torch hose assembly
Wire feed motor will not turn	Fuses defective	New fuse required
Operating indicate **A1** does not light	1. Overheating the power source.	Cooling the power unit.
	2. Insufficient water pressure.	Coolants KF 23E-10 refill.

Reason	Possible Cause	Remedial Action
The weld seam is porous	1. Too much or too little gas.	Wire diameter x 10 gives minimum approximate gas flow rate.
	2. Empty gas cylinder.	Change the cylinder
	3. Incorrect gas quality. i.e. Incorrect purity.	Exchange the gas cylinder
	4. Torch stand off too high	Reduce stand off distance
	5. Draughty conditions, i.e. wind.	Control the draught by shielding the welding area.
	6. Gas nozzle is full of spatter.	Clean or exchange the gas nozzle
	7. Incorrect wire quality or unclean surface.	Use a wire of the correct quality for MIG/MAG welding. Store wire in a clean place.
	8. Very dirty material surfaces.	Clean the base material.
	9. Excessive overheating of the work piece.	The welding must take place with shorter welding period. Or the Workpiece must have time to cool down between welding runs.
	10. Air is being drawn into the gas line.	Seal the gas line properly and replace hose if necessary.
Abnormally heavy spatter	1. Arc voltage length is too low or too high.	Reduce or increase welding voltage on the power source.
	2. Arc blow	Make a better connection between the work piece cable and the Workpiece.
	3. No gas.	Set gas on machine
Poor quality weld seam with penetration problems.	Arc voltage is too high.	Lower the voltage.
Incorrect function of the drive. The contractor, or solenoid.	Problem with electronics.	Change the electronics.

Reason	Possible Cause	Remedial Action
No welding current.	1. Poor connection to the Workpiece cable.	Check the connection and rectify.
	2. Primary contractor does not operate.	Check fuses, also check the torch trigger, and the control circuit for the contractor.
Wire Feed Drive is erratic	1. Blocked or damaged wire guide spiral	Clean out or exchange
	2. Wire feed spool brake is set too tight	Release brake slightly
	3. Contact tip hole is too small for wire	Replace with correct sized tip
	4. Arc voltage is too low	Select a higher arc voltage

8.1 Function description of the fuses PCB WK4



Diag. 12:

PCB WK - 4

LED 1 lighting up, when the fuse F1 is break down

F1: - Protect the coolant pump of the unit from

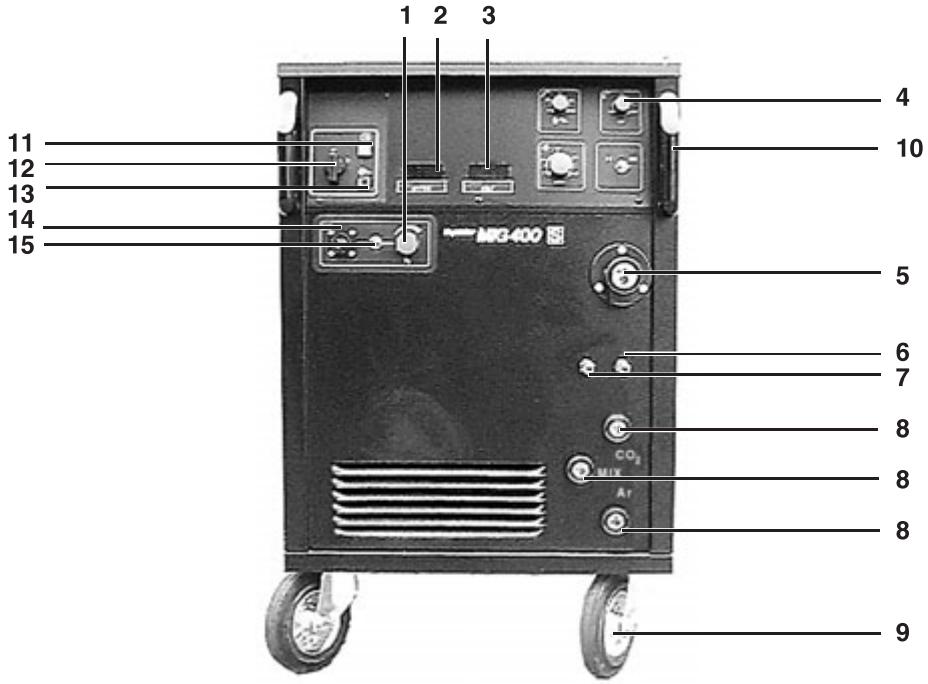
- Fuse: 1,6 A slowly

LED 2 lighting up, when the fuse F2 is break down

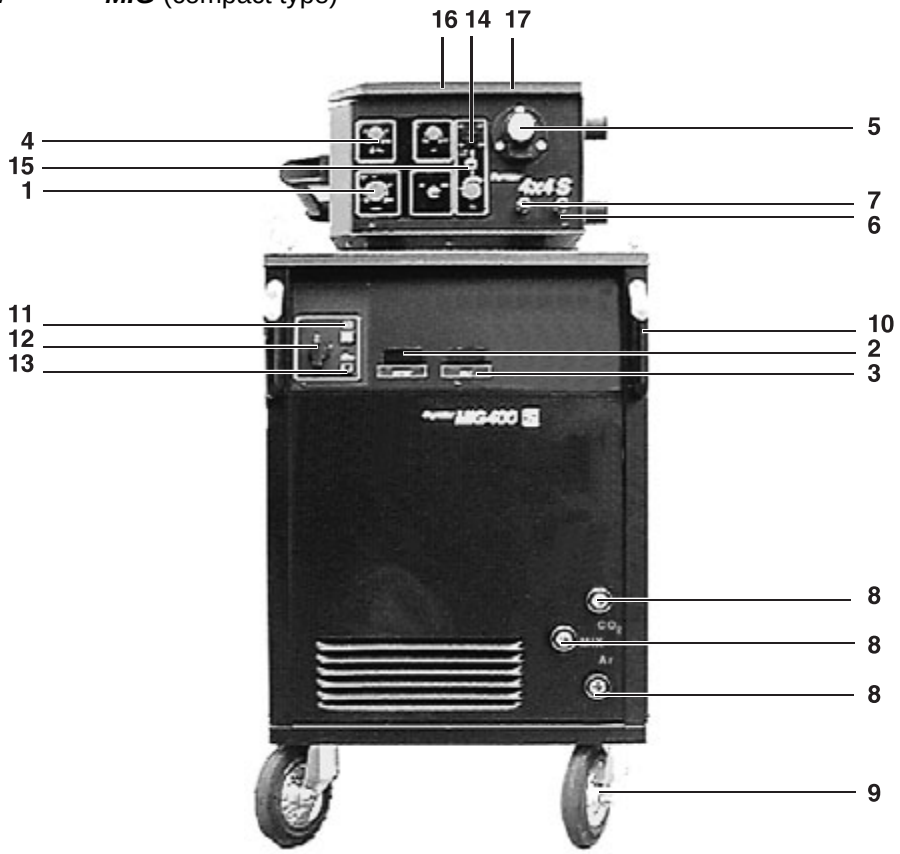
F2: - Takes over the exclusion of wire support motor and PCB electronics.

- Fuse: 4 A slowly

9. Spare part list *thyristor MIG - series*



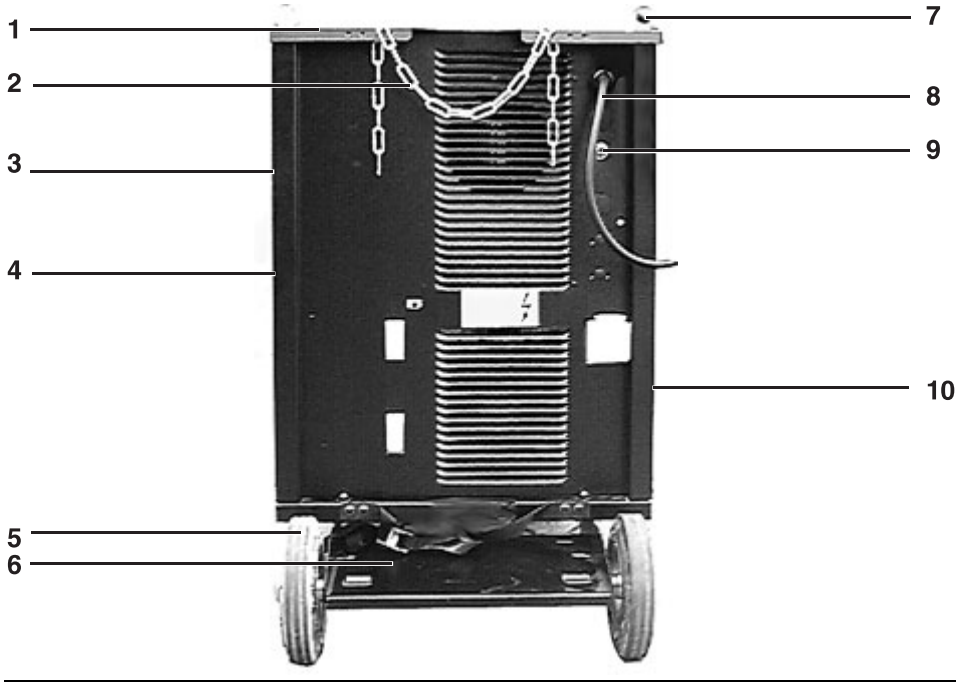
Diag. 13 :
Front view ***thyristor MIG*** (compact type)



Diag. 14 :

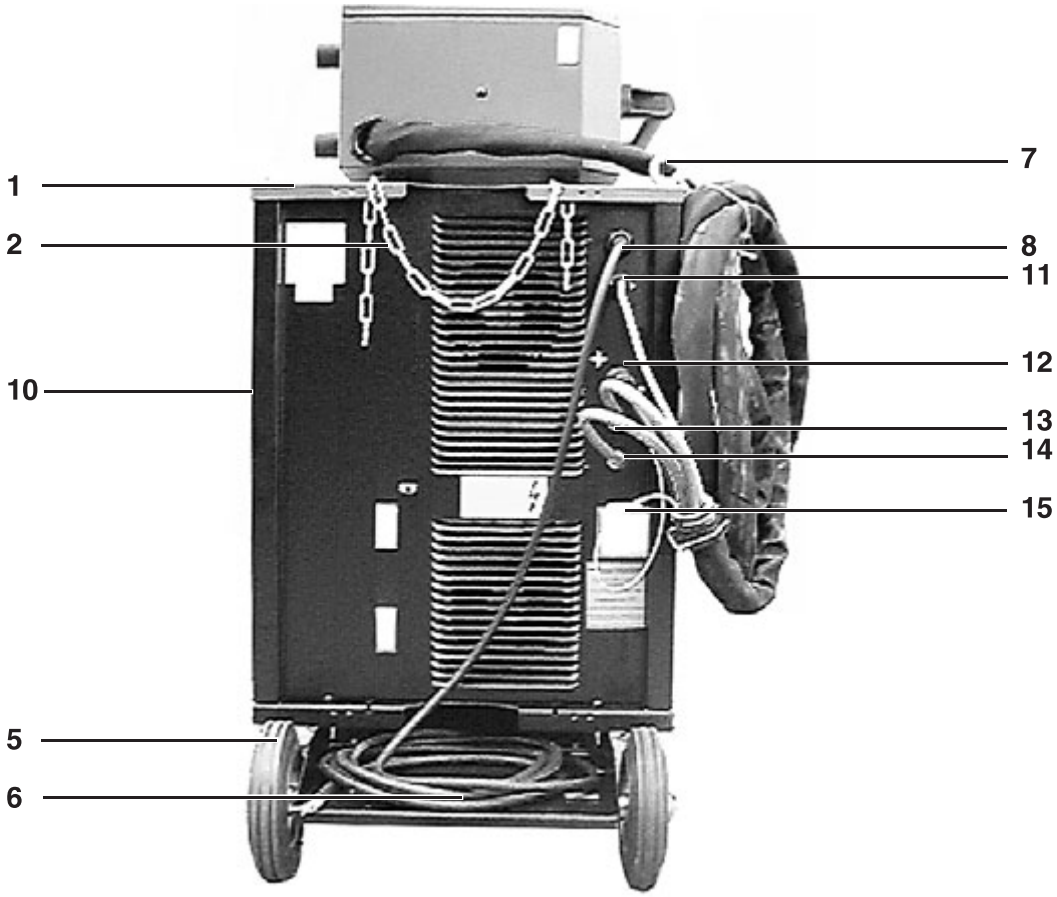
Front view ***thyristor MIG*** (Decompact type)

	Description	*thyristor* ***MIG 400*** article no.:	*thyristor* ***MIG 500*** article no.:	*thyristor* ***MIG 600*** article no.:
1	Knob ∅ 31mm	(only by compact - machines) 74.0234.00		
to 1	Cover for knob ∅ 31mm	(only by compact - machines) 74.0234.01		
to 1	Arrow indicator for knob ∅ 31mm	(only by compact - machines) 74.0234.02		
4	Knob ∅ 23mm	(only by compact - machines) 74.0315.00		
to 4	Cover for knob ∅ 23mm	(only by compact - machines) 74.0315.01		
to 4	Arrow indicator for knob ∅ 23mm	(only by compact - machines) 74.0315.02		
2 a. 3	Option: LED display V / A with hold - Function	DVM 1/1-1 40.0385.00		
2	analoge Voltmeter	94.0631.00		
3	analoge Ammeter	94.0628.00	94.0629.00	94.0630.00
5	Central torch connection	(only by compact - machines) 94.0347.00		
6	Quick Release Coupling blue	(only by water cooling - machines) 94.0521.00		
7	Quick Release Coupling rot	(only by water cooling - machines) 94.0520.00		
8	Welding current socket outlet	74.0232.00		
9	Front wheel	94.0327.00		
10	Grip	94.0212.00		
11	Lamp holder	94.0619.00		
to 11	Light bulb	94.0619.02		
to 11	Charlotte green	94.0619.01		
12	Mains ON / OFF switch	94.0656.00		
for 12	Switch grip	94.1814.00		
13	Key switch with charlotte	94.1429.00		
for 13	Switch element	94.1429.01		
14	Connection socket 7 pole	94.0227.00		
15	Double throw switch to the remote control FRT50	44.1969.00		
16	Fingerhole	(only by compact - machines) 94.0434.00		
17	Fingerhole with spring lock	94.0594.00		



Diag. 15 :

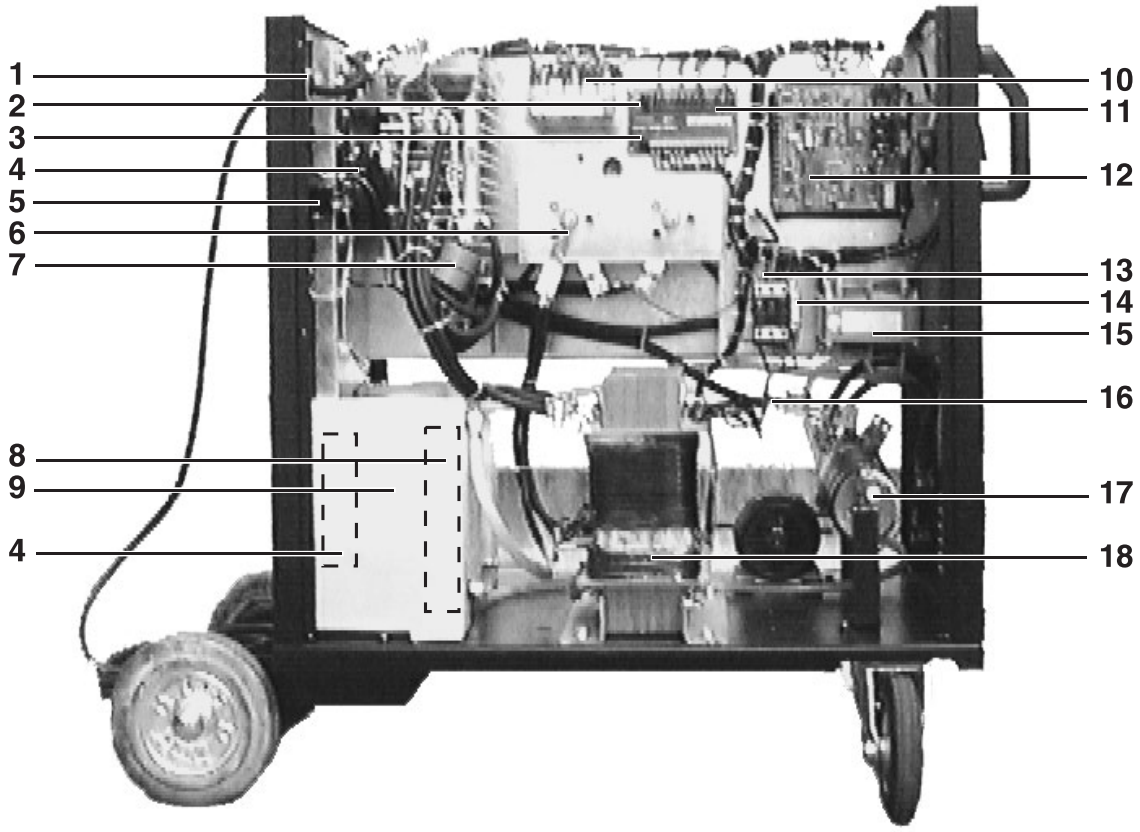
Back view ***thyristor MIG*** (compact type)



Diag. 16 :

Back view ***thyristor MIG*** (Decompact type)

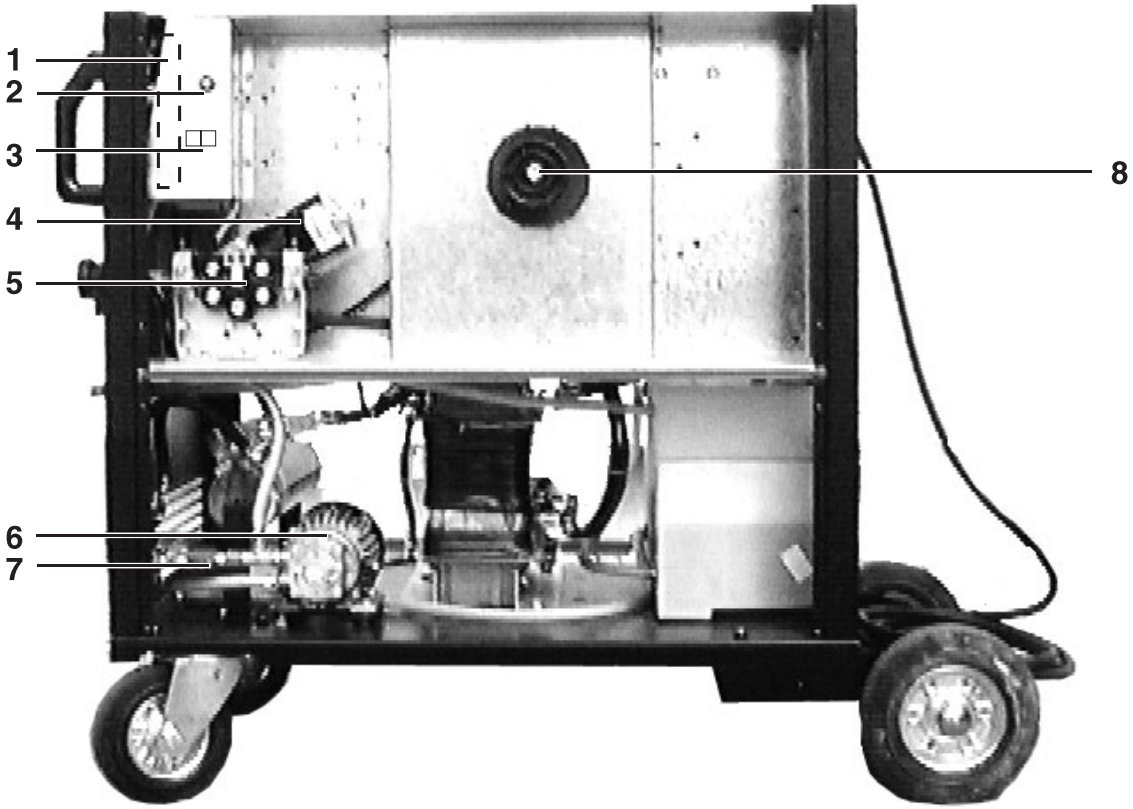
	Description	*thyristor* ***MIG 400*** article no.:.	*thyristor* ***MIG 500*** article no.:.	*thyristor* ***MIG 600*** article no.:.
1	**Top panel**	94.0419.01		
2	**Chain**	94.0178.00		
3	**Side panel right big**	(only by compact - machines) 94.0422.02		
4	**Side panel right thin**	(only by compact - machines) 94.0611.02		
10	**Side panel left**	94.0614.01		
5	**Rear wheel**	94.0420.01		
6	**Cylinder bracket**	BFG536,5x327,5x85x3/1-9005 94.0420.01		
7	**Lifting lugs**	94.0209.00		
8	**Mains cable**	4x2,5QMM/ H07RN-F 94.0365.00	4x4QMM/H07RN-F 94.0404.00	
9	**Gas connection 1/4“**	(only by compact - machines) 94.0597.00		
11	**Connection socket 7 pole**	94.0227.00		
12	**Welding current socket outlet**	74.0232.00	74.0517.00	
13	**Quick Release Coupling blue**	(only by water cooling - machines) 94.0521.00		
14	**Quick Release Coupling red**	(only by water cooling - machines) 94.0520.00		
15	**Filter sieve**	94.1373.00		
for 15	**Chain**	64.1685.00		



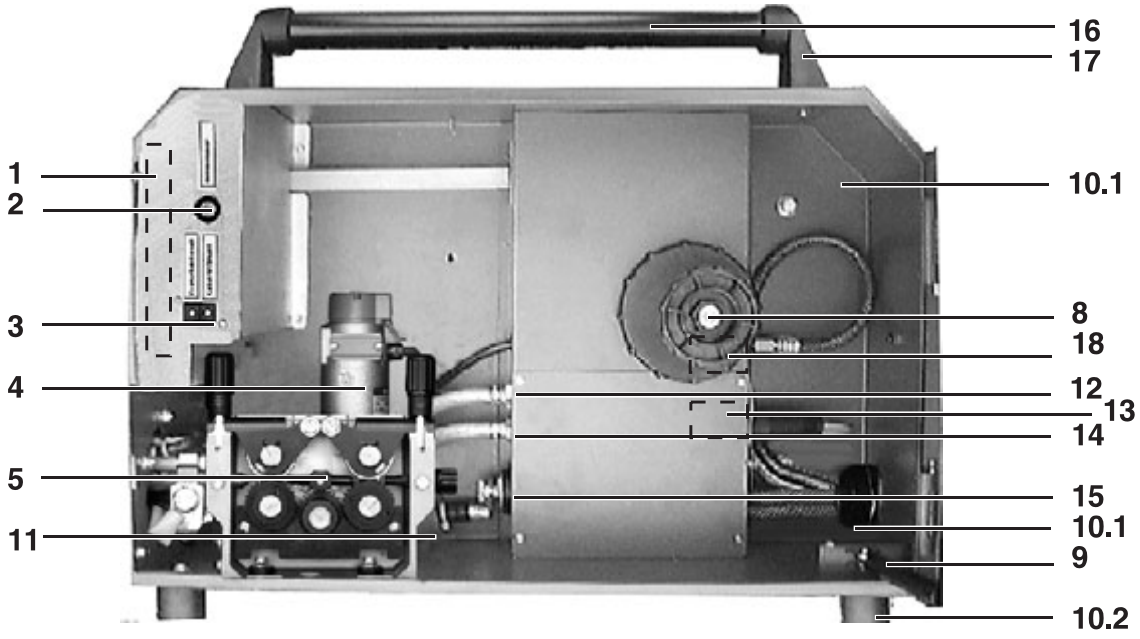
Diag. 17 :

Left side ***thyristor MIG*** (compact type)

	Description	*thyristor* ***MIG 400*** **article no.:**	*thyristor* ***MIG 500*** **article no.:**	*thyristor* ***MIG 600*** **article no.:**
1	**Cable guide**	traction relief 94.0208.00 nut 24.0207.01		
2	**Fuse**	4A/slow/250V/5x20MM 44.1841.00		
3	**Fuse**	1,6A/slow/250V/5x20MM 94.1729.00		
4	**Fan**	IMC5915PC-23T-B30 74.0267.00		
5	**Solenoid valve**	(only by compact - machines) 94.0472.00		
6	**Mains rectifier**	DB 125/165-50/62 SIEM 60.5009.04NM01		
7	**Saturation converter**	Q77 / 400 / 030 / L3 (measurement) 40.0967.01		
8	**Heat exchanger**	(only by water cooled - machines) 94.0133.00		
9	**Tank 7l.**	(only by water cooled - machines) 94.0164.00		
10	**supply transformer for thyristor stack**	3 UI 60a 94.1418.01		
11	**PCB contractor switching**	WK4/1 40.0425.00		
12	**PCB Over voltage Monitor or**	**only by machines with analogue measuring** ÜSW3/42V - MIG 40.0424.00		
13	**PCB**	**Option by machines with digital measuring** DVM-3 40.0442.00		
13	**Power contactor**	DILOAM/48V/50HZ 94.0591.00	DIL1M/48V/50HZ 94.0590.00	DIL1AM/48V/50HZ 94.0589.00
14	**Help contact for contactor**	94.0593.00		
15	**Transfomer supply**	EI150a/595VA/415-230-12-18V 94.0322.00		
16	**Shunt**	400A / 60mV 74.0439.00	500A / 60mV 74.0440.00	600A / 60mV 74.0441.00
17	**Welding choke**	GLD16MYH <ECO.400A> 94.0744.02	GLD20MYH <ECO.500/600> 94.0745.01	
18	**Welding transformer**	3UI 168b/92 94.1420.00	UI180/93 94.1432.00	3UI 210/88 94.1431.00
19	**Thyristor stack MIG 4.3**	B6C 125/165-170 /580S + MIG 4.3 61.G110.04K	B6C 125/165-265/930S + MIG 4.3 61.G109.04K	



Diag. 18 :
Right Side ***thyristor MIG*** (compact type)



Diag. 19 :
(inside) ***thyristor 4x4 S***

	Description	*thyristor* ***MIG 400*** article no.:	*thyristor* ***MIG 500*** article no.:	*thyristor* ***MIG 600*** article no.:
1	**PCB for welding electronics**	(only by compact - machines) W44/200 40.0428.00		
2	**Press key**	40.0185.00		
3	**Option: Additional PCB**	Gas pre- and gas post flow time 40.0186.00		
4	**Wire feed motor by compact - machines and *thyristor 4x4***	KSV-5035-552/42V/200 94.0339.02		
to 4	**Wire feed motor by *thyristor 4x4 S***	GNM 3150 - G2.6Ü=30:1 94.0680.00		
5	**Wire feed 4x4**	ME8942-4/4 94.0339.05		
5	**Wire feed 4x4S**	4 - wire feed RPL 4x4S 94.0679.00		
6	**Pump**	(only by water - cooled - machines) 94.0053.00		
7	**Pressure switch**	31017/5611/250V/50HZ/1bar 94.0232.01		
8	**Spool holder complete**	(only by compact - machines) 94.0346.00		
9	**Shock absorber**	94.0373.00		
10.1	**Rubber feed (Back view)**	94.1824.00		
10.2	**Rubber feed**	74.0223.00		
11	**saturation converter**	Q77 / 400 / 030 / L3 measurement 40.0967.01		
12	**Quick Release Coupling red**	(only by water - cooled - machines) 94.0520.00		
14	**Quick Release Coupling blue**	(only by water - cooled - machines) 94.0521.00		
13	**Torch connection socket 7 pole**	94.0226.00		
15	**Welding current socket outlet**	94.0401.00		
16	**Hand grip**	74.0237.07		
17	**Holder for hand grip**	74.0237.00		
18	**Solenoid valve**	94.0227.00		
for 18	**Gas pilot head 0-16l/min**	94.0914.00		
for 18	**Gas pilot head 0-32l/min**	94.1100.00		

10. Accessories:

Remote Controls		
FRT 50	Remote control	90.8002.00
Extension Cables for Remote Control		
FRV 3	3m long	92.0005.03
FRV 5	5m long	92.0005.00
FRV10	10m long	92.0005.01
Special accessories		
Adapter for basket coils		on request
Gas pilot head **0-16l/min**		94.0914.00
Gas pilot head **0-32l/min**		94.1100.00
KF 23E-10	Coolant contents 9,3L (antifreeze up to -10°C)	94.0530.00
Special accessories (retrofit)		
retrofit kit digital voltmeter / Ammeter with Hold - Funktion up to 400A		92.0257.00
retrofit kit digital voltmeter / Ammeter with Hold - Function up to 500A		92.0258.00
retrofit kit digital voltmeter / Ammeter with Hold - Function up to 600A		92.0259.00
retrofit kit for adjustable Gaspre- and Gaspost flow time		92.0241.00
Whisper Fan Cooling System		92.0244.00
Retrofit kit for the connection of a second wire feeder for compact gauge		92.0245.00
Water flow detection switch instead of water pressure switch		94.0232.00
Wheel mounting kit for wire feed unit		90.8035.00
Turning support for wire feed unit		90.8048.00
General accessories		
Gas hose 2m		94.0010.00
Pressure regulator with contents gauge		94.0009.00
Pressure regulator with contents gauge		94.0408.00
Shielding gas flow gauge		94.0074.00
Work piece connection cables		
WK50QMM-4M/K	with cable 50mm^2 and clamp, 4m long	92.0003.00
WK50QMM-4M/Z	with cable 50mm^2 and clamp, 4m long	92.0012.00
WK70QMM-4M/K	with cable 70mm^2 and clamp, 4m long	92.0013.00
WK95QMM-4M/Z	with cable 95mm^2 and clamp, 4m long	92.0171.00
Interconnecting hose packages:		
Gas cooled:		
with a max. capacity of **400A** welding current		
50QMM/MIG1,5M/L/complete	1,5m	94.0579.00
50QMM/MIG5M/L/complete	5m	94.0579.01
50QMM/MIG10M/L/complete	10m	94.0579.02

Water - cooled:

with a max. capacity **400A** welding current		
50QMM/MIG1,5M/W/complete	1,5m	94.0405.00
50QMM/MIG5M/W/complete	5m	94.0405.01
50QMM/MIG10M/W/complete	10m	94.0405.02
with a max. capacity **500A** welding current		
70QMM/MIG1,5M/W/complete	1,5m	94.0406.00
70QMM/MIG5M/W/complete	5m	94.0406.01
70QMM/MIG10M/W/complete	10m	94.0406.02
with a max. capacity **600A** welding current		
95QMM/MIG1,5M/W/complete	1,5m	94.0407.00
95QMM/MIG5M/W/complete	5m	94.0407.01
95QMM/MIG10M/W/complete	10m	94.0407.02

Driver Roller Set (2 Driver roller) ∅ 30mm for *thyristor 4x4*:

AR 08-10AL	for Aluminium wire ∅ 0,8 + 1,0mm	92.0191.03
AR 10-12AL	for Aluminium wire ∅ 1,0 + 1,2mm	92.0191.00
AR 12-16AL	for Aluminium wire ∅ 1,2 + 1,6mm	92.0191.01
AR 24-32AL	for Aluminium wire ∅ 2,4 + 3,2mm	92.0191.02
AR 06-08FE	for Steel wire ∅ 0,6 + 0,8mm	92.0192.00
AR 08-10FE	for Steel wire ∅ 0,8 + 1,0mm	92.0192.01
AR 10-12FE	for Steel wire ∅ 1,0 + 1,2mm	92.0192.02
AR 12-16FE	for Steel wire ∅ 1,2 + 1,6mm	92.0192.03
AR 10-16RÖ	for Cored wire ∅ 1,0-1,2 + 1,4-1,6mm	92.0193.00
AR 14-24RÖ	for Cored wire ∅ 1,4-1,6 + 2,0-2,4mm	92.0193.01
AR 28-32RÖ	for Cored wire ∅ 2,8-3,2mm	92.0193.02

Driver Roller Set (2 Driver Roller and 2 against pressure roller)
Driver Roller 38mm for *thyristor 4x4 S*:

AR 08-10 AL / S	for Aluminium wire ∅ 0,8 - 1,0mm	92.0194.00
AR 12 AL / S	for Aluminium wire ∅ 1,2mm	92.0194.01
AR 16 AL / S	for Aluminium wire ∅ 1,6mm	92.0194.02
AR 08-10 FE / S	for Steel wire ∅ 0,8 - 1,0mm	92.0195.00
AR 12 FE / S	for Steel wire ∅ 1,2mm	92.0195.01
AR 16 FE / S	for Steel wire ∅ 1,6mm	92.0195.02
AR 12 RÖ / S	for Cored wire ∅ 1,2mm	92.0196.00
AR 14 RÖ / S	for Cored wire ∅ 1,4mm	92.0196.01
AR 16 RÖ / S	for Cored wire ∅ 1,6mm	92.0196.02
AR 20 RÖ / S	for Cored wire ∅ 2,0mm	92.0196.03
AR 24 RÖ / S	for Cored wire ∅ 2,4mm	92.0196.04