

WELDING MACHINE

RYVAL 200 MIG MAN PFC

OPERATING MANUAL

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1. INTRODUCTION

Congratulations on your new Linde AG, Linde Gas Deutschland product. We are proud to have you as our customer and will strive to provide you with the best service and reliability in the industry.

This Operating Manual has been designed to instruct you on the correct use and operation of your Linde AG, Linde Gas Deutschland product. Your satisfaction with this product and its safe operation is our ultimate concern. Therefore please take the time to read the entire manual, especially the Safety Precautions. They will help you to avoid potential hazards that may exist when working with this product.

Read and understand this entire Manual and your employer's safety practices before installing, operating, or servicing the equipment. While the information contained in this Manual represents the Manufacturer's best judgement, the Manufacturer assumes no liability for its use.

The model of RYVAL 200 MIG MAN PFC is the multi-function inverter power generators welding by those methods

- a) MIG/MAG in 2T, 4T, wires SG2 or stainless steel 0,6 - 1,0 mm, Al wires 1,0 mm, flux cored wires shelf shielding or standard.
- b) E – (MMA) coated electrodes up to 4,0 mm
- c) TIG lift arc

RYVAL 200 MIG MAN PFC is equipped by system of Power Factor Correction (PFC) – which enables operating on AC power supply of 95V – 270V.

What are the advantages of PFC solution?

1. Higher efficiency and less stress related to the circuit breaker (in other words, circuit breaker will switch off later than the devices without PFC)
2. The machine can be connected to the mains 110 V - 230 V + -15% Small influence of under voltage and overvoltage mains power
3. Smaller level of electromagnetic interference
4. Minimum net reactive current loading

2. SAFETY INSTRUCTIONS AND WARNINGS

1. Once the packing has been opened, make sure that the machine is not damaged. If in any doubt, call the service centre.
2. This equipment must only be used by qualified personnel.
3. During installation, any electric work must only be carried out by trained personnel.
4. The machine must be used in a dry place with good ventilation.
5. Make sure that no metal dust can be drawn in by the fan inside the machine, as this could cause damage to the electronic circuits.
6. It is prohibited to connect more than one INVERTER generator in series or in parallel.
7. When installing the machine, follow the local regulations on safety.
8. The position of the machine must allow easy access by the operator to the controls and connectors.
9. When the welding machine is operating, all its covers and doors must be closed and well fixed.
10. Do not expose the welding machine to direct sunlight or to heavy rain. This equipment conforms to protection rating IP23S.
11. During welding, the welding cables must be located near or at ground level. They should be as short as possible.
12. The operator must wear gloves, clothes, shoes, and a helmet or a welder's helmet, which protect and are fire-resistant in order to protect him against electric shock, flashes and sparks from welding.
13. The operator must protect his eyes with safety visor or mask designed for welding, fitted with standard safety filters. He should also be aware that during electrical welding ULTRAVIOLET RADIATION is emitted. Therefore it is vital that his face is also protected from radiation. Ultraviolet rays produce the same harmful effect as sun burning on unprotected skin.
14. The operator is obliged to warn anyone near the welding area of the risks that welding involves and to arrange to provide adequate protection equipment.
15. It is very important to arrange for sufficient ventilation, especially when welding in enclosed spaces. We suggest using suitable fume extractors to prevent the risk of intoxication by fumes or gas generated by the welding process.
16. The operator must ensure all flammable materials are removed from the work area to avoid any risk of fire.
17. The operator must NEVER weld containers that have previously contained petrol, lubricants, gas or similar flammable materials, even if the container has been empty for a considerable time. THERE IS A VERY HIGH RISK OF EXPLOSION.

18. The operator must be aware of all the special regulations which he needs to conform to when welding in enclosed spaces with a high risk of explosion.
19. To prevent electric shock, we strongly suggest the following rules:
20. Do not work in a damp or humid environment.
21. Do not use the welding machine if its cables are damaged in any way.
22. Make sure that the earthing system of the electric equipment is correctly connected and operational.
23. The operator must be insulated from the metal components connected to the return wire.
24. The earthing of the piece being worked could increase the risk of injury to the operator.
25. EN 60974-1 Standard: Open-circuit voltage. During the operation of the machine, the highest voltage, with which it is possible to come into contact, is the open-circuit voltage between the welding clamps. In our generator this voltage is 58V.
26. The maximum open-circuit voltage of the welding machines is established by national and international standards (EN 60974-1) depending on the type of weld current to be used, on its waveform and on the hazards arising from the work place. These values are not applicable to the strike currents and those for stabilisation of the arc that could be above it.
27. The open-circuit voltage, for as many adjustments as possible, must never exceed the values relating to the various cases shown in the following table:

Case	Working conditions	Open-circuit voltage	
1	Places with increased risk of electric shock	DC current: 113V peak value	AC current: 68V peak value and 48V effective
2	Places without increased risk of electric shock	DC current: 113V peak value	AC current: 113V peak value and 80V effective
3	Torches held mechanically with increased protection for the operator	DC current: 141V peak value	AC current: 141V peak value and 100V effective

28. In case 1, the dc welding machines with rectifier must be built in such a way that, in case of a fault developing in the rectifier (for example open circuit, short circuit or lack of power), the permitted values cannot be exceeded. The welding machines of this type can be marked with the

symbol: **S**

29. Before opening the machine switch off the machine and disconnect it from the power socket.

30. Only personnel authorised by this company can carry out maintenance on the machine.

NOTE:

Device complies with IEC 61000-3-12.

ELECTROMAGNETIC COMPATIBILITY

The welding device is in terms of interference designed primarily for industrial areas. It meets the requirements of EN 60974-10 class A and it isn't designed for using in residential areas, where the electrical energy is supplied by public low-voltage power supply network. It can be here potential problems with ensuring of electromagnetic compatibility in this areas, due to interference caused by power lines as well as the radiated interference. During operation, the device may be the source of interference.



Caution

We warn users, that they are responsible for possible interference from welding.

3. TECHNICAL DATA

Method		MIG/MAG	MMA	TIG
Mains voltage	V/Hz	1x230/50-60		
Welding current range	A	25 - 200	10 - 200	10 - 200
Open-circuit voltage U ₂₀	V	68		
Mains protection	A	16 @		
Max. effective current I _{1eff}	A	15,8	16,0	13,2
Welding current (DC=100%) I ₂	A	140	120	150
Welding current (DC=60%) I ₂	A	170	140	180
Welding current (DC=x%) I ₂	A	35%=200	30%=200	40%=200
Protection		IP 23S		
Standards		EN 60974-1; EN 60974-10 class A		
Dimensions (w x l x h) generator	mm	251x540x395		
Weight	kg	16,5		

Linde AG, Linde Gas Deutschland continuously strives to produce the best

product possible and therefore reserves the right to change, improve or revise the specifications or design of this or any product without prior notice. Such updates or changes do not entitle the buyer of equipment previously sold or shipped to the corresponding changes, updates, improvements or replacement of such items.

4. EQUIPMENT

MODELS

Item No	Description
5.G-19	RYVAL 200 MIG MAN PFC

ACCESSORIES TO ORDER

Item No.	Description
VM0253	Welding Cable Set 2x 3m 35-50 160A
5.0156	Roll 0.6-0.8/1.0 RYVAL MIG
4281	Valve Red.AR /CO2, 2 manometers,MINI
S777a	Light Reactive Welding Helmet S777a GRAY
5950	Set SGT, SR 17/18/26d=1,6
5951	Set SGT, SR 17/18/26d=2,4
5952	Set SGT, SR 17/18/26d=3,2
700.0306.10	Electrode wolf.1.6x175-Violet
700.0308.10	Electrode wolf.2.4x175-Violet
700.0310.10	Electrode wolfram E3 3.2x175 - violet
SGB25-3	Torch PARKER SG 250 3m (MIG/MAG)
SGB25-4	Torch PARKER SG 250 4m (MIG/MAG)
SGB25-5	Torch PARKER SG 250 5m (MIG/MAG)
17FSL4ST	Torch PARKER SGT 17 4m 35-50 FX ST (TIG)
5756	Set Connectors RYVAL 200 MIG PFC
VM0321-3	Hose Gas 3m RYVAL
4314	Quick connector RYVAL 160/40

5. OPERATOR CONTROLS

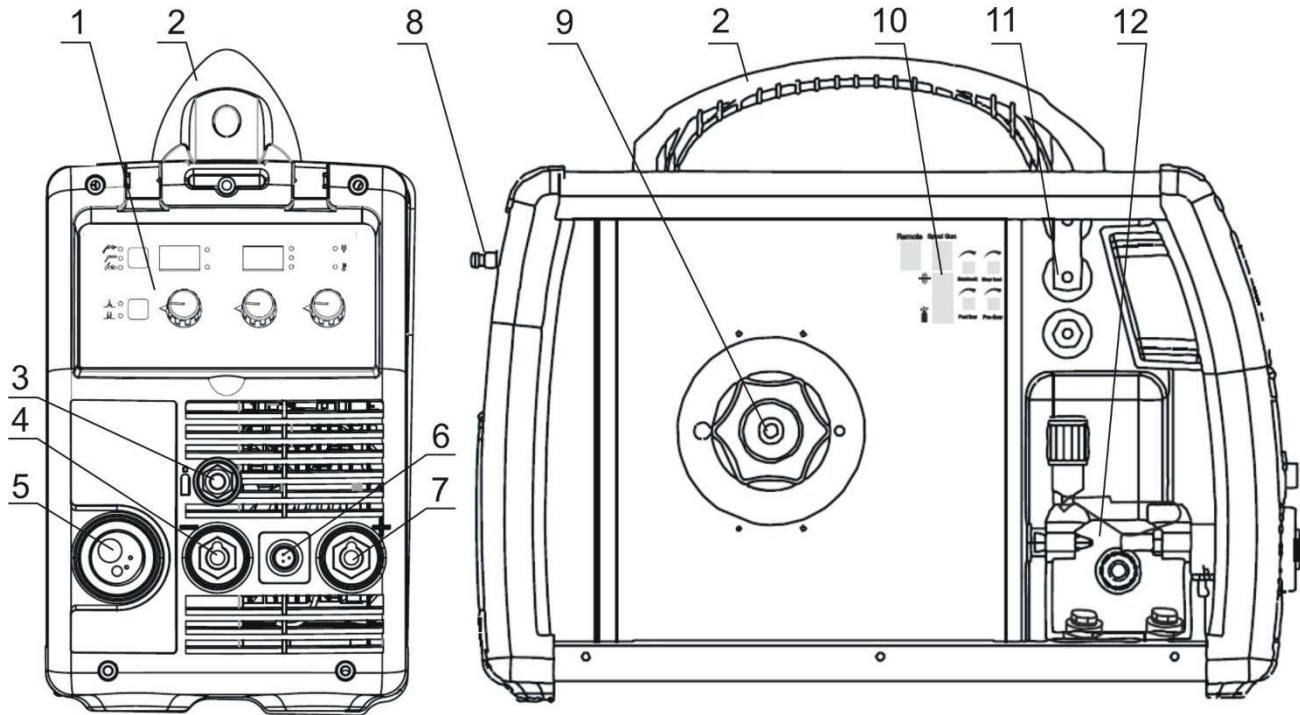


Fig. 1. RYVAL 200 MIG MAN PFC

Pos.	Description
1	Control panel
2	Handle
3	Gas connector for TIG torch
4	(-) terminal of welding cables TIG torch connector
5	Central MIG/MAG torch connector
6	TIG torch control connector
7	(+) terminal of welding cables
8	Gas connector
9	Spool holder
10	Secondary control panel (see details below)
11	Terminals of change polarity MIG / MAG torch
12	Wire feeder

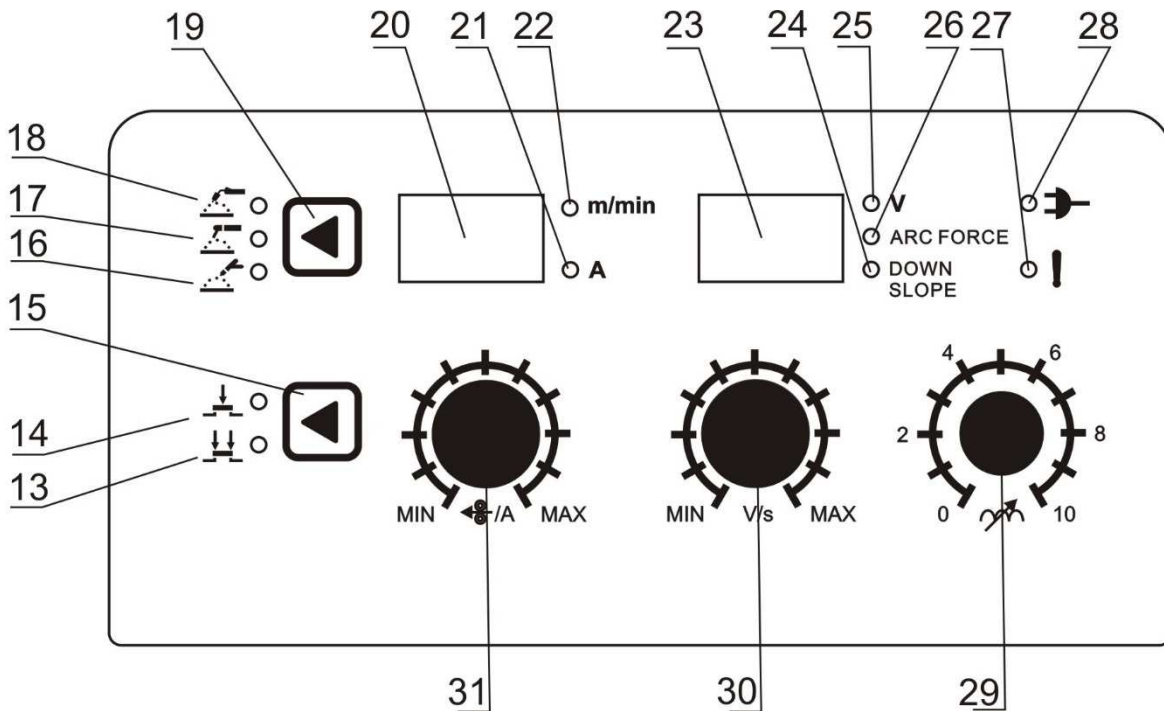


Fig. 2 – Control panel

Pos.	Description
13	LED. If it lights the mode 4 stroke has been selected by the button 15.
14	LED. If it illuminates the mode 2 stroke has been selected by the button 15.
15	Button for selecting the 2T or 4T mode.
16	LED TIG
17	LED MMA
18	LED MIG/MAG
19	Button for selecting the welding method.
20	Display
21	LED. If it lights the display 20 shows welding current
22	LED. If it lights the display 20 shows the wire feed speed
23	Display
24	LED. If it lights the display 23 shows the time of down slope
25	LED. If it lights the display 23 shows the voltage
26	LED. If it lights display 23 shows the value of ARC FORCE

27	LED. If it lights the thermo-switch is disconnected. In such a case leave the machine on to cool down.
28	LED. If it lights the machine is switched on by the main switch
29	Choke potentiometer
30	Potentiometer: <ul style="list-style-type: none"> • Voltage for MIG/MAG MAN, • ARC FORCE for MMA • Down Slope for TIG
31	Potentiometer: <ul style="list-style-type: none"> • Wire speed feed (MIG/MAG) • Current for MMA and TIG

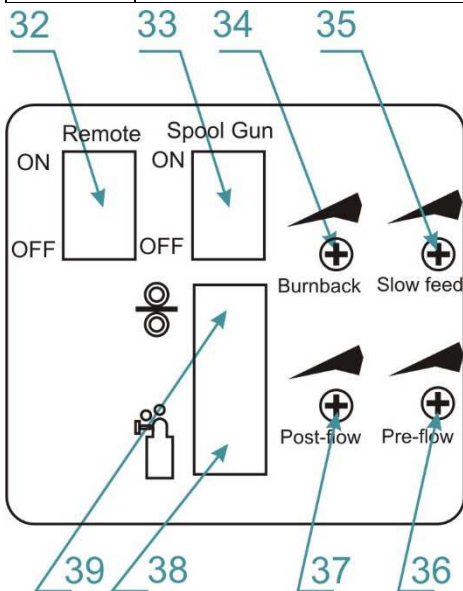


Fig. 3 Secondary control panel – panel in the space of the wire feeder

Pos.	Descriptions
32	Switch Remote. ON – on the remote control OFF – of the remote control
33	Switch Spool Gun. In the ON position one can weld with the Spool Gun
34	Potentiometer for the Burnback time setting
35	Potentiometer for the initial wire speed setting
36	Potentiometer for the Pre Gas time setting

37	Potentiometer for the Post Gas time setting
38	Gas setting button
39	Wire feeding button

WIRE FEEDER

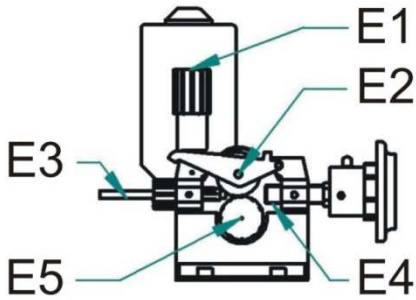
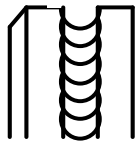


Fig. 4 Wire feeder

Pos.	Description
E1	Nut of pressure arm
E2	Pressure arm
E3	Inlet liner
E4	EURO connector
E5	Roll

OVERVIEW OF ROLLS FOR WIRE FEED

		b = 30 mm
Groove type	Wire diameter	Item No
Steel 	0,6-0,8	2187
	0,8-1,0	2188
Aluminum 	0,8-1,0	2270

Flux core 	0,8-1,0	2318
	1,0-1,2	2319

6. GETTING STARTED MIG/MAG

Getting started must be consistent with technical data and conditions of use.

CHOOSING THE FEEDING ROLL

In all machines (Linde AG, Linde Gas Deutschland MIG / MAG) rolls with two grooves are used. These grooves are intended for two different wire diameters (e.g. 0,8 and 1,0 mm).

Rolls for wire feed must comply with the diameter and material of the welding wire. Only this way a smooth wire feed can be achieved. Irregularities of the wire feed leads to a poor quality of welding and deformation of the wire.

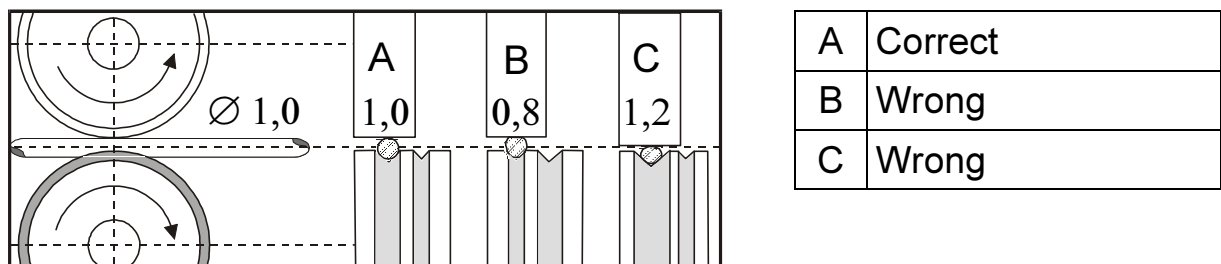
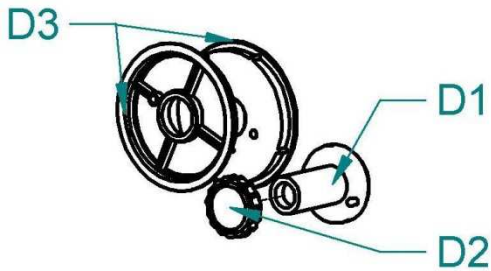


Fig. 5 The influence of the roll groove on the welding wire

INSERTING THE WIRE

1. Open the side cover of the wire feeder space
2. Put the wire spool on the wire spool holder **D1** and fix it with the fixing nut **D2**.
3. Cut off the curved or damaged end of welding wire and lead it through the inlet liner **E3**, and the roll into the liner inside the EURO torch connector (about 5 cm). Make sure, that you use the suitable groove.
4. Put the pressure arm **E2** down in that way, that the teeth or the gear fit and fix it by setting the lever **E1** into vertical position.
5. Adjust the pressure nut that way that it provides constant movement of wire but it does not deform wire. The adjusting screw is located under the plastic screw **E1**.
6. The spool brake is set by the manufacturer. If necessary, the brake can be adjusted by a screw **D1** so that while stopping the feed, spool will be stopped on time (it will avoid excessive release of wire). However, too

tight brake needlessly strains the feeding mechanism and thus slippage may occur in the wire rolls.



Pos.	Description
D1	Spool Holder
D2	Nut Spool Holder
D3	It is not for this welder

Fig. 6 Spool holder

INSERTING THE WIRE TO THE TORCH AND CONNECTION OF GROUND CABLE

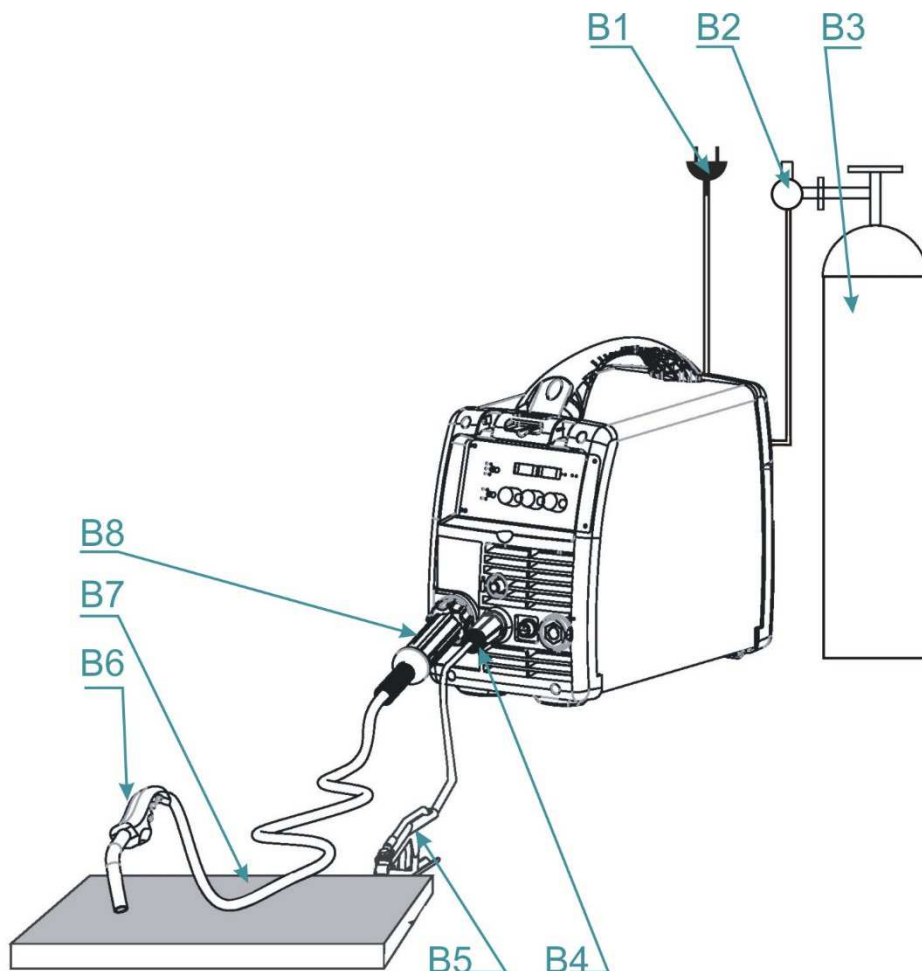




Fig. 7 Connecting the ground cable and the torch

1. Connect the torch **B6** to connector **B8** on the machine while the machine is turned off.
2. Connect the ground cable to the terminal of welding cables (-) **B4**

3. Connect the ground clamps **B5** to the welder **B7** or to the welding table.

 **Notice**  When inserting the wire do not point with torch to the eyes!

4. Remove the gas nozzle from the torch

5. Unscrew the current nozzle

6. Connect the machine to power supply

7. Turn the main switch on the back panel to ON

8. Press the button **19** to select the mode MIG/MAG 



9. Press the button **15** to select 2T or 4T.

10. Press the button **39**. The welding wire is fed into the torch. After coming off from the torch tube, screw the current nozzle and gas nozzle on.

11. Before welding, spray the area in a gas hose and current nozzle with a separation spray, to prevent damage.

ADJUSTMENT OF GAS FLOW

The electric arc and the weld must be perfectly shielded by gas. Too small amount of gas does not perform the protective atmosphere and on the other hand to big amount of the gas brings air into the electric arc.

 **Notice**  Gas bottle must be well secured against fall. This manual does not solve the safe securing of gas bottle. Information can be obtained from a supplier of industrial gases.

1. Connect the gas hose to gas outlet **F8** on the valve and the gas inlet to the gas connector **8**.
2. Press the button **38**.
3. Turn the adjusting screw **F7** at the bottom side pressure reducing valve, until the meter **F6** shows the required flow, then release the button. The optimum flow is 10-15l/min.
4. After long-term shutdown of the machine or replacement of the torch it is suitable to blow the pipes with protective gas before welding.

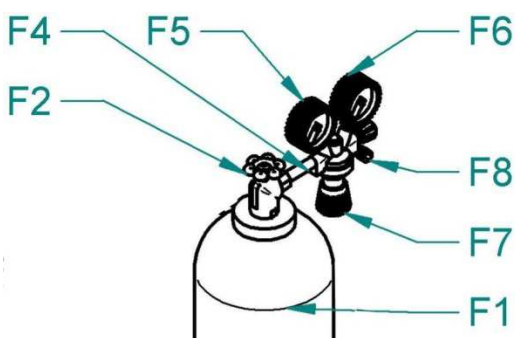


Fig. 8 - Gas flow setting

Pos.	Description
F1	Gas bottle
F2	Cylinder Valve
F4	Pressure Reducer
F5	High Pressure Manometer
F6	Low Pressure Manometer
F7	Adjusting Screw
F8	Gas outlet

ADJUSTING WELDING PARAMETERS FOR MIG MAN

1. Approximate setting for the MIG / MAG welding current and voltage corresponds the empirical relationship $U_2 = 14 + 0.05 I_2$. According to this relationship, we can determine the required voltage. When setting the voltage, we expect the decline in voltage during load. The voltage drop is approximately 4.5-5.0 V at 100 A.
2. By means of the potentiometer **30** select voltage.
3. Then by means of the potentiometer **31** select the appropriate wire speed.
4. By means of the potentiometer **29** tune the arc by changing the levels of the choke.

Wire diameter (mm)	Welding current (A)	Material thickness (mm)
0,6	25 - 110	1,0 - 1,6
0,8	35 - 160	1,0 - 2,3
0,9	45 - 160	1,0 - 2,3
1,0	45 - 200	1,2 - 7,0

Table of approximate parameter settings

ADJUSTING THE MACHINE FOR ANOTHER WIRE DIAMETER

In all machines Linde AG, Linde Gas Deutschland MIG / MAG are used rolls with two grooves. These grooves are intended for two different wire diameters (e.g. 0,8 a 1,0 mm). Groove can be replaced by removing the rolls and rotating them, or use a different roll grooves with required dimensions.

1. Open the nut **E1** to the right, pressure roll **E2** will be opened upward
2. Unscrew the plastic locking element **E5** and remove the roll
3. If there is a suitable groove on the roll, rotate the roll and place it back on the shaft and secure it by screwing the element **E5**.

FLUX CORE WIRE – SETTING THE POLARITY FOR MIG/MAG TORCH

1. It is desirable to have positive polarity on the MIG/MAG torch while welding with solid wire in majority of cases. The welder is supplied with positive polarity on the MIG/MAG torch.
2. For welding with flux cored wires it may be necessary to have negative polarity on the MIG/MAG torch.
3. The middle terminal K3 is connected to the central euro connector of the MIG/MAG torch. We supply the welder with K3 connected to (+) K1.
4. In case of welding with flux core wire with (-) polarity, connect K3 by means the bridge K2 with K4 terminal. Use Phillips screwdriver.
5. Make sure you fasten the terminals properly.
6. Connect the ground cable to the (+) panel socket, fig. 1, pos. 7.

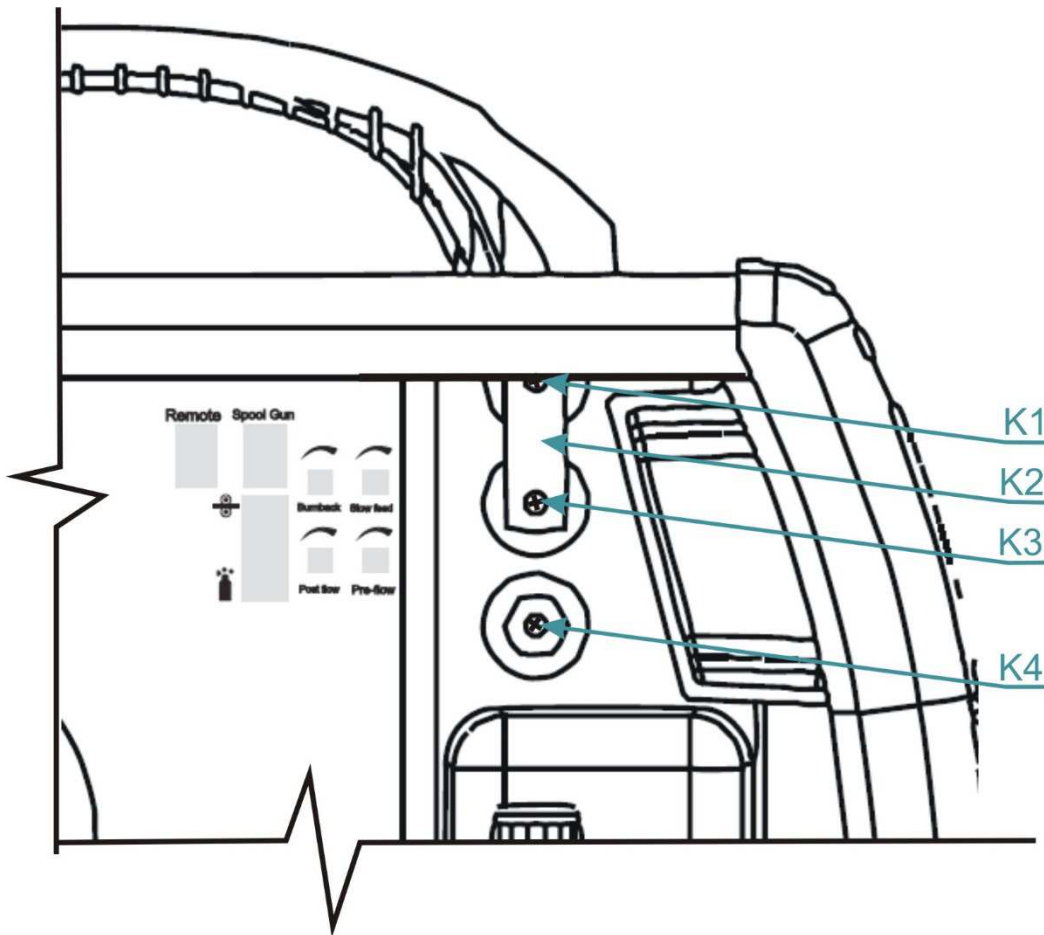


Fig. 9 Terminals for changing the polarity of the MIG/MAG torch

Pos.	Description
K1	Upper terminal (+)
K2	Bridge
K3	Middle terminal
K4	Lower terminal (-)

ADJUSTING THE MACHINE FOR WELDING OF ALUMINIUM

For feeding the AL wire it is necessary to use roll with the “U” profile - see paragraph OVERVIEW ROLLS WIRE FEED. To prevent problems with feeding use wires with diameter. 1.0 mm of AlMg3 or AlMg. Wire of alloy Al99, 5 or AlSi5 are too soft and easily will cause problems with movement.

For the aluminum welding it is also necessary to provide the torch tefl. liner and special current nipple. We do not recommend you to use the torch longer than 3 m. Great attention must be paid to adjust the contact power of rolls – it must not be too high, otherwise there is a deformation of the wire.

As a protective atmosphere is necessary to use argon.

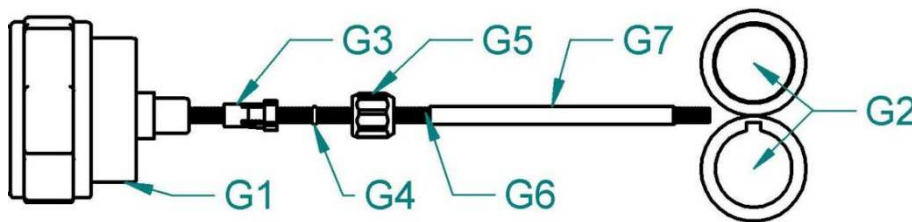


Fig. 10 Customization of the feed for the aluminium wire

Pos.	Description
G1	EURO connector
G2	Rolls
G3	Liner terminal for 4,0mm, 4,7mm outer diameter
G4	O-ring 3,5 x1, 5mm to prevent escape of gas
G5	Nut
G6	Liner tefl.
G7	Sustain pipe for teflon and plastic liner

7. GETTING STARTED TIG

Getting started must be consistent with technical data and conditions of use.

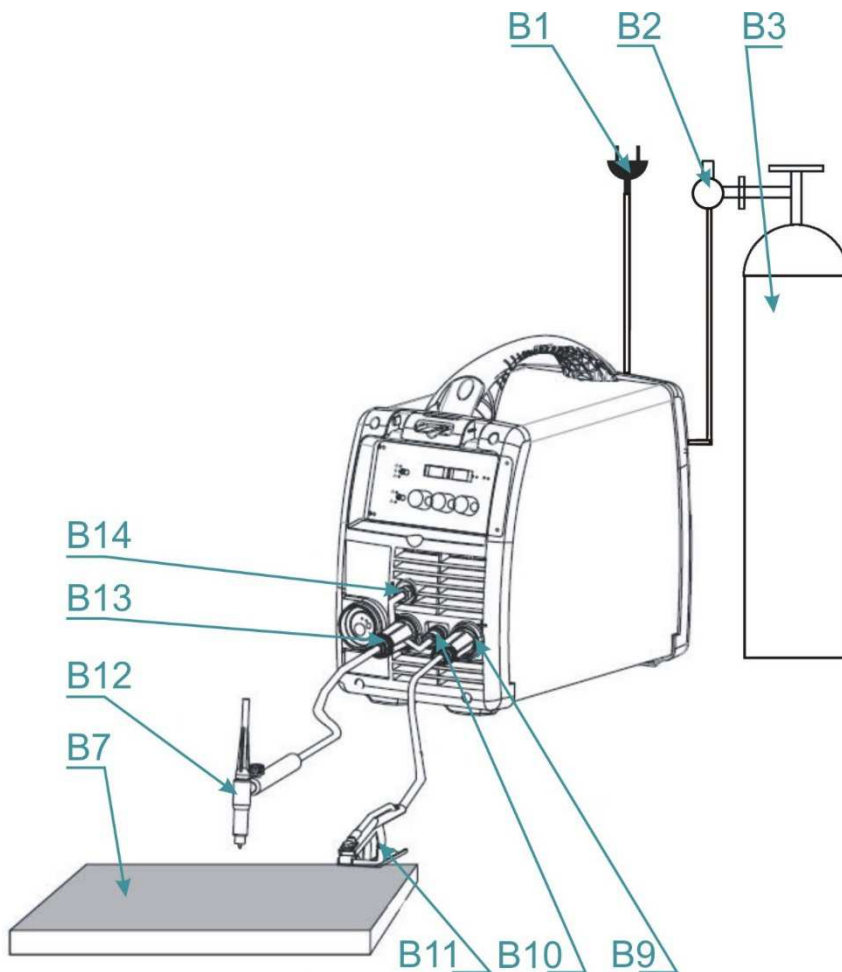



Fig. 11 Connecting the ground cable and the torch

1. Connect the torch **B12** to the terminal of welding cables (-) **B13**, to the gas connector **B14** and connector **B10**.
2. Connect the ground cable to the terminal of welding cables (+) **B9** and the ground clamps **B11** to the welder **B7** or to the welding table.
3. Connect the machine to power supply and turn the main switch on the back panel to ON.
4. Connect the gas hose and gas flow adjustment described in **6.4**
ADJUSTMENT OF GAS FLOW

5. Press the button **19** to select the mode TIG .
6. Use the potentiometer **31** to adjust the welding current.
7. Use the potentiometer **30** to adjust the time of Slope down.
8. By means of the potentiometers **36** you can change the time of Pre Gas.
9. By means of the potentiometers **37** you can change the time of Post Gas.

BASIC SETTINGS FOR TIG WELDING – STAINLESS STEEL, DC CURRENT

Material thickness mm	Tungsten electrode diameter mm	Filler material diameter mm	Welding current A	Argon flow l/min	Gas nozzle mm
1	1	1,5	40-60	3	10
1,5	1,5	1,5	50-90	4	10
2	2	2	80-100	4	12
3	2-3	2-3	90-140	5	12
4-5	3-4	3-4	110-180	5	12


8. GETTING STARTED MMA

Getting started must be consistent with technical data and conditions of use.

1. Connect the electrode holder and the work lead to terminals **B13** and **B9** according to the instructions on the electrode package.





NOTE Prevent touching the electrode any metal material for in this mode the terminals **B13** and **B9** are under current.



2. Press the button 19 to select the mode MMA .
3. To select the current use the potentiometer 31.
4. It is possible to change the level of ARC FORCE by means of the potentiometer **30**.

9. ROUTINE MAINTENANCE & INSPECTION

1. The only routine maintenance required for the Ryval range of machines is a thorough cleaning and inspection, with the frequency depending on the usage and the operating environment.

2.  **WARNING**  Disconnect the Ryval from the mains supply voltage before disassembling.

Special maintenance is not necessary for the control unit parts in the Welder. If these parts are damaged for any reason, replacement is recommended.



3.  **CAUTION**  Do not blow air into the welder during cleaning. Blowing air into the welder can cause metal particles to interfere with sensitive electronic components and cause damage to the welder.

4. To clean the welder, disconnect it from the mains supply voltage then open the enclosure and use a vacuum cleaner to remove any accumulated dirt and dust. The welder should also be wiped clean. If necessary, solvents that are recommended for cleaning electrical apparatus may be used.
5. Troubleshooting and repairing of Ryval welding equipment should only be carried out only by suitably qualified or competent person.
6. A 'competent person' must be a person who has acquired through training, qualification or experience, or a combination of them, the knowledge and skills enabling that person to safely carry out a risk assessment and repairs to the electrical equipment in question.
7. The person carrying out the servicing needs and repairs must know what to look at, what to look for and what to do.

10. STATEMENT OF WARRANTY

1. In accordance with the warranty periods stated below, Linde AG, Linde Gas Deutschland guarantees the proposed product to be free from defects in material or workmanship when operated in accordance with the written instructions as defined in this operating manual.
2. Linde AG, Linde Gas Deutschland welding products are manufactured for use by commercial and industrial users and trained personnel with experience in the use and maintenance of electrical welding and cutting equipment.
3. Linde AG, Linde Gas Deutschland will repair or replace, at its discretion, any warranted parts or components that fail due to defects in material or workmanship within the warranty period. The warranty period begins on the date of sale to the end user.
4. If warranty is being sought, please contact your Linde AG, Linde Gas Deutschland product supplier for the warranty repair procedure.
5. Linde AG, Linde Gas Deutschland warranty will not apply to:
6. Equipment that has been modified by any other party other than Linde AG, Linde Gas Deutschland's own service personnel or with prior written consent obtained from Linde AG, Linde Gas Deutschland Service Department.
7. Equipment that has been used beyond the specifications established in the operating manual.
8. Installation not in accordance with the installation/operating manual.
9. Any product that has been subjected to abuse, misuse, negligence or accident.
10. Failure to clean and maintain (including lack of lubrication, maintenance and protection), the machine as set forth in the operating, installation or service manual.
11. Within this operating manual are details regarding the maintenance

necessary to ensure trouble free operation.

12.  NOTE  Warranty repairs must be performed by either an Linde AG, Linde Gas Deutschland Service Centre, an Linde AG, Linde Gas Deutschland distributor or an Authorised Service Agent approved by the company Linde AG, Linde Gas Deutschland.

11. DISPOSAL



Only for EU countries. Do not dispose of electric tools together with household waste material.

In accordance with European Council Directive 2002/96/EC on electrical and electronic equipment waste and its implementation in accordance with national law, electric tools that have reached the end of their service life must be collected separately and returned to an environmentally

compatible recycling facility.