



Welding machine

Taurus 401 Basic FKW
Taurus 501 Basic FKW

099-005230-EW501

02.04.2014

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General instructions

CAUTION



Read the operating instructions!

The operating instructions provide an introduction to the safe use of the products.

- Read the operating instructions for all system components!
- Observe accident prevention regulations!
- Observe all local regulations!
- Confirm with a signature where appropriate.

NOTE



In the event of queries on installation, commissioning, operation or special conditions at the installation site, or on usage, please contact your sales partner or our customer service department on +49 2680 181-0.

A list of authorised sales partners can be found at www.ewm-group.com.

Liability relating to the operation of this equipment is restricted solely to the function of the equipment. No other form of liability, regardless of type, shall be accepted. This exclusion of liability shall be deemed accepted by the user on commissioning the equipment.

The manufacturer is unable to monitor whether or not these instructions or the conditions and methods are observed during installation, operation, usage and maintenance of the equipment.

An incorrectly performed installation can result in material damage and injure persons as a result. For this reason, we do not accept any responsibility or liability for losses, damages or costs arising from incorrect installation, improper operation or incorrect usage and maintenance or any actions connected to this in any way.

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2 Safety instructions

2.1 Notes on the use of these operating instructions

DANGER

Working or operating procedures which must be closely observed to prevent imminent serious and even fatal injuries.

- Safety notes include the "DANGER" keyword in the heading with a general warning symbol.
- The hazard is also highlighted using a symbol on the edge of the page.

WARNING

Working or operating procedures which must be closely observed to prevent serious and even fatal injuries.

- Safety notes include the "WARNING" keyword in the heading with a general warning symbol.
- The hazard is also highlighted using a symbol in the page margin.

CAUTION

Working or operating procedures which must be closely observed to prevent possible minor personal injury.

- The safety information includes the "CAUTION" keyword in its heading with a general warning symbol.
- The risk is explained using a symbol on the edge of the page.

CAUTION

Working and operating procedures which must be followed precisely to avoid damaging or destroying the product.

- The safety information includes the "CAUTION" keyword in its heading without a general warning symbol.
- The hazard is explained using a symbol at the edge of the page.

NOTE

Special technical points which users must observe.

- Notes include the "NOTE" keyword in the heading without a general warning symbol.

Instructions and lists detailing step-by-step actions for given situations can be recognised via bullet points, e.g.:

- Insert the welding current lead socket into the relevant socket and lock.

2.2 Explanation of icons

Symbol	Description
	Press
	Do not press
	Turn
	Switch
	Switch off machine
	Switch on machine
	ENTER (enter the menu)
	NAVIGATION (Navigating in the menu)
	EXIT (Exit the menu)
	Time display (example: wait 4s/press)
	Interruption in the menu display (other setting options possible)
	Tool not required/do not use
	Tool required/use

2.3 General

DANGER



Electric shock!

Welding machines use high voltages which can result in potentially fatal electric shocks and burns on contact. Even low voltages can cause you to get a shock and lead to accidents.

- Do not touch any live parts in or on the machine!
- Connection cables and leads must be free of faults!
- Switching off alone is not sufficient!
- Place welding torch and stick electrode holder on an insulated surface!
- The unit should only be opened by specialist staff after the mains plug has been unplugged!
- Only wear dry protective clothing!
- Wait for 4 minutes until the capacitors have discharged!



Electromagnetic fields!

The power source may cause electrical or electromagnetic fields to be produced which could affect the correct functioning of electronic equipment such as IT or CNC devices, telecommunication lines, power cables, signal lines and pacemakers.

- Observe the maintenance instructions! (see Maintenance and Testing chapter)
- Unwind welding leads completely!
- Shield devices or equipment sensitive to radiation accordingly!
- The correct functioning of pacemakers may be affected (obtain advice from a doctor if necessary).



Do not carry out any unauthorised repairs or modifications!

To avoid injury and equipment damage, the unit must only be repaired or modified by specialist, skilled persons!

The warranty becomes null and void in the event of unauthorised interference.

- Appoint only skilled persons for repair work (trained service personnel)!

WARNING



Risk of accidents if these safety instructions are not observed!

Non-observance of these safety instructions is potentially fatal!

- Carefully read the safety information in this manual!
- Observe the accident prevention regulations in your country.
- Inform persons in the working area that they must observe the regulations!



Risk of injury due to radiation or heat!

Arc radiation results in injury to skin and eyes.

Contact with hot workpieces and sparks results in burns.

- Use welding shield or welding helmet with the appropriate safety level (depending on the application)!
- Wear dry protective clothing (e.g. welding shield, gloves, etc.) according to the relevant regulations in the country in question!
- Protect persons not involved in the work against arc beams and the risk of glare using safety curtains!

WARNING



Explosion risk!

Apparently harmless substances in closed containers may generate excessive pressure when heated.

- Move containers with inflammable or explosive liquids away from the working area!
- Never heat explosive liquids, dusts or gases by welding or cutting!



Smoke and gases!

Smoke and gases can lead to breathing difficulties and poisoning. In addition, solvent vapour (chlorinated hydrocarbon) may be converted into poisonous phosgene due to the ultraviolet radiation of the arc!

- Ensure that there is sufficient fresh air!
- Keep solvent vapour away from the arc beam field!
- Wear suitable breathing apparatus if appropriate!



Fire hazard!

Flames may arise as a result of the high temperatures, stray sparks, glowing-hot parts and hot slag produced during the welding process.

Stray welding currents can also result in flames forming!

- Check for fire hazards in the working area!
- Do not carry any easily flammable objects such as matches or lighters.
- Keep appropriate fire extinguishing equipment to hand in the working area!
- Thoroughly remove any residue of flammable substances from the workpiece before starting welding.
- Only continue work on welded workpieces once they have cooled down.
Do not allow to come into contact with flammable material!
- Connect welding leads correctly!



Danger when coupling multiple power sources!

Coupling multiple power sources in parallel or in series has to be carried out by qualified personnel and in accordance with the manufacturer's guidelines. Before bringing the power sources into service for arc welding operations, a test has to verify that they cannot exceed the maximum allowed open circuit voltage.

- Connection of the machine may be carried out by qualified personnel only!
- When decommissioning individual power sources, all mains and welding current leads have to be safely disconnected from the welding system as a whole. (Danger due to inverse voltages!)
- Do not couple welding machines with pole reversing switch (PWS series) or machines for AC welding, as a minor error in operation can cause the welding voltages to be combined.

CAUTION



Noise exposure!

Noise exceeding 70 dBA can cause permanent hearing damage!

- Wear suitable ear protection!
- Persons located within the working area must wear suitable ear protection!

CAUTION**Obligations of the operator!**

The respective national directives and laws must be observed for operation of the machine!

- National implementation of the framework directive (89/391/EWG), as well as the associated individual directives.
- In particular, directive (89/655/EWG), on the minimum regulations for safety and health protection when staff members use equipment during work.
- The regulations regarding work safety and accident prevention for the respective country.
- Setting up and operating the machine according to IEC 60974-9.
- Check at regular intervals that users are working in a safety-conscious way.
- Regular checks of the machine according to IEC 60974-4.

**Damage due to the use of non-genuine parts!**

The manufacturer's warranty becomes void if non-genuine parts are used!

- Only use system components and options (power sources, welding torches, electrode holders, remote controls, spare parts and replacement parts, etc.) from our range of products!
- Only insert and lock accessory components into the relevant connection socket when the machine is switched off.

**Damage to the machine due to stray welding currents!**

Stray welding currents can destroy protective earth conductors, damage equipment and electronic devices and cause overheating of components leading to fire.

- Make sure all welding leads are securely connected and check regularly.
- Always ensure a proper and secure electrical connection to the workpiece!
- Set up, attach or suspend all conductive power source components like casing, transport vehicle and crane frames so they are insulated!
- Do not place any other electronic devices such as drillers or angle grinders, etc., on the power source, transport vehicle or crane frames unless they are insulated!
- Always put welding torches and electrode holders on an insulated surface when they are not in use!

**Mains connection****Requirements for connection to the public mains network**

High-performance machines can influence the mains quality by taking current from the mains network. For some types of machines, connection restrictions or requirements relating to the maximum possible line impedance or the necessary minimum supply capacity at the interface with the public network (Point of Common Coupling, PCC) can therefore apply. In this respect, attention is also drawn to the machines' technical data. In this case, it is the responsibility of the operator, where necessary in consultation with the mains network operator, to ensure that the machine can be connected.

CAUTION



EMC Machine Classification

In accordance with IEC 60974-10, welding machines are grouped in two electromagnetic compatibility classes (see technical data):

Class A machines are not intended for use in residential areas where the power supply comes from the low-voltage public mains network. When ensuring the electromagnetic compatibility of class A machines, difficulties can arise in these areas due to interference not only in the supply lines but also in the form of radiated interference.

Class B machines fulfil the EMC requirements in industrial as well as residential areas, including residential areas connected to the low-voltage public mains network.

Setting up and operating

When operating arc welding systems, in some cases, electro-magnetic interference can occur although all of the welding machines comply with the emission limits specified in the standard. The user is responsible for any interference caused by welding.

In order to **evaluate** any possible problems with electromagnetic compatibility in the surrounding area, the user must consider the following: (see also EN 60974-10 Appendix A)

- Mains, control, signal and telecommunication lines
- Radios and televisions
- Computers and other control systems
- Safety equipment
- The health of neighbouring persons, especially if they have a pacemaker or wear a hearing aid
- Calibration and measuring equipment
- The immunity to interference of other equipment in the surrounding area
- The time of day at which the welding work must be carried out

Recommendations for **reducing interference emission**

- Mains connection, e.g. additional mains filter or shielding with a metal tube
- Maintenance of the arc welding equipment
- Welding leads should be as short as possible and run closely together along the ground
- Potential equalization
- Earthing of the workpiece. In cases where it is not possible to earth the workpiece directly, it should be connected by means of suitable capacitors.
- Shielding from other equipment in the surrounding area or the entire welding system

2.4 Transport and installation

WARNING



Incorrect handling of shielding gas cylinders!

Incorrect handling of shielding gas cylinders can result in serious and even fatal injury.

- Observe the instructions from the gas manufacturer and in any relevant regulations concerning the use of compressed air!
- Place shielding gas cylinders in the holders provided for them and secure with fixing devices.
- Avoid heating the shielding gas cylinder!

CAUTION



Risk of tipping!

There is a risk of the machine tipping over and injuring persons or being damaged itself during movement and set up. Tilt resistance is guaranteed up to an angle of 10° (according to EN 60974-A2).

- Set up and transport the machine on level, solid ground!
- Secure add-on parts using suitable equipment!
- Replace damaged wheels and their fixing elements!
- Fix external wire feed units during transport (avoid uncontrolled rotation)!



Damage due to supply lines not being disconnected!

During transport, supply lines which have not been disconnected (mains supply leads, control leads, etc.) may cause hazards such as connected equipment tipping over and injuring persons!

- Disconnect supply lines!

CAUTION



Equipment damage when not operated in an upright position!

The units are designed for operation in an upright position!

Operation in non-permissible positions can cause equipment damage.

- Only transport and operate in an upright position!

2.4.1 Lifting by crane

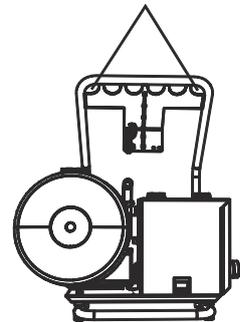
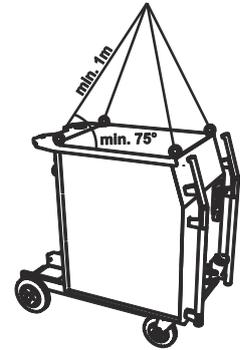
WARNING



Risk of injury during lifting by crane!

When lifting the machine by crane, persons may be severely injured by falling machines or mount-on components.

- Simultaneous lifting of system components such as power source, wire feeder or cooling unit is not allowed. Each system component has to be lifted separately!
- Remove any supply leads and accessories before lifting by crane (e.g. hose package, wire spool, shielding gas cylinder, toolbox, wire feeder, remote control, etc.)!
- Properly close and lock all casing covers and protective caps before lifting by crane!
- Use the correct number of hoisting equipment of the right size and right capacity! Observe craning principle (see figure)!
- For machines with lifting eyes: always lift all lifting eyes simultaneously!
- When using retrofitted craning frames etc.: always use at least two lifting points positioned as far apart as possible – observe option description.
- Avoid any jerky movements!
- Ensure that the load is distributed evenly! • Use chain hoists and chain slings of the same length only!
- Stay outside the danger zone underneath the machine!
- Observe the regulations regarding occupational safety and accident prevention for the respective country.



Craning principle



Risk of injury due to unsuitable lifting eye!

In case of improper use of lifting eyes or the use of unsuitable lifting eyes, persons can be seriously damaged by falling equipment or add-on components!

- The lifting eye must be completely screwed in!
- The lifting eye must be positioned flat onto and in full contact with the supporting surfaces!
- Check that the lifting eyes are securely fastened before use and check for any damage (corrosion, deformation)!
- Do not use or screw in damaged lifting eyes!
- Avoid lateral loading of the lifting eyes!

2.4.2 Ambient conditions

CAUTION



Installation site!

The machine must not be operated in the open air and must only be set up and operated on a suitable, stable and level base!

- The operator must ensure that the ground is non-slip and level, and provide sufficient lighting for the place of work.
- Safe operation of the machine must be guaranteed at all times.

CAUTION



Equipment damage due to dirt accumulation!

Unusually high quantities of dust, acid, corrosive gases or substances may damage the equipment.

- Avoid high volumes of smoke, vapour, oil vapour and grinding dust!
- Avoid ambient air containing salt (sea air)!



Non-permissible ambient conditions!

Insufficient ventilation results in a reduction in performance and equipment damage.

- Observe the ambient conditions!
- Keep the cooling air inlet and outlet clear!
- Observe the minimum distance of 0.5 m from obstacles!

2.4.2.1 In operation

Temperature range of the ambient air:

- -25 °C to +40 °C

Relative air humidity:

- Up to 50% at 40 °C
- Up to 90% at 20 °C

2.4.2.2 Transport and storage

Storage in an enclosed space, temperature range of the ambient air:

- -30 °C to +70 °C

Relative air humidity

- Up to 90% at 20 °C

3 Intended use

WARNING



Hazards due to improper usage!

Hazards may arise for persons, animals and material objects if the equipment is not used correctly. No liability is accepted for any damages arising from improper usage!

- The equipment must only be used in line with proper usage and by trained or expert staff!
- Do not modify or convert the equipment improperly!

3.1 Applications

3.1.1 MIG/MAG standard welding

Metal arc welding using a wire electrode whereby gas from an external source surrounds the arc and the molten pool to protect them from the atmosphere.

3.1.1.1 MIG/MAG cored wire welding

Welding with cored wire electrodes consisting of a metal casing and a powder core.

As with MIG/MAG standard welding, the arc is protected from the atmosphere by shielding gas. The gas is supplied either externally (gas shielded cored wires) or produced in the arc by means of the powder core (self-shielding cored wires).

3.1.2 MMA welding

Manual arc welding or, for short, MMA welding. It is characterised by the fact that the arc burns between a melting electrode and the molten pool. There is no external protection; any protection against the atmosphere comes from the electrode.

3.1.2.1 Air arc gouging

During air arc gouging, bad welding seams are heated with a carbon electrode and then removed with compressed air. Special electrode holders and carbon electrodes are required for air arc gouging.

3.2 Documents which also apply

3.2.1 Warranty

NOTE



For further information, please see the accompanying supplementary sheets "Machine and Company Data, Maintenance and Testing, Warranty"!

3.2.2 Declaration of Conformity



The designated machine conforms to EC Directives and standards in terms of its design and construction:

- EC Low Voltage Directive (2006/95/EC),
- EC EMC Directive (2004/108/EC),

This declaration shall become null and void in the event of unauthorised modifications, improperly conducted repairs, non-observance of the deadlines for the repetition test and / or non-permitted conversion work not specifically authorised by the manufacturer.

The original copy of the declaration of conformity is enclosed with the unit.

3.2.3 Welding in environments with increased electrical hazards



In compliance with IEC / DIN EN 60974, VDE 0544 the machines can be used in environments with an increased electrical hazard.

3.2.4 Service documents (spare parts and circuit diagrams)



DANGER



Do not carry out any unauthorised repairs or modifications!

To avoid injury and equipment damage, the unit must only be repaired or modified by specialist, skilled persons!

The warranty becomes null and void in the event of unauthorised interference.

- Appoint only skilled persons for repair work (trained service personnel)!

Original copies of the circuit diagrams are enclosed with the unit.

Spare parts can be obtained from the relevant authorised dealer.

3.2.5 Calibration/Validation

We hereby confirm that this machine has been tested using calibrated measuring equipment, as stipulated in IEC/EN 60974, ISO/EN 17662, EN 50504, and complies with the admissible tolerances. Recommended calibration interval: 12 months

4 Machine description – quick overview

4.1 Front view

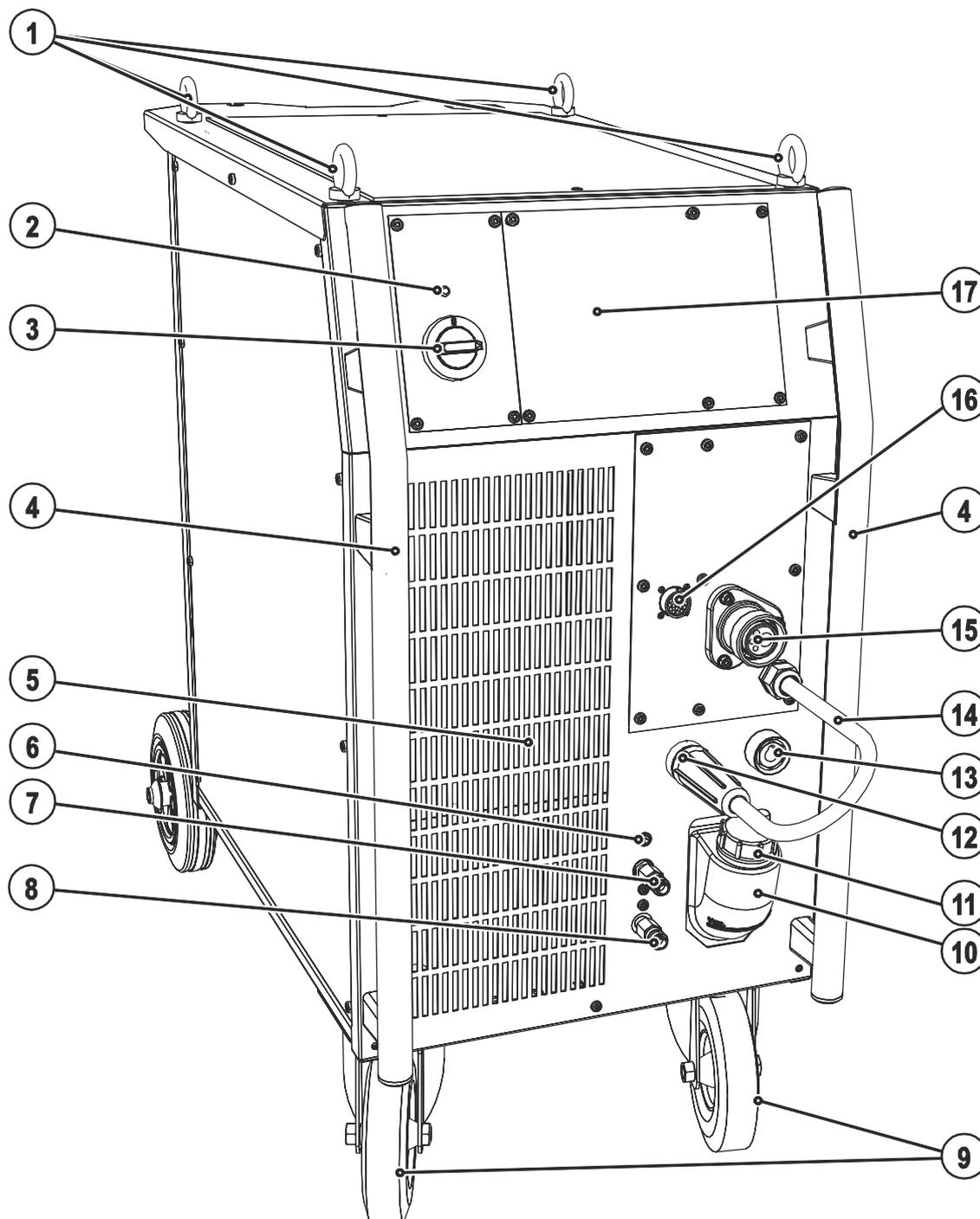


Figure 4-1

Item	Symbol	Description
1		Lifting lug
2		Ready for operation signal light Signal light on when the machine is switched on and ready for operation
3		Main switch, machine on/off
4		Carrying handle
5		Cooling air inlet
6		Automatic cut-out of coolant pump key button press to reset a triggered fuse
7		Quick connect coupling (red) coolant return
8		Quick connect coupling (blue) coolant supply
9		Wheels, guide castors
10		Coolant tank
11		Coolant tank cap
12		Connection socket, “-” welding current <ul style="list-style-type: none"> • MIG/MAG welding: workpiece connection • MIG/MAG cored wire welding: welding current connection for the welding torch • MMA welding: electrode holder connection
13		Connection socket, “+” welding current <ul style="list-style-type: none"> • MIG/MAG welding: welding current connection for the welding torch • MIG/MAG cored wire welding: workpiece connection • MMA welding: workpiece connection
14		Welding current cable, polarity selection Welding current to the central connector/torch, enables polarity selection. <ul style="list-style-type: none"> • MIG/MAG: Connection socket for “+” welding current • Self-shielding cored wire
15		Welding torch connection (Euro or Dinse torch connector) Welding current, shielding gas and torch trigger integrated
16		19-pole connection socket (analogue) For connecting analogue remote controls
17		Machine control See Machine control – operating elements chapter

4.2 Rear view

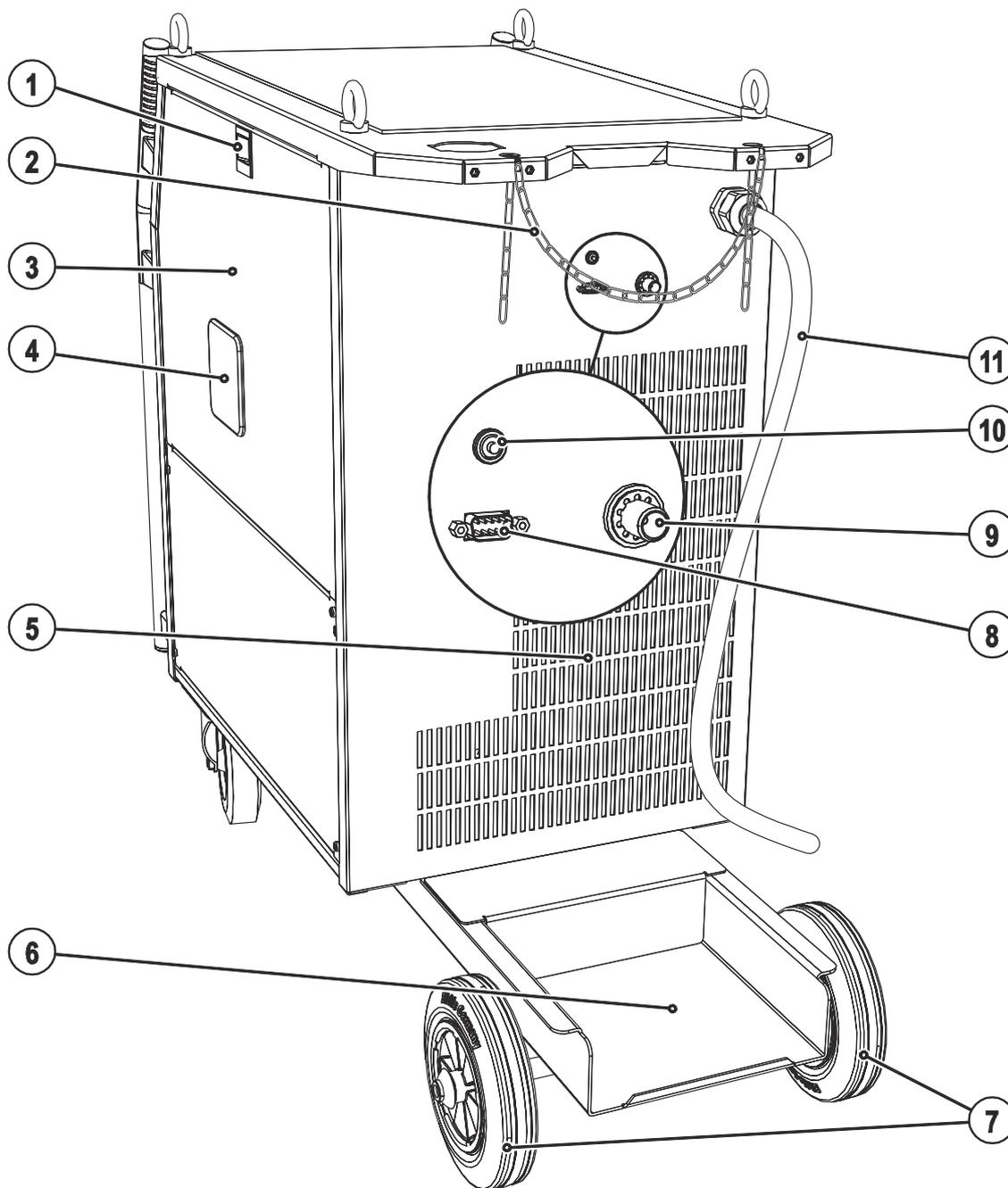


Figure 4-2

Item	Symbol	Description
1		Slide latch, lock for the protective cap
2		Securing elements for shielding gas cylinder (strap/chain)
3		Protective cap Cover for the wire feed mechanism and other operating elements. Depending on the machine series, additional stickers with information on the replacement parts and JOB lists will be located on the inside.
4		Wire spool inspection window Check wire supply
5		Cooling air outlet
6		Bracket for shielding gas cylinder
7		Wheels, fixed castors
8		D-sub connection socket, 9-pole With this machine series for maintenance purposes only (specialist staff)
9		Connecting nipple G¹/₄, shielding gas connection
10		Key button, automatic cutout Wire feed motor supply voltage fuse press to reset a triggered fuse
11		Mains connection cable

4.3 Inside view

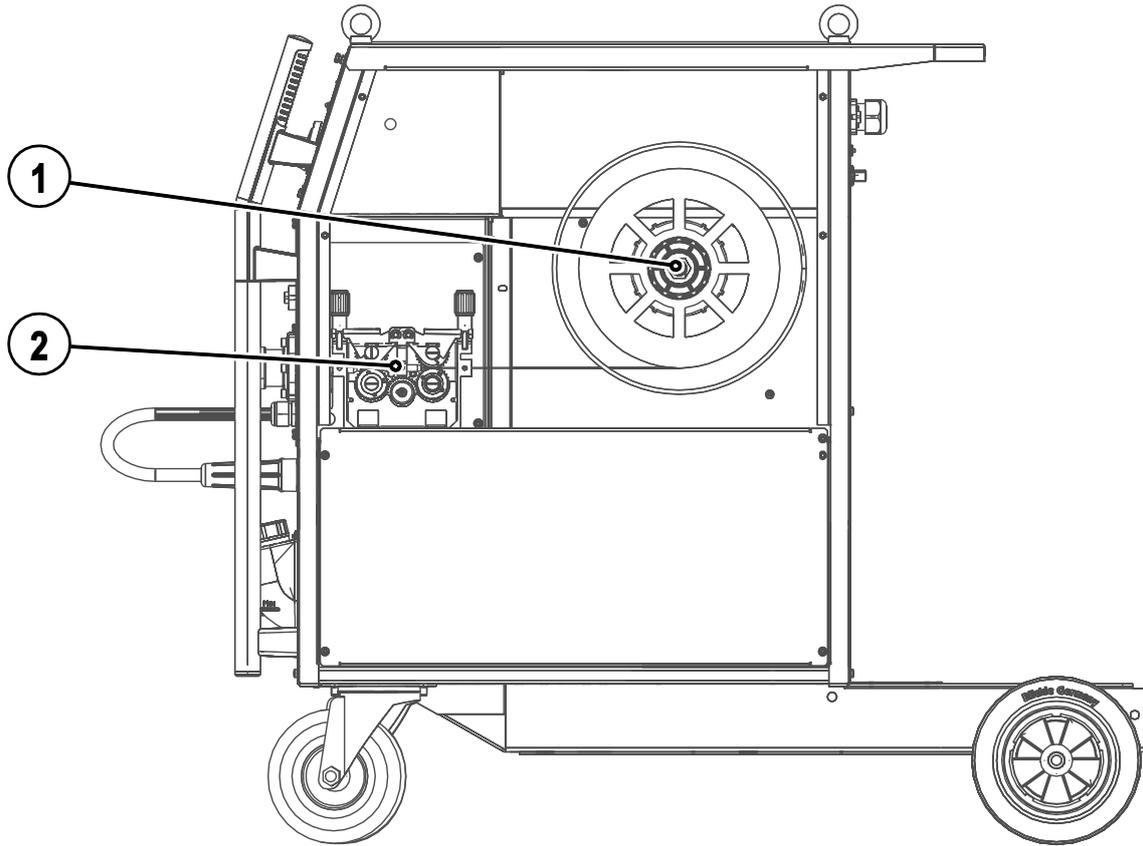


Figure 4-3

Item	Symbol	Description
1		Wire spool holder
2		Wire feed unit

4.4 Machine control – Operating elements

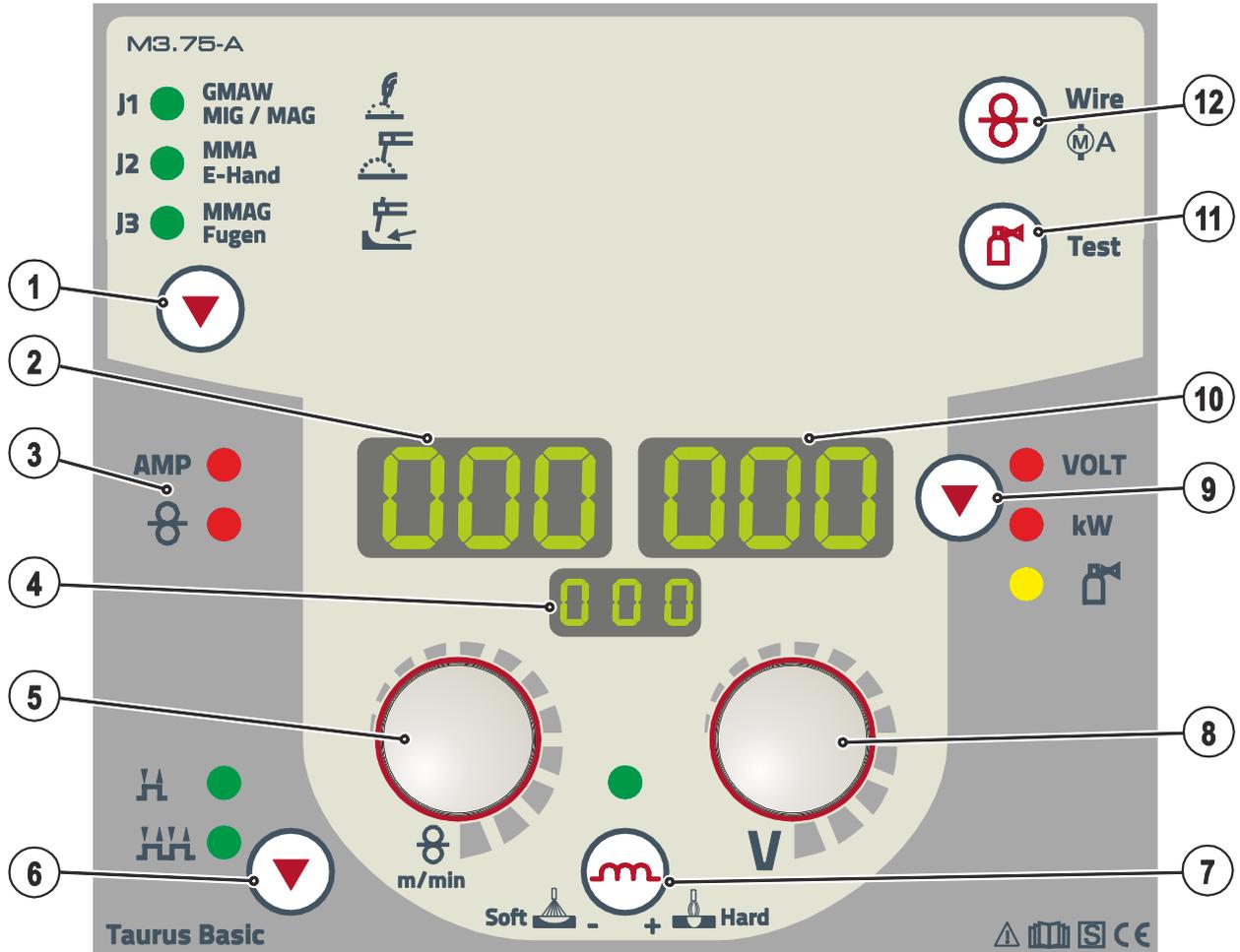


Figure 4-4

Item	Symbol	Description
1		Button, welding process J1 GMAW / MIG / MAG MIG/MAG welding J2 MMA E-Hand MMA welding J3 MMAG Fugan Air arc gouging
2		Display, left Welding current, wire feed speed
3		Status displays AMP "Welding current display" signal light "Wire feed speed display" signal light
4		Display, welding process J1 MIG/MAG welding J2 MMA welding J3 Gouging
5		Welding parameter setting, rotary dial For setting the welding performance, for selecting the JOB (welding task) and for setting other welding parameters.
6		Select operating mode button Non-latched Latched
7		Push-button, throttling effect (arc dynamics) + Hard Arc is harder and more narrow Soft - Arc is softer and wider
8		Rotary dial, welding voltage Adjustment of the welding voltage from min. to max. (twin-knob operation: wire speed/welding voltage)
9		Button, Parameter selection (right) VOLT Welding voltage kW Welding performance display Gas flow quantity (optional)
10		Display, right Welding voltage, welding performance, motor current (wire feed mechanism) during wire inching, shielding gas flow rate (option)
11		Gas test / rinse button <ul style="list-style-type: none"> Gas test: For setting the shielding gas quantity Rinse: For rinsing longer hose packages See also "Shielding Gas Supply" chapter
12		Push-button, wire inching/motor current (wire feed mechanism) Cf. chapter "Inching the wire electrode".

5 Design and function

5.1 General

WARNING



Risk of injury from electric shock!

Contact with live parts, e.g. welding current sockets, is potentially fatal!

- Follow safety instructions on the opening pages of the operating instructions.
- Commissioning may only be carried out by persons who have the relevant expertise of working with arc welding machines!
- Connection and welding leads (e.g. electrode holder, welding torch, workpiece lead, interfaces) may only be connected when the machine is switched off!

CAUTION



Insulate the arc welder from welding voltage!

Not all active parts of the welding current circuit can be shielded from direct contact. To avoid any associated risks it is vital for the welder to adhere to the relevant safety regulations. Even low voltages can cause a shock and lead to accidents.

- Wear dry and undamaged protective clothing (shoes with rubber soles/welder's gloves made from leather without any studs or braces)!
- Avoid direct contact with non-insulated connection sockets or connectors!
- Always place torches and electrode holders on an insulated surface!



Risk of burns on the welding current connection!

If the welding current connections are not locked, connections and leads heat up and can cause burns, if touched!

- Check the welding current connections every day and lock by turning in clockwise direction, if necessary.



Risk of injury due to moving parts!

The wire feeders are equipped with moving parts, which can trap hands, hair, clothing or tools and thus injure persons!

- Do not reach into rotating or moving parts or drive components!
- Keep casing covers or protective caps closed during operation!



Risk of injury due to welding wire escaping in an unpredictable manner!

Welding wire can be conveyed at very high speeds and, if conveyed incorrectly, may escape in an uncontrolled manner and injure persons!

- Before mains connection, set up the complete wire guide system from the wire spool to the welding torch!
- Remove the pressure rollers from the wire feeder if no welding torch is fitted!
- Check wire guide at regular intervals!
- Keep all casing covers or protective caps closed during operation!



Risk from electrical current!

If welding is carried out alternately using different methods and if a welding torch and an electrode holder remain connected to the machine, the open-circuit/welding voltage is applied simultaneously on all cables.

- The torch and the electrode holder should therefore always be placed on an insulated surface before starting work and during breaks.

CAUTION**Damage due to incorrect connection!**

Accessory components and the power source itself can be damaged by incorrect connection!

- Only insert and lock accessory components into the relevant connection socket when the machine is switched off.
- Comprehensive descriptions can be found in the operating instructions for the relevant accessory components.
- Accessory components are detected automatically after the power source is switched on.

**Using protective dust caps!**

Protective dust caps protect the connection sockets and therefore the machine against dirt and damage.

- The protective dust cap must be fitted if there is no accessory component being operated on that connection.
- The cap must be replaced if faulty or if lost!

5.2 Installation

CAUTION**Installation site!**

The machine must not be operated in the open air and must only be set up and operated on a suitable, stable and level base!

- The operator must ensure that the ground is non-slip and level, and provide sufficient lighting for the place of work.
- Safe operation of the machine must be guaranteed at all times.

5.3 Machine cooling

To obtain an optimal duty cycle from the power components, the following precautions should be observed:

- Ensure that the working area is adequately ventilated.
- Do not obstruct the air inlets and outlets of the machine.
- Do not allow metal parts, dust or other objects to get into the machine.

5.4 Workpiece lead, general

CAUTION**Risk of burns due to incorrect connection of the workpiece lead!**

Paint, rust and dirt on the connection restrict the power flow and may lead to stray welding currents.

Stray welding currents may cause fires and injuries!

- Clean the connections!
- Fix the workpiece lead securely!
- Do not use structural parts of the workpiece as a return lead for the welding current!
- Take care to ensure faultless power connections!

5.5 Welding torch cooling system

CAUTION



Coolant mixtures!

Mixtures with other liquids or the use of unsuitable coolants result in material damage and renders the manufacturer's warranty void!

- Only use the coolant described in this manual (overview of coolants).
- Do not mix different coolants.
- When changing the coolant, the entire volume of liquid must be changed.



Insufficient frost protection in the welding torch coolant!

Depending on the ambient conditions, different liquids are used for cooling the welding torch (see overview of coolants).

Coolants with frost protection (KF 37E or KF 23E) must be checked regularly to ensure that the frost protection is adequate to prevent damage to the machine or the accessory components.

- The coolant must be checked for adequate frost protection with the TYP 1 frost protection tester (see accessories).
- Replace coolant as necessary if frost protection is inadequate!

NOTE



The disposal of coolant must be carried out according to official regulations and observing the relevant safety data sheets (German waste code number: 70104)!

- Coolant must not be disposed of together with household waste.
- Coolant must not be discharged into the sewerage system.
- Recommended cleaning agent: water, if necessary with cleaning agent added.

5.5.1 List of coolants

The following coolants may be used (for item nos., please see the Accessories chapter):

Coolant	Temperature range
KF 23E (Standard)	-10 °C to +40 °C
KF 37E	-20 °C to +10 °C

5.5.2 Adding coolant

The unit is supplied ex works with a minimum level of coolant.

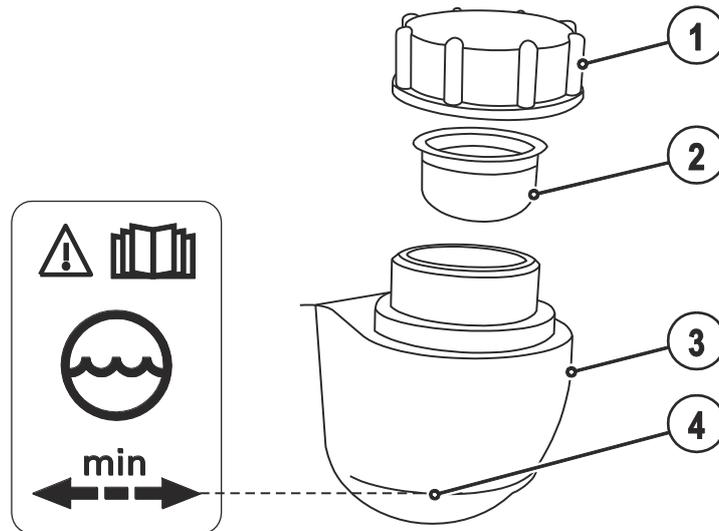


Figure 5-1

Item	Symbol	Description
1		Coolant tank cap
2		Coolant filter sieve
3		Coolant tank
4		"Min" mark Minimum coolant level

- Unscrew and remove the coolant tank sealing cover.
- Check filter sieve insert for dirt, clean if necessary and reinsert into position.
- Top up coolant to the filter sieve insert, close sealing cover again.

NOTE

- ☞ After the initial filling, wait for at least one minute when the machine is switched on so that the hose package is filled with coolant completely and without bubbles. With frequent changes of torch and during the initial filling process, the cooling unit tank should be topped up as necessary.
- ☞ The level of coolant must never fall below the "min" mark.
- ☞ If there is less coolant in the coolant tank than the minimum required you may need to vent the coolant circuit. In this case the welding machine will automatically shut down the coolant pump and signal an error, see chapter "Rectifying faults".

5.6 Mains connection

⚠ DANGER



Hazard caused by improper mains connection!

An improper mains connection can cause injuries or damage property!

- Only use machine with a plug socket that has a correctly fitted protective conductor.
- If a mains plug must be fitted, this may only be carried out by an electrician in accordance with the relevant national provisions or regulations!
- Mains plug, socket and lead must be checked regularly by an electrician!
- When operating the generator always ensure it is earthed as stated in the operating instructions. The resulting network has to be suitable for operating devices according to protection class 1.

5.6.1 Mains configuration

NOTE



The machine may be connected to:

- a three-phase system with four conductors and an earthed neutral conductor
- a three-phase system with three conductors of which any one can be earthed, e.g. the outer conductor

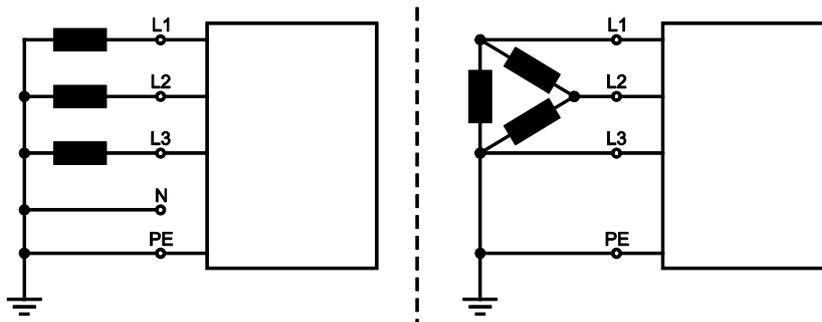


Figure 5-2

Legend

Item	Designation	Colour code
L1	Outer conductor 1	brown
L2	Outer conductor 2	black
L3	Outer conductor 3	grey
N	Neutral conductor	blue
PE	Protective conductor	green-yellow

CAUTION



Operating voltage - mains voltage!

The operating voltage shown on the rating plate must be consistent with the mains voltage, in order to avoid damage to the machine!

- For mains fuse protection, please refer to the “Technical data” chapter!

- Insert mains plug of the switched-off machine into the appropriate socket.

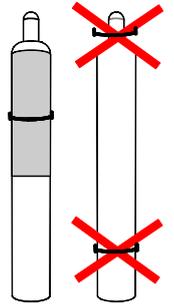
5.7 Shielding gas supply (shielding gas cylinder for welding machine)

WARNING



Risk of injury due to improper handling of shielding gas cylinders! Improper handling and insufficient securing of shielding gas cylinders can cause serious injuries!

- Secure shielding gas cylinders using the standard fastening elements on the unit (chain/belt)!
- The fastening elements must tightly enclose the shielding gas cylinder!
- Attach the fastening elements within the upper half of the shielding gas cylinder!
- Do not attach any element to the shielding gas cylinder valve!
- Observe the instructions from the gas manufacturer and any relevant regulations concerning the use of compressed air!
- Avoid heating the shielding gas cylinder!



CAUTION



Faults in the shielding gas supply.

An unhindered shielding gas supply from the shielding gas cylinder to the welding torch is a fundamental requirement for optimum welding results. In addition, a blocked shielding gas supply may result in the welding torch being destroyed.

- Always re-fit the yellow protective cap when not using the shielding gas connection.
- All shielding gas connections must be gas tight.

NOTE



Before connecting the pressure regulator to the gas cylinder, open the cylinder valve briefly to expel any dirt.

- Place the shielding gas cylinder into the relevant cylinder bracket.
- Secure the shielding gas cylinder using a securing chain.

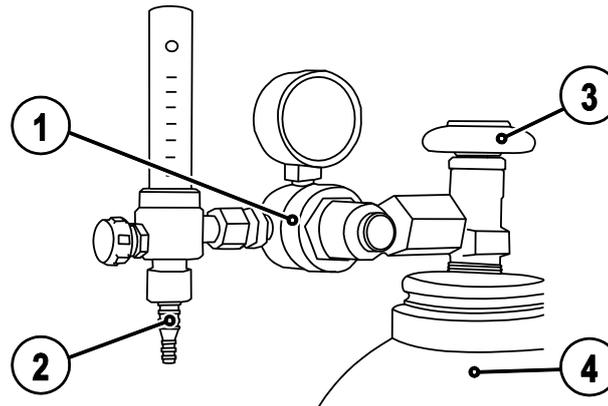


Figure 5-3

Item	Symbol	Description
1		Pressure regulator
2		Shielding gas cylinder
3		Output side of the pressure regulator
4		Cylinder valve

- Tighten the pressure regulator screw connection on the gas bottle valve to be gas-tight.
- Screw gas hose connection crown nut onto the output side of the pressure regulator.
- Fasten the gas hose to the shielding gas connecting nipple at the back of the machine using the crown nut.

5.7.1 Gas test

- Slowly open the gas cylinder valve.
- Open the pressure regulator.
- Switch on the power source at the main switch.
- Initiate gas test function on the machine control.
- Set the relevant gas quantity for the application on the pressure regulator.
- The gas test is triggered on the machine control by pressing the button briefly.

Shielding gas flows for around 25 seconds or until the button is pressed again.

5.7.2 Adjusting the gas post-flow time

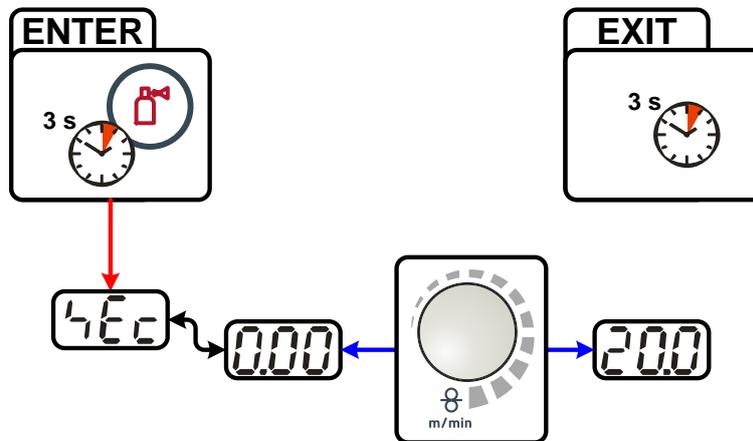


Figure 5-4

5.7.3 Setting the shielding gas quantity

Welding process	Recommended shielding gas quantity
MAG welding	Wire diameter x 11.5 = l/min
MIG brazing	Wire diameter x 11.5 = l/min
MIG welding (aluminium)	Wire diameter x 13.5 = l/min (100 % argon)

Helium-rich gas mixtures require a higher gas volume!

The table below can be used to correct the gas volume calculated where necessary:

Shielding gas	Factor
75% Ar/25% He	1.14
50% Ar/50% He	1.35
25% Ar/75% He	1.75
100% He	3.16

NOTE



Incorrect shielding gas setting!

If the shielding gas setting is too low or too high, this can introduce air to the weld pool and may cause pores to form.

- Adjust the shielding gas quantity to suit the welding task!

5.7.4 Welding data display

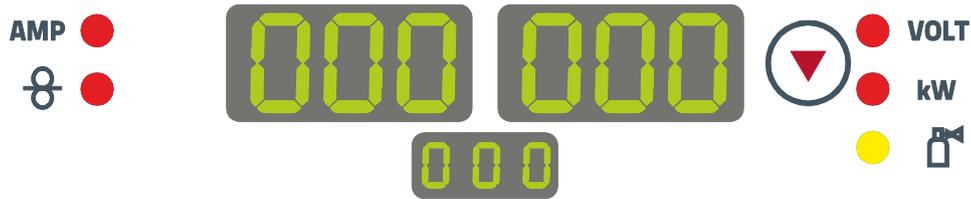


Figure 5-5

The machine control displays show all welding parameters that are required by the welder. The lower centre display shows the selected welding task (JOB number). The "parameter selection" (▼) push-button can be used to switch the display between welding voltage, welding performance and gas flow rate (option).

What is shown on the displays depends, among other things, on the selected welding procedure and the machine state (welding, power-saving mode, machine error).

MIG/MAG welding

Parameter	Nominal values	Actual values	Hold values
Welding current	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Wire feed speed	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Welding voltage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Welding performance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

MMA welding

Parameter	Nominal values	Actual values	Hold values
Welding current	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Welding voltage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Welding performance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

5.8 MIG/MAG welding

5.8.1 Welding torch and workpiece line connection

NOTE

**Fault with the wire guide!**

On delivery, the central connector is fitted with a capillary tube for welding torches with spiral guides. Conversion is necessary if a welding torch with a plastic core is used!

Welding torch with plastic core:

- use with guide tube!

Welding torch with spiral guide:

- use with capillary tube!

Depending on the wire electrode diameter or type, either a steel liner or plastic liner with the correct inner diameter must be inserted in the torch!

Recommendation:

- Use a steel liner when welding hard, unalloyed wire electrodes (steel).
- Use a chrome nickel liner when welding hard, high-alloy wire electrodes (CrNi).
- Use a plastic core to weld or braze soft wire electrodes, high-alloy wire electrodes or aluminium materials.

Preparation for connecting welding torches with a plastic core:

- Push forward the capillary tube on the wire feed side in the direction of the central connector and remove it there.
- Slide plastic core guide tube off the central connector.
- Carefully insert the central plug for the welding torch, with the still oversized plastic liner, into the central connector and screw together with crown nut.
- Use a suitable tool to cut off the plastic liner just before the wire feed roller, making sure not to pinch it.
- Unfasten and remove the central plug on the welding torch.
- Cleanly remove the burr from the separated end of the plastic core!

Preparation for connecting welding torches with a spiral guide:

- Check that the capillary tube is correctly positioned in relation to the central connector!

5.8.1.1 MIG/MAG standard welding

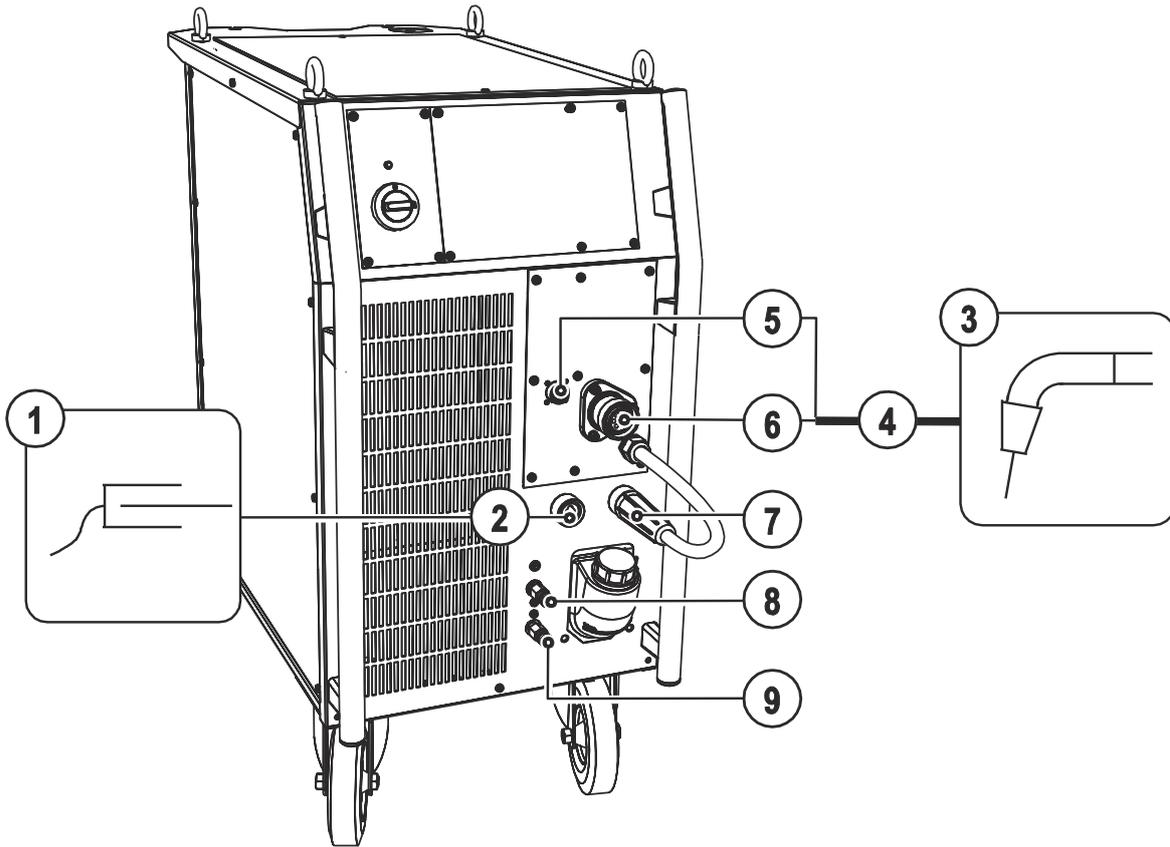


Figure 5-6

Item	Symbol	Description
1		Workpiece
2		"-" welding current connection socket • MIG/MAG welding: Workpiece connection
3		Welding torch
4		Welding torch hose package
5		19-pole connection socket (analogue) For connecting analogue accessory components (remote control, welding torch control lead, etc.)
6		Welding torch connection (Euro or Dinse torch connector) Welding current, shielding gas and torch trigger integrated
7		Welding current cable, polarity selection Welding current to central connection/torch. Permits polarity selection for MIG/MAG welding. • Standard applications > Connection for "+" welding current connection socket
8		Quick connect coupling (red) coolant return
9		Quick connect coupling (blue) coolant supply

- Insert the central plug for the welding torch into the central connector and screw together with crown nut.
- Insert the plug on the workpiece lead into the "-" welding current connection socket and lock.
- Welding current lead, insert polarity selection into the "+" welding current connection socket and lock.
- Lock connecting nipples of the cooling water tubes into the corresponding quick connect couplings:
Return line red to quick connect coupling, red (coolant return) and
supply line blue to quick connect coupling, blue (coolant supply).

Where applicable:

- Insert the welding torch control cable into the 19-pole connection socket and lock (MIG/MAG torches with additional control cables only).

5.8.1.2 MIG/MAG cored wire welding

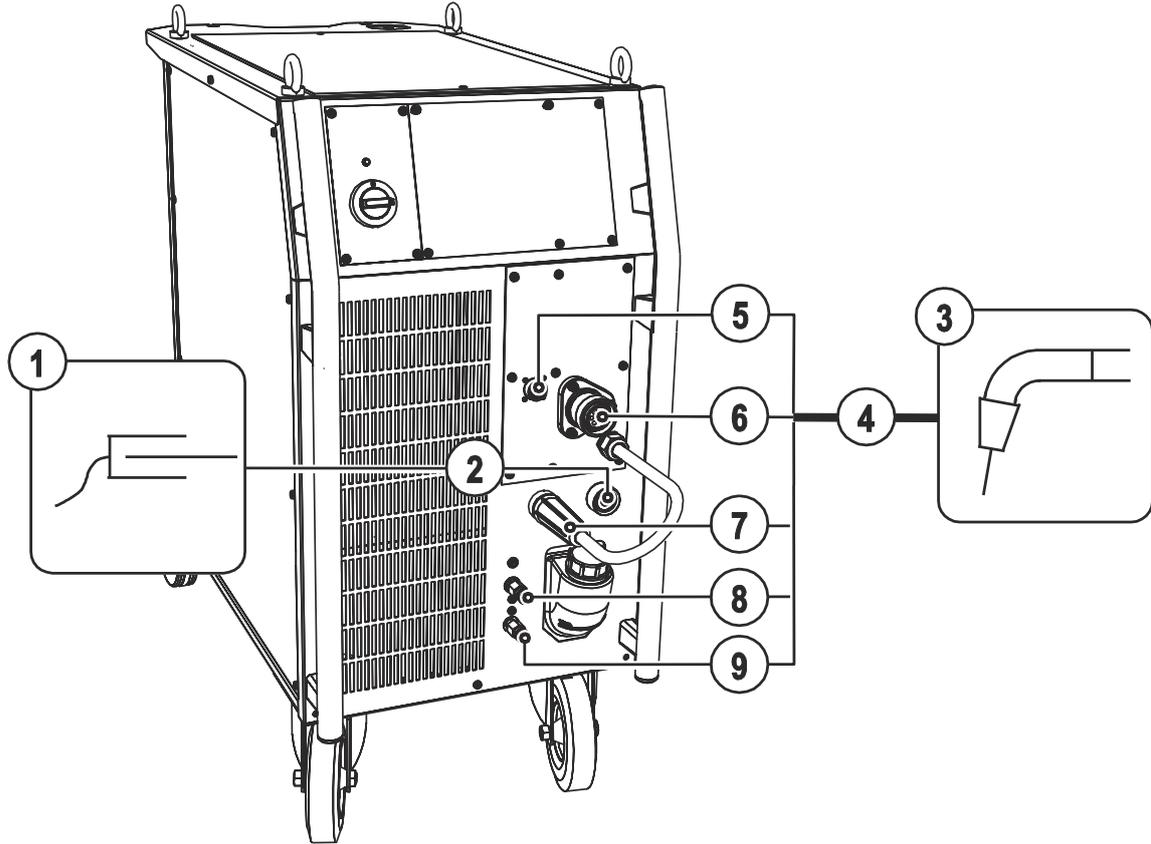


Figure 5-7

Item	Symbol	Description
1		Workpiece
2		Connection socket, "+" welding current • MIG/MAG cored wire welding: Workpiece connection
3		Welding torch
4		Welding torch hose package
5		19-pole connection socket (analogue) For connecting analogue accessory components (remote control, welding torch control lead, etc.)
6		Welding torch connection (Euro or Dinse torch connector) Welding current, shielding gas and torch trigger integrated
7		Welding current cable, polarity selection Welding current to central connection/torch. Permits polarity selection for MIG/MAG welding. • Cored wire welding > Connection for "-" welding current connection socket
8		Quick connect coupling (red) coolant return
9		Quick connect coupling (blue) coolant supply

- Insert the central plug for the welding torch into the central connector and screw together with crown nut.
- Insert the plug on the workpiece lead into the "+" welding current connection socket and lock.
- Welding current lead, insert polarity selection into the "-" welding current connection socket and lock.
- Lock connecting nipples of the cooling water tubes into the corresponding quick connect couplings:
Return line red to quick connect coupling, red (coolant return) and
supply line blue to quick connect coupling, blue (coolant supply).

Where applicable:

- Insert the welding torch control cable into the 19-pole connection socket and lock (MIG/MAG torches with additional control cables only).

5.8.2 Wire feed

5.8.2.1 Open the protective flap of the wire feeder

CAUTION



To perform the following steps, the protective flap of the wire feeder needs to be opened. Make sure to close the protective flap again before starting to work.

- Unlock and open protective flap.

5.8.2.2 Inserting the wire spool

CAUTION



Risk of injury due to incorrectly secured wire spool.

If the wire spool is not secured properly, it may come loose from the wire spool holder and fall to the ground, causing damage to the machine and injuries.

- Securely fasten the wire spool to the wire spool holder using the knurled nut.
- Before you start working, always check the wire spool is securely fastened.

NOTE



Standard D300 wire spool holder can be used. Adapters (see accessories) are required when using standardised basket coils (DIN 8559).

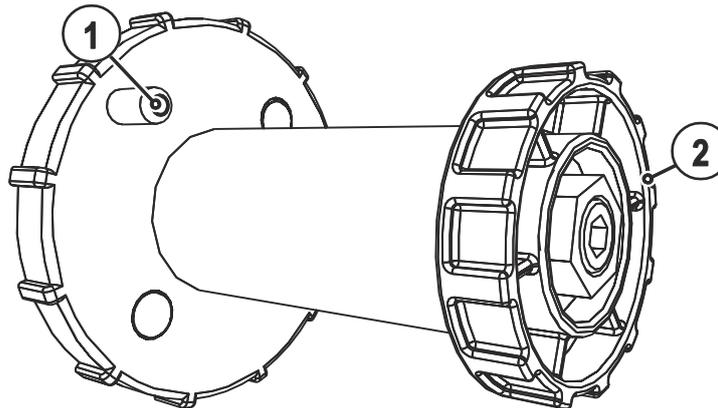


Figure 5-8

Item	Symbol	Description
1		Carrier pin For fixing the wire spool
2		Knurled nut For fixing the wire spool

- Loosen knurled nut from spool holder.
- Fix welding wire reel onto the spool holder so that the carrier pin locks into the spool bore.
- Fasten wire spool using knurled nut.

5.8.2.3 Changing the wire feed rollers

NOTE**Unsatisfactory welding results due to faulty wire feeding!**

Wire feed rollers must be suitable for the diameter of the wire and the material.

- Check the roller label to verify that the rollers are suitable for the wire diameter. Turn or change if necessary!
- use V-groove rollers with for steel wires and other hard wires,
- use U-groove rollers for aluminium wires and other soft, alloyed wires.

- Slide new drive rollers into place so that the diameter of the wire used is visible on the drive roller.
- Screw the drive rollers in place with knurled screws.

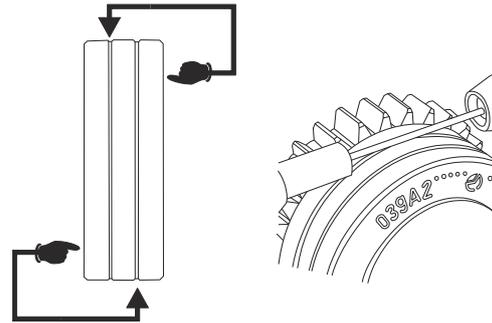


Figure 5-9

5.8.2.4 Inching the wire electrode

CAUTION



Risk of injury due to moving parts!

The wire feeders are equipped with moving parts, which can trap hands, hair, clothing or tools and thus injure persons!

- Do not reach into rotating or moving parts or drive components!
- Keep casing covers or protective caps closed during operation!



Risk of injury due to welding wire escaping in an unpredictable manner!

Welding wire can be conveyed at very high speeds and, if conveyed incorrectly, may escape in an uncontrolled manner and injure persons!

- Before mains connection, set up the complete wire guide system from the wire spool to the welding torch!
- Remove the pressure rollers from the wire feeder if no welding torch is fitted!
- Check wire guide at regular intervals!
- Keep all casing covers or protective caps closed during operation!



Risk of injury due to welding wire escaping from the welding torch!

The welding wire can escape from the welding torch at high speed and cause bodily injury including injuries to the face and eyes!

- Never direct the welding torch towards your own body or towards other persons!

CAUTION



Extensive wear due to incorrect contact pressure!

Incorrect contact pressure will cause extensive wear of the wire feed rollers!

- With the adjusting nuts of the pressure units set the contact pressure so that the wire electrode is conveyed but will still slip through if the wire spool jams.
- Set the contact pressure of the front rollers (in wire feed direction) to a higher value!

NOTE



The inching speed is infinitely adjustable by simultaneously pressing the wire inching push-button and turning the wire speed rotary knob. The left display shows the wire feed speed selected, the right display shows the current motor current of the wire feed mechanism.

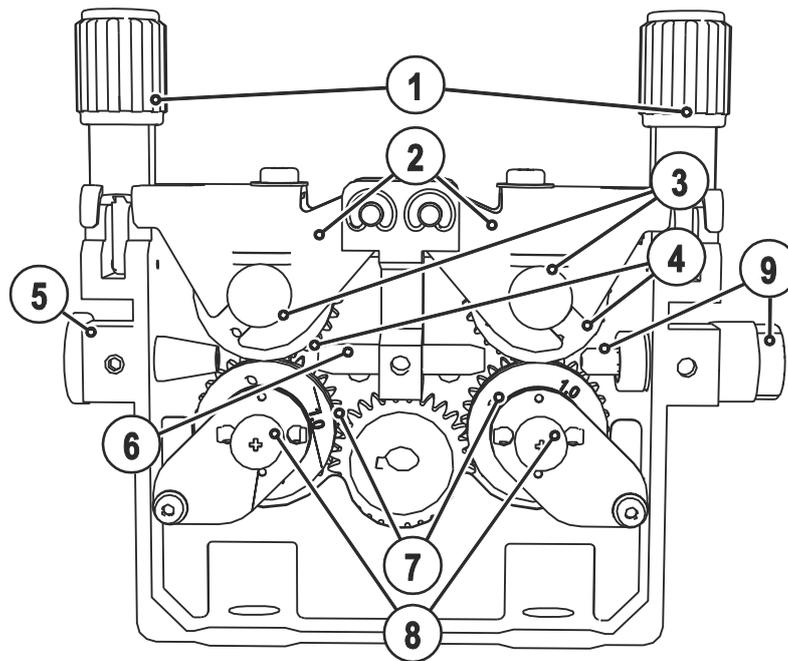


Figure 5-10

Item	Symbol	Description
1		Feed roll tensioner Fixing the clamping unit and setting the pressure.
2		Clamping unit
3		Knurled nut
4		Pressure roller
5		Wire feed nipple
6		Guide tube
7		Drive rollers
8		"Undetachable" knurled screws
9		Wire feed nipple with wire stabiliser

- Extend and lay out the torch hose package.
- Unfasten pressure units and fold out (clamping units and pressure rollers will automatically flip upwards).
- Unwind welding wire carefully from the wire spool and insert through the wire inlet nipple over the drive roller grooves and the guide pipe into the capillary tube and Teflon core using guide pipe.
- Press the clamping element with the pressure roller back downwards and fold the wire units back up again (wire electrode should be in the groove on the drive roller).
- Set the contact pressure with the adjusting nuts of the pressure unit.
- Press the wire inching button until the wire electrode projects out of the welding torch.

5.8.2.5 Spool brake setting

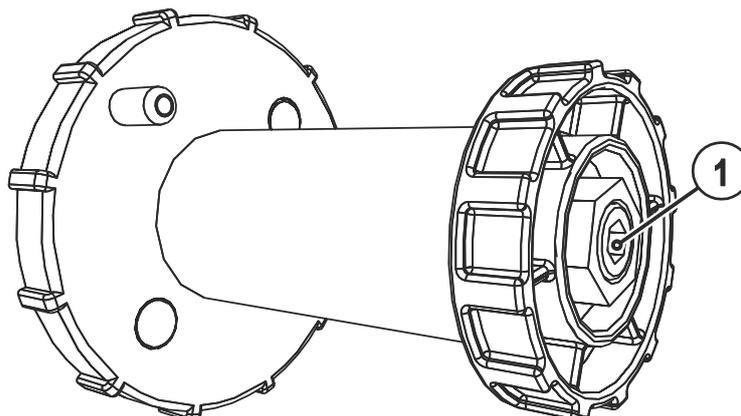


Figure 5-11

Item	Symbol	Description
1		Allen screw Securing the wire spool retainer and adjustment of the spool brake

- Tighten the Allen screw (8 mm) in the clockwise direction to increase the braking effect.

NOTE



Tighten the spool brake until the wire spool no longer turns when the wire feed motor stops but without it jamming during operation!

5.8.3 Welding task selection

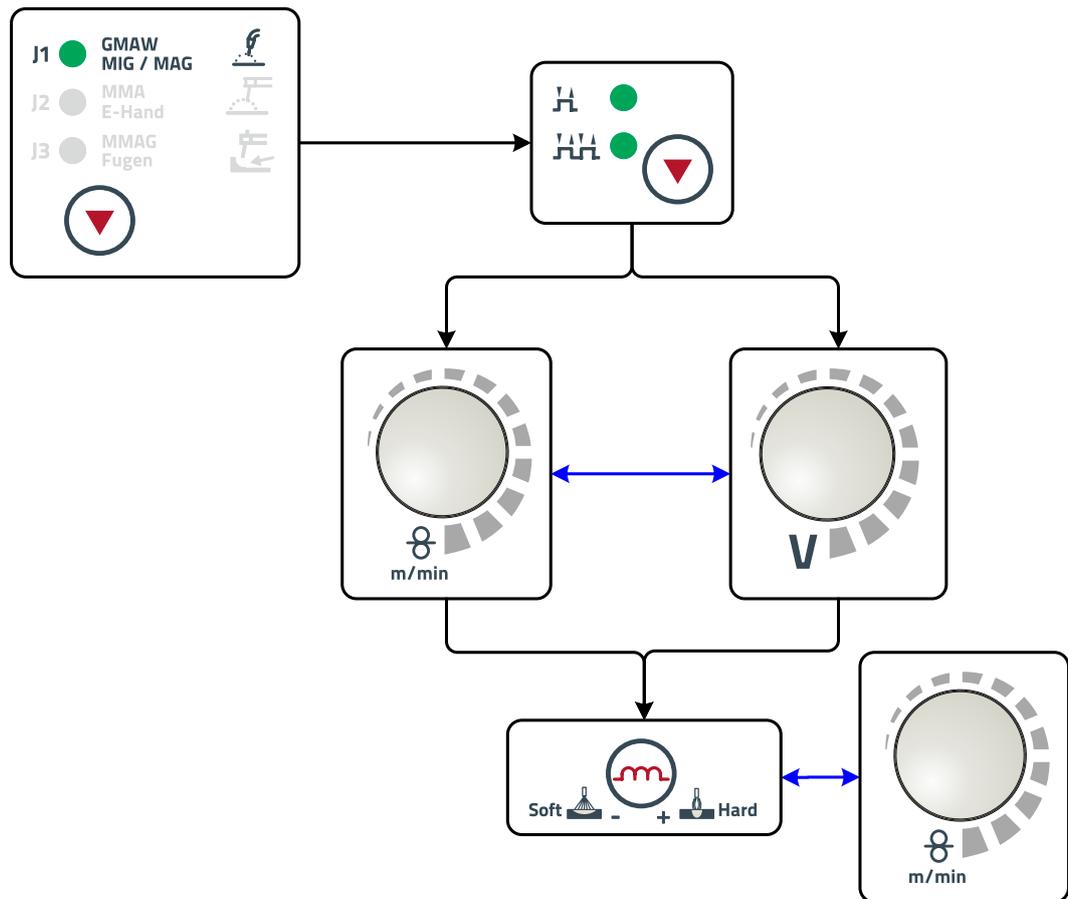


Figure 5-12

5.8.3.1 Accessory components for operating point setting

The operating point setting can also be made with the accessory components

- R11 / RG11 remote control
- Up/Down torch with two rockers (2 U/D)

You will find an overview of accessory components in the "Accessories" chapter. See the operating instructions for the machine in question for a more detailed description of the individual machines and their functions.

5.8.4 MIG/MAG functional sequences / operating modes

5.8.5 Explanation of signs and functions

Symbol	Meaning
	Press torch trigger
	Release torch trigger
	Tap torch trigger (press briefly and release)
	Shielding gas flowing
I	Welding output
	Wire electrode is being conveyed
	Wire creep
	Wire burn-back
	Gas pre-flows
	Gas post-flows
	Non-latched
	Latched
t	Time
PSTART	Ignition program
PA	Main program
PEND	End program

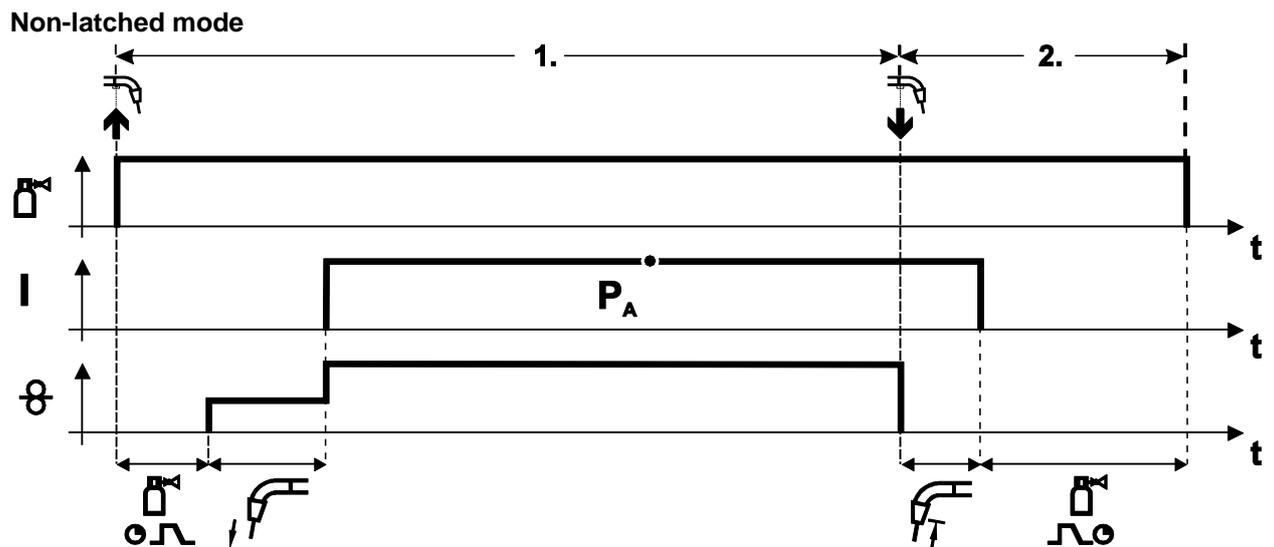


Figure 5-13

Step 1

- Press and hold torch trigger.
- Shielding gas is expelled (gas pre-flows).
- Wire feed motor runs at "creep speed".
- Arc ignites after the wire electrode makes contact with the workpiece; welding current flows.
- Change over to pre-selected wire speed.

Step 2

- Release torch trigger.
- WF motor stops.
- Arc is extinguished after the preselected wire burn-back time expires.
- Gas post-flow time elapses.

Latched mode

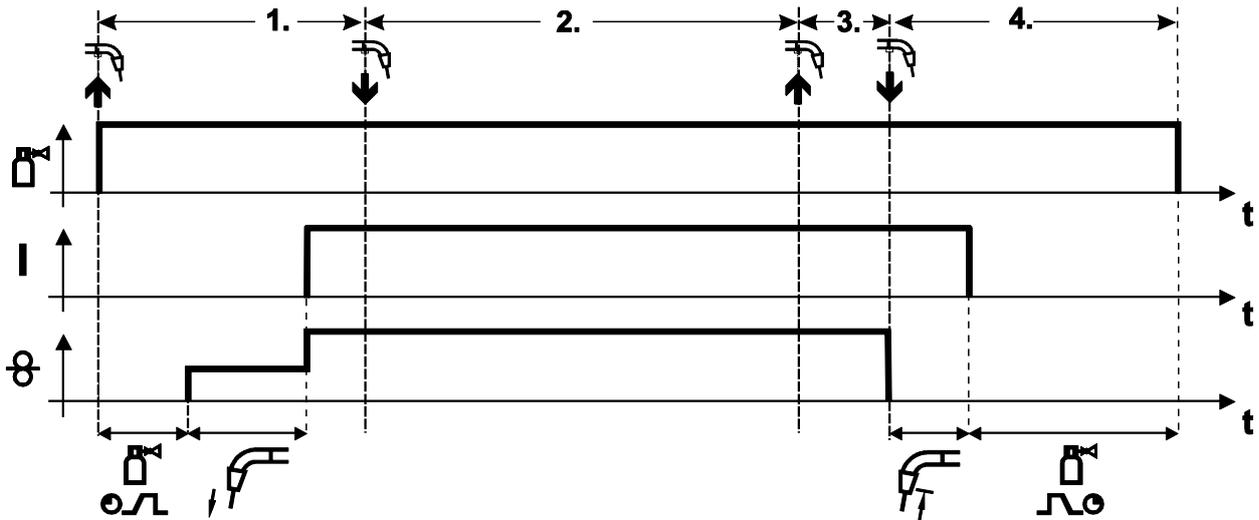


Figure 5-14

Step 1

- Press and hold torch trigger
- Shielding gas is expelled (gas pre-flows)
- Wire feed motor runs at “creep speed”.
- Arc ignites after the wire electrode makes contact with the workpiece; welding current flows.
- Change over to pre-selected WF speed (main program P_A).

Step 2

- Release torch trigger (no effect)

Step 3

- Press torch trigger (no effect)

Step 4

- Release torch trigger
- WF motor stops.
- Arc is extinguished after the preselected wire burn-back time expires.
- Gas post-flow time elapses.

5.8.6 Standard MIG/MAG torch

The MIG welding torch trigger is essentially used to start and stop the welding process.

Operating elements	Functions
 Torch trigger	<ul style="list-style-type: none"> • Start/stop welding

5.8.7 MIG/MAG special-torches

Function specifications and more indepth information can be found in the operating manual for the relevant welding torch!

5.9 MMA welding

CAUTION



Risk of being crushed or burnt.

When replacing spent or new stick electrodes

- Switch off machine at the main switch
- Wear appropriate safety gloves
- Use insulated tongs to remove spent stick electrodes or to move welded workpieces and
- Always put the electrode holder down on an insulated surface.

5.9.1 Connecting the electrode holder and workpiece lead

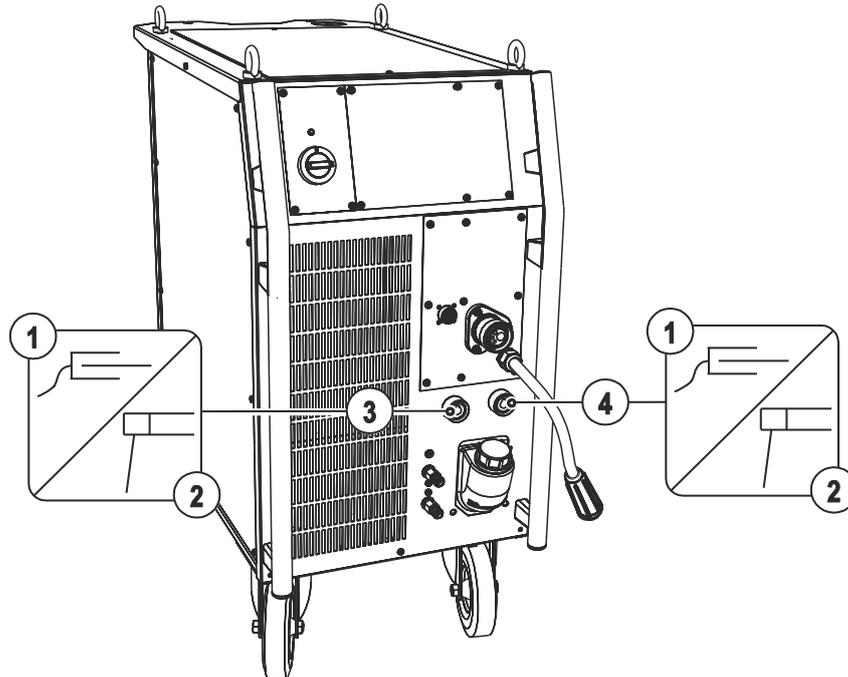


Figure 5-15

Item	Symbol	Description
1		Workpiece
2		Electrode holder
3		Connection socket, "-" welding current
4		Connection socket, "+" welding current

- Insert cable plug of the electrode holder into either the "+" or "-" welding current connection socket and lock by turning to the right.
- Insert cable plug of the workpiece lead into either the "+" or "-" welding current connection socket and lock by turning to the right.

NOTE



Polarity depends on the instructions from the electrode manufacturer given on the electrode packaging.

5.9.2 Welding task selection

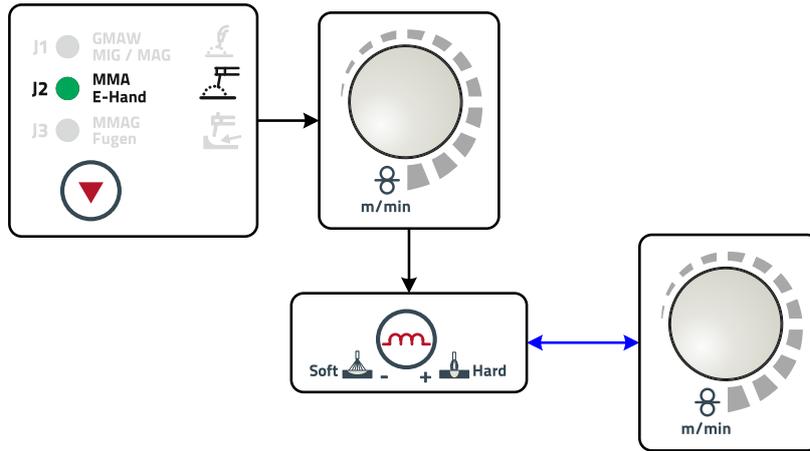


Figure 5-16

NOTE

Special electrode holders and carbon electrodes are required for air arc gouging.

5.9.3 Welding current setting

The welding current is normally set using the "Wire speed" rotary dial.

Operating element	Action	Result	Displays
		Welding current is set	Setpoint setting

5.9.4 Arcforce

Operating element	Action	Result	Display
		Select arcforcing welding parameter LED for the button ● is on.	
		Arcforcing setting for electrode types: (Setting range -40 to 40) Negative values Rutile Values around zero Basic Positive values Cellulose	

5.9.5 Hotstart

The hotstart device improves the ignition of the stick electrodes using an increased ignition current.

- a) = Hotstart time
- b) = Hotstart current
- I = Welding current
- t = Time

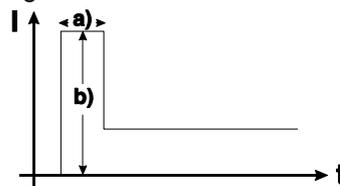
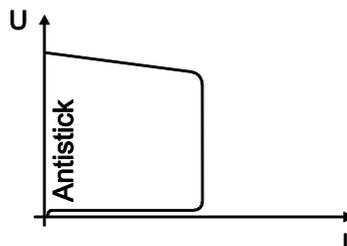


Figure 5-17

5.9.6 Antistick



Anti-stick prevents the electrode from annealing.

If the electrode sticks in spite of the Arcforce device, the machine automatically switches over to the minimum current within about 1 second to prevent the electrode from overheating. Check the welding current setting and correct according to the welding task!

Figure 5-18

5.9.7 Air arc gouging

5.9.7.1 Connection

NOTE



Please note the relevant documentation of the accessory components.



Special electrode holders and carbon electrodes are required for air arc gouging.

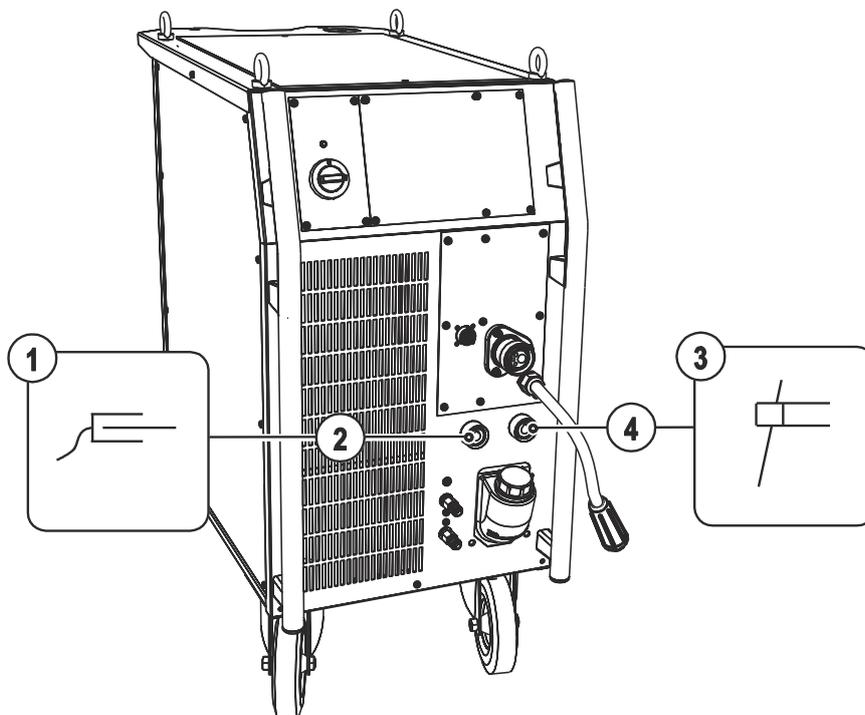


Figure 5-19

Item	Symbol	Description
1		Workpiece
2		Connection socket, "-" welding current
3		Gouging torch
4		Connection socket, "+" welding current

- Insert the gouging torch cable plug into the "+" welding current connection socket and lock in place by turning to the right.
- Insert cable plug on the workpiece lead into the "-" welding current socket and lock by turning to the right.

5.9.8 Welding task selection

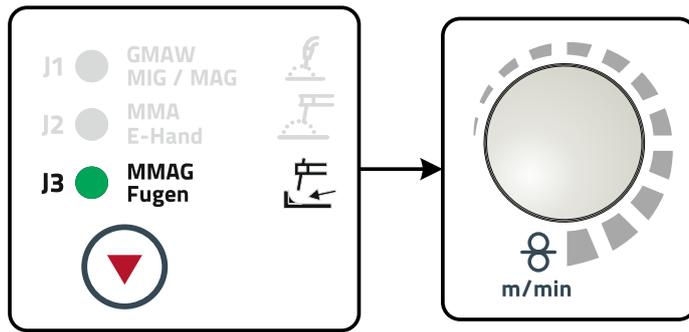


Figure 5-20

5.9.9 Welding current setting

The welding current is normally set using the "Wire speed" rotary dial.

Operating element	Action	Result	Displays
		Welding current is set	Setpoint setting

5.10 Remote control

CAUTION



Damage due to the use of non-genuine parts!

The manufacturer's warranty becomes void if non-genuine parts are used!

- Only use system components and options (power sources, welding torches, electrode holders, remote controls, spare parts and replacement parts, etc.) from our range of products!
- Only insert and lock accessory components into the relevant connection socket when the machine is switched off.

NOTE



The remote controls are operated on the 19-pole remote control connection socket (analogue).



Please note the relevant documentation of the accessory components.

5.11 Special parameters (advanced settings)

Special parameters (P1 to Pn) are applied for customer-specific configuration of machine functions. This allows the user maximum flexibility in optimising their requirements.

These settings are not configured directly on the machine control since a regular setting of the parameters is generally not required. The number of selectable special parameters can deviate between the machine controls used in the welding system (also see the relevant standard operating instructions).

If required, the special parameters can be reset to the factory settings.

5.11.1 Selecting, changing and saving parameters

NOTE



ENTER (Enter the menu)

- Switch off the machine at the main switch.
- Press and hold the "operating mode" push-button and switch the machine on again at the same time.

NAVIGATION (Navigate the menu)

- Select parameters by turning the "welding parameter setting" rotary knob.
- Set or change the parameters by turning the "welding voltage" rotary knob.

EXIT (Exit the menu)

- Press the "gas test" push-button (switch machine off and on again).

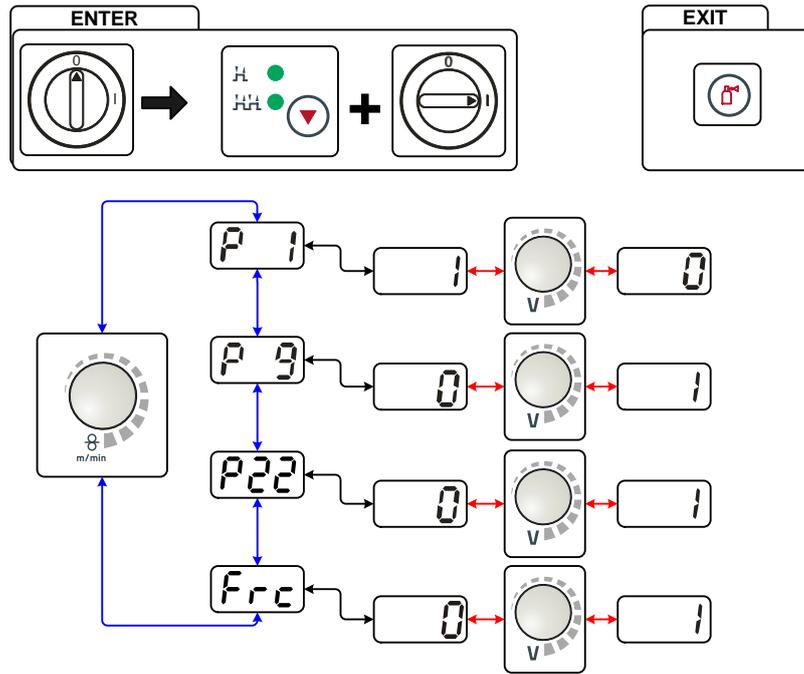


Figure 5-21

Display	Setting/selection
P 1	Ramp time for wire inching 0 = normal inching (10s ramp time) 1 = fast inching (3s ramp time) (Ex works)
P 9	Lat. and sp. lat. tapping start 0 = no latched tapping start (Ex works) 1 = latched tapping start possible
P22	Support for wire feeders with voltage-sensing. 0 = Function switched off 1 = Function switched on (ex works)
Frc	Alternative remote control coding (FRC) 0 = no alternative remote control coding (works setting) 1-15 = alternative remote control coding

5.11.2 Reset to factory settings

NOTE

 All special parameters saved by the user will be overwritten by the factory settings!

Operating element	Action	Result	Display	
			left	right
		Switch off welding machine		
		Press and hold push-button		
		Switch on welding machine		
		Release push-button Wait for about 3 s		
 		Switch off the welding machine and restart in order to implement the changes.		

5.11.3 The special parameters in detail

Ramp time for wire inching (P1)

The wire inching starts with a speed 1.0 m/min for 2 secs. It is subsequently increased to a ramp function to 6.0 m/min. The ramp time can be set between two ranges.

During wire inching, the speed can be changed by means of the welding parameter setting rotary dial. Changing the speed has no effect on the ramp time.

Latched/special-latched tap start (P9)

In latched – tap start – operating mode it is possible to switch straight to the second step by tapping the torch trigger; it is not necessary for current to be flowing.

The welding can be halted by pressing the torch trigger for a second time.

5.12 Machine configuration menu

5.12.1 Selecting, changing and saving parameters

NOTE

- ENTER (Enter the menu)**
- Switch off the machine at the main switch.
 - Press and hold the "welding procedure" push-button and switch the machine on again at the same time.
- NAVIGATION (Navigate the menu)**
- Select parameters by turning the "welding parameter setting" rotary knob.
 - Set or change the parameters by turning the "welding voltage" rotary knob.
- EXIT (Exit the menu)**
- Press the "gas test" push-button (switch machine off and on again).

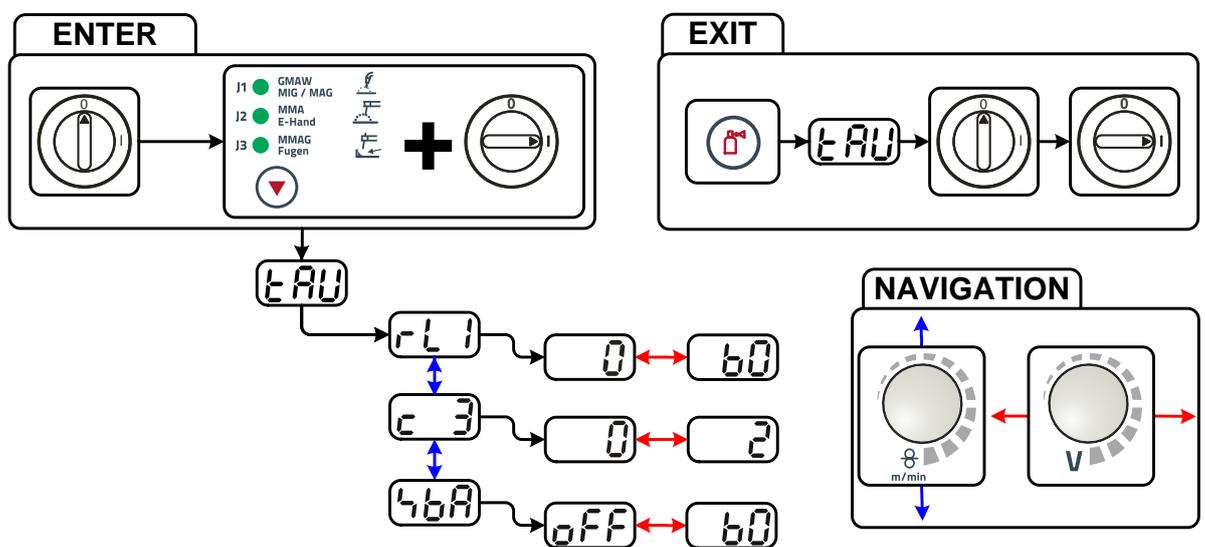


Figure 5-22

Display	Setting/selection
	Lead resistance 1 Lead resistance for the first welding circuit 0 mΩ–60 mΩ (8 mΩ ex works).
	Only qualified service personnel may change the parameters!
	Time-based power-saving mode <ul style="list-style-type: none"> • 5 min.–60 min. = Time to activation of power-saving mode in case of inactivity. • off = inactivated

5.12.2 Power-saving mode

The power-saving function can be activated either by pressing the button for a longer time (see chapter "Machine description – Short overview") or by setting a parameter in the configuration menu (time-based power-saving mode).



When power-saving mode is activated, both machine displays show the horizontal digit in the centre of the display only.

Pressing any operating element (e.g. tapping the torch trigger) deactivates power-saving mode and the machine is ready for welding again.

6 Maintenance, care and disposal

DANGER



Risk of injury from electric shock!

Cleaning machines that are not disconnected from the mains can lead to serious injuries!

- Disconnect the machine completely from the mains.
- Remove the mains plug!
- Wait for 4 minutes until the capacitors have discharged!

6.1 General

When used in the specified environmental conditions and under normal operating conditions, this machine is largely maintenance-free and requires a minimum of care.

There are some points, which should be observed, to guarantee fault-free operation of your welding machine. Among these are regular cleaning and checking as described below, depending on the pollution level of the environment and the length of time the unit is in use.

6.2 Maintenance work, intervals

CAUTION



Electric current!

Repairs may only be carried out by authorised specialist staff!

- Do not remove the torch from the hose package!
- Never clamp the torch body in a vice or similar, as this can cause the torch to be irreparably destroyed!
- If damage occurs to the torch or to the hose package which cannot be corrected as part of the maintenance work, the entire torch must be returned to the manufacturer

6.2.1 Daily maintenance tasks

- Check that all connections and wearing parts are hand-tight and tighten if necessary.
- Check that all screw and plug connections and replaceable parts are secured correctly, tighten if necessary.
- Remove any spatter.
- Clean the wire feed rollers on a regular basis (depending on the degree of soiling).

6.2.1.1 Visual inspection

- Check hose package and power connections for exterior damage and replace or have repaired by specialist staff as necessary!
- Mains supply lead and its strain relief
- Gas tubes and their switching equipment (solenoid valve)
- Other, general condition

6.2.1.2 Functional test

- Check correct mounting of the wire spool.
- Welding current cables (check that they are fitted correctly and secured)
- Gas cylinder securing elements
- Operating, message, safety and adjustment devices (Functional test)

6.2.2 Monthly maintenance tasks

6.2.2.1 Visual inspection

- Casing damage (front, rear and side walls)
- Wheels and their securing elements
- Transport elements (strap, lifting lugs, handle)
- Check coolant tubes and their connections for impurities

6.2.2.2 Functional test

- Selector switches, command devices, emergency stop devices, voltage reducing devices, message and control lamps
- Check that the wire guide elements (inlet nipple, wire guide tube) are fitted securely.

6.2.3 Annual test (inspection and testing during operation)

NOTE

-  **The welding machine may only be tested by competent, capable persons. A capable person is one who, because of his training, knowledge and experience, is able to recognise the dangers that can occur while testing welding power sources as well as possible subsequent damage and who is able to implement the required safety procedures.**
-  **For further information, please see the accompanying supplementary sheets "Machine and Company Data, Maintenance and Testing, Warranty"!**

A periodic test according to IEC 60974-4 "Periodic inspection and test" has to be carried out. In addition to the regulations on testing given here, the relevant local laws and regulations must also be observed.

6.3 Maintenance work



DANGER



Do not carry out any unauthorised repairs or modifications!

To avoid injury and equipment damage, the unit must only be repaired or modified by specialist, skilled persons!

The warranty becomes null and void in the event of unauthorised interference.

- Appoint only skilled persons for repair work (trained service personnel)!

Repair and maintenance work may only be performed by qualified authorised personnel; otherwise the right to claim under warranty is void. In all service matters, always consult the dealer who supplied the machine. Return deliveries of defective equipment subject to warranty may only be made through your dealer. When replacing parts, use only original spare parts. When ordering spare parts, please quote the machine type, serial number and item number of the machine, as well as the type designation and item number of the spare part.

6.4 Disposing of equipment

NOTE



Proper disposal!

The machine contains valuable raw materials, which should be recycled, and electronic components, which must be disposed of.

- Do not dispose of in household waste!
- Observe the local regulations regarding disposal!



6.4.1 Manufacturer's declaration to the end user

- According to European provisions (guideline 2002/96/EG of the European Parliament and the Council of January, 27th 2003), used electric and electronic equipment may no longer be placed in unsorted municipal waste. It must be collected separately. The symbol depicting a waste container on wheels indicates that the equipment must be collected separately.
This machine is to be placed for disposal or recycling in the waste separation systems provided for this purpose.
- According to German law (law governing the distribution, taking back and environmentally correct disposal of electric and electronic equipment (ElektroG) from 16.03.2005), used machines are to be placed in a collection system separate from unsorted municipal waste. The public waste management utilities (communities) have created collection points at which used equipment from private households can be disposed of free of charge.
- Information about giving back used equipment or about collections can be obtained from the respective municipal administration office.
- EWM participates in an approved waste disposal and recycling system and is registered in the Used Electrical Equipment Register (EAR) under number WEEE DE 57686922.
- In addition to this, returns are also possible throughout Europe via EWM sales partners.

6.5 Meeting the requirements of RoHS

We, EWM AG Mündersbach, hereby confirm that all products supplied by us which are affected by the RoHS Directive, meet the requirements of the RoHS (Directive 2002/95/EC).

7 Rectifying faults

All products are subject to rigorous production checks and final checks. If, despite this, something fails to work at any time, please check the product using the following flowchart. If none of the fault rectification procedures described leads to the correct functioning of the product, please inform your authorised dealer.

7.1 Checklist for rectifying faults

NOTE



The correct machine equipment for the material and process gas in use is a fundamental requirement for perfect operation!

Legend	Symbol	Description
	↘	Fault/Cause
	✘	Remedy

Coolant error/no coolant flowing

- ↘ Insufficient coolant flow
 - ✘ Check coolant level and refill if necessary
- ↘ Air in the coolant circuit
 - ✘ see chapter "Vent coolant circuit"

Wire feed problems

- ↘ Contact tip blocked
 - ✘ Clean, spray with anti-spatter spray and replace if necessary
- ↘ Setting the spool brake (see "Setting the spool brake" chapter)
 - ✘ Check settings and correct if necessary
- ↘ Setting pressure units (see "Inching wire electrodes" chapter)
 - ✘ Check settings and correct if necessary
- ↘ Worn wire rolls
 - ✘ Check and replace if necessary
- ↘ Wire feed motor without supply voltage (automatic cutout triggered by overloading)
 - ✘ Reset triggered fuse (rear of the power source) by pressing the key button
- ↘ Kinked hose packages
 - ✘ Extend and lay out the torch hose package
- ↘ Wire guide core or spiral is dirty or worn
 - ✘ Clean core or spiral; replace kinked or worn cores

Functional errors

- ↘ Machine control without displaying the signal lights after switching on
 - ✘ Phase failure > check mains connection (fuses)
- ↘ No welding performance
 - ✘ Phase failure > check mains connection (fuses)
- ↘ Various parameters cannot be set
 - ✘ Entry level is blocked, disable access lock (see chapter entitled "Lock welding parameters against unauthorised access")
- ↘ Connection problems
 - ✘ Make control lead connections and check that they are fitted correctly.
- ↘ Loose welding current connections
 - ✘ Tighten power connections on the torch and/or on the workpiece
 - ✘ Tighten contact tip correctly

7.2 Error messages (power source)

NOTE

-  A welding machine error is indicated by an error code being displayed (see table) on the display on the machine control.
In the event of a machine error, the power unit is shut down.
-  The display of possible error numbers depends on the machine version (interfaces/functions).

- Document machine errors and inform service staff as necessary.
- If multiple errors occur, these are displayed in succession.

Error	Category			Possible cause	Remedy
	a)	b)	c)		
Error 1 (Ov.Vol)	-	-	x	Mains overvoltage	Check the mains voltages and compare with the connection voltages of the welding machine
Error 2 (Un.Vol)	-	-	x	Mains undervoltage	
Error 3 (Temp)	x	-	-	Welding machine excess temperature	Allow the machine to cool down (mains switch to "1")
Error 4 (Water)	xx	x	-	Low coolant level	Top off the coolant Leak in the coolant circuit > rectify the leak and top off the coolant Coolant pump is not working > check excess current trigger on air cooling unit
Error 5 (Wi.Spe)	x	-	-	Wire feeder, speedometer error	Check the wire feeder speedometer is not issuing a signal, M3.00 defective > inform Service
Error 6 (gas)	x	-	-	Shielding gas error	Check shielding gas supply (for machines with shielding gas monitoring)
Error 7 (Se.Vol)	-	-	x	Secondary excess voltage	Inverter error > inform Service
Error 8 (no PE)	-	-	x	Earth fault between welding wire and earth line (Phoenix 330 only)	Separate the connection between the welding wire and casing or an earthed object
Error 9 (fast stop)	x	-	-	Fast cut-out triggered by BUSINT X11 or RINT X12	Rectify error on robot
Error 10 (no arc)	-	x	-	Arc break triggered by BUSINT X11 or RINT X12	Check wire feeding
Error 11 (no ign)	-	x	-	Ignition fault after 5 s triggered by BUSINT X11 or RINT X12	Check wire feeding
Error 14 (no DV)	-	x	-	Wire feeder not detected. Control cable not connected.	Check cable connections
				Incorrect ID numbers assigned during operation with multiple wire feeders.	Check assignment of ID numbers (see the "Changing ID number of wire feeder" chapter)
Error 15 (DV2?)	-	x	-	Wire feeder 2 not detected. Control cable not connected.	Check cable connections
Error 16 (VRD)	-	-	x	VRD (open circuit voltage reduction error)	Inform Service
Error 17 (WF. Ov.)	-	x	x	Wire feed mechanism overcurrent detection	Check the wire feeding

Error	Category			Possible cause	Remedy
	a)	b)	c)		
Error 18 (WF. Sl.)	-	x	x	No speedometer signal from second wire feeder (slave drive)	Check the connection and particularly the speedometer of the second wire feeder (slave drive).

Legend for categories (error reset)

a) The error message will disappear once the error has been rectified.

b) The error message can be reset by pressing a key button:

Welding machine control	Key button
RC1 / RC2	
Expert	
CarExpert / Progress (M3.11)	
alpha Q / Concept / Basic / Basic S / Synergic / Synergic S / Progress (M3.71) Picomig 305	not possible

c) The error message can only be reset by switching the machine off and on again.

The shielding gas error (Err 6) can be reset by pressing the "Welding parameters" key button.

7.3 Welding parameter calibration

When differentiating between the welding parameters set on the wire feed unit/remote control and those shown on the welding machine, they can be calibrated easily with this function.

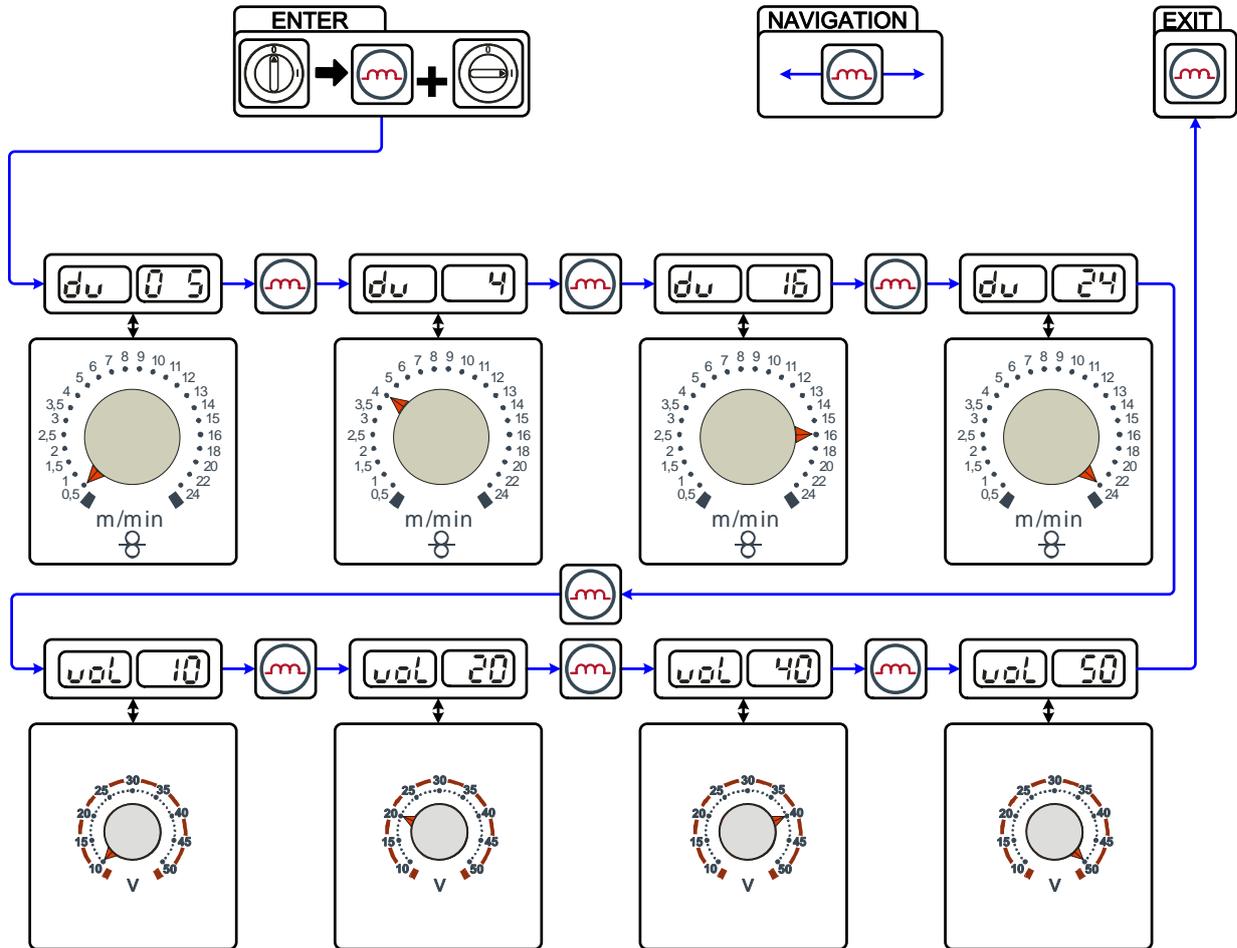


Figure 7-1

7.4 Vent coolant circuit

NOTE

- Coolant tank and quick connect coupling of coolant supply and return are only fitted in machines with water cooling.
- To vent the cooling system always use the blue coolant connection, which is located as deep as possible inside the system (close to the coolant tank)!

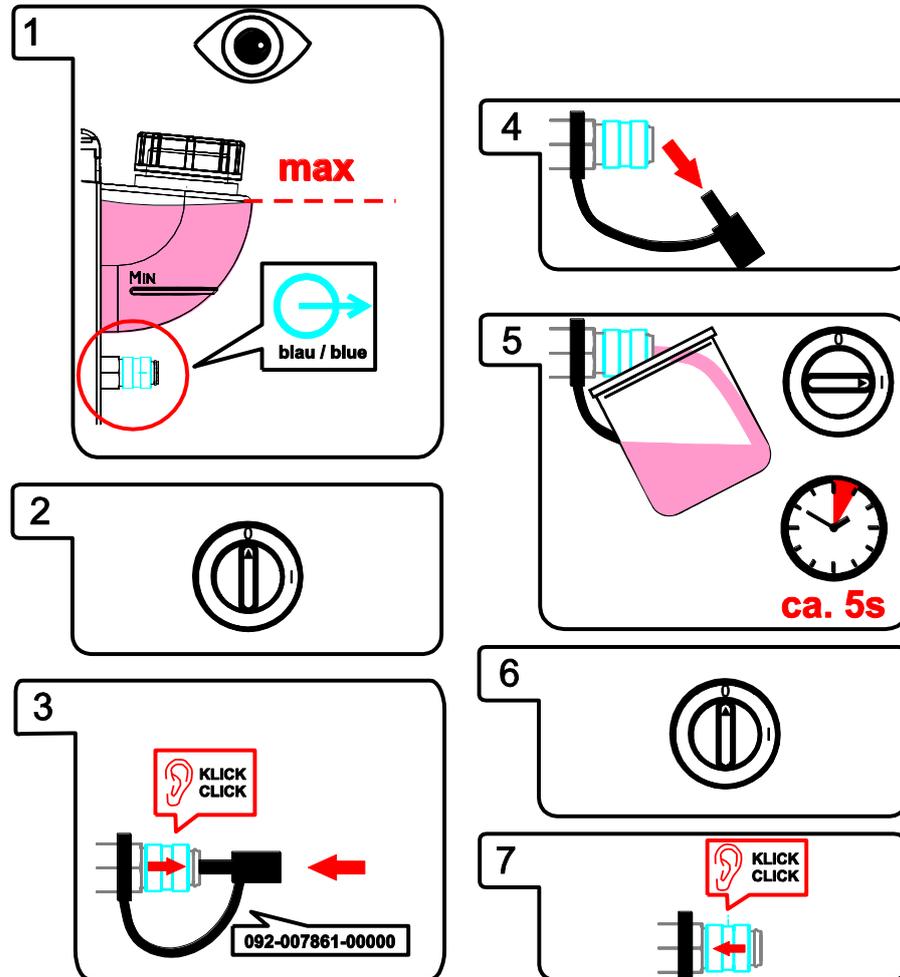


Figure 7-2

8 Technical data

NOTE

 Performance specifications and guarantee only in connection with original spare and replacement parts!

8.1 Taurus 401 Basic FKW

Setting range for welding current/voltage:

MMA	5 A/20.2 V to 400 A/36.0 V
MIG/MAG	5 A/14.3 V to 400 A/34.0 V
Duty cycle at 40 °C	
100%	400 A
Load alternation	10 min. (60% DC Δ 6 min. welding, 4 min. pause)
Open circuit voltage	79 V
Mains voltage (tolerances)	3 x 400 V (-25% to +20%)
Frequency	50/60 Hz
Mains fuse (safety fuse, slow-blow)	3 x 32 A
Mains connection lead	H07RN-F4G6
Maximum connected load	
MIG/MAG	17.5 kVA
MMA	18.5 kVA
Recommended generator rating	25 kVA
cos ϕ	0.99
Insulation class/protection classification	H/IP 23
Ambient temperature*	-25 °C to +40 °C
Machine/torch cooling	Fan/gas or water
Cooling capacity at 1 l/min	1500 W
Max. flow rate	5 l/min
Max. coolant outlet pressure	3.5 bar
Max. tank capacity	12 l
Welding lead	70 mm ²
Dimensions L x W x H in mm	1100 x 455 x 950
Weight	120 kg
Wire feed speed	0.5 m/min to 24 m/min
Standard roller installation	1.0 mm + 1.2 mm (for steel wire)
Drive type	4-roller (37 mm)
Welding torch connection	Euro torch connector
EMC class	A
Constructed to standards	IEC 60974-1, -2, -5, -10 /  /  / 

NOTE

* Ambient temperature depends on coolant!
Observe the coolant temperature range for the welding torch cooling!

8.2 Taurus 501 Basic FKW

	MIG/MAG		MMA	
Setting range for welding current	5 A–500 A			
Setting range for welding voltage	14.3 V–39.0 V		20.2 V–40.0 V	
Duty cycle	40 °C	25 °C	40 °C	25 °C
60%	500 A	-	500 A	-
65%	-	500 A	-	500 A
100%	430 A	460 A	430 A	460 A
Load alternation	10 min. (60% DC Δ 6 min. welding, 4 min. pause)			
Open circuit voltage	79 V			
Mains voltage (tolerances)	3 x 400 V (-25% to +20%)			
Frequency	50/60 Hz			
Mains fuse (safety fuse, slow-blow)	3 x 32 A			
Mains connection lead	H07RN-F4G6			
Maximum connected load				
Max. connected load	24.9 kVA		25.6 kVA	
Recommended generator rating	34.6 kVA			
Cos ϕ	0.99			
Insulation class/protection classification	H/IP 23			
Ambient temperature*	-25 °C to +40 °C			
Machine/torch cooling	Fan/gas or water			
Cooling capacity at 1 l/min	1500 W			
Max. flow rate	5 l/min			
Max. coolant outlet pressure	3.5 bar			
Max. tank capacity	12 l			
Workpiece lead	95 mm ²			
Dimensions L x W x H in mm	1100 x 455 x 950			
Weight	124 kg			
Wire feed speed	0.5 m/min. to 24 m/min.			
Standard roller installation	1.0 mm + 1.2 mm (for steel wire)			
Drive type	4-roller (37 mm)			
Welding torch connection	Euro torch connector			
EMC class	A			
Constructed to standards	IEC 60974-1, -2, -5, -10 /  / C E			

NOTE

- * Ambient temperature depends on coolant!
Observe the coolant temperature range for the welding torch cooling!

9 Accessories

NOTE

 Performance-dependent accessories like torches, workpiece leads, electrode holders or intermediate hose packages are available from your authorised dealer.

9.1 General accessories

Type	Designation	Item no.
AK300	Wire spool adapter K300	094-001803-00001
DM AR/MIX 35L/MIN	Manometer pressure regulator	094-000009-00000
GH 2X1/4" 2M	Gas hose	094-000010-00001
5POLE/CEE/32A/M	Machine plug	094-000207-00000
HOSE BRIDGE	Tube bridge	092-007843-00000
TYP 1	Frost protection tester	094-014499-00000
KF 23E-10	Coolant (-10 °C), 9.3 l	094-000530-00000
KF 23E-200	Coolant (-10 °C), 200 litres	094-000530-00001
KF 37E-10	Coolant (-20 °C), 9.3 l	094-006256-00000
KF 37E-200	Coolant (-20 °C), 200 l	094-006256-00001
SPL	Sharpener for plastic liners	094-010427-00000
HC PL	Hose cutter	094-016585-00000

9.2 Remote control / connection cable

Type	Designation	Item no.
R11 19POL	Remote control	090-008601-00502
RG11 19POL 5M	Remote control	090-008107-00000
RA5 19POL 5M	Remote control e.g. connection cable	092-001470-00005
RA10 19POL 10M	Remote control e.g. connection cable	092-001470-00010
RA20 19POL 20M	Remote control e.g. connection cable	092-001470-00020

9.3 Options

Type	Designation	Item no.
ON LB Wheels 160x40MM	Retrofit option for locking brake for machine wheels	092-002110-00000
ON Holder Gas Bottle <50L	Holding plate for gas cylinders smaller than 50 litres	092-002151-00000
ON Shock Protect	Ram protection retrofit option	092-002154-00000
ON Hose/FR Mount	Optional holder for tubes and remote control for machines without pivot support	092-002116-00000
ON Filter T/P	Retrofit option contamination filter for air inlet	092-002092-00000
ON Tool Box	Retrofit option tool box	092-002138-00000

10 Replaceable parts

CAUTION



Damage due to the use of non-genuine parts!

The manufacturer's warranty becomes void if non-genuine parts are used!

- Only use system components and options (power sources, welding torches, electrode holders, remote controls, spare parts and replacement parts, etc.) from our range of products!
- Only insert and lock accessory components into the relevant connection socket when the machine is switched off.

10.1 Wire feed rollers

10.1.1 Wire feed rollers for steel wire

Type	Designation	Item no.
FE 2DR4R 0,6+0,8	Drive rollers, 37 mm, steel	092-000839-00000
FE 2DR4R 0,8+1,0	Drive rollers, 37 mm, steel	092-000840-00000
FE 2DR4R 0,9+1,2	Drive rollers, 37 mm, steel	092-000841-00000
FE 2DR4R 1,0+1,2	Drive rollers, 37 mm, steel	092-000842-00000
FE 2DR4R 1,2+1,6	Drive rollers, 37 mm, steel	092-000843-00000
FE/AL 2GR4R	Pressure rollers, smooth, 37mm	092-000844-00000

10.1.2 Wire feed rollers for aluminium wire

Type	Designation	Item no.
AL 4ZR4R 0,8+1,0	Twin rollers, 37 mm, for aluminium	092-000869-00000
AL 4ZR4R 1,0+1,2	Twin rollers, 37 mm, for aluminium	092-000848-00000
AL 4ZR4R 1,2+1,6	Twin rollers, 37 mm, for aluminium	092-000849-00000
AL 4ZR4R 2,4+3,2	Twin rollers, 37 mm, for aluminium	092-000870-00000

10.1.3 Wire feed rollers for cored wire

Type	Designation	Item no.
ROE 2DR4R 0,8/0,9+0,8/0,9	Drive rollers, 37 mm, cored wire	092-000834-00000
ROE 2DR4R 1,0/1,2+1,4/1,6	Drive rollers, 37 mm, cored wire	092-000835-00000
ROE 2DR4R 1,4/1,6+2,0/2,4	Drive rollers, 37 mm, cored wire	092-000836-00000
ROE 2DR4R 2,8+3,2	Drive rollers, 37 mm, cored wire	092-000837-00000
ROE 2GR4R	Pressure rollers, knurled, 37mm	092-000838-00000

10.1.4 Conversion sets

Type	Designation	Item no.
URUE VERZ>UNVERZ FE/AL 4R	Conversion kit, 37mm, 4-roller drive on non-toothed rollers (steel/aluminium)	092-000845-00000
URUE AL 4ZR4R 0,8+1,0	Conversion kit, 37mm, 4-roller drive for aluminium	092-000867-00000
URUE AL 4ZR4R 1,0+1,2	Conversion kit, 37mm, 4-roller drive for aluminium	092-000846-00000
URUE AL 4ZR4R 1,2+1,6	Conversion kit, 37mm, 4-roller drive for aluminium	092-000847-00000
URUE AL 4ZR4R 2,4+3,2	Conversion kit, 37mm, 4-roller drive for aluminium	092-000868-00000
URUE ROE 2DR4R 0,8/0,9+0,8/0,9	Conversion kit, 37mm, 4-roller drive for cored wire	092-000830-00000
URUE ROE 2DR4R 1,0/1,2+1,4/1,6	Conversion kit, 37mm, 4-roller drive for cored wire	092-000831-00000
URUE ROE 2DR4R 1,4/1,6+2,0/2,4	Conversion kit, 37mm, 4-roller drive for cored wire	092-000832-00000
URUE ROE 2DR4R 2,8+3,2	Conversion kit, 37mm, 4-roller drive for cored wire	092-000833-00000

Verschleißteile 4 Rollen-Antrieb Ø = 37mm		St= Stahl Al= Aluminium CrNi= Edelstahl Cu= Kupfer		St= Steel Al= Aluminium CrNi= Stainless steel Cu= Copper	Wear parts 4-Roller drive system Ø = 37mm	
V-Nut: St-, CrNi-, Cu-Draht „Standard V-Nut“, oben unverzahnt und glatt, Rollenbezeichnung: „1,0“			V-groove: St-, CrNi-, Cu wire "Standard V-groove", on the top ungeared and plane, rolls description: "1,0"			
Antriebsrollen- Ø (b): Drive rolls- Ø (b): 0,6 + 0,8 0,8 + 1,0 0,9 + 1,2 1,0 + 1,2 1,2 + 1,6	Ersatzset: Spare set: 092-000839-00000 092-000840-00000 092-000841-00000 092-000842-00000 092-000843-00000					
Gegendruckrollenset (a) Set of counter pressure rolls (a) 092-000844-00000 Umrüstung verzahnt → unverzahnt: conversion geared → ungeared: 092-000845-00000						
U-Nut: Al-, Cu-Draht „Option U-Nut“, oben verzahnt, Rollenbezeichnung: „1,0 A2“			U-groove: Al-, Cu wire "Option U-groove", on the top geared-twin rolls, rolls description: "1,0 A2"			
Antriebsrollen- Ø (a+b): Drive rolls- Ø (a+b): 0,8 + 1,0 1,0 + 1,2 1,2 + 1,6 2,4 + 3,2	Ersatzset: Spare set: 092-000869-00000 092-000848-00000 092-000849-00000 092-000870-00000	Umrüstset: Conversion set: 092-000867-00000 092-000846-00000 092-000847-00000 092-000868-00000				
U-Nut gerändelt: Füll-/Röhrchendraht „Option U-Nut gerändelt“, oben verzahnt, ohne Nut gerändelt, Rollenbezeichnung: „1,0-1,2 R“			knurled U-groove: Cored wire "Option knurled U-groove", on the top geared, without knurled groove, rolls description: "1,0-1,2 R"			
Antriebsrollen- Ø (b): Drive rolls- Ø (b): 0,8 / 0,9 + 0,8 / 0,9 1,0 / 1,2 + 1,4 / 1,6 1,4 / 1,6 + 2,0 / 2,4 2,8 + 3,2	Ersatzset: Spare set: 092-000834-00000 092-000835-00000 092-000836-00000 092-000837-00000	Umrüstset: Conversion set: 092-000830-00000 092-000831-00000 092-000832-00000 092-000833-00000				
Gegendruckrollenset (a): Set of counterpressure rolls (a): 092-000838-00000						

Figure 10-1

11 Appendix A

11.1 Setting instructions

Taurus Basic		SG2/3 G3/4 S11		SG2/3 G3/4 S11		CrNi	
		Ar82/1 8		CO ₂ 100		Ar98/2	
 mm	 mm	 m/min	VOLT	 m/min	VOLT	 m/min	VOLT
0,8	0,8	2,0	15,1	2,0	15,7	2,4	13,6
	1,0	1,5	15,1	1,8	17,4	1,6	13,6
1,0	0,8	2,6	15,4	2,7	16,3	3,0	14,5
	1,0	2,2	15,4	2,1	17,8	2,2	14,2
	1,2	1,2	14,4	1,6	17,8	1,5	13,6
2,0	0,8	5,5	17,4	4,8	19,0	6,9	18,3
	1,0	4,0	18,0	3,2	18,7	4,6	17,2
	1,2	3,2	17,1	2,8	18,7	3,5	16,6
3,0	0,8	8,8	19,2	9,2	26,5	10,5	19,6
	1,0	5,1	18,7	4,6	19,9	6,8	18,4
	1,2	4,3	18,7	3,6	19,6	4,6	17,5
4,0	0,8	10,8	20,8	12,0	28,9	12,8	21,4
	1,0	7,0	19,8	6,3	21,7	8,4	24,0
	1,2	5,0	19,8	4,9	21,7	5,8	18,0
5,0	0,8	14,0	21,9	14,2	30,9	14,6	24,3
	1,0	8,5	21,4	8,2	27,1	9,6	25,9
	1,2	6,2	20,5	6,1	24,3	6,7	19,3
6,0	0,8	17,8	23,2	18,6	32,7	17,5	26,5
	1,0	9,8	24,7	9,5	29,1	11,0	27,6
	1,2	7,8	26,1	7,3	29,7	8,1	23,1
8,0	0,8	22,0	27,1	21,8	34,8	21,0	28,8
	1,0	12,0	28,8	11,6	31,8	13,5	28,8
	1,2	8,5	28,0	9,1	31,8	9,5	27,5
10,0	1,0	14,8	30,6	14,2	34,9	15,5	30,0
	1,2	9,8	29,7	11,3	33,7	11,5	28,9

Figure 11-1

12 Appendix B

12.1 Overview of EWM branches

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