



Welding machine

Taurus 351, 401, 451, 551 Synergic S FDG/FDW

099-005187-EW501

Observe additional system documents!

03.01.2012

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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.

1 Contents

1	Contents	3
2	Safety instructions	5
2.1	Notes on the use of these operating instructions	5
2.2	Explanation of icons	6
2.3	General	7
2.4	Transport and installation	11
2.4.1	Lifting by crane	12
2.4.2	Ambient conditions	13
2.4.2.1	In operation	13
2.4.2.2	Transport and storage	13
3	Intended use	14
3.1	Applications	14
3.1.1	MIG/MAG standard welding	14
3.1.1.1	forceArc	14
3.1.1.2	rootArc	14
3.1.2	TIG (Liftarc) welding	14
3.1.3	MMA welding	14
3.2	Use and operation solely with the following machines	15
3.3	Documents which also apply	15
3.3.1	Warranty	15
3.3.2	Declaration of Conformity	15
3.3.3	Welding in environments with increased electrical hazards	15
3.3.4	Service documents (spare parts and circuit diagrams)	15
4	Machine description – quick overview	16
4.1	Front view	16
4.2	Rear view	18
5	Design and function	20
5.1	General	20
5.2	Installation	21
5.3	Machine cooling	21
5.4	Workpiece lead, general	21
5.5	Welding torch cooling system	22
5.5.1	General	22
5.5.2	List of coolants	22
5.5.3	Adding coolant	23
5.6	Mains connection	24
5.6.1	Mains configuration	24
5.7	Intermediate hose package connection	25
5.8	Shielding gas supply	26
5.8.1	Connecting the shielding gas supply	26
5.9	MIG/MAG welding	28
5.9.1	Connection for workpiece lead	28
5.9.2	Remote control	29
5.10	TIG welding	30
5.10.1	Welding torch connection	30
5.10.2	Connection for workpiece lead	31
5.11	MMA welding	32
5.11.1	Connecting the electrode holder and workpiece lead	32
5.12	Interfaces	33
5.12.1	PC Interfaces	33
6	Maintenance, care and disposal	34
6.1	General	34
6.2	Maintenance work, intervals	34
6.2.1	Daily maintenance tasks	34
6.2.2	Monthly maintenance tasks	34
6.2.3	Annual test (inspection and testing during operation)	34

6.3	Maintenance work	35
6.4	Disposing of equipment.....	35
6.4.1	Manufacturer's declaration to the end user	35
6.5	Meeting the requirements of RoHS.....	35
7	Rectifying faults.....	36
7.1	Resetting JOBS (welding tasks) to the factory settings.....	36
7.1.1	Resetting a single JOB	36
7.1.2	Resetting all JOBS	37
7.2	Error messages (Wire feed unit)	38
7.3	Checklist for rectifying faults	39
7.4	Vent coolant circuit.....	40
8	Technical data.....	41
8.1	Taurus 401	41
8.2	Taurus 351, 451, 551	42
9	Accessories	43
9.1	System components.....	43
9.2	General accessories	43
9.3	Remote control / connection cable.....	43
9.4	Options	44
9.5	Computer communication	44
10	Appendix A.....	45
10.1	Overview of EWM branches.....	45

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!

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/EEG), as well as the associated individual directives.
- In particular, directive (89/655/EEG), 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.

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.

**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



DANGER



Risk of injury during lifting by crane!

When lifting the equipment by crane, serious injuries can be inflicted by falling equipment or add-on units.

- Transport on all lifting lugs at the same time (see Fig. Lifting principle)!
- Ensure that there is an even load distribution! Only use ring chains or suspension ropes of the same length!
- Observe the lifting principle (see Fig.)!
- Remove all accessory components before lifting (e.g. shielding gas cylinders, tool boxes, wire feed units, etc.)!
- Avoid jerky movements when raising or lowering!
- Use shackles and load hooks of the appropriate size!

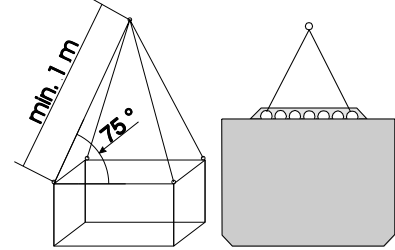


Fig. Lifting principle



Risk of injury due to unsuitable ring screws!

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

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

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:

- -20 °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:

- -25 °C to +55 °C

Relative air humidity

- Up to 90% at 20 °C

3 Intended use

This machine has been manufactured according to the latest developments in technology and current regulations and standards. It must only be operated in line with the instructions on correct usage.

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 **forceArc**

Welding with a powerful forced arc, deep fusion penetration and virtually spatter-free weld seams of the highest quality.

3.1.1.2 **rootArc**

Stable, soft, short arc even with long welding leads; ideal for simple, reliable root welding without pool support, easy gap bridging.

3.1.2 TIG (Liftarc) welding

TIG welding process with arc ignition by means of workpiece contact.

3.1.3 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.

3.2 Use and operation solely with the following machines

NOTE



A suitable wire feed unit (system component) is required in order to operate the welding machine!

Taurus Synergic S	351, 401, 451, 551		
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drive 300C	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
drive 4L	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
drive 4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

3.3 Documents which also apply

3.3.1 Warranty

NOTE



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

3.3.2 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.

3.3.3 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.

3.3.4 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.

4 Machine description – quick overview

4.1 Front view

NOTE

 Coolant tank and quick connect coupling of coolant supply and return are only fitted in machines with water cooling.

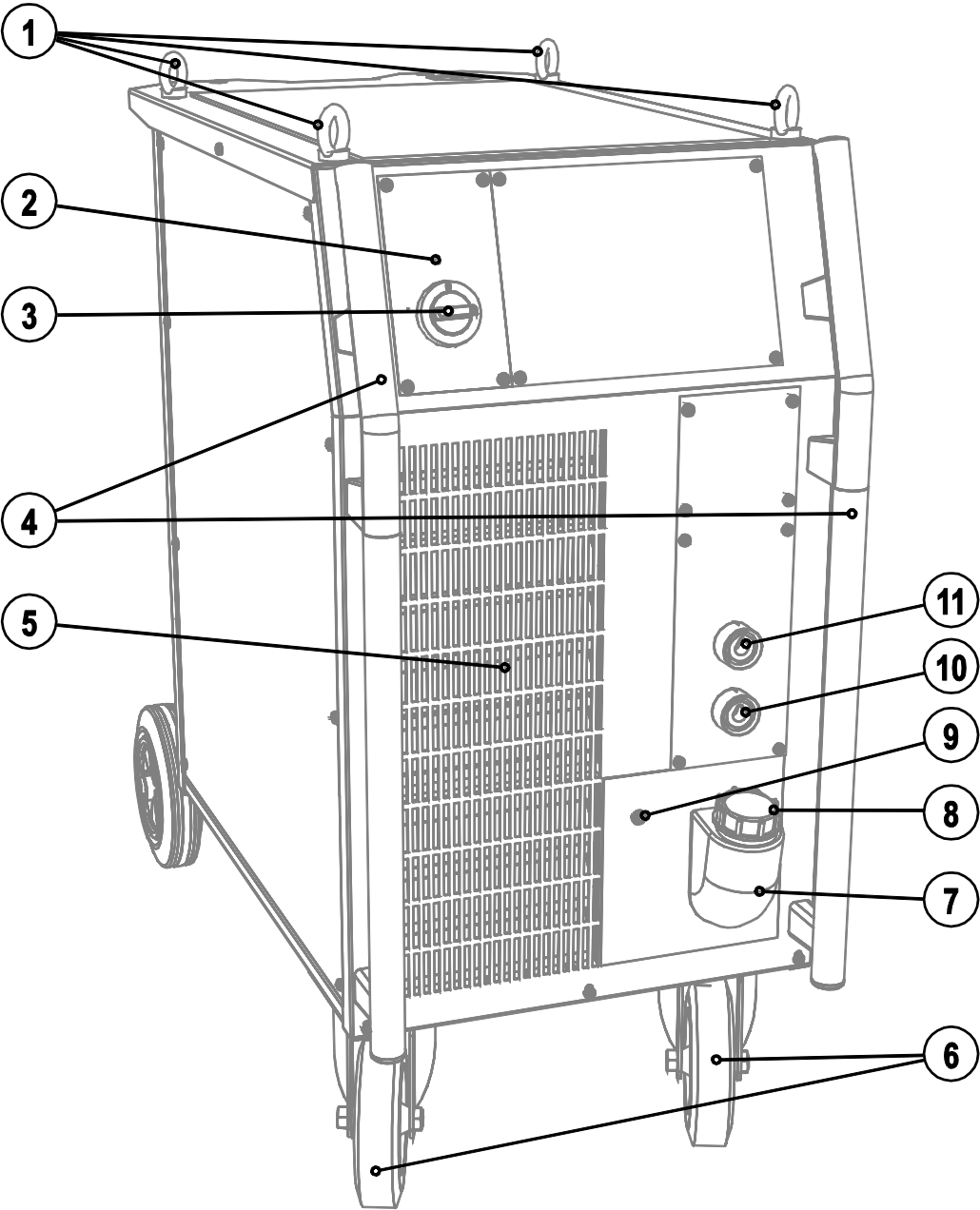







Figure 4-1

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		Wheels, guide castors
7		Coolant tank
8		Coolant tank cap
9		Automatic cut-out of coolant pump key button press to reset a triggered fuse
10		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
11		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

4.2 Rear view

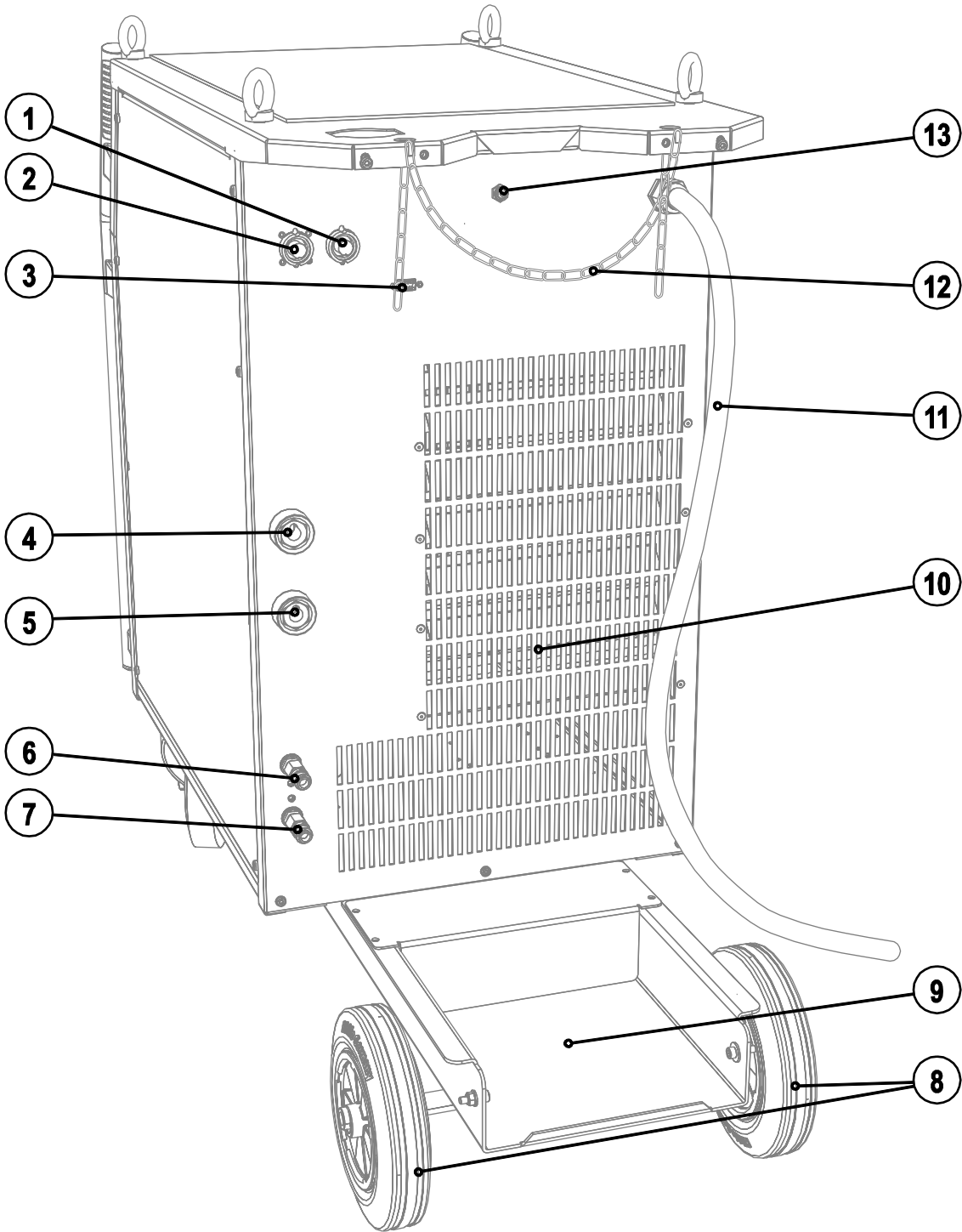







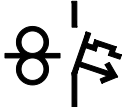


Figure 4-2

Item	Symbol	Description
1		7-pole connection socket (digital) For connecting digital accessory components
2		7-pole connection socket (digital) Wire feed unit connection
3		D-sub connection socket, 9-pole With this machine series for maintenance purposes only (specialist staff)
4		Connection socket, "+" welding current • MIG/MAG welding: Welding current to central connection/torch
5		"-" welding current connection socket • MIG/MAG cored wire welding: Welding current to central connection/torch
6		Quick connect coupling (red) coolant return
7		Quick connect coupling (blue) coolant supply
8		Wheels, fixed castors
9		Bracket for shielding gas cylinder
10		Cooling air outlet
11		Mains connection cable
12		Securing elements for shielding gas cylinder (strap/chain)
13		Key button, Automatic cutout Wire feed motor supply voltage fuse (press to reset a triggered fuse)

5 Design and function

NOTE



Observe documentation of other system components when connecting!

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



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 feed units 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 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 feed unit if no welding torch is fitted!
- Check wire guide at regular intervals!
- Keep all casing covers 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

NOTE



Only with water-cooled welding machines!

5.5.1 General

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.

5.5.2 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
DKF 23E (for plasma machines)	0 °C to +40 °C

5.5.3 Adding coolant

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

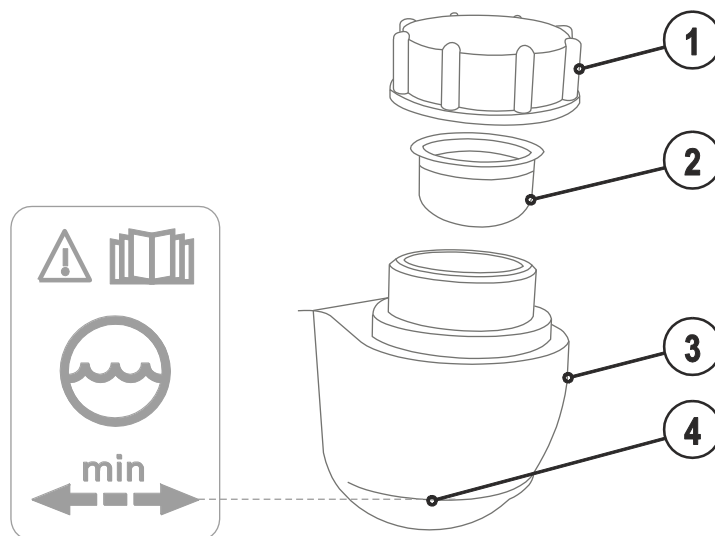


Figure 5-1

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 (any phase sequence for three-phase machines)!
- 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

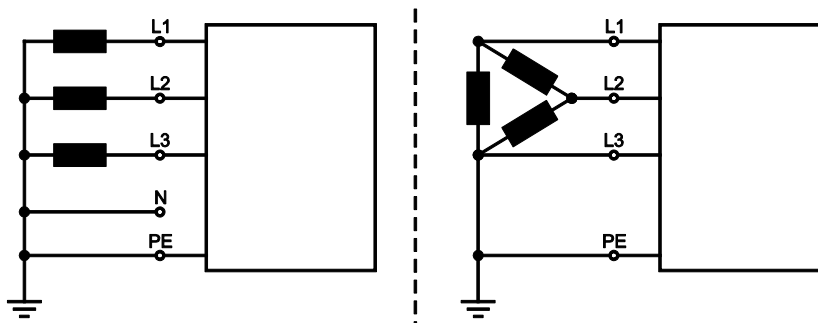


Figure 5-2

Legend

Item	Designation	Colour code
L1	Outer conductor 1	black
L2	Outer conductor 2	brown
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 Intermediate hose package connection

NOTE



Note the polarity of the welding current!

Some wire electrodes (e.g. self-shielding cored wire) are welded using negative polarity. In this case, the welding current lead should be connected to the "-" welding current socket, and the workpiece lead should be connected to the "+" welding current socket.

- Observe the information from the electrode manufacturer!

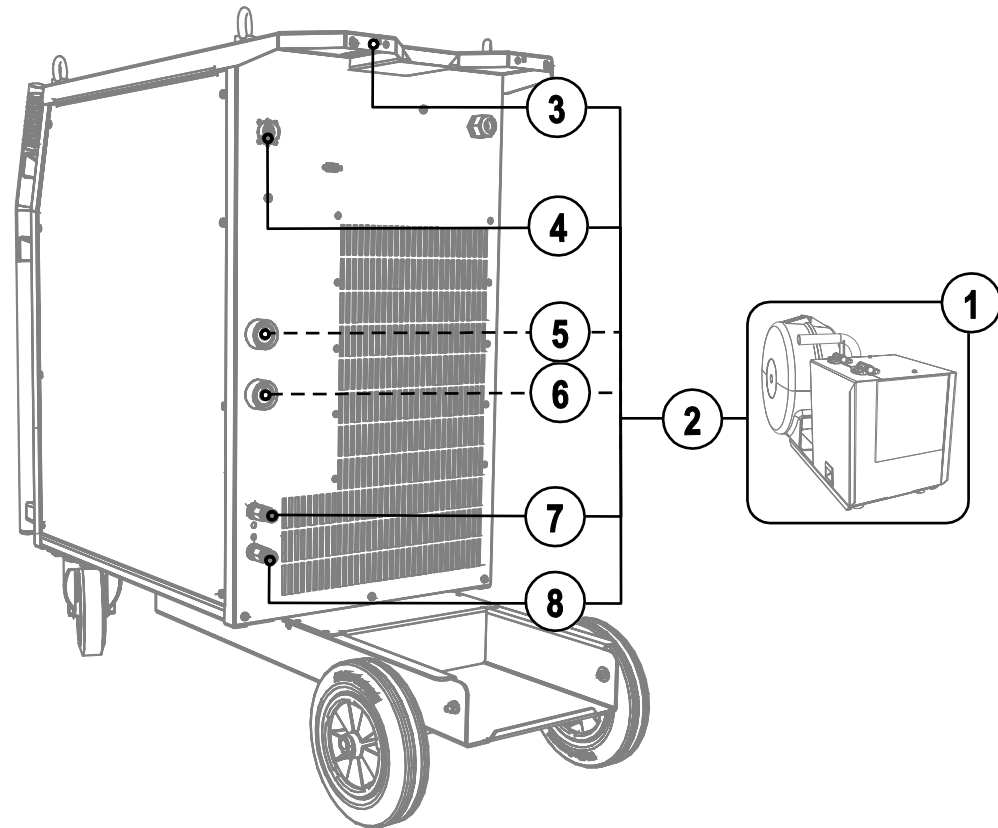







Figure 5-3

Item	Symbol	Description
1		Wire feed unit
2		Intermediate hose package
3		Intermediate hose package strain relief
4		7-pole connection socket (digital) Wire feed unit connection
5		Connection socket, "+" welding current • MIG/MAG welding: Welding current to central connection/torch
6		"-" welding current connection socket • MIG/MAG cored wire welding: Welding current to central connection/torch
7		Quick connect coupling (red) coolant return
8		Quick connect coupling (blue) coolant supply

- Insert the end of the hose package through the strain relief of the hose package and lock by turning to the right.
- Insert the plug on the welding current lead into the welding current connection socket "+" and lock.
- Insert cable plug on the control lead into the 7-pole connection socket and secure with crown nut (the plug can only be inserted into the connection socket in one position).

Where applicable:

- 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).

5.8 Shielding gas supply

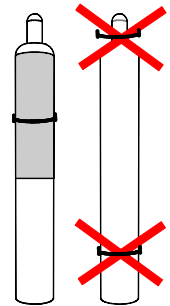
5.8.1 Connecting the shielding gas supply

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.

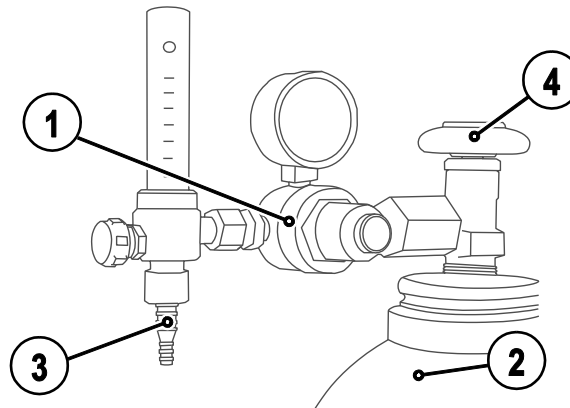


Figure 5-4


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 the gas hose (intermediate hose package) to the pressure regulator ensuring that it is gas tight.

5.9 MIG/MAG welding

5.9.1 Connection for workpiece lead

NOTE



Note the polarity of the welding current!
Some wire electrodes (e.g. self-shielding cored wire) are welded using negative polarity. In this case, the welding current lead should be connected to the "-" welding current socket, and the workpiece lead should be connected to the "+" welding current socket.

- Observe the information from the electrode manufacturer!

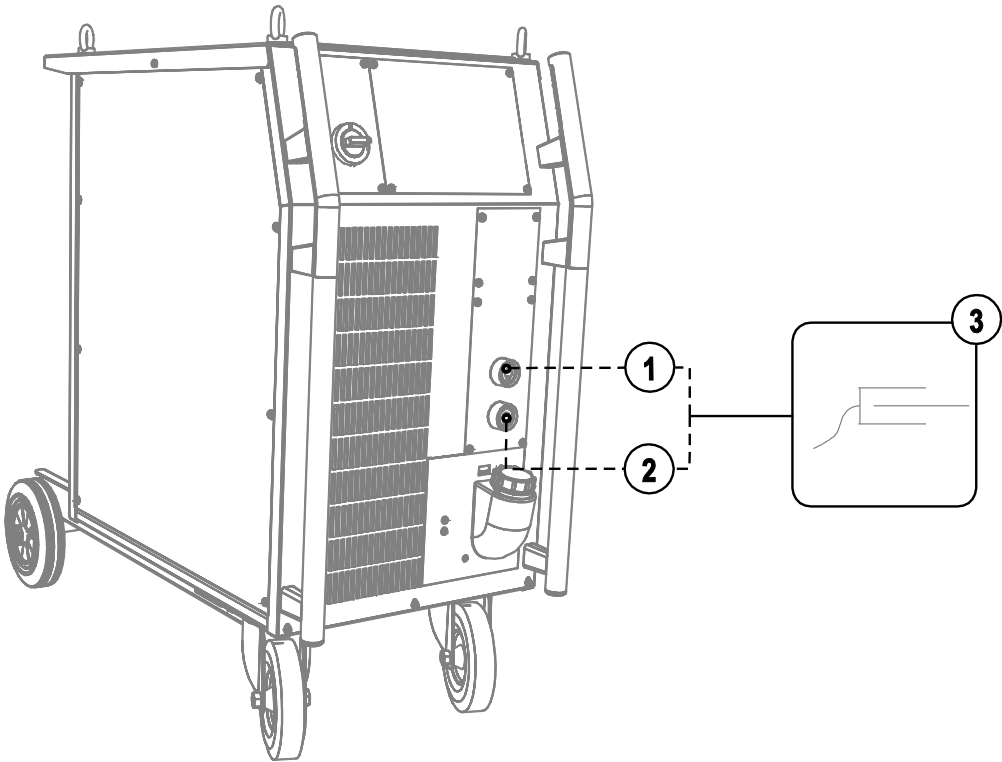



Figure 5-5

Item	Symbol	Description
1	+	Connection socket, "+" welding current <ul style="list-style-type: none">MIG/MAG cored wire welding: Workpiece connection
2	-	"-" welding current connection socket <ul style="list-style-type: none">MIG/MAG welding: Workpiece connection
3		Workpiece

- Insert the plug on the workpiece lead into the "-" welding current connection socket and lock.

5.9.2 Remote control

CAUTION



Damage to the machine due to improper connection!

The remote controls have been developed to be connected to welding machines or wire feed units only. Connecting them to other machines may cause damage to the machines!

- Observe the operating instructions for the welding machine or wire feed unit!
- Switch off the welding machine before connecting!

NOTE



Please note the relevant documentation of the accessory components.


The operation of the remote control and its settings are directly dependent on the configuration of the respective welding machine or wire feed unit. The settings are defined by changeover switches or by setting special parameters (dependent on the control).

- Adjust wire feed speed and arc length correction (welding voltage) in all programs.
- Switch over programs or limit the number of programs.
- Customise the entire program sequence ("Program Steps" mode).
- Switch superpulses on or off.
- Switch over welding types (standard welding/pulse arc welding).

5.10 TIG welding

5.10.1 Welding torch connection

NOTE

 **TIG welding torches to be connected to a Euro torch connector are available in two versions:**

- TIG combi welding torches are connected to the Euro torch connector of the wire feeder and to the (-) welding current plug of the power source.
- TIG welding torches of the EZA version are connected to the Euro torch connector of the wire feeder only. To do so, the welding current lead of the intermediate hose package must be connected to the (-) welding current connection at the rear of the unit!

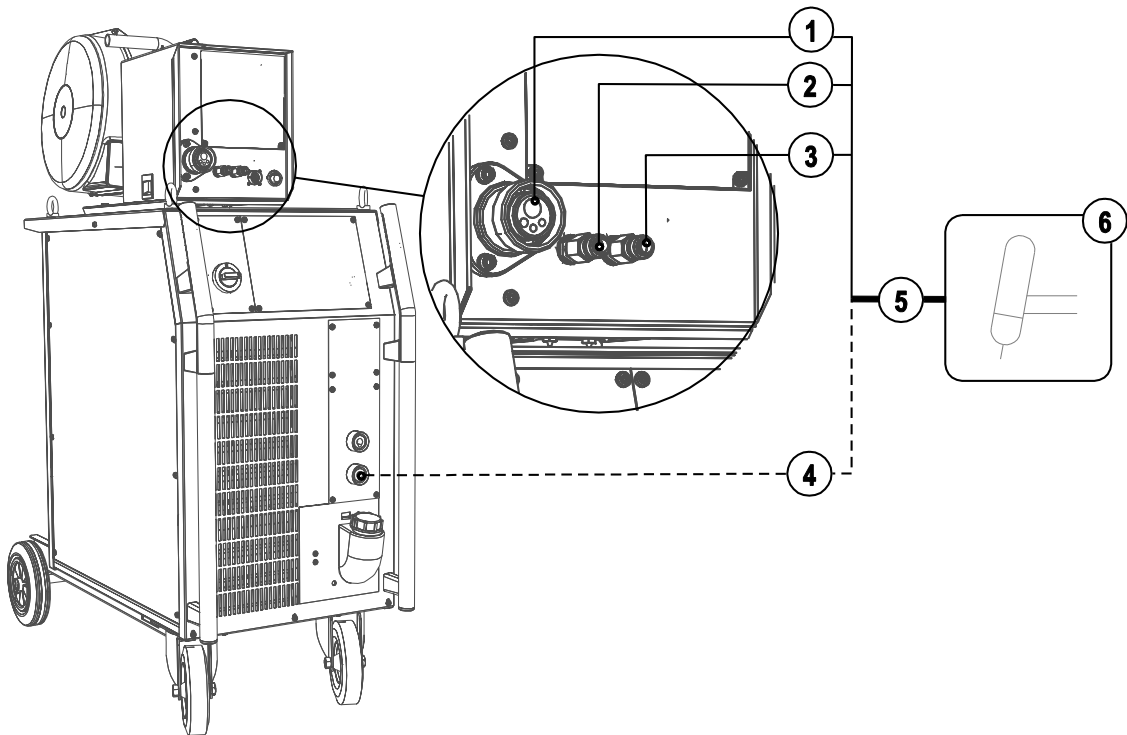







Figure 5-6

Item	Symbol	Description
1		Central connection for welding torch (Euro) Integrated welding current, shielding gas and torch trigger
2		Quick connect coupling (red) coolant return
3		Quick connect coupling (blue) coolant supply
4		"-" welding current connection socket • TIG welding: Welding current connection for welding torch
5		Welding torch hose package
6		Welding torch

- Insert the central plug for the welding torch into the central connector and screw together with crown nut.
- Insert the welding current plug of the combi welding torch into the (-) welding current connection socket and lock into place by turning to the right (only in case of a separate welding current connection).

If fitted:

- 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).

5.10.2 Connection for workpiece lead

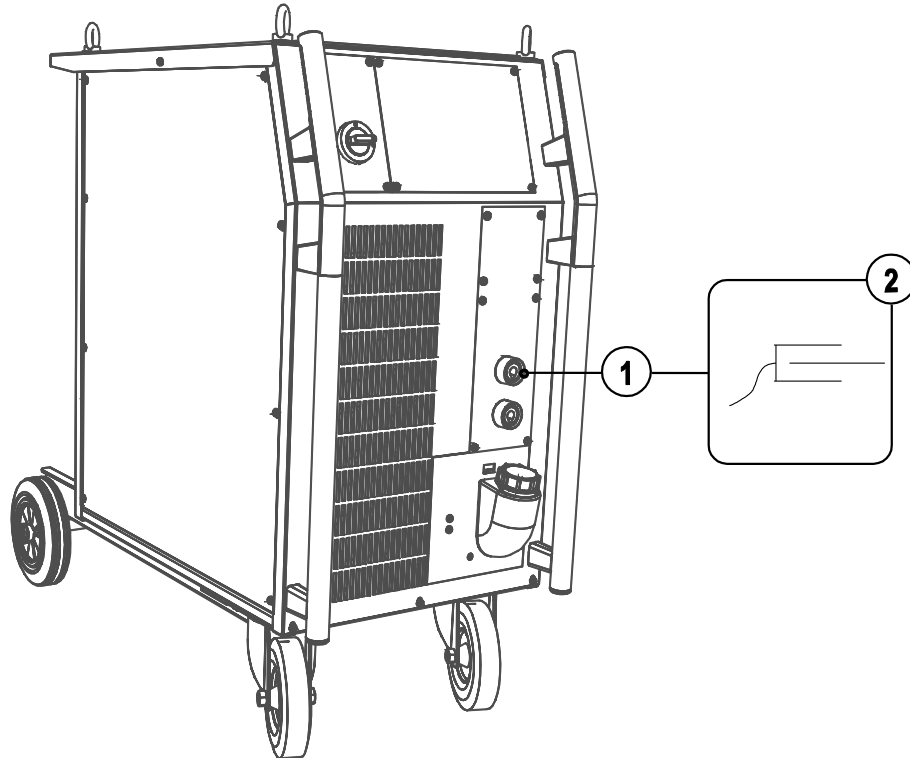




Figure 5-7

Item	Symbol	Description
1		Connection socket, "+" welding current • TIG welding: Workpiece connection
2		Workpiece

- Insert the cable plug on the work piece lead into the "+" welding current connection socket and lock by turning to the right.

5.11 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.

5.11.1 Connecting the electrode holder and workpiece lead

NOTE

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

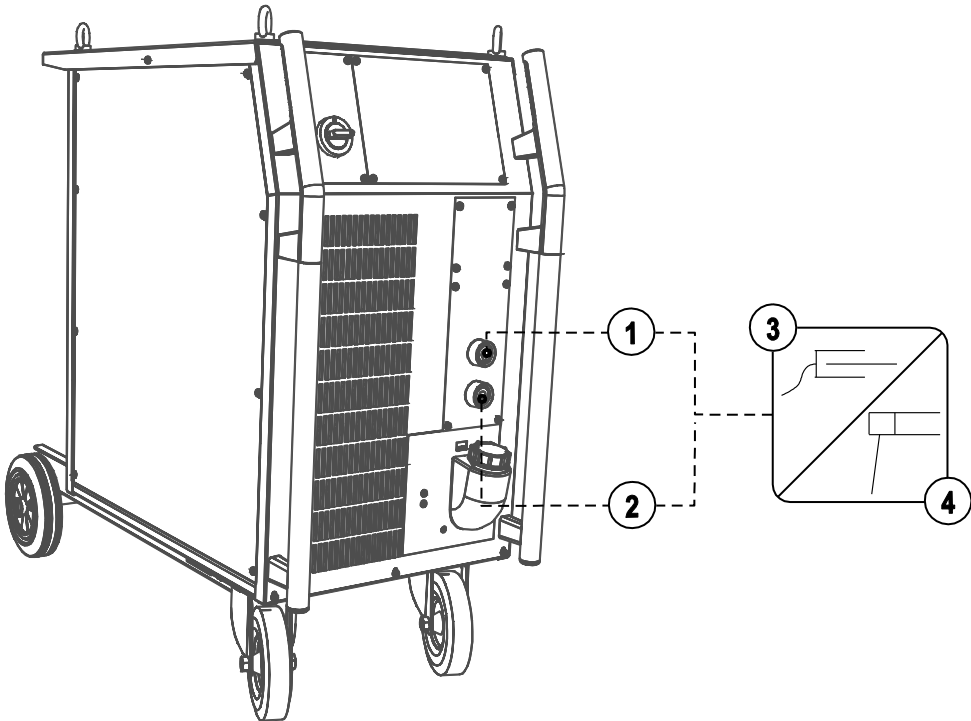


Figure 5-8

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

- 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.

5.12 Interfaces

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.

**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.

5.12.1 PC Interfaces

CAUTION

**Equipment damage or faults may occur if the PC is connected incorrectly!**

Not using the SECINT X10USB interface results in equipment damage or faults in signal transmission. The PC may be destroyed due to high frequency ignition pulses.

- Interface SECINT X10USB must be connected between the PC and the welding machine!
- The connection must only be made using the cables supplied (do not use any additional extension cables)!

PC 300 welding parameter software

Create all welding parameters quickly on the PC and easily transfer them to one or more welding machines (accessories: set consisting of software, interface, connection leads).

Q-DOC 9000 welding data documentation software

(Accessories: set consisting of software, interface, connection leads)

The ideal tool for welding data documentation of, for example: welding voltage and current, wire speed and motor current.

WELDQAS welding data monitoring and documentation system

Network-compatible welding data monitoring and documentation system for digital machines

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

6.2.1 Daily maintenance tasks

- Check correct mounting of the wire spool.
- Mains supply lead and its strain relief
- Welding current cables (check that they are fitted correctly and secured)
- Gas tubes and their switching equipment (solenoid valve)
- Gas cylinder securing elements
- Operating, message, safety and adjustment devices (Functional test)
- Other, general condition

6.2.2 Monthly maintenance tasks

- Casing damage (front, rear and side walls)
- Wheels and their securing elements
- Transport elements (strap, lifting lugs, handle)
- Selector switches, command devices, emergency stop devices, voltage reducing devices, message and control lamps
- Check coolant tubes and their connections for impurities
- 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 HIGHTEC Welding GmbH 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 Resetting JOBs (welding tasks) to the factory settings

NOTE

All customised welding parameters that are stored will be replaced by the factory settings.

Setting can only be carried out at the wire feeder.

7.1.1 Resetting a single JOB

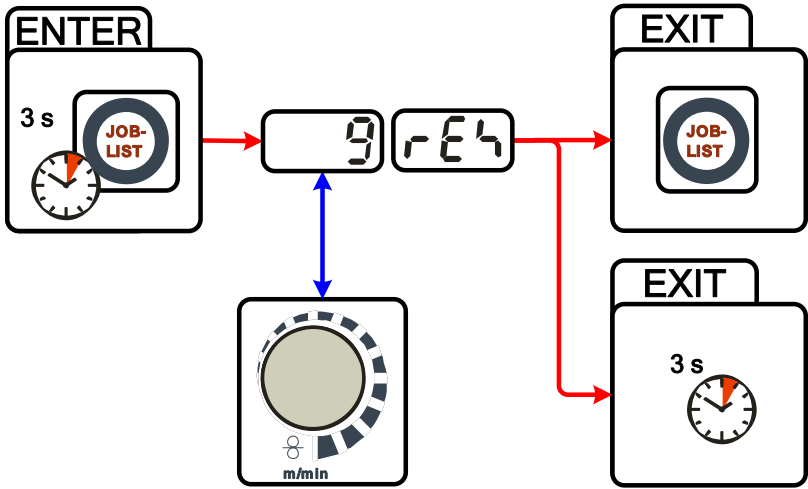


Figure 7-1

Display	Setting/selection
	Reset to factory settings The RESET will be done after pressing the button. The menu will be ended when no changes are done after 3 sec.
	JOB-number (example) The shown JOB will be set to ex works.

7.1.2 Resetting all JOBs

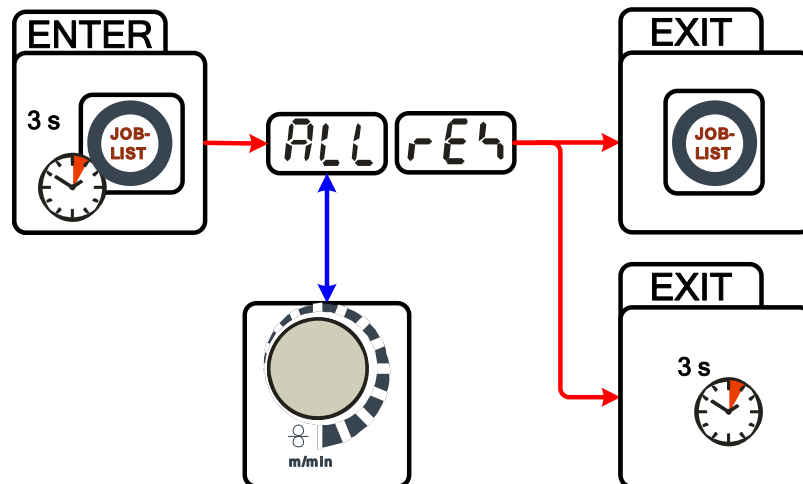
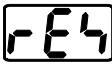




Figure 7-2

Display	Setting/selection
	Reset to factory settings The RESET will be done after pressing the button. The menu will be ended when no changes are done after 3 sec.

7.2 Error messages (Wire feed unit)

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.

Error	Category		Possible cause	Remedy
	a)	b)		
Err 1	-	x	Mains overvoltage	Check the mains voltages and compare with the connection voltages of the welding machine (see Technical Data, chapter 1)
Err 2	-	x	Mains undervoltage	
Err 3	x	-	Welding machine, excess temperature	Allow the machine to cool down (mains switch to "1")
Err 4	-	x	Low coolant level	Top up the coolant Leak in the coolant circuit > rectify the leak and top up the coolant Coolant pump is not working > check excess current release on air cooling unit
Err 5	-	x	Error WF unit, WF motor fault, Speedometer error	Check wire feed unit check wire-feeding no signal from speedometer, > inform Service
Err 7	-	x	Secondary overvoltage	Inverter error > inform Service
Err 8	-	x	Earth fault between welding wire and earth line	Separate the connection between the welding wire and casing or an earthed object
Err 9	x	-	Fast shut-down triggered by BUSINT X10 or RINT X12	Rectify error on robot
Err 10	-	x	Arc interruption triggered by BUSINT X10 or RINT X12	Check wire feed
Err 11	-	x	Ignition fault after 5 s triggered by BUSINT X10 or RINT X12	Check wire feed

Category legend for error reset

- a) The error message will disappear once the error has been rectified.
- b) Errors can only be reset by switching the machine off and back on again.

7.3 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

7.4 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)!

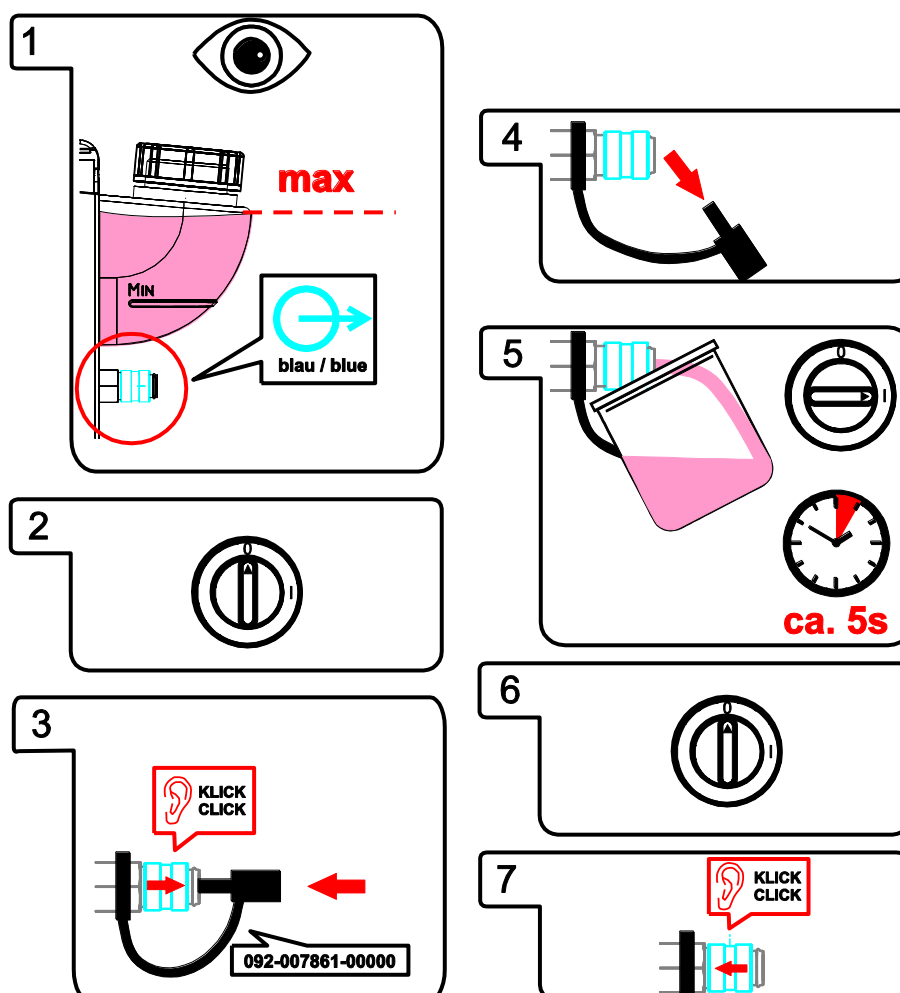


Figure 7-3

8 Technical data

NOTE



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

8.1 Taurus 401

	MMA	TIG	MIG/MAG
Setting range for welding current	5 A - 400 A		
Setting range for welding voltage	20.2 V – 36.0 V	10.2 V – 26.0 V	14.3 V – 34.0 V
Duty cycle at 40 °C (60% DC)	400 A		
Duty cycle at 40 °C (100% DC)	360 A		
Load alternation	10 min (60% DC \wedge 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 35 A		
Mains connection lead	H07RN-F4G4		
Maximum connected load	18.2 kVA	13.1 kVA	17.2 kVA
Recommended generator rating	25 kVA		
cos ϕ	0,99		
Insulation class/protection classification	H/IP 23		
Ambient temperature	-20 °C to +40 °C		
Machine/torch cooling ⁽¹⁾	Fan/water		
Cooling performance at 1 l/min ⁽¹⁾	1500 W		
Maximum flow rate ⁽¹⁾	5 l/min		
Maximum coolant outlet pressure ⁽¹⁾	3.5 bar		
Maximum tank capacity ⁽¹⁾	12 l		
Coolant ⁽¹⁾	Ex works: KF 23E (-10 °C to +40 °C) or KF 37E (-20 °C to +10 °C)		
Welding lead	70 mm ²		
Dimensions L x W x H in mm	1100 x 455 x 1000		
Weight	107 kg		
Weight ⁽¹⁾	118 kg		
EMC class	A		
Constructed to standard	IEC 60974-1, -2, -10 S / C E		

⁽¹⁾ Machine with water cooling (FDW)

8.2 Taurus 351, 451, 551

	351	451	551
Setting range welding current/voltage:			
TIG	5 to 350 A 10,2 to 24,0 V	5 to 450 A 10,2 to 28 V	5 to 550 A 10,2 to 32 V
MMA	5 to 350 A 20.2 to 34.0 V	5 to 450 A 20.2 to 38 V	5 to 550 A 20.2 to 42 V
MIG/MAG	5 to 350 A 14.3 to 31.5 V	5 to 450 A 14.3 to 36.5 V	5 to 550 A 14.3 to 41.5 V
Duty cycle at 25 °C			
60%	-	-	550 A
80%	-	-	520 A
100%	350 A	450 A	450 A
Duty cycle at 40 °C			
60%			550 A
80%	-	450 A	-
100%	350 A	420 A	420 A
Load alternation	10 min. (60% DC \triangle 6 min. welding, 4 min. break)		
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 25 A	3 x 35 A	
Mains connection lead	H07RN-F4G6		
Maximum connected load			
MIG/MAG	13.9 kVA	20.7 kVA	28,8 kVA
TIG	10,6 kVA	15,9 kVA	22,2 kVA
MMA	15.0 kVA	21.6 kVA	29.2 kVA
Recommended generator rating	20.3 kVA	29.1 kVA	39.4 kVA
Cosφ	0.99		
Insulation class/protection classification	H/IP 23		
Ambient temperature	-20 °C to +40 °C		
Machine/torch cooling	Fan / water ⁽¹⁾ or gas		
Cooling capacity at 1 l/min ⁽¹⁾	1500 W		
Maximum flow rate ⁽¹⁾	5 l/min.		
Maximum coolant output pressure ⁽¹⁾	3.5 bar		
Maximum tank capacity ⁽¹⁾	12 l		
Coolant ⁽¹⁾	Ex works: KF 23E (-10 °C to +40 °C) or KF 37E (-20 °C to +10 °C)		
Workpiece lead	70 mm ²		95 mm ²
Dimensions L x W x H in mm	1100 x 455 x 1000		
Weight	118 kg		
Weight ⁽¹⁾	129 kg		
EMC class	A		
Constructed to standards	IEC 60974-1, -2 ⁽¹⁾ , -10 S/C €		

⁽¹⁾ Machines with water cooling (FDW)

9 Accessories

NOTE



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

9.1 System components

Type	Designation	Item no.
Taurus Synergic S drive 4 WE	Wire feed unit, water, Euro central connector	090-005199-00502
Taurus Synergic S drive 4L WE	Wire feed unit, water, Euro central connector	090-005201-00502
Taurus Synergic S drive 200C	Wire feed unit, water, Euro central connector	090-005204-00502
Taurus Synergic S drive 300C	Wire feed unit, water, Euro central connector	090-005205-00502
M drive 4Z W	Wire feeding intermediate drive, water, steel	090-004811-00502

9.2 General accessories

Type	Designation	Item no.
AK300	Adapter for K300 basket coil	094-001803-00001
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
DM1 32L/MIN	Manometer pressure regulator	094-000009-00000
GH 2X1/4" 2M	Gas hose	094-000010-00001
GS16L G1/4" SW 17	Pilot static tube	094-000914-00000
GS25L G1/4" SW 17	Pilot static tube	094-001100-00000
5POLE/CEE/32A/M	Machine plug	094-000207-00000
HOSE BRIDGE	Tube bridge	092-007843-00000

9.3 Remote control / connection cable

Type	Designation	Item no.
R40 7POL	Remote control, 10 programs	090-008088-00000
FRV 7POL 5 m	Extension/connecting cable	092-000201-00003
FRV 7POL 10 m	Extension/connecting cable	092-000201-00000
FRV 7POL 20 m	Extension/connecting cable	092-000201-00001

9.4 Options

Type	Designation	Item no.
ON LB Wheels 160x40MM	Retrofit option for locking brake for machine wheels	092-002110-00000
ON Hose/FR Mount DK 4L	Mounting for hoses and remote controls for machines with 4L pivot support (092-002112-00000 and 092-002113-00000)	092-002117-00000
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
ON Holder Gas Bottle <50L TETRIX XL	Retrofit option holding plate for gas bottle <50 L	092-002151-00000
ON Shock Protect	Ram protection retrofit option	092-002154-00000

9.5 Computer communication

Type	Designation	Item no.
PC300.Net	PC300.Net welding parameter software set incl. cable and SECINT X10 USB interface	090-008265-00000
CD PC300.Net update	PC300.Net Update on CD-ROM	092-008172-00001
WELDQAS1 Station	Stationary welding data monitoring and docu set for one welding machine	090-008215-00000
WELDQAS2 Station	Stationary welding data monitoring and docu set for two welding machines	090-008218-00000
FRV 7POL 5 m	Extension/connecting cable	092-000201-00003
FRV 7POL 10 m	Extension/connecting cable	092-000201-00000
FRV 7POL 20 m	Extension/connecting cable	092-000201-00001
QDOC9000 V2.0	Set consisting of interface, documentation software, connection lead	090-008713-00000
PCV10-L 10M 9POL	Cable between PC/interface	094-001206-00002

10 Appendix A

10.1 Overview of EWM branches

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