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Originalfassung

DE BETRIEBSANLEITUNG **WIG/TIG INVERTER SCHWEISSANLAGE**

Übersetzung / Translation

EN USER MANUAL **WELDER INVERTER DC WIG/TIG**

CE

TISA160 TISA200

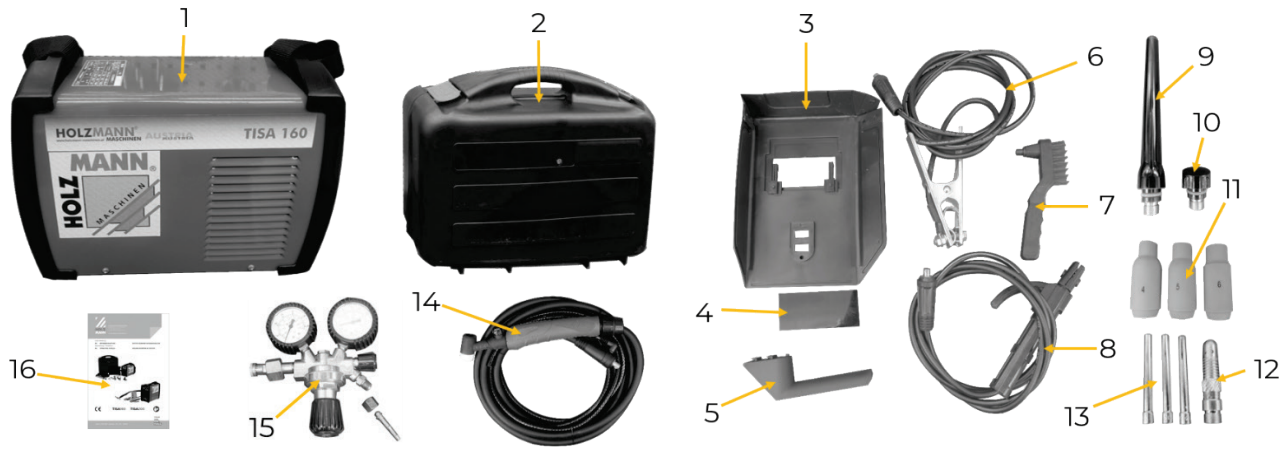
YOUR JOB. OUR TOOLS.

Edition: 16.05.2023 – Revision - 00 – EcC - DE/EN

3 TECHNIK / TECHNICS

3.1 Lieferumfang / Delivery content

TISA160



1	Maschine / machine
2	Tansportkoffer / carrying case
3	Schweißschirm / welding screen
4	Schweißschirmglas / welding screen glass
5	Schweißschirmgriff / handle welding screen
6	Massekabel / earth cable
7	Schlackenhammer mit Bürste / chipping hammer with brush
8	Elektrodenhalter / electrode holder
9	Brennerkappe lang / long back cap
10	Brennerkappe kurz / short back cap
11	Gasdüsen (4, 5, 6) / gas nozzles (4, 5, 6)
12	Spannhülsengehäuse / collet housing
13	Spannhülsen (3x Ø1,6 mm) / collets (3x Ø1,6 mm)
14	Schweißbrenner / welding torch
15	Druckminderner / pressure relief
16	Betriebsanleitung / user manual

TISA200

1	Maschine / machine
2	Schweißbrenner / welding torch
3	Schlauchklemmen / hose clamps
4	Gasschlauch / gas hose
5	Schweißschirm / welding screen
6	Montageteile Schweißschirm / hardware welding screen
7	Schweißschirmgriff / handle welding screen
8	Schweißschirmgläser / welding screen glasses
9	Massekabel / earth cable
10	Schlackenhammer mit Bürste / chipping hammer with brush
11	Elektrodenhalter / electrode holder
12	Brennerkappe lang / long back cap
13	Brennerkappe kurz / short back cap
14	Gasdüsen (5, 6, 7) / gas nozzles (5, 6, 7)
15	Spannhülsengehäuse / collet housing
16	Spannhülsen (Ø1,6, Ø2,0, Ø2,4 mm) / collets (Ø1,6, Ø2,0, Ø2,4 mm)
17	Druckminderner / pressure relief
18	Betriebsanleitung / user manual

3.2 Komponenten / Components

TISA160

1	Schweißstromregler / welding current controller
2	Wahlschalter Schweißart (0 = MMA, 1 = WIG) / selector switch welding mode (0 = MMA, 1 = TIG)
3	Warnleuchte Überlastschutz / warning lamp overload protection
4	Betriebskontrollleuchte / power indicator light
5	Negative (-) Schweißstrombuchse / negative (-) welding current terminal
6	Positive (+) Schweißstrombuchse / positive (+) welding current terminal
7	Ein-Aus-Schalter / ON-OFF switch
8	Schweißbrenner / welding torch
9	Elektrodenhalter / electrode holder
10	Masseklemme / earth clamp
11	Trageriemen / carrying strap
12	Gehäuse / housing

TISA200

1	Schweißstromregler / welding current controller
2	Gasnachströmzeitregler / gas post flow time controller
3	Warnleuchte Überlastschutz / warning lamp overload protection
4	Betriebskontrollleuchte / power indicator light
5	Wahlschalter Schweißart (0 = MMA, 1 = WIG) / Selector switch welding mode (0 = MMA, 1 = TIG)
6	Negative (-) Schweißstrombuchse / negative (-) welding current terminal
7	Gasausgang / gas output
8	Steuerungsanschluss / control plug
9	Positive (+) Schweißstrombuchse / positive (+) welding current terminal
10	Ein-Aus-Schalter / ON-OFF switch
11	Gaseingang / gas input
12	Schweißbrenner / welding torch
13	Elektrodenhalter / electrode holder
14	Masseklemme / earth clamp
15	Trageriemen / carrying strap
16	Gehäuse / housing

3.3 Technische Daten / Technical data

Parameter / parameters	TISA160	TISA200
Spannung (Frequenz) / voltage (frequency)	230 V (50/60 Hz)	230 V (50/60 Hz)
Eingangsleistungskapazität / input power capacity	4,7 KVA	6,0 KVA
Leerlaufspannung / no load voltage	60 – 80 V	70 V
Schutzart / protection mode	IP21S	IP21S
Schutzklasse / protection class	F	F
max. Schutzgasdruck / max shielding gas pressure	5 bar (0,5 Mpa)	5 bar (0,5 Mpa)
WIG Schweißstrombereich / TIG welding current range	10 – 160 A	5 – 200 A
max. Primärstrom I_{1max} / max. rated input current I_{1max}	21 A	28,7 A
max. effektiver Primärstrom I_{1eff} / max. effective input current I_{1eff}	13 A	17,2 A
min. Energieeffizienz der Stromquelle / min. power source efficiency	83 %	83 %
max. Leistungsaufnahme im Leerlaufzustand / max. idle state power consumption	63 W	42 W
WIG Lichtbogenzündung / TIG arc striking	LIFT	HF
MMA Schweißstrombereich / MMA welding current range	10A / 20,4V – 160A / 26,4V	5A / 20,2V – 160A / 26,4V
WIG Schweißstrombereich / TIG welding current range	10A / 10,4V – 160A / 16,4V	5A / 10,2V – 200A / 18V
Schweißkabellänge / welding cable length	3 m	3 m
Masseklemme / earth clamp	200 A	300 A
Elektrodenhalter / electrode holder	200 A	300 A
Gasschlauchlänge / gas hose length	2 m	2 m
Brennerkabellänge / welding torch length	3 m	4 m
Massekabellänge / earth cable length	2,5 m	2,5 m
Elektrodenhalterkabellänge / electrode holder cable length	2,5 m	2,5 m
Anschlusskabel / cord	H05VV-F 3G 1,5mm²	H05VV-F 3G 1,5mm²
Anschlusskabellänge / cord length	2 m	2 m
Gasnachströmzeit / gas post flow time	--	1 – 10 s
Kühlung / cooling	Lüfter / fan	Lüfter / fan
Einschaltdauer (MMA) / duty cycle (MMA)	35% 160A 60% 130A 100% 100A	35% 160A 60% 130A 100% 100A
Einschaltdauer (WIG) / duty cycle (TIG)	35% 160A 60% 130A 100% 100A	35% 200A 60% 160A 100% 130A
Netto-Gewicht (mit Zubehör) / net weight (with equipment)	4,5 (6,5) kg	8,5 (12,5) kg
Brutto-Gewicht / gross weight	12 kg	17 kg
Verpackungsmaße (LxBxH) / packaging dimensions (LxWxH)	590x230x480 mm	420x380x365 mm
Maschinenmaße (LxBxH) / machine dimensions (LxWxH)	310x130x245 mm	325x165x290 mm

(DE) Das Gerät erzeugt einen maximalen Schallleistungspegel <80dB(A) bei Leerlauf sowie in der Kühlungsphase nach Betrieb entsprechend dem maximal zulässigem Arbeitspunkt bei Normlast gemäß EN 60974-1.
Ein arbeitsplatzbezogener Emissionswert kann beim Schweißen (und Schneiden) nicht angegeben werden, da dieser verfahrens- und umgebungsbedingt ist. Er ist abhängig von den verschiedensten Parametern wie z.B. Schweißverfahren (MIG/MAG-, WIG/TIG-Schweißen), der angewählten Stromart (Gleichstrom, Wechselstrom), dem Leistungsbereich, der Art des Schweißgutes, dem Resonanzverhalten des Werkstückes, der Arbeitsplatzumgebung u.a.m.
(EN) The unit generates a maximum sound power level <80dB(A) at no load as well as in the cooling phase after operation according to the maximum permissible operating point at standard load in accordance with EN 60974-1.
A workplace-related emission value cannot be specified for welding (and cutting), as this is process and environment dependent. It depends on various parameters such as the welding process (MIG/MAG-, WIG/TIG- welding), the type of current selected (direct current, alternating current), the power range, the type of material to be welded, the resonance behaviour of the workpiece, the workplace environment, and many more.

11 PREFACE (EN)

Dear Customer!

This operating manual contains information and important notes for safe commissioning and handling of the WELDER INVERTER DC WIG/TIG TISA160 and TISA200, hereinafter referred to as "machine".

The manual is an integral part of the machine and must not be removed. Keep it for later use in a suitable place, easily accessible to users (operators), protected from dust and moisture, and enclose it with the machine if it is passed on to third parties!

Please pay special attention to the chapter Safety!

Due to the constant further development of our products, illustrations and contents may differ slightly. If you notice any errors, please inform us.

Technical changes reserved!

Check the goods immediately after receipt and make a note of any complaints on the consignment note when the delivery person takes them over!

Transport damage must be reported separately to us within 24 hours.

Holzmann Maschinen GmbH cannot accept any liability for transport damage not noted.

Copyright

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12 SAFETY

This section contains information and important notes on safe start-up and handling of the machine.

For your own safety, read these operating instructions carefully before putting the machine into operation. This will enable you to handle the machine safely and prevent misunderstandings as well as personal injury and damage to property. In addition, observe the symbols and pictograms used on the machine as well as the safety and hazard information!

12.1 Intended use of the machine

The machinery is intended exclusively for the following operations: for WIG/TIG (gas-shielded) welding and MMA (electrodes) - welding with direct current of unalloyed and alloyed steels, stainless steels and non-ferrous metals (except aluminium and aluminium alloys), each within the prescribed technical limits.

NOTE

HOLZMANN MASCHINEN GmbH assumes no responsibility or warranty for other activities and any resulting property damage or injuries!

12.1.1 Technical restrictions

The machine is intended for use under the following ambient conditions:

Rel. Humidity:	max. 50 % at 40 °C; max. 90 % at 20 °C
Temperature (Operation)	-10 °C to +40 °C
Temperature (Storage, Transport)	-20 °C to +50 °C

12.1.2 Prohibited Applications / Hazardous misapplications

- Operating the machine without adequate physical and mental aptitude.
- Operating the machine without knowledge of the operating instructions.
- Changes in the design of the machine.
- Operating the machine in rooms that do not have sufficient ventilation.
- Operating the machine in a damp or wet environment.
- Operating the machine in a potentially explosive environment (machine can generate ignition sparks during operation).
- Operating the machine close to flammable materials.
- Operating the machine to defrost pipes.
- Operating the machine close to people who have a pacemaker.
- Operating the machine outside the technical limits specified in this manual.
- Remove the safety markings attached to the machine.
- Modify, circumvent or disable the safety devices of the machine.

The improper use or disregard of the versions and instructions described in this manual will result in the voiding of all warranty and compensation claims against Holzmann Maschinen GmbH.

12.2 User Requirements

The machine is designed for operation by one person. The physical and mental aptitude as well as knowledge and understanding of the operating instructions are prerequisites for operating the machine. Persons who, because of their physical, sensory or mental abilities or their inexperience or ignorance, are unable to operate the machinery safely must not use it without supervision or instruction from a responsible person.

Basic knowledge of welding and metal working especially the correlation of material, electrodes, current and gas flow.

Please note that local laws and regulations may determine the minimum age of the operator and restrict the use of this machine!

Put on your personal protective equipment before working on the machine.

Work on electrical components or equipment may only be carried out by a qualified electrician or under the instruction and supervision of a qualified electrician.

12.3 Safety devices

The machine is equipped with the following safety devices:

	• Overload protection: Warning lamp lights up in case of overload. Let the machine cool down!

12.4 General safety information

To avoid malfunctions, damage and health hazards when working with the machine, in addition to the general rules for safe working, the following points must be observed:

- Before start-up, check the machine for completeness and function. Only use the machine if the guards and other non-parting guards required for machining have been fitted, are in good operating condition and have been properly maintained.
- Choose a level, vibration-free, non-slip surface for the installation location.
- Ensure sufficient space around the machine!
- Ensure sufficient lighting conditions at the workplace to avoid stroboscopic effects.
- Ensure a clean working environment.
- Keep the area around the machine free of obstacles (e.g. dust, chips, cut workpiece parts etc.).
- Only use perfect tools that are free of cracks and other defects (e.g. deformations).
- Remove tool keys and other adjustment tools from the machine before switching it on.
- Check the machine connections for strength before each use.
- Never leave the running machine unattended. Switch off the machine before leaving the working area and secure it against unintentional or unauthorised recommissioning.
- The machine may only be operated, serviced or repaired by persons who are familiar with it and who have been informed of the dangers arising during this work.
- Ensure that unauthorised persons maintain a safe distance from the machine and keep children away from the machine.
- When working on the machine, never wear loose jewellery, loose clothing, ties or long, open hair.
- Hide long hair under hair protection.
- Wear close-fitting protective clothing (flame resistant) and suitable protective equipment (eye protection, welding helm, welding screen, ear protection, welding gloves, stout footwear).
- Metal dust can contain chemical substances that can have a negative effect on health. Work with the machine should only be carried out in well-ventilated rooms. If necessary, use a suitable extraction system.
- If there are connections for dust extraction, make sure that they are properly connected and in working order.
- Always work with care and the necessary caution and never use excessive force.
- Do not overload the machine!
- Shut down the machine and disconnect it from the power supply before carrying out any adjustment, conversion, cleaning, maintenance or repair work
- Before starting any work on the machine, always wait until all tools or machine parts have come to a complete standstill and secure the machine against unintentional restarting.
- Do not work on the machine if it is tired, not concentrated or under the influence of medication, alcohol or drugs!
- Do not use the machine in areas where vapours from paints, solvents or flammable liquids represent a potential danger (danger of fire or explosion!).

12.5 Electrical safety

- Make sure that the machine is grounded.
- Only use suitable extension cables.
- A damaged or tangled cable increases the risk of electric shock. Handle the cable with care. Never use the cable to carry, pull or disconnect the power tool. Keep the cable away from heat, oil, sharp edges or moving parts.
- Proper plugs and outlets reduce the risk of electric shock.
- Water entry into the machine increases the risk of electric shock. Do not expose the machine to rain or moisture.
- The machine may only be used if the power supply is protected by a residual current circuit breaker.
- Use the machine only when the ON-OFF switch is in good working order.
- Before connecting the machine always make sure that it is switches off.

12.6 Special safety instructions for this machine

- Only electrodes (rod electrode, tungsten electrode) suitable for the machine may be used.
- Never immerse the electrode (rod electrode, tungsten electrode) in liquids for cooling.
- Never touch the electrode (rod electrode, tungsten electrode) when the power source is switched on.
- Do not expose yourself or other persons without protection to electric arc or hot metal. Spraying welding pearls may cause burns.
- Let the welding torch nozzle and the material being processed cool down after being operated.
- Do not carry out welding or cutting work on sealed tanks, vessels or pipes unless these have been prepared in accordance with the relevant national and international standards.
- Do not carry out welding on containers that are being or have been used to store gases, propellants, mineral oils or similar products. Residues pose an explosive hazard.
- Workplaces shall be shielded in such a way that persons in the vicinity are protected.
- Keep your face away from welding fumes and gases.
- Ensure an adequate supply of fresh air. Otherwise, a welding helmet with an air supply must be worn.
- Sparks and pieces of hot metal may also get into adjacent areas through small gaps or openings. Take appropriate precautions to prevent any danger of injury or fire.
- A suitable, tested fire extinguisher must be available and ready for use.
- Make sure that you and others are protected with an adequately insulated, dry base or cover for the earth or ground potential. This base or cover must extend over the entire area between the body and the earth or ground potential.
- Do not wrap cables or leads around the body or parts of the body.
- Ensure that the earth clamp is firmly connected to the workpiece as close as possible to the welding point. Make sure that the connection at the contact point is metallically bright!

12.7 Special safety instructions for handling shielding gas cylinders

- Shielding gas cylinders contain gas under pressure and can explode if damaged. As the shielding gas cylinders are part of the welding equipment, they must be handled with the greatest of care.
- Make sure the shielding gas cylinders are used and stored in rooms with sufficient air inlet and outlet.
- A leaking shielding gas cylinder may reduce the share of oxygen in the inhaled air and therefore represent a risk of suffocation.
- Before use, make sure the shielding gas cylinder contains gas designed for the work being done.
- Protect shielding gas cylinders containing compressed gas from excessive heat, mechanical impact, slag, naked flames, sparks and arcs.
- Mount the shielding gas cylinders vertically and secure to prevent them falling over.
- Keep the shielding gas cylinders well away from any welding or other electrical circuits.
- Never hang a welding torch on a shielding gas cylinder.
- Never touch a shielding gas cylinder with an electrode (rod electrode, tungsten electrode)
- Never attempt to weld a pressurised shielding gas cylinder. Risk of explosion!

- Only use shielding gas cylinders suitable for the application in hand, along with the correct and appropriate accessories (pressure relief, hoses and fittings).
- Only use shielding gas cylinders and accessories that are in good condition.
- Turn your face to one side when opening the valve of a shielding gas cylinder.
- Close the shielding gas cylinder valve if no welding.
- If the shielding gas cylinder is not connected, leave the valve cap in place on the cylinder.
- The manufacturer's instructions must be observed as well as applicable national and international regulations for shielding gas cylinders and accessories.

12.8 Hazard Warnings

Despite the intended use, certain residual risks remain.

- Never touch the workpiece during or after welding
  - risk of burns
- Slag can jump off cooling workpieces
  - The specified protective equipment must therefore also be worn when reworking workpieces and steps must be taken to ensure that other people are also adequately protected.
- Risk of electric shock if incorrect electrical connections are used.
- Risk of tripping due to supply lines on the floor.
  - Properly route supply lines and cables

Residual risks can be minimized if the "Safety instructions" and the "Intended use" as well as the operating instructions are observed. Due to the design and construction of the machine, hazardous situations may occur when handling the machines, which are identified in these operating instructions as follows:

DANGER	
	A safety instruction designed in this way indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING	
	Such a safety instruction indicates a potentially hazardous situation which, if not avoided, may result in serious injury or even death.

CAUTION	
	A safety instruction designed in this way indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTE	
	A safety notice designed in this way indicates a potentially hazardous situation which, if not avoided, may result in property damage.

Irrespective of all safety regulations, your common sense and appropriate technical suitability/training are and will remain the most important safety factor for error-free operation of the machine. Safe working primarily depends on you!

13 TRANSPORT

For proper transport, follow the instructions and information on the transport packaging regarding centre of gravity, attachment points, weight, means of transport to be used and prescribed transport position, etc.
Transport the product in its packaging to the place of installation. When lifting, carrying and depositing the load, make sure that you are in the correct posture:

- **Lifting, Depositing** Ensure stability when lifting / setting down (legs hip width). Lift / lower load with bent knees and straight back (like weightlifter). Do not lift / lower the load jerkily.

- **Carrying** Carry load with both hands as close to body as possible. Carry load with straight back.

Always secure the assembled product during transport in the transport position to prevent damage to the product.

- Do not lift or transport operational devices
- Switch off devices before transport or lifting
- Before transporting the device detach the shielding gas cylinder

14 ASSEMBLY

14.1 Preparatory activities

14.1.1 Checking delivery content

Always note visible transport damage on the delivery note and check the machine immediately after unpacking for transport damage or missing or damaged parts. Report any damage to the machine or missing parts immediately to your retailer or freight forwarder.

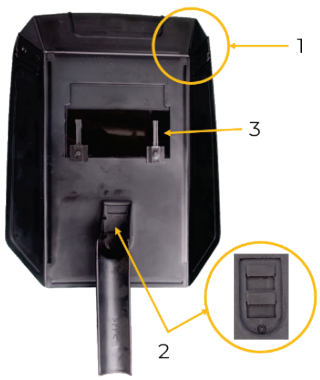
14.1.2 Site requirements

Place the machine on a level (max. permissible tilt angle ≤10°) solid surface. The space required by the machine and the required load-bearing capacity of the subfloor result from the technical data (dimensions, weight) of your machine. When designing the working area around the machine, observe the local safety regulations. When dimensioning the required space, ensure there is an all-round clearance of 0.5 m to ensure that cooling air can flow in and out freely and take into account that the operation of the machine must be possible without restrictions at all times. The selected installation location must ensure a suitable connection to the electrical mains.

Use spot extraction and room extraction. Ensure sufficient fresh air supply - ventilation rate of at least 20 m^3 / hour.

14.1.3 Assembling

The machine is pre-assembled, the parts removed for transport must be assembled (instructions at the respective welding type) and the connection to mains have to be made.



Welding screen:

- Fold the side parts together and snap the rivets into place (1).
- Push the handle into the cutouts and snap both connectors into place (2)
- Insert welding glass (3)

14.2 Electrical connection

WARNING

Dangerous electrical voltage!

→ The machine may only be connected to the power supply and the associated checks carried out by a qualified electrician or under the instruction and supervision of a qualified electrician!

1. Check that the neutral connection and protective earthing are functioning properly
2. Check that the supply voltage and current frequency correspond to the specifications of the machine

NOTE

Deviation of the supply voltage and current frequency

A deviation from the value of the supply voltage of ± 5% is permissible.

A short-circuit fuse must be provided in the power supply system of the machine!

3. Use a supply cable that fulfils the electrical requirements (e.g. H07RN, H05RN) and take the required cross-section of the supply cable from a current carrying capacity table. Pay attention to the measures for protection against mechanical damage.
4. Make sure that the power source is protected by a residual current circuit breaker.
5. Connect the unit only to a properly grounded outlet.
6. When using an extension cable, make sure that it is dimensioned appropriately for the connected load of the machine (the connected load can be found in the technical data). You can find the correlation between cable cross-section and cable length in specialist literature or consult an electrician.

NOTE

- Operation is only permitted with residual current device (RCD) with maximum residual current of 30 mA. Mains fuse 16 A (C).

15 OPERATION

15.1 Basic knowledges

Basically, welding is divided into two types of processes: fusion joint welding (joint without force) and pressure joint welding (joint with force). In fusion welding, two workpieces (usually metals of the same kind) are melted at the joints and joined with or without the addition of filler materials. The energy required for this is supplied from outside. The most common fusion welding processes include electrode welding (MMA) and shielding gas welding (TIG/WIG, MIG, MAG).

Before starting work, thoroughly remove rust and paint from the workpieces and grind them bright. Then place the parts to be welded together (if necessary, fix them with gripping pliers or a screw clamp) and attach the earth cable to a bare spot on the workpiece. First weld the seams with spots only - this way you can still correct the position of the parts if necessary and still prevent the material from warping due to the heat of the arc by fixing the spots. After you have removed the slag from the welding spots, weld the seams through.

Note: Slag will form along the weld and you will have to tap or grind it off. If the weld seam is only slightly raised after removing the slag, you have chosen the optimal welding current. If you finish it with a roughing wheel, the bare metal appears.

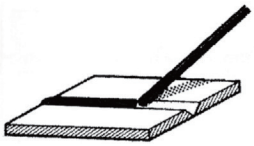
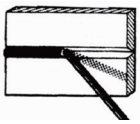
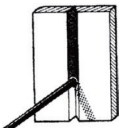
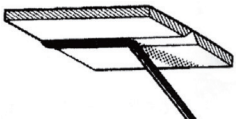
Welding current too weak or too strong: If the seam is only on the surface of the workpiece, the connection between the materials is not strong enough. This means that you have selected a welding current that is too weak. If the welding current is too high, too much material is melted from the workpiece. Thinner workpieces can even burn through.

When igniting, do not hold the electrode anywhere on the workpiece, but always in the area of the later weld seam. This way you avoid cracks and binding errors and the weld seam becomes more even.

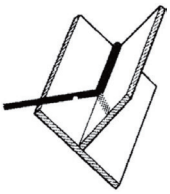
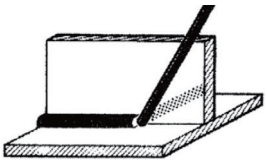
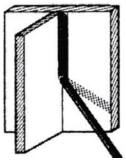
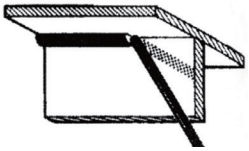
Note: Before working on the actual workpiece, first gain some experience on residual or test pieces.

15.1.1 Weldseams

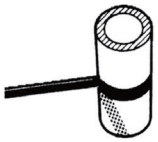
Butt welds:

PA – Flat position 	**PC** – Transverse position 	**PG** – Vertical down position 	**PE** – Overhead position 

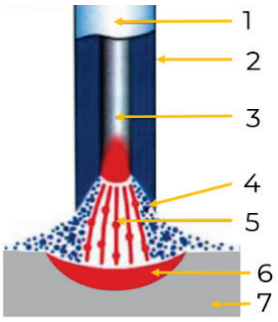
Fillet welds:

PA – Flat position 	**PB** – Horizontal-downhand position 	**PG** – Vertical down position 	**PD** – Horizontal-overhead position 

Pipe-Butt welds:

PA – Pipe: rotated Axis: horizontal Welding: flat 	**PC** – Pipe: fixed Axis: vertical Welding: transverse 	**PF** – Pipe: fixed Axis: horizontal welding: vertical up 	**PG** – Pipe: fixed Axis: horizontal Welding: vertical down 

15.2 MMA-Welding



1) Stick electrode
2) Coating
3) Metalic core
4) Gas / Slag
5) Arc
6) Weld pool
7) Parent material

The electric arc burns between the workpiece and a consumable electrode. The electrode thus simultaneously supplies the filler metal. The stick electrode is clamped in an electrode holder and guided by the welder at the seam. Stick electrodes are generally coated. The coating also melts before the outside air enters. After the weld pool has cooled, slag is removed. Almost all weldable materials can be welded with stick electrodes, e.g. structural steel, boiler steel, tubular steel, cast steel, stainless steel, hardfacing steels, etc.

MMA welding is simple and safe. The compact devices are easy to handle and easy to transport. As no gas is required, welding can be done outdoors, even in windy conditions.

Welding behaviour and seam appearance are largely determined by the coating. Rutile-coated and basic stick electrodes are used. Rutile coated electrodes have a fine droplet material transition

and result in fine-flake, smooth and flat seams. They can be welded to both direct current and alternating current. The slag can be easily removed, in some cases it is self-dissolving. Basic coated electrodes can only be welded with direct current (electrode at the positive pole). Due to the coarser drop transfer, they can be welded well in forced positions. Due to their good gap bridging properties, they are often used for root welds. Compared to the rutile coated stick electrodes, the weld is coarser and the slag is comparatively more difficult to remove. With both types of coating, the arc should be as short as possible.

15.2.1 Choosing the electrodes

Electrode designation according to EN ISO 2560

Codes for the strength and expansion properties of the weld metal

Code	Min. yield strength	Tensile strength	Min. fracture strain
35	355 N/mm²	440 – 570 N/mm²	22 %
38	380 N/mm²	470 – 600 N/mm²	20 %
42	420 N/mm²	500 – 640 N/mm²	20 %
46	460 N/mm²	530 – 680 N/mm²	20 %
50	500 N/mm²	560 – 720 N/mm²	18 %

Codes for the coating types

Type	Coating	Type	Coating
A	acid	**RC**	rutile cellulose
C	cellulose	**RA**	rutile acid
R	rutile	**RB**	rutile basic
RR	thick rutile	**C**	basic

Codes for the impact energy of the weld metal

Code	Temperature for min. notch impact energy 47J
Z	No requirements
A	+20 °C
0	0 °C
2	-20 °C
3	-30 °C
4	-40 °C
5	-50 °C
6	-60 °C

Codes for efficiency and current type

Code	Efficiency		Current type
1	≤105 %		AC and DC
2			DC
3	>105 %	≤ 125%	AC and DC
4			DC
5	>125 %	≤ 160%	AC and DC
6			DC
7	< 160 %		AC and DC
8			DC

Codes for position

Code	Position
1	All positions
2	all positions except vertical-down
3	Butt weld in position PA, fillet weld in position PA and PB
4	Butt weld in position PA, fillet weld in position PA
5	Positions as for 3 plus position PG

Codes for the hydrogen content of the weld metal

Code	Hydrogen content of weld metal
H5	max. 5 ml/100g
H10	max. 10 ml/100g
H15	max. 15 ml/100g

Example:

E	46	3	B	4	2	H5
stick electrode	strength and expansion properties	notch impact energy	coating	current type	position	hydrogen content

Reference values for butt welds on unalloyed and low-alloy sheet materials

Sheet thickness	Welding position	Elektrode type	Ø Electrode in mm	Current intensity in A
4 mm	PA	RA	2,5	75
6 mm			3,2	140
			4,0	180
10 mm		B	3,2	120
			4,0	170
	PF	RB	3,2	95
			4,0	160
15 mm	PA	B	3,2	130
			4,0	170
	PF	B	3,2	90
			4,0	140
20 mm	PA	B	4,0	160
			5,0	220
	PF	B	3,2	90
			4,0	140

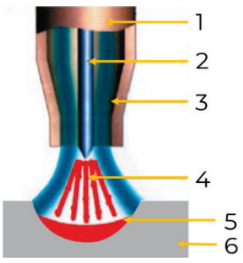
Reference values for fillet welds on unalloyed and low-alloy steels

Eff. throat thickness	Welding position	Electrode type	Ø Electrode in mm	Current intensity in A
2 mm	PG	RC	2,5	70
3 mm	PB	RR	3,2	130
			4,0	180
4 mm				190
		RR160		
5 mm		RR		180
			5,0	240
6 mm		RR160		290
		RR	4,0	180
			5,0	240
8 mm	PF	B	3,2	110
			4,0	140

Reference values for butt welds on pipes made from unalloyed and low-alloy steel

Wall thickness	Welding position	Electrode type	Ø Electrode in mm	Current intensity in A
8 mm	PG	C	4,0	125 - 170
10 mm			4,0	130 - 150
			5,0	175 - 190
			4,0	130 - 180
12 mm			5,0	175 - 200

15.3 WIG/TIG-Welding



1) Gas nozzle
2) Tungsten electrode
3) Shielding gas
4) Arc
5) Weld pool
6) Parent material

In the TIG process (TIG = Tungsten Inert Gas), the electric arc burns between the non-melting tungsten electrode and the workpiece. The arc is very intense and can be guided very well. A separately supplied argon shielding gas protects the arc and the welding zone from entry of the atmosphere. If necessary, filler metal is added manually or with a special cold wire feeder.

Steel, stainless steel, copper, titanium, etc. are welded with direct current. The electrode is connected to the negative pole and ground to a point.

Aluminium, magnesium and their alloys are welded exclusively with alternating current in order to break up the oxide skin. The electrode is blunt. During welding, a round to spherical shape is formed.

The advantages of TIG welding:

The easy handling and a good controllability of the arc allow a very comfortable and clean work. The low scaling of the workpiece, the narrow welding zone, the elimination of flux and the spatter-free arc ensure clean, precise seams without slag inclusions and without significant finishing.

15.3.1 Choosing the electrodes

Fusing behaviour and seam width:

Point angles of 30° - 60° are recommended for good fusing behaviour.

Smaller point angle = deeper fusing; Larger point angle = increased seam width

Electrode designation according to EN 26848

Code	Composition				Identifying color
	Added oxides		Contamination	tungsten	
	% (m/m)	Type	% (m/m)	% (m/m)	
WP	---	---	≤ 0,20	99,8	green
WT 4	0,35 – 0,55	ThO_2		Residue	blue
WT 10	0,80 – 1,20				yellow
WT 20	1,70 – 2,20				red
WT 30	2,80 – 3,20				violet
WT 40	3,80 – 4,20				orange
WZ 3	0,15 – 0,50	ZrO_2			brown
WZ 8	0,70 – 0,90				white
WL 10	0,90 – 1,20	LaO_2			black
WC 20	1,80 – 2,20	CeO_2			grey

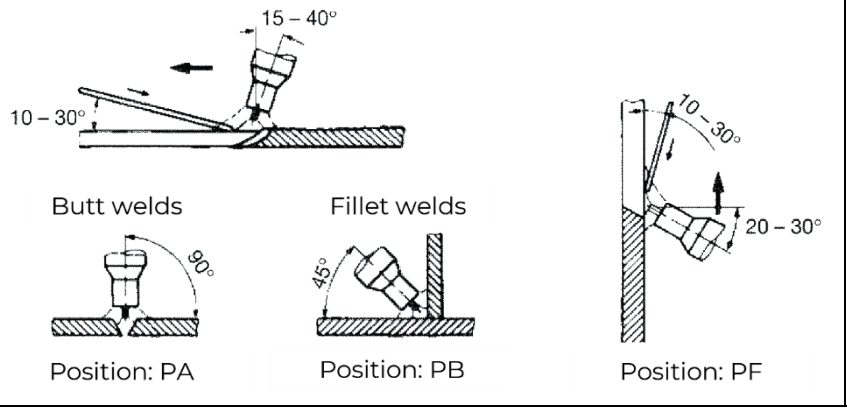
Reference values of current intensity ranges for tungsten electrodes according to EN 26848

Ø Electrode	DC in A				AC in A	
	Minus pole on the electrode		Plus pole on the electrode		Pure tungsten	Tungsten with oxide
	Pure tungsten	ungsten with oxide	Pure tungsten	ungsten with oxide		
1,6 mm	40 – 130	60 – 150	10 – 20	10 – 20	45 – 90	60 – 125
2,0 mm	75 – 180	100 – 200	15 – 25	15 – 25	65 – 125	85 – 160
2,4 mm	130 – 230	170 – 250	17 – 30	17 – 30	80 – 140	120 – 210
3,2 mm	160 – 310	225 – 330	20 – 35	20 – 35	150 – 190	150 – 250
4,0 mm	275 – 450	350 – 480	35 – 50	35 – 50	180 – 260	240 – 350
4,8 mm	400 - 625	500 - 675	50 - 70	50 - 70	240 - 350	330 - 460

15.3.2 Current type

Direct current is normally used for TIG welding. When welding steel and many other metals and alloys, the colder minus pole is positioned against the electrode and the hotter plus pole on the workpiece. The current-carrying capacity and the service life of the electrode are considerably greater with this polarity than with plus pole welding. Alternating current is used with aluminium and aluminium alloys, and with some bronzes, in other words materials which form high-melting or highly viscous oxides.

15.3.3 Notes on operation



In addition to the correct choice of welding parameters, gas nozzle size and shielding gas quantity, the torch guidance and, if necessary, the addition of the filler metal must also be taken into account.

The torch inclination in welding direction is approx. 15° - 40°.

Cleanliness:

The welding seam area must be free of grease, oil and other impurities. Care must also be taken to ensure that the welding filler metal and gloves are clean.

This applies especially when joining aluminium to prevent the build-up of pores.

Welding filler adding:

The end of the welding filler to be melted off must always be added in the shielding gas shield to prevent oxidation. The welding filler must be fed at a small angle (10° - 30°) in relation to the workpiece surface.

Grinding of the tungsten electrode:

The electrode point should be ground in the axial direction. The finer the point surface, the smoother the arc burns and the longer the life time.

When grinding the tungsten electrode, the grinding wheel must run against the electrode point to avoid burning in the brittle material.

Inert gas quantity:

The quantity of shielding gas must be adapted to the respective welding task or the gas nozzle size. After the end of welding, the gas post flow must be long enough to protect the cooling weld pool and the tungsten electrode sufficiently from oxidation. Depending on the current, material and type of shielding gas, approx. 5 - 12 l/min of shielding gas are required for safe gas protection.

Welding parameters (Reference values):

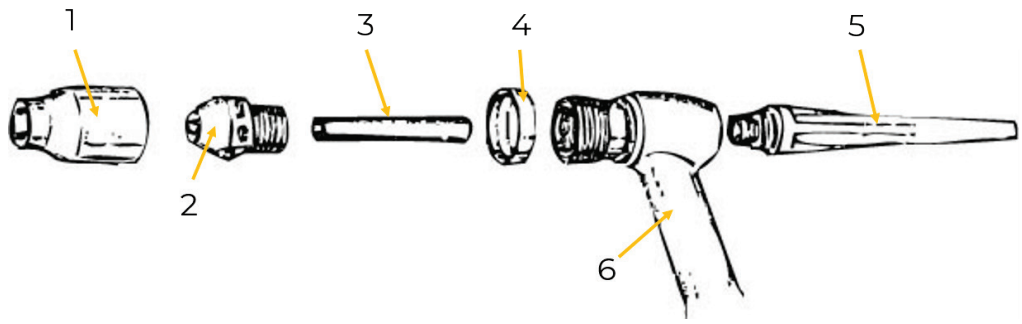
Example for unalloyed steels, direct current and argon

Sheet thickness	Welding current	Ø Electrode	Inert gas quantity
0,9 mm	100 A	1,6 mm	4 l/min
1,5 mm	100 – 140 A	1,6 mm	5 l/min
2,2 mm	140 – 170 A	2,4 mm	7 l/min

15.3.4 Welding torch

The welding torch is the TIG welder's tool. Its function has a significant impact on the weld seam produced. The torch is connected to the welding machine via the hose package. The welding current lead runs through the hose package, along with the shielding gas supply and the control lead which allows various functions to be switched on and off using the switch on the torch.

Design:



1: Gas nozzle	**3:** Collet	**5:** Back cap
2: Collet housing	**4:** Seal	**6:** Handle

15.3.5 Welding filler

The welding filler for TIG welding is usually in the form of a rod. In the case of fully mechanical use of the process, it is fed in the form of a wire through a separate feed unit.

As a rule, the welding fillers are selected to be the same type as the parent metal.

The diameter of the welding filler must be matched to the welding task. It depends on the material thickness and thus also on the diameter of the tungsten electrode.

Sheet thickness	Ø Tungsten electrode	Gas nozzle size no.	Ø Welding filler
1 mm	1,0 mm	4	1,6 mm
2 mm	1,6 mm	4 – 6	2,0 mm
3 mm	1,6 mm	6	2,5 mm
4 mm	2,4 mm	6 – 8	3,0 mm
5 mm	2,4 – 3,0 mm	6 – 8	3,2 mm
6 mm	3,2 mm	8	4,0 mm
8 mm	4,0 mm	8 - 10	4,0 mm

15.4 Operating the machine

WARNING

Danger due to electrical voltage!

Handling the machine with connected power supply may result in serious injury or death.

→ Always disconnect the machine from the power supply before maintenance or repair work and secure it against unintentional reconnection.

CAUTION

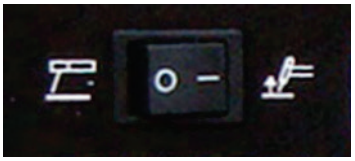
Danger of personal injury and damage to property due to electric shock.

As soon as the machine is switched on, the electrode is live. Make sure that the electrode does not touch any persons or electrically conductive or earthed parts (e.g. housing, etc.).

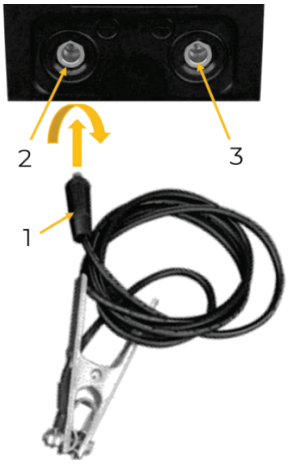
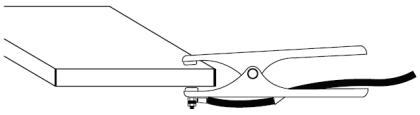
15.4.1 Switch the machine on and off

	Position I: Switch on Position 0: Switch off

15.4.2 Select welding mode

	Position I: TIG-Welding Position 0: MMA-Welding

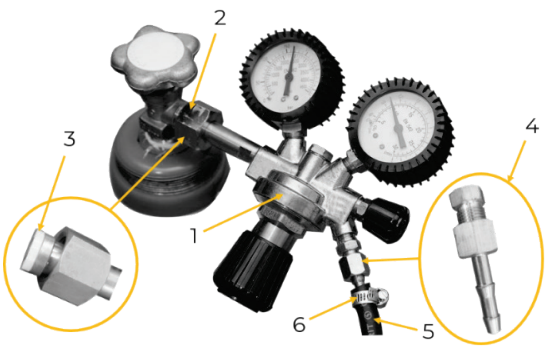
15.4.3 Connecting the earth clamp

	Plug the earth cable (1) into the (-) welding current terminal (2) or into the (+) welding current terminal (3) depending on the electrode type and welding mode and lock it by turning.
	Use the earth clamp to make a connection with the workpiece

15.4.4 Assembly pressure relief

NOTE

All valves of the pressurized cylinder and the pressure relief must be closed during assembly!

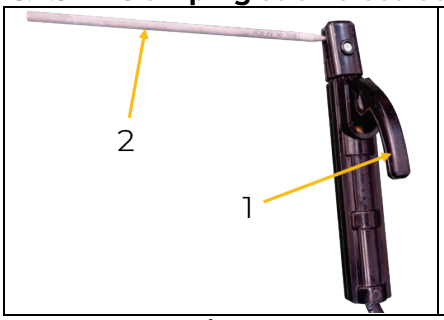


- Screw the pressure relief valve (1) onto the connection of the gas bottle (2). Pay attention to the seal (3)!
- Screw on the gas hose connection (4)
- Push on the gas hose (5) and fix it with the hose clamp (6).

NOTE

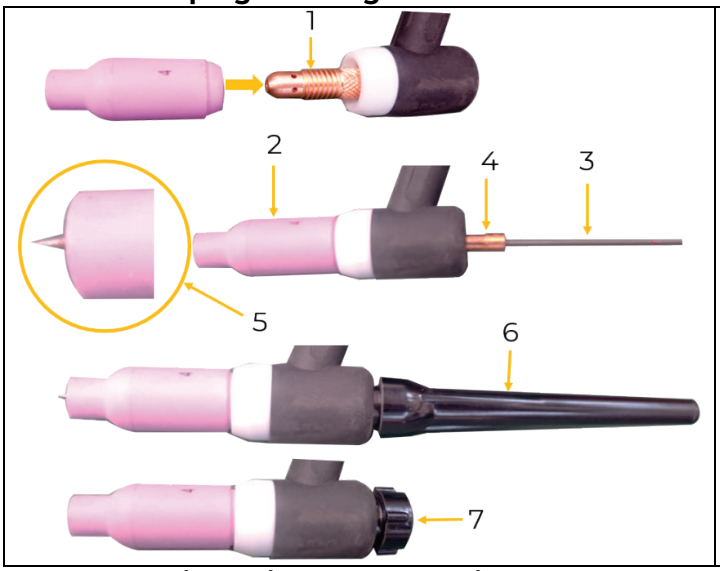
Absolute cleanliness must be ensured during assembly!

15.4.5 Clamping stick electrodes



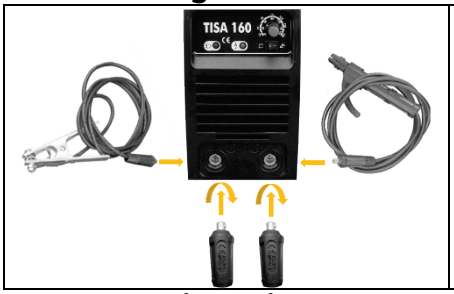
- Open the electrode holder by pushing the handle (1).
- Insert electrode (2)
- Release the handle to clamp

15.4.6 Clamping the tungsten electrode



- Screw in the collet housing (1)
- Put on gas nozzle (2)
- Insert the electrode (3) into the collet (4) and insert it into the torch
- Adjust the length of the electrode point (5)
- Depending on the length of the electrode, screw on the long (6) or short (7) back cap

15.4.7 Configuration MMA-Welding TISA160



- Plug the earth cable into the (-) welding current terminal or into the (+) welding current terminal depending on the electrode type and lock it by turning
- Depending on the electrode type, insert the current plug of the electrode holder into the free current socket with opposite polarity and lock it by turning

NOTE: For information on whether the stick electrodes are to be welded at the positive pole or at the negative pole, refer to the manufacturer's instructions for the electrodes.

15.4.8 Configuration MMA-Welding TISA200

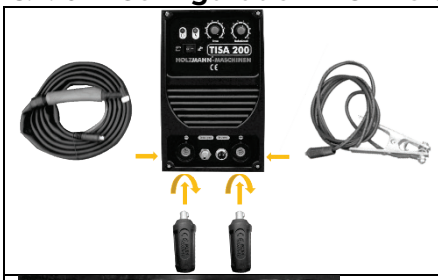
- Plug the earth cable into the (-) welding current terminal or into the (+) welding current terminal depending on the electrode type and lock it by turning
- Depending on the electrode type, insert the current plug of the electrode holder into the free current socket with opposite polarity and lock it by turning

NOTE: For information on whether the stick electrodes are to be welded at the positive pole or at the negative pole, refer to the manufacturer's instructions for the electrodes.

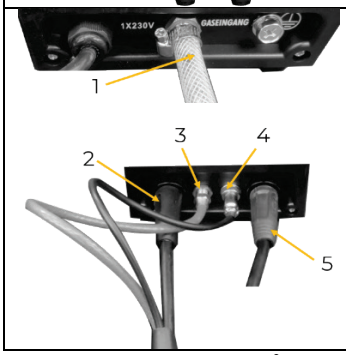
15.4.9 Configuration TIG-Welding TISA160

- Plug the earth cable into the (+) welding current terminal and lock it by turning
- Insert the plug of the welding torch into the (-) welding current terminal and lock it by turning

15.4.10 Configuration TIG-Welding TISA200



- Plug the earth cable into the (+) welding current terminal and lock it by turning
- Insert the plug of the welding torch into the (-) welding current terminal and lock it by turning
- Connect pressure relief valve to machine with gas hose



- Connect the gas hose (1) to the gas inlet and fix it with a hose clamp

Connection details:

- Power plug of the welding torch (2)
- Gas hose of the welding torch (3)
- Control cable of the welding torch (4)
- Power plug earth cable (5)

15.4.11 MMA-Welding TISA160

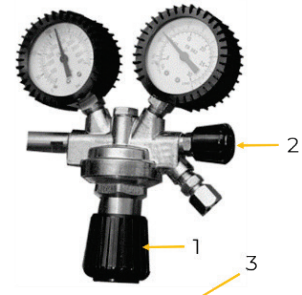
- Switch on the machine
- Power indicator light lights up (warning lamp overload protection goes out after approx. 5s)
- Select welding mode MMA-Welding
- Set welding current with welding current controller
- Perform welding process

15.4.12 MMA-Welding TISA200

- Switch on the machine
- Power indicator light lights up
- Select welding mode MMA-Welding
- Set welding current with welding current controller
- Perform welding process

15.4.13 TIG-Welding TISA160

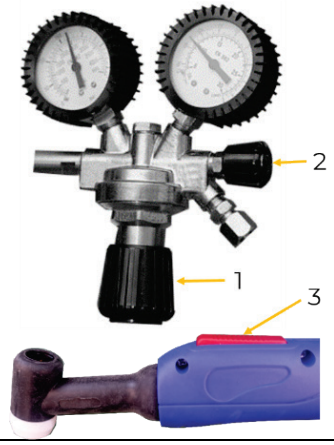
- Switch on the machine
- Power indicator light lights up (warning lamp overload protection goes out after approx. 5s)
- Select welding mode TIG-Welding
- Set welding current with welding current controller



- Set the desired protective gas flow rate on the pressure relief (1) and open the valve (2)

- Open gas control knob (3)
- Arc is ignited on contact with the workpiece
- Perform welding process

15.4.14 TIG-Welding TISA200



- Switch on the machine
- Power indicator light lights up
- Select welding mode TIG-Welding
- Set welding current with welding current controller
- Set gas post flow time with gas post flow time controller
- Set the desired protective gas flow rate on the pressure relief (1) and open the valve (2)
- Ignite the arc on the torch by pressing the button (3)
- Perform welding process

16 CLEANING, MAINTENANCE, STORAGE, DISPOSAL

WARNING

Danger due to electrical voltage!
Handling the machine with connected power supply may result in serious injury or death.
→ Always disconnect the machine from the power supply before maintenance or repair work and secure it against unintentional reconnection.

16.1 Cleaning

Regular cleaning guarantees the long service life of your machine and is a prerequisite for its safe operation.

NOTE

Incorrect cleaning products can attack the finish of the machine. Do not use any solvents, nitro thinners or other cleaning products that could damage the machine's finish.
Observe the specifications and instructions of the cleaning agent manufacturer.

Therefore, clean the device after each use of chips and dirt particles.

16.2 Maintenance

The machine is low-maintenance and only a few parts have to be serviced. Nevertheless, any faults or defects which may affect the safety of the user must be rectified immediately!

- Before each start-up, make sure that the safety devices are in perfect condition and function properly.
- Check all connections for tightness at least once a week.
- Regularly check that the warning and safety labels on the machine are in perfect and legible condition.
- Only use original spare parts recommended by the manufacturer.

16.2.1 Inspection and maintenance plan

The type and degree of machine wear depends to a large extent on the operating conditions. The following intervals apply when the machine is used within the specified limits:

Interval	Component	Action
Before start of work or after every maintenance or servicing	Cable and plug	Check for damage and replace if necessary
Monthly	Screw connections	Check for tightness
If needed	Cooling holes	Cleaning

16.3 Storage

NOTE

Improper storage can damage and destroy important components. Only store packed or unpacked parts under the intended environmental conditions!

Store the machine in a dry, frost-proof and lockable place when not in use. Disconnect the machine from the power supply. Make sure that unauthorised persons and especially children do not have access to the machine.

16.4 Disposal

Observe the national waste disposal regulations. Never dispose of the machine, machine components or equipment in residual waste. If necessary, contact your local authorities for information on the disposal options available.
If you buy a new machine or an equivalent device from your specialist dealer, he is obliged in certain countries to dispose of your old machine properly.

17 TROUBLESHOOTING

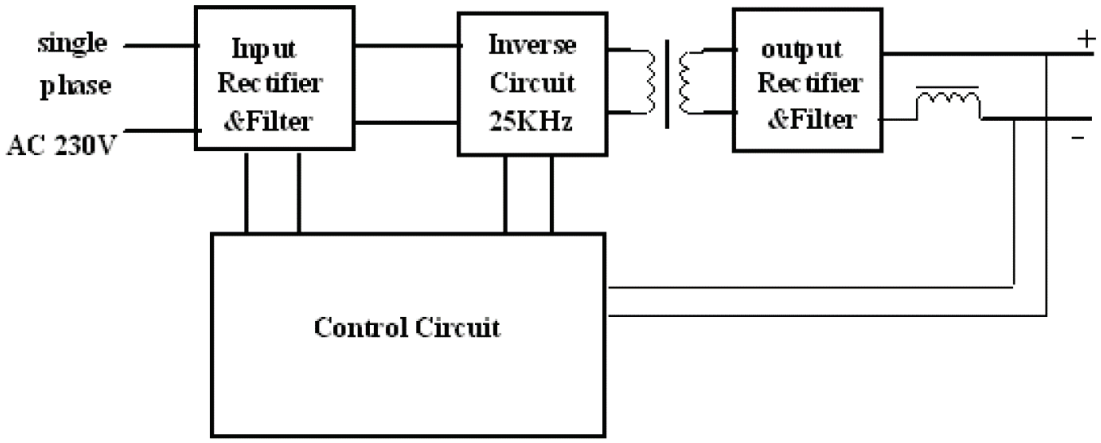
WARNING

Danger due to electrical voltage!
Handling the machine with connected power supply may result in serious injury or death.
→ Always disconnect the machine from the power supply before maintenance or repair work and secure it against unintentional reconnection.

Many possible sources of error can be excluded in advance if the machine is properly connected to the power supply.
If you are unable to carry out necessary repairs properly and/or do not have the required training, always consult a specialist to solve the problem.

Fault	Possible cause	Correction
Machine does not start	Power supply incorrect	Check all electrical connections
	Defective switches	Exchange
	Fuse or contactor broken	Change fuse, activate contactor
Overheated machine	Overload	Let the machine cool down
No welding current	Earth connection incorrect	Ensure good contact at earth clamp
No gas flow	Gas cylinder empty	Change gas cylinder
	Gas hose unmounted or defective	Change or mount gas hose
	Pressure relief defective	Change pressure relief
	Welding torch defective	Change welding torch

18 BLOCKSCHALTBILD / SYSTEMTIC BLOCK DIAGRAMM



19 ERSATZTEILE / SPARE PARTS

19.1 Ersatzteilbestellung / Spare parts order

(DE) Mit HOLZMANN-Ersatzteilen verwenden Sie Ersatzteile, die ideal aufeinander abgestimmt sind. Die optimale Passgenauigkeit der Teile verkürzen die Einbauzeiten und erhöhen die Lebensdauer.

HINWEIS

Der Einbau von anderen als Originalersatzteilen führt zum Verlust der Garantie! Daher gilt: Beim Tausch von Komponenten/Teile nur vom Hersteller empfohlene Ersatzteile verwenden.

Bestellen Sie die Ersatzteile direkt auf unserer Homepage – Kategorie ERSATZTEILE.

oder kontaktieren Sie unseren Kundendienst

- über unsere Homepage – Kategorie SERVICE – ERSATZTEILANFORDERUNG,
- per Mail an service@holzmann-maschinen.at.

Geben Sie stets Maschinentype, Ersatzteilnummer sowie Bezeichnung an. Um Missverständnissen vorzubeugen, empfehlen wir mit der Ersatzteilbestellung eine Kopie der Ersatzteilzeichnung beizulegen, auf der die benötigten Ersatzteile eindeutig markiert sind falls sie nicht über den Online-Ersatzteilkatalog anfragen.

(EN) With original HOLZMANN spare parts you use parts that are attuned to each other shorten the installation time and elongate your products lifespan.

NOTE

The installation of parts other than original spare parts leads to the loss of the guarantee! Therefore: When replacing components/parts, only use spare parts recommended by the manufacturer.

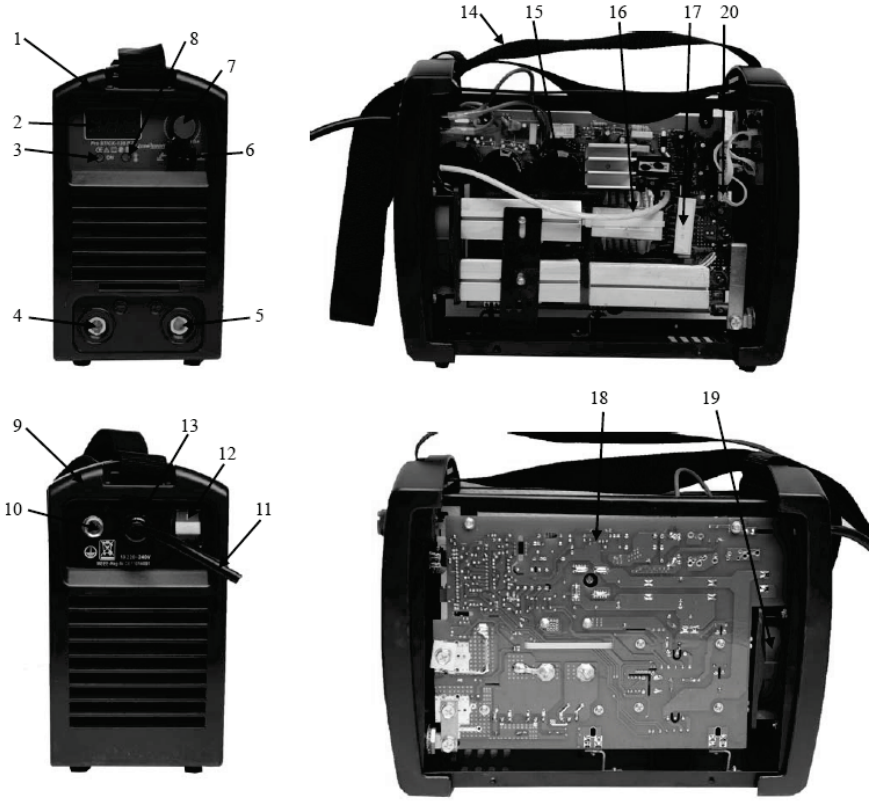
Order the spare parts directly on our homepage – category SPARE PARTS or contact our customer service

- via our Homepage - category SERVICE - SPARE PARTS REQUEST,
- by e-mail to service@holzmann-maschinen.at.

Always state the machine type, spare part number and designation. To prevent misunderstandings, we recommend that you add a copy of the spare parts drawing with the spare parts order, on which the required spare parts are clearly marked especially when not using the online-spare-part catalogue.

19.2 Ersatzteilliste / Spare parts list

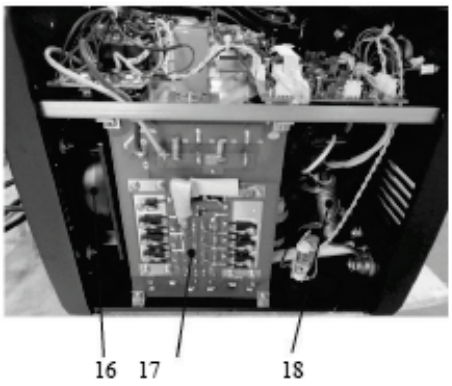
TISA 160

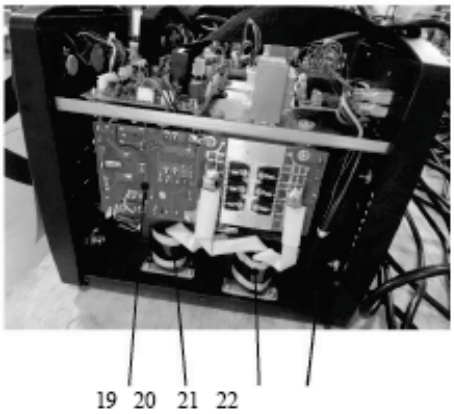


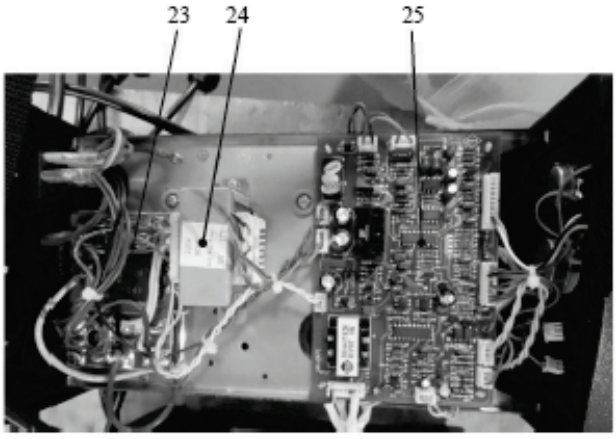
No.	Description	No.	Description
1	Front plastic panel	11	Cord
2	Display	12	ON-OFF switch
3	Power indicator light	13	Cord fixed ring
4	Negative (-) welding current terminal	14	Carrying strap
5	Positive (+) welding current terminal	15	Capacitor
6	Selector switch welding mode (MMA/TIG)	16	Inverter transformer
7	Welding current controller	17	Output reactor
8	Warning lamp overload protection	18	Main inverter PCB
9	Rear plastic panel	19	Cooling fan
10	Earth bolt	20	Lift TIG PCB

Druckminderer / pressure relief
Schweißbrenner-Schlauchpacket / torch
Ersatzteilset / spare part set
Elektrodenhalter + 2,5m Kabel / electrode holder 200A + 2,5m cable
Elektrodenhalter / electrode holder 200A
Masseklemme / earth clamp 200A
Lüfterrad / fan

TISA200







No.	Description	No.	Description
1	Front plastic panel	14	Gaas input
2	Selector switch welding mode (MMA/TIG)	15	Earth bolt
3	Negative (-) welding current terminal	16	Cooling fan
4	Gas output	17	IGBT inverter board
5	Control plug	18	HF coil
6	Positive (+) welding current terminal	19	Output board

7	Gas post flow time controller	20	Reactor
8	Welding current controller	21	Main transformer
9	Warning lamp overload protection	22	Gas valve
10	Power indicator light	23	Soft start board
11	Rear plastic panel	24	Power transformer
12	ON-OFF switch	25	Main control board
13	Cord		

Druckminderer / pressure relief
Schweißbrenner (2poliger Stecker) / torch
Ersatzteilset / spare part set
Elektrodenhalter + 2,5m Kabel / electrode holder 300A + 2,5m cable
Elektrodenhalter / electrode holder 300A
Masseklemme / earth clamp 300A

20 ZUBEHÖR / ACCESSORIES

(DE) Optionales Zubehör finden Sie online auf der Produktseite, Kategorie EMPFOHLENES ZUBEHÖR ZUM PRODUKT.

(EN) Optional accessories can be found online on the product page, category RECOMMENDED PRODUCT ACCESSORIES.