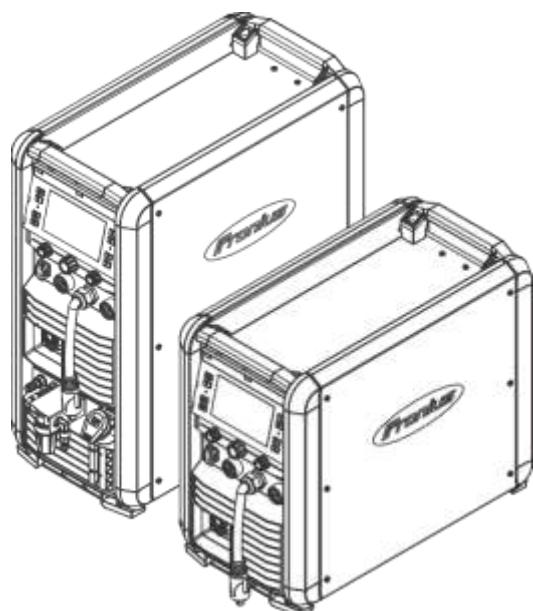


# Operating Instructions

**Fortis 270 C /G, Fortis 320 C /G Fortis 320 C  
/GW, Fortis 400 C /GW Fortis 500 C /GW  
Fortis 320 /GW, Fortis 400 /GW  
Fortis 500 /GW**





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# **General information**



# General

## Explanation of safety instructions



### DANGER!

#### Indicates an immediate danger.

Could result in major injury or death.

- Avoid the described danger.



### WARNING!

#### Indicates a dangerous situation.

Could result in serious injury or death.

- Avoid the dangerous situation.



### CAUTION!

#### Indicates a harmful situation.

Could result in injury and damage to property.

- Avoid the harmful situation.

### NOTE!

Indicates the possibility of damage to property and adverse effects on work results, as well as necessary additional information, tips and tricks, recommendations, etc.

## Obligations of the Operating Company

The operating company must only allow persons to work with the device if they

- Are familiar with the basic occupational safety and accident prevention regulations and are trained in handling the device
- Have read and understood these Operating Instructions, especially the section "Safety Rules," and have confirmed this with their signature
- Are trained according to the requirements for the work results

The safety-conscious work of the personnel must be checked regularly.

## Obligations of Personnel

All persons who are assigned to work with the device must do the following before beginning the work:

- Follow the basic regulations for occupational safety and accident prevention
- Read these Operating Instructions, especially the section "Safety Rules," and confirm that they have understood and will follow them by signing

Before leaving the workplace, ensure that no personal injury or property damage can occur in one's absence.

---

<b>Safety symbols</b>	Devices with the CE label meet the requirements of all valid EU Directives, such as: <ul style="list-style-type: none"><li>- Directive 2014/30/EU on electromagnetic compatibility</li><li>- Directive 2014/35/EU Low Voltage Directive</li><li>- Directive 2014/53/EU Radio Equipment Directive</li><li>- EN IEC 60974 Arc welding equipment</li><li>- and others</li></ul> <p>The full text of the EU Declaration of Conformity is available at <a href="https://www.fronius.com">https://www.fronius.com</a> .</p> <hr/> <p>Devices bearing the CSA label satisfy the requirements of the relevant standards for Canada and the USA.</p> <hr/>
<b>Data backup</b>	With regard to data security, the user is responsible for: <ul style="list-style-type: none"><li>- backing up any changes made to the factory settings</li><li>- saving and storing personal settings</li></ul>
<b>Copyright</b>	<p>Copyright of these operating instructions remains with the manufacturer.</p> <hr/> <p>Text and illustrations were accurate at the time of printing, subject to change. We are grateful for suggestions for improvement and information on any discrepancies in the operating instructions.</p>

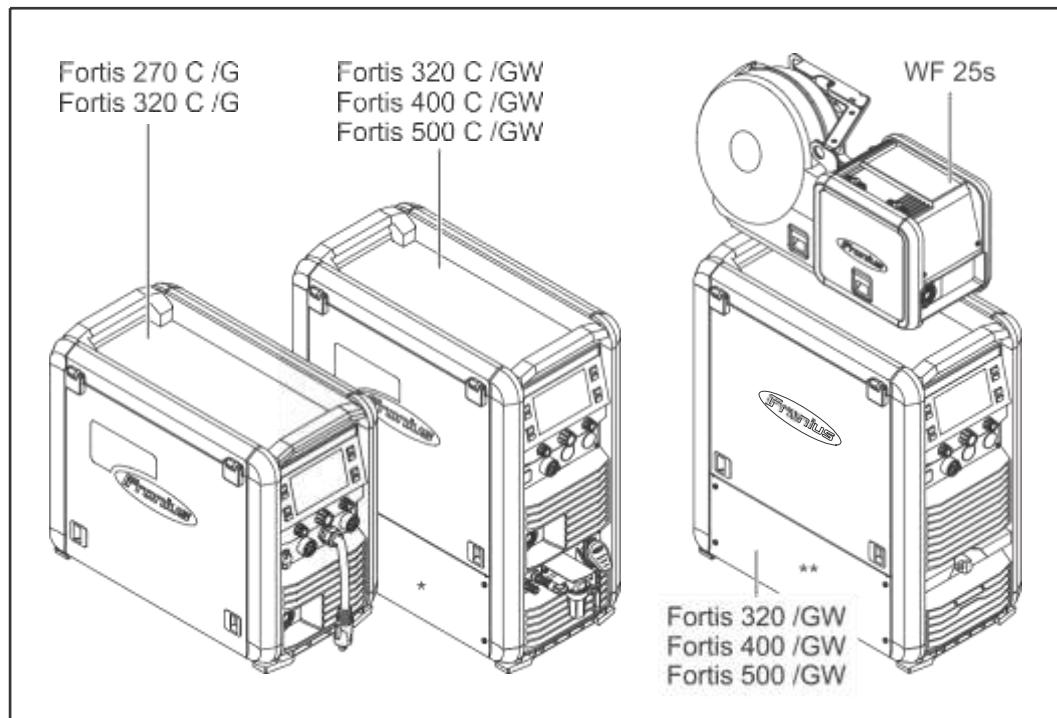
# Utilization in accordance with "intended purpose"

---

<b>Intended use</b>	<p>The device has been manufactured in line with the state of the art and according to recognized safety standards.</p> <p>The welding machine is only intended for MIG/MAG, MMA, and TIG welding in conjunction with Fronius components.</p> <p>Any other use shall be deemed to be not in accordance with the intended use. The manufacturer shall not be liable for any resulting damage.</p> <p>Intended use also means</p> <ul style="list-style-type: none"><li>- Carefully reading and adhering to these operating instructions</li><li>- Observing and obeying all safety instructions</li><li>- Carrying out all the specified inspection and maintenance work</li></ul>
<b>Foreseeable mis- use</b>	<p><b>IMPORTANT!</b> Any use that does not comply with the intended use shall be deemed misuse.</p> <p>Impermissible misuse includes the following:</p> <ul style="list-style-type: none"><li>- Using the device to thaw pipes</li><li>- Using the device to charge batteries/rechargeable batteries</li><li>- Using the device to start motors</li><li>- Operation or storage of the device outside the environmental conditions specified in the technical data</li><li>- Operation or storage of the device outside the protection class specified in the technical data</li><li>- ...</li></ul>

# Information about the device

## Device concept



\* Cooling unit option, \*\* Toolbox option

The Fortis MIG/MAG welding machine is a digitalized, microprocessor-controlled inverter welding machine.

Depending on the variant, the welding machine is available with integrated 4- roller wire drive or with a separate wirefeeder.

A modular and compact design and the ability to easily extend the system guarantee a high degree of flexibility.

The welding machine can be adapted to any specific situation.

## Device overview

### Gas-cooled welding machines with integrated wire drive:

- Fortis 270 C /G
- Fortis 320 C /G

### Welding machines with integrated wire drive, gas-cooled or optionally water- cooled or optionally with toolbox:

- Fortis 320 C /GW
- Fortis 400 C /GW
- Fortis 500 C /GW

### Welding machines with separate WF 25s wirefeeder, gas-cooled or optionally water-cooled or optionally with toolbox:

- Fortis 320 /GW
- Fortis 400 /GW
- Fortis 500 /GW

Explanation of the abbreviations:

- C Welding machine with integrated 4-roller wire drive
- /G Gas-cooled (small machine housing)
- /GW Gas-cooled or water-cooled (large machine housing)

In addition to the standard version, all welding machines are also available in the following versions:

- /nc without mains cable
- /XT Extended
  - (larger voltage range, lower energy consumption, single-phase usage, CEL welding)
- /600 Input voltage of 600 V (only for welding machines with 400 A and 500 A)

---

#### **Operating principle**

The central control and regulation unit of the welding machines is coupled with a digital signal processor. The central control and regulation unit and signal processor control the entire welding process.

During the welding process, the actual data is measured continuously and the device responds immediately to any changes. Rule algorithms ensure that the desired target state is maintained.

This results in:

- A precise welding process
- Exact reproducibility of all results
- Excellent weld properties

---

#### **Application areas**

The machines are used commercially for manual applications, mainly with steel and galvanized sheets.

However, aluminum, other metals, and alloys as well as flux core wires can also be welded.

Common areas of application include

- Mechanical and equipment engineering
- Steel construction
- Plant and container construction
- Metal and portal construction
- Rail vehicle construction
- Repair and maintenance
- Assembly in shipyards
- Automotive suppliers
- etc.

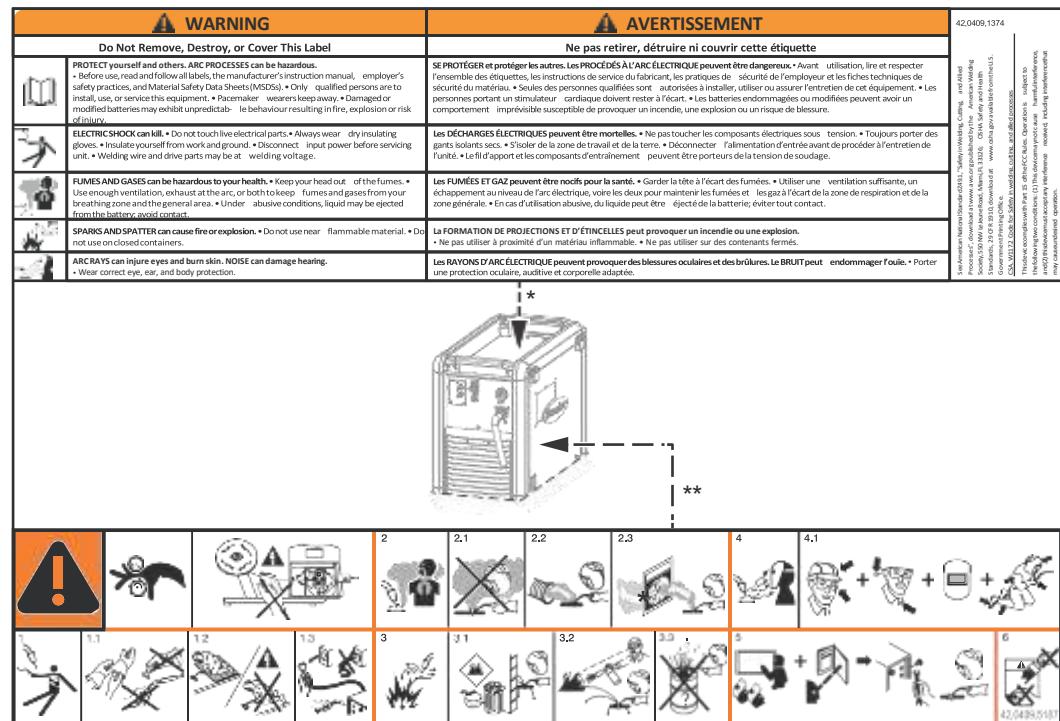
# Notes on the device

## Notes on the device

A rating plate and different safety symbols for the specific model are attached to the device. The safety symbols indicate hazards during welding, which, if not observed, can lead to serious injury and damage to property.

### Rating plate and safety symbols:

- Must be kept in a legible state
- Must not be damaged
- Must not be removed
- Must not be covered, have anything stuck on them, or painted over



\* On all Fortis /XT and Fortis /600 V welding machines

\*\* On the inside of the machine only on Fortis C /XT welding machines and Fortis C /600 V welding machines

### Safety symbols on the rating plate:



Welding is dangerous. The following basic requirements must be met:

- Adequate welding qualifications
- Appropriate protective equipment
- Exclusion of unauthorized persons

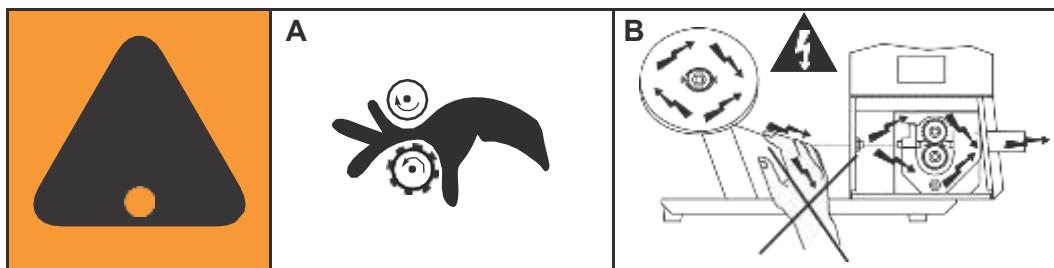


Do not use the functions described here until you have fully read and understood the following documents:

- These operating instructions
- All system component operating instructions, especially the safety rules

**Description of the warnings on the device**

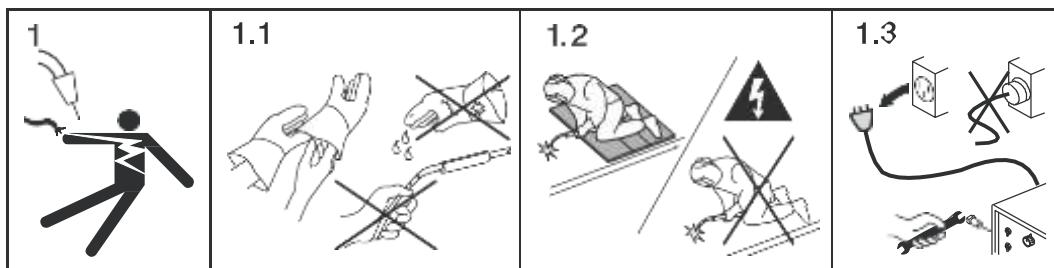
Warning notices are attached to the device for certain device versions. The arrangement of the symbols may vary.



! **Warning! Caution!**  
**The symbols represent possible dangers.**

A Drive rollers can injure fingers.

B The welding wire and drive parts are under welding voltage during operation. Keep hands and metal objects away!

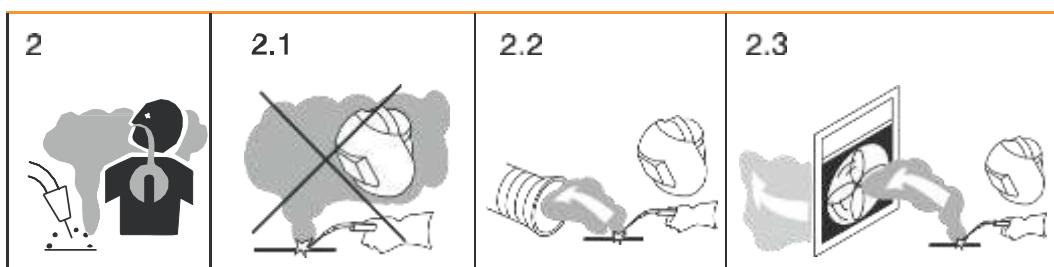


1. An electric shock can be fatal.

1.1 Wear dry, insulating gloves. Do not touch the wire electrode with bare hands. Do not wear wet or damaged gloves.

1.2 Use a base that is insulated from the floor and work area to protect against electric shock.

1.3 Before working on the device, switch off the device and remove the mains plug or disconnect the power supply.



2. Inhalation of welding fumes can be harmful to health.

2.1 Keep your face away from any welding fumes.

2.2 Use forced-air ventilation or local extraction to remove welding fumes.

2.3 Remove welding fumes with a fan.

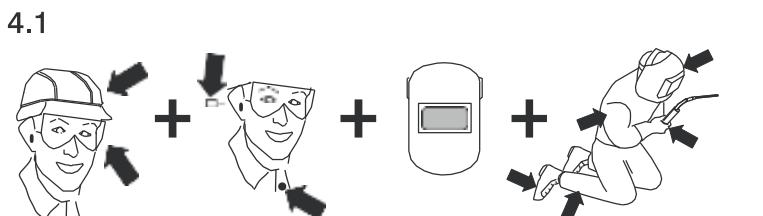


3. Welding sparks can cause an explosion or fire.

3.1 Keep flammable materials away from the welding process. Do not perform welding near flammable materials.

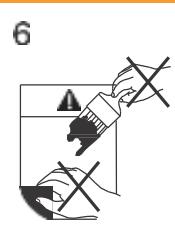
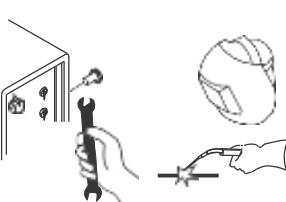
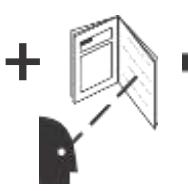
3.2 Welding sparks can cause a fire. Have fire extinguishers ready. If necessary, have a supervisor ready who can operate the fire extinguisher.

3.3 Do not weld on drums or closed containers.



4. Arc rays can burn the eyes and injure the skin.

4.1 Wear headgear and protective goggles. Use ear protection and wear a shirt collar with button. Use a welding helmet with the correct tinting. Wear suitable protective clothing over the entire body.



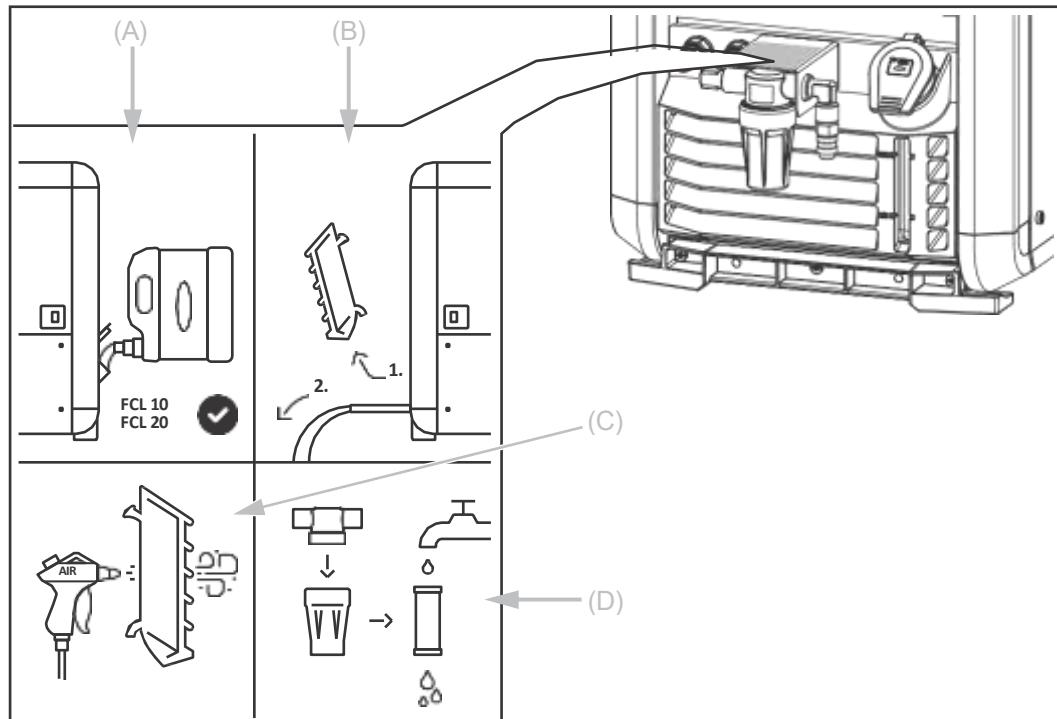
5. Before working on the machine or welding:

undertake training on the device and read the instructions!

6. Do not remove or paint over the sticker with the warnings.

\* Manufacturer order number of the sticker

**Notes on the optional cooling unit**



(A) The cooling unit must only be operated using Cooling Liquid FCL10/20. Other coolants are not suitable due to their electrical conductivity and in- sufficient material compatibility.  
See also 'Filling the cooling unit' from page [119](#) onwards.

(B) Draining the coolant  
See also 'Replacing the coolant' from page [121](#) onwards.

(C) Cleaning the fin element using compressed air

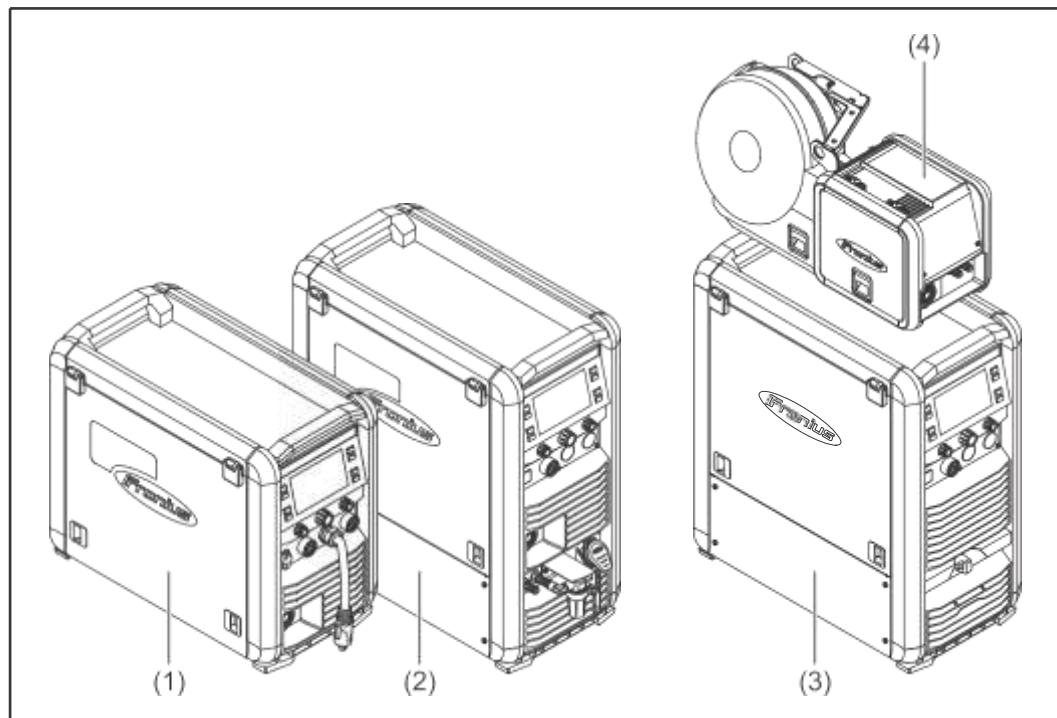
(D) Cleaning the cooling unit filter  
See also 'Cleaning the cooling unit filter' from page [266](#) onwards.

# System components

## General

The welding machines can be operated with various system components and options. This makes it possible to optimize procedures and to simplify machine handling and operation, depending on the field of application for the welding machine.

## System components



*System components*

**(1) Fortis 270 - 320 C /G welding machine (with integrated wirefeeder)**

**(2) Fortis 320 - 500 C /GW welding machine (with integrated wirefeeder)**

+

**optional cooling unit**

**(3) Fortis 320 - 500 GW welding machine**

+

**optional toolbox**

**(4) WF 25s wirefeeder**

Other system components (not shown):

- Welding torch
- Remote control RC Bar / RC Panel
- Trolley and gas cylinder holders
- Wirefeeder trolley Trabant WF /s
- Interconnecting hosepacks
- Grounding and electrode cable
- TIG welding torch
- Human /s hosepack boom
- TIG Multi Connector Automatic Interface
- Options

<b>Options</b>	<p><b>OPT/s Duo</b> Hardware extension for a C /GW welding machine in order to be able to additionally operate an external WF 25s wirefeeder (= DUO operation)</p> <hr/> <p><b>OPT/s CU 1200</b> Optional water cooling for the welding machines Fortis 320 - 500 C /GW and Fortis 320 - 500 /GW incl. start-up monitoring and temperature sensors</p> <hr/> <p><b>OPT/s CU 1200 MC</b> Optional water cooling for the welding machines Fortis 320 - 500 C /GW and Fortis 320 - 500 /GW, also for DUO operation incl. temperature sensors, coolant connections at the rear and front, bracket, and flow sensor</p> <p>The filter can also be mounted on the rear of the device. DUO</p> <p>operation: The Fortis 320 - 500 C /GW welding machines are also operated with a separate WF 25s wirefeeder.</p> <hr/> <p><b>OPT/s Water Connection DUO</b> Double water connections on the cooling unit (required for DUO operation)</p> <p>The filter can also be mounted on the rear of the device.</p> <hr/> <p><b>OPT/s CU Flow Sensor</b> Flow sensor for the cooling unit</p> <hr/> <p><b>OPT/s VRD Class A</b> Safety option to reduce open circuit voltage</p> <hr/> <p><b>OPT/s Toolbox</b> Removable, lockable toolbox for the gas-cooled welding machines Fortis 320 - 500 C /GW and Fortis 320 - 500 /GW</p> <hr/> <p><b>OPT/s Ethernet</b> Optional RJ45 Ethernet port to connect the welding machines to a local network</p> <hr/> <p><b>OPT/s MP 400/500, OPT/s MP 400/500 XT /600 V</b> Multiprocess incl. additional TIG socket, built-in gas solenoid valve, polarity reverser, and TIG Multi Connector port</p> <ul style="list-style-type: none"> <li>- Standard for the welding machines Fortis 270 C /G, Fortis 320 C /G, and Fortis 320 C /GW, in the standard and XT variants</li> <li>- Optional for the welding machines Fortis 400 C /GW and Fortis 500 C /GW</li> <li>- Not available for the welding machines Fortis 320 - 500 /GW</li> </ul> <hr/> <p><b>OPT/s TMC 400/500</b> Optional TIG Multi Connector port for non-Multiprocess devices</p> <hr/> <p><b>OPT/s Current Socket Front</b> Additional current socket on the front for 400 / 500 A welding machines (e.g., for arc air gouging)</p> <hr/> <p><b>OPT/s Welding Torch Holder OPT/s</b></p> <hr/> <p><b>Organizer</b> Small parts storage on the top of the welding machine</p> <hr/> <p><b>AI IO TMC /s</b> Automatic Interface</p>
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**OPT/s NFC Reader /TMC**

External NFC card reader

- To lock or unlock the control panel using an NFC key
- To activate/deactivate user management

---

**OPT/s VRD Class A /IK**

VRD Class A functionality

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**OPT/s MultiProcess**

For enhanced TIG and MMA functionality

---

Standard for the Fortis 270 C /G and Fortis 320 C /G Optional for the Fortis 400 C and Fortis 500 C

---

**Software options**

---

**OPT/s Pulse/Std Mix Fortis**

All MIG/MAG mix characteristics and the additional characteristic property "mix" are available on the welding machine.

---

**OPT/s Retro TransSteel**

All MIG/MAG standard and pulse characteristics of the TransSteel series and the additional characteristic property "Retro" are available on the welding machine.

---

**OPT/i WeldCube Navigator**

Software for creating digital instructions for manual welding processes, which are processed by welders.

The welder is guided through the welding instructions by WeldCube Navigator.

For the OPT/i WeldCube Navigator option to work properly, the OPT/s Job, OPT/s Documentation, and OPT/s NFC Reader options must be available on the welding machine.

For Fortis C devices without multiprocess, the OPT/s TMC 400/500 option must also be available on the welding machine.

For Fortis /GW devices, the OPT/s WF TIG Multi Connector port option must be available on the WF 25s wirefeeder or the OPT/s TMC 400/500 option must be available on the welding machine.

---

**OPT/s Duo**

Duo functionality (two welding lines)

For the OPT/s Duo option to work properly, the OPT/s Duo /IK option or the OPT/s Duo CK option must be available on the welding machine.

---

**OPT/s Documentation**

To document the welding data

Without OPT/s Documentation only a logbook with events is available.

---

**OPT/s Jobs**

With the OPT/s Jobs option, the job process is available, including Load More EasyJobs, Optimize job, Duplicate job, Job correction limits, and Delete job.

Without OPT/s Job, only a maximum of four EasyJobs can be saved and selected.

---

**BLE-WIFI24 inside**

WLAN and Bluetooth functionality on the welding machine control panel (for certified countries)

Depending on the country, the option is automatically released on the welding machine.

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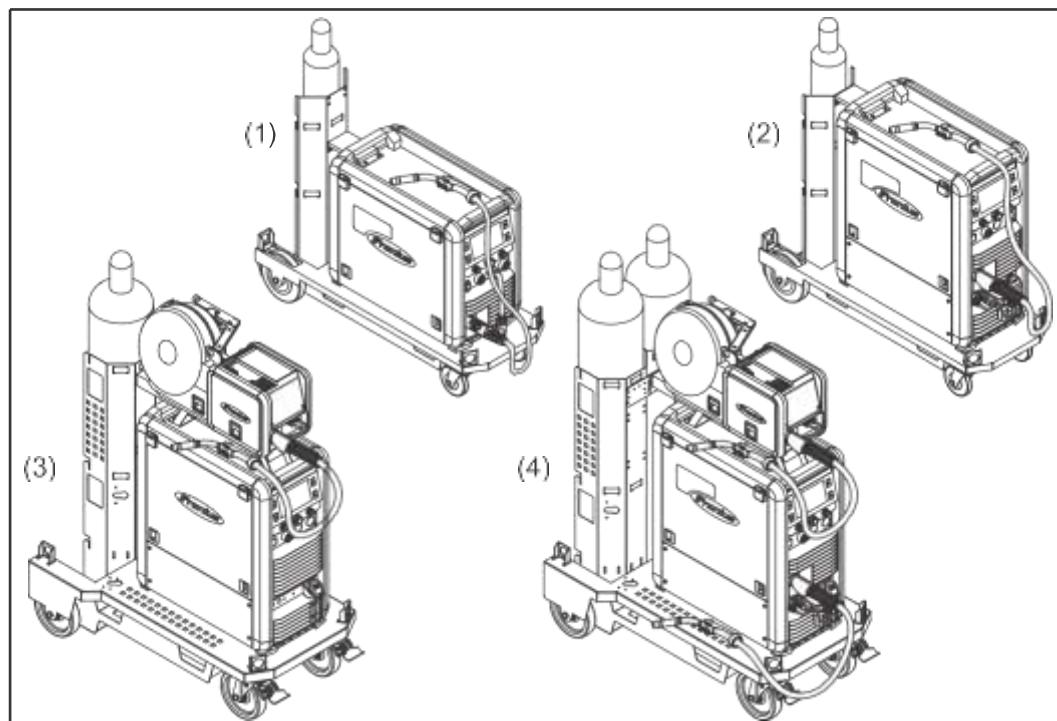
**OPT/i Custom NFC - ISO 14443A**

Option to use a custom frequency band for key cards

Option OPT/s NFC Reader /TMC is required for the option OPT/i Custom NFC - ISO 14443A.

---

**System config-  
urations**



(1)	Fortis C /G + TU Move 4 Standard	(2)	Fortis C /GW + TU Move 4 Standard
(3)	Fortis /GW + WF 25s + TU Move 4 Pro	(4)	DUO Fortis C /GW + OPT/s Duo + WF 25s + TU Move 4 Pro + OPT/TU 2nd gas cylinder /s

# **Welding packages, welding characteristics and welding processes**



# Welding Packages

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<b>General</b>	The welding machines have a number of different Welding Packages, welding characteristics, and welding processes so that the broadest range of materials can be effectively processed.
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<b>Welding Packages</b>	The following Welding Packages (WP) are available for the welding machines:
-------------------------	---

WP Standard Fortis  
4,066,023  
(enables MIG/MAG standard welding)

WP Pulse Fortis 4,066,024  
(enables MIG/MAG pulse welding)

WP Standard/Pulse Fortis 4,066,025  
(enables MIG/MAG standard welding and MIG/MAG pulse welding)

**IMPORTANT!** On a welding machine without Welding Packages, only the following welding processes are available:

- MIG/MAG manual welding
- TIG welding (with gas-valve welding torch)
- Manual metal arc welding
- CEL welding (only with /XT devices)

# Welding characteristics

---

**Welding characteristics** Depending on the welding process and shielding gas combination, various process-optimized welding characteristics are available when selecting the filler metal. The welding characteristics have special properties that provide information about usage.

**Special properties and use of the welding characteristics**  
(described according to the following pattern):

**Property**

Process Description

---

**dynamic**

Puls, Standard

Characteristic for deep penetration and reliable root formation at high welding speeds

---

**mix**

Puls

Characteristic for the generation of a rippled weld seam.

The heat input into the component is specifically controlled by the cyclic process change between pulse and dip transfer arc.

---

**PCS**

Puls + Standard

The characteristic changes directly from the pulsed arc to a concentrated spray arc above a certain power. The advantages of pulsed and spray arcs are combined in one characteristic.

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**retro**

Pulse, Standard

The characteristic has the same welding properties as the predecessor TransSteel (TSt) device series.

---

**root**

Standard

Characteristics for root passes with powerful arc

---

**universal**

Puls, Standard

The characteristic is very well suited for all common welding tasks.

# Welding processes and process functions

---

<b>MIG/MAG pulse welding</b>	<p>MIG/MAG pulse welding is a pulsed arc process with a controlled material transfer. In the base current phase, the energy input is reduced to such an extent that the arc barely burns steadily and the surface of the workpiece is preheated. In the pulsing current phase, an accurately timed current pulse guarantees a precise detachment of the weld material droplet. This principle guarantees low-spatter welding and precise operation throughout the entire power range.</p> <p>MIG/MAG pulse welding can be set on the control panel of the welding machine under "Pulse" in the welding processes.</p> <hr/>
<b>MIG/MAG standard welding</b>	<p>MIG/MAG standard welding is a MIG/MAG welding process covering the entire power range of the welding machine with the following arc types:</p> <p>Dip transfer arc Droplet transfer occurs in the lower power range during the short circuit.</p> <p>Intermediate arc The intermediate arc alternates irregularly between short circuits and spray transfers. This results in increased spatter. It is not possible to use this arc effectively, so it is better to avoid it.</p> <p>Spray arc. A short circuit-free transfer of material in the high power range.</p> <p>MIG/MAG standard welding can be set on the control panel of the welding machine under "Standard" in the welding processes.</p> <hr/>
<b>MIG/MAG manual welding</b>	<p>MIG/MAG manual welding is a MIG/MAG welding process in which the wire speed, the welding voltage, and the arc-force dynamic (a correction parameter) are set separately.</p> <p>MIG/MAG manual welding can be set on the control panel of the welding machine under "Manual" in the welding processes.</p> <hr/>
<b>SynchroPulse welding</b>	<p>SynchroPulse is available for all process (Standard / Pulse). The cyclic change of the welding power between two operating points with SynchroPulse achieves a finely rippled weld appearance and a non-continuous heat input.</p> <hr/>
<b>Stitch welding</b>	<p>With stitch welding, all welding processes can be interrupted cyclically. As such, the heat input is controlled in a targeted manner. The welding time, pause time and the number of interval cycles can be set individually (e.g. for producing a rippled weld seam, for tacking thin sheets or, in the case of longer pause times, for simple, automatic spot welding operation).</p>

Stitch welding is possible with every operating mode.

In special 2-step mode and special 4-step mode, no interval cycles are executed during the start and end phases. The interval cycles are only executed in the main process phase.

---

#### **TIG welding**

TIG welding is a welding process in which the arc is ignited between the work-piece and a non-consumable, heat-resistant tungsten electrode. The arc fuses the base material. Depending on the application, filler metal can be fed into the weld pool in the form of rods or welding wires. The weld pool is surrounded by an inert shielding gas environment in order to protect the weld pool from reactions with the ambient air.

TIG welding can be set on the control panel of the welding machine under "TIG" in the welding processes.

---

#### **Manual metal arc welding**

Manual metal arc welding is a manual welding process in which a sheathed stick electrode is melted. The sheath of the stick electrode melts during welding, releasing gas and slag that protect the weld pool from reactions with the ambient air.

Manual metal arc welding can be set on the control panel of the welding machine under "MMA" in the welding processes.

---

#### **Gouging (Arc Air Gouging)**

In arc air gouging, an arc is ignited between a carbon electrode and the work-piece; the base material is melted and blown out with compressed air.

The operating parameters for arc air gouging are defined in a special character- istic.

Applications:

- Removal of shrink holes, pores, or slag inclusions from workpieces
- Detaching sprues or the processing of entire workpiece surfaces in foundries
- Edge preparation for heavy plates
- Preparation and repair of weld seams
- Finishing of roots or defects
- Production of air gaps

**IMPORTANT!** Arc air gouging is only possible with steel materials!

# **Operating controls, connections and mechanical components**



# Control Panel

## General

The parameters necessary for welding can be easily selected and changed using dials. The parameters are shown on the display during welding.

### NOTE!

**Because of firmware updates, certain functions may be available for your device but not described in these operating instructions or vice versa.**

In addition, individual figures may also differ slightly from the operating controls of your device. These operating controls function in exactly the same way, however.

## Safety



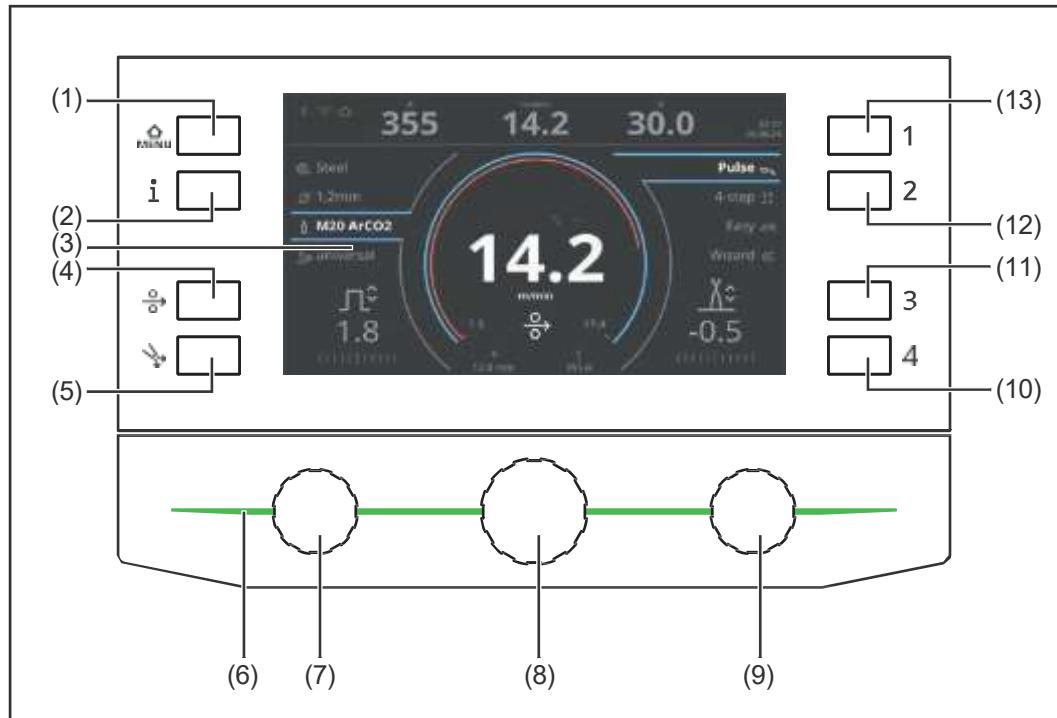
### WARNING!

#### **Danger from incorrect operation and work that is not carried out properly.**

This can result in serious personal injury and damage to property.

- All the work and functions described in this document must only be carried out by technically trained and qualified personnel.
- Read and understand this document in full.
- Read and understand all safety rules and user documentation for this equipment and all system components

## Control panel



### No. Function

#### (1) Menu button

To open the Setup menu

#### (2) Information button

For retrieving a variety of information on the operation of the welding machine

#### (3) Display

#### (4) Wire-threading button

For threading the wire electrode into the torch hosepack without gas or current

After pressing the button, an animated graphic with motor current, motor power, and conveyed wire length is displayed.

The feeder inching speed can be changed immediately using the middle selection dial (8).

#### (5) Gas-test button

To set the required quantity of gas on the gas pressure regulator.

After pressing the Gas-test button, gas flows for 30 s. Pressing it again ends the process prematurely.

The display shows an animated graphic with the remaining gas flow duration.

**NOTE!**

**Pressing the Gas-test button also causes a cooling unit to start working.**

After pressing the Gas-test button, the cooling unit will then operate for 3 minutes.

► Press the Gas-test button only when the welding torch is connected.

**(6) Status indicator**

Green animated ... Device starting up or restarting Lights up

green ... Device is ready for welding Lights up white ...

Notification

Lights up orange ... Warning Lights up

red ... Error

Blue animated ... Active welding mode Yellow

animated ... Gas test is active Mint animated ...

Wire threading is active

**(7) Left-hand selection dial with rotary/push button function**

For selecting and setting correction parameters as well as filler metal and shielding gas during MIG/MAG welding

If the left-hand selection dial is pressed for longer than 2 seconds with the correction parameter selected, an additional menu opens. The additional menu allows you to define which parameter is displayed on the welding screen.

For details on setting the parameter displayed on the welding screen, see from page 43 onwards.

**(8) Middle selection dial with rotary/push button function**

For selecting and setting the main welding parameters

If the middle selection dial is pressed for more than 2 seconds during MIG/MAG welding, the SynchroPulse and Interval process functions can be activated or

deactivated.

**(9) Right-hand selection dial with rotary/push button function**

For selecting and setting welding processes, operating mode, jobs, the welding parameter wizard, and correction parameters

If the right-hand selection dial is pressed for longer than 2 seconds with the correction parameter selected, an additional menu opens. The additional menu allows you to define which parameter is displayed on the welding screen.

For details on setting the parameter displayed on the welding screen, see from page 43 onwards.

**(10) Multifunctional dial**

**(11) Multifunctional dial**

**(12) Multifunctional dial**

**(13) Multifunctional dial**

The buttons (10) - (13) can be assigned with an EasyJob or with parameters from the Setup menu.

More information about EasyJobs can be found from page 271 onwards

## Input options

### Turning the selection dial



- Select elements on the display
- Change values

For some parameters, a value that has been changed by turning the selection dial is automatically applied without having to press the selection dial.

A selected element is highlighted in white on the display between two blue lines:



Examples of selected elements

The shielding gas ArCO<sub>2</sub> is selected.

The main welding parameter wire speed is selected.

The outer circle in the setting area is displayed in blue.

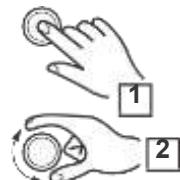
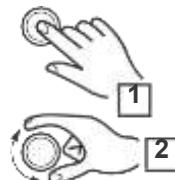
The correction parameter 'arc length correction' is selected.

To change the values of selected elements, press the corresponding selection dial.

## Pressing the selection dial



- Open a selected element to change its value. The value is changed by turning the selection dial.
- Apply values of specific parameters.
- Confirm or cancel queries, settings, or operations.



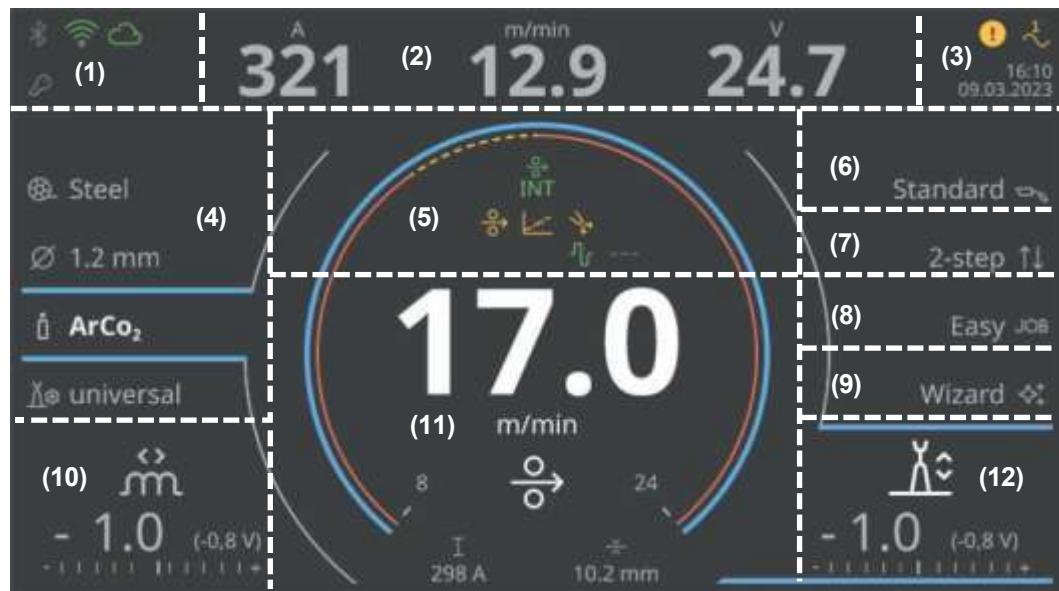
Examples of value changes for selected elements

After pressing the left- hand selection dial, the shielding gas can be changed by turning the left or middle selection dial.

After pressing the middle selection dial, the main welding para- meter of wire speed can be changed. The outer circle in the setting area is displayed in blue.

After pressing the right- hand selection dial, the 4-step operating mode can be changed by turn- ing the right or middle selection dial.

## Display



The following information or parameters are displayed in the individual sections of the display.  
The displayed parameters vary according to the selected welding process.

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No.	Description
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**(1) Bluetooth status indicator (only on certified devices)**

- Symbol lights up green:  
Active connection to a Bluetooth participant
- Symbol is gray:  
Bluetooth activated, no active connection

**WLAN status**

- Symbol lights up green:  
Active connection to a WLAN network
- Symbol is gray:  
WLAN is activated but not connected to a WLAN network
- Symbol is not displayed:  
WLAN is deactivated

**Cloud status**

WeldCube Air

The symbol lights up green when there is an active connection to Weld-Cube Air.

---

**Logged-on users / locked state of the welding machine**

---

**(2) Welding data**

Welding current [A], wire speed [m/min or ipm], welding voltage [V]

Different values are displayed depending on the situation:

- When setting the standard value
- The actual value during welding
- The mean value after welding

---

(3)	<b>Errors, warnings, notes</b>
	<b>Single-phase power supply display (for /XT devices only)</b>
	<b>Date</b>
(4)	<b>Filler metal Wire diameter</b>
	<b>Shielding gas</b>
	<b>Characteristic property</b>
(5)	<b>Process functions and indicators</b>
	The display is gray ... Function possible, but not activated The indicator lights up green ... Function is activated
	 <b>Current welding process line (in Duo operation)</b> INT = wire drive of the welding machine EXT = separate wirefeeder
	 <b>Wire threading indicator</b> lights up during wire threading if the wire threading graphic is hidden
	 <b>MIG/MAG:</b> Intermediate arc indicator during standard welding
	 <b>TIG:</b> On Multiprocess welding machines, the symbol for the over-loaded electrode is displayed here.
	 <b>Gas-test indicator</b> lights up after pressing the Gas-test button if the gas-test graphic is hidden
	 <b>MIG/MAG:</b> SynchroPulse indicator
	 <b>TIG:</b> During TIG welding, the symbol for TIG pulsing (pulse frequency) is displayed here:
	 <b>Interval indicator</b>
(6)	<b>Welding process</b>
(7)	<b>Operating mode</b>

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**(8) Easy JOB / editing JOB**

For details see Job Mode from page [151](#) onwards

---

**(9) Welding parameter wizard**

For details on the welding parameter wizard, see from page [143](#) onwards

---

**(10) Correction parameters \***

**(11) Currently set welding parameters (standard value)**

+ unit

**Setting range and symbol of the currently set welding parameter**

(setting range depends on the current characteristic)

**Symbol and value of the other synergic parameters**

Wire speed – welding current – sheet thickness

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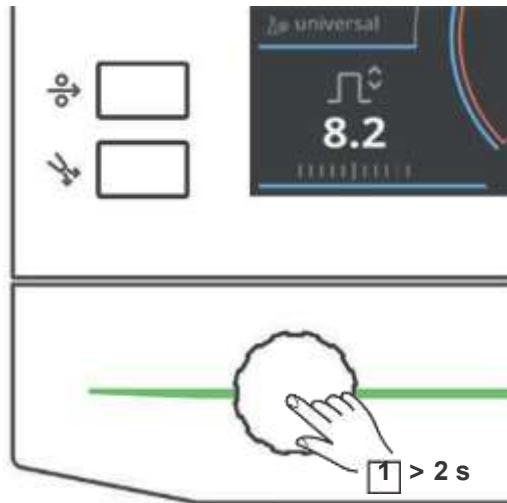
**(12) Correction parameters \***

\* Depending on the welding process, the last parameter displayed on the left or right display section can be defined.

For details see from page [43](#) onwards.

## Setting the parameter displayed on the welding screen

Depending on the selected welding process, an additional menu is available for displaying a parameter on the welding screen.



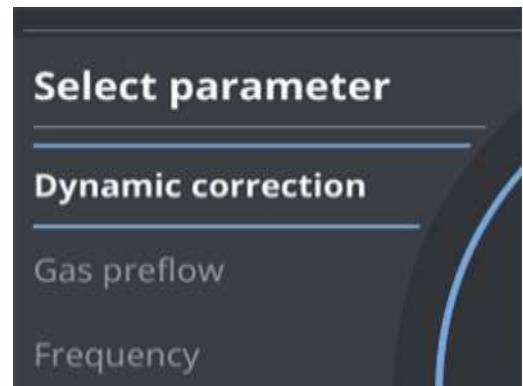
- 1 With the correction parameter selected, press the left-hand selection dial for longer than 2 seconds

The additional menu is opened and the possible welding parameters are displayed.

### Alternative way to open the additional menu:



Additional menu selected (blue line at the top and bottom)



Additional menu

- 1 Turn the left-hand selection dial and select the additional menu directly
- 2 Press the left-hand selection dial

The additional menu opens and the possible welding parameters are displayed.

- 3 Turn the left-hand selection dial and select the desired parameter. Press the left-hand selection dial
- 4

The welding parameter is opened for changing.

- 5 Turn the left-hand selection dial to change the value of the parameter. Press the left-hand selection dial
- 6

The value change is accepted.

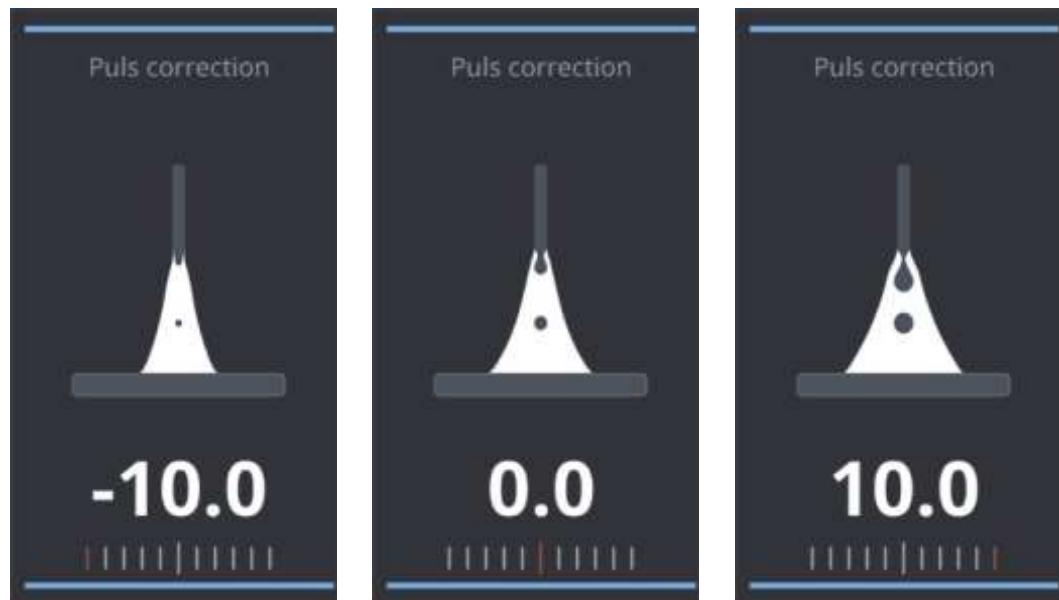
The parameter is now displayed on the welding screen.

The parameter selection with the right-hand selection dial is performed in the same way.

---

**Animated graph- ics**

For certain parameters, animated graphics are shown on the display. These animated graphics change when the value of the parameter is changed.



*Example: Welding parameters for pulse correction -10 / 0 / +10*

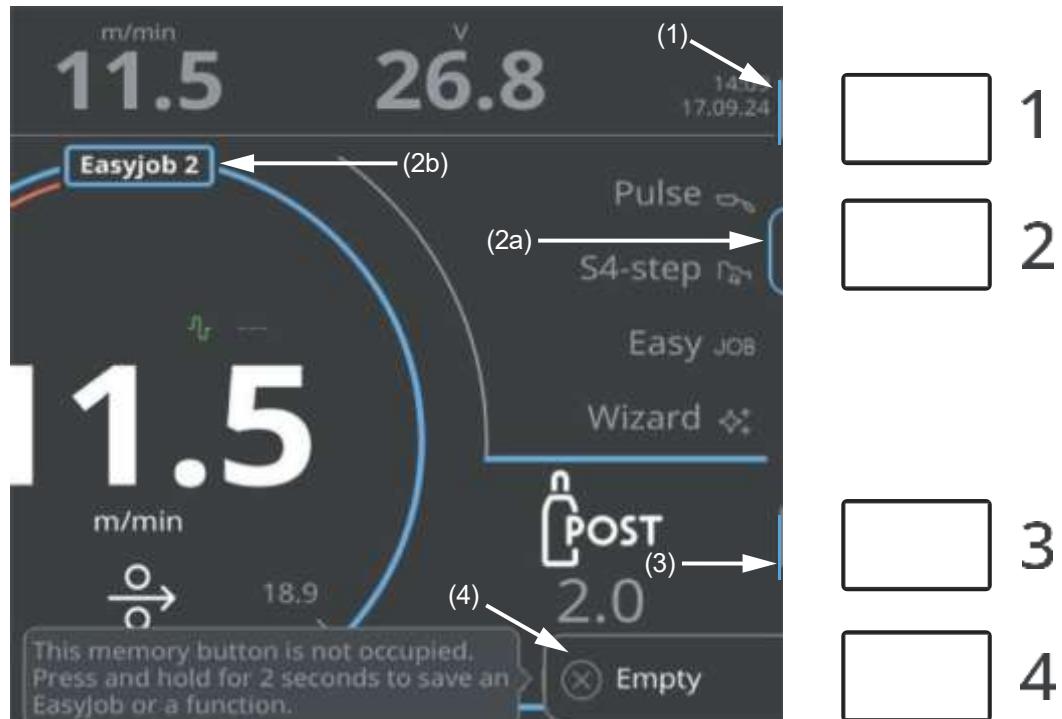


*Example: Welding parameters for arc length correction -10 / 0 / +10*

# Multifunctional buttons

---

<b>General</b>	EasyJobs or parameters from the setup menu can be assigned to the four multi-functional buttons on the control panel. The EasyJobs or the setup parameters can then be easily retrieved with the press of a button.
<b>Button assignment display</b>	The assignment of the multifunctional buttons is shown on the display as per the following example:



*Example of different button assignments*

**Button 1:**

The button is assigned but not currently activated.

A thin line (1) is shown on the right edge of the display at the height of the button.

**Button 2:**

The button is assigned and currently activated.

At the right edge of the display, the left end of a button (2a) is shown at the height of the button.

In addition, the currently active function (2b) is shown in the central display section (e.g., EasyJob 2, as shown in the figure).

**Button 3:**

Same as button 1

**Button 4:**

The button is not assigned.

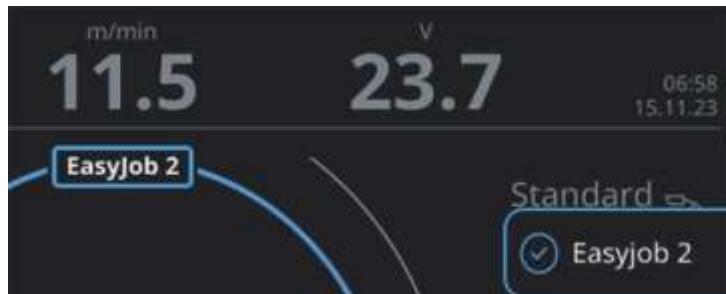
When the button is pressed, a symbolized empty button (4) is displayed along with info text.

---

## Retrieving an EasyJob

- 1 To retrieve a saved EasyJob, briefly press the corresponding multifunctional button (< 3 seconds)

A symbolized EasyJob button is shown on the right edge of the display at the height of the button, and the active EasyJob is shown in the central display section.



Example: EasyJob 2

## Assigning setup parameters to multifunctional buttons

### NOTE!

Instead of EasyJobs, the multifunctional buttons can also be assigned with setup parameters.

A combination of EasyJobs and setup parameters is also possible.

- Saving a setup parameter overwrites an EasyJob or setup parameter already saved under the same multifunctional button!

- 1 Access the Setup menu (press the Menu button) Select the
- 2 desired menu
- 3 Select the desired setup parameter
- 4 Press one of the multifunctional buttons for approx. 3 seconds to store the parameter

After approx. 3 seconds, a symbolized button with a green frame, the parameter, and the Save symbol are shown on the display, e.g.:



The parameter has been saved under the selected multifunctional button and can be retrieved using this button.

## Retrieving setup parameters

- 1 To retrieve a saved setup parameter, briefly press the corresponding multi-functional button (< 3 seconds)

A symbolized button with the saved parameter is shown on the right edge of the display at the height of the button, and the active storage location is shown in the central display section.



Example: Multifunctional button 3 is assigned SynchroPulse, storage location "Memory 3"

The parameter can now be changed.

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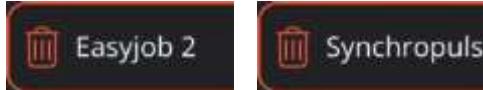
**Deleting Easy- Jobs  
or setup  
parameters from  
the multifunc-  
tional button**

**1** To delete an EasyJob or a setup parameter, press the corresponding multi- functional button for approx. 5 seconds

After approx. 3 seconds, a symbolized button with a green frame and the Save symbol is shown on the display.

The EasyJob or setup parameter saved under the multifunctional button is over- written with the current settings.

After a total of approx. 5 seconds, the symbolized button is displayed with a red frame and the Delete symbol.

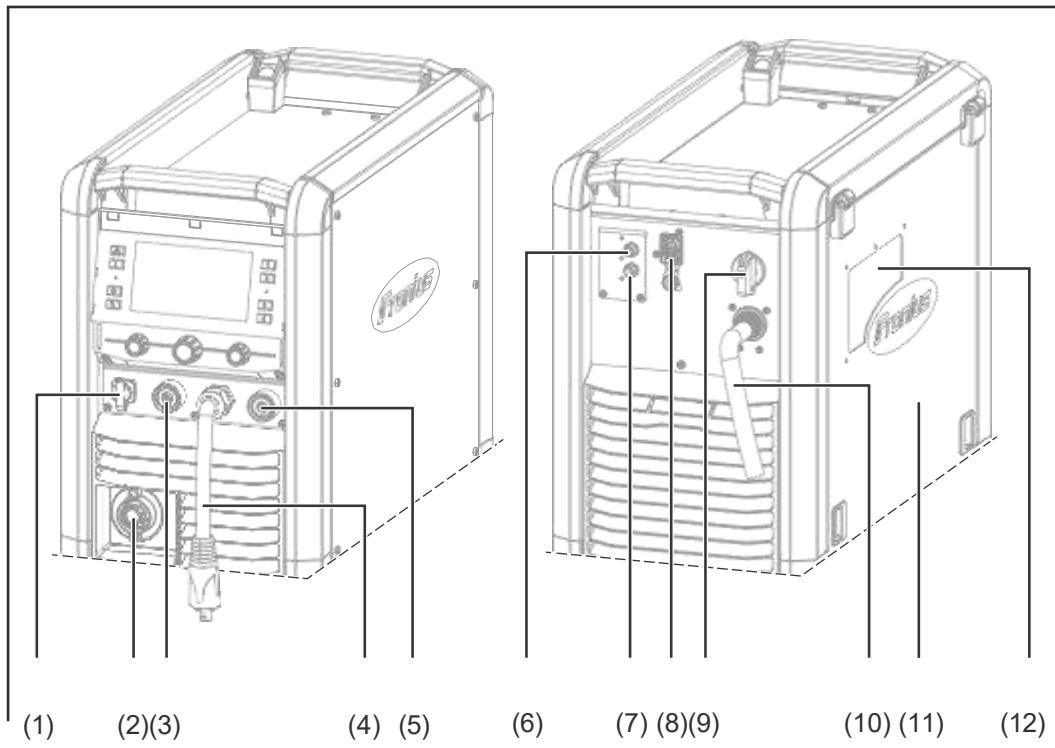


The EasyJob or setup parameter has been deleted from the storage location.

# Connections, Switches, and Mechanical Components

**Welding machines with integrated wire drive**

Fortis 270 C /G, Fortis 320 C /G  
Fortis 320 C /GW, Fortis 400 C /GW, Fortis 500 C /GW



No.	Function
(1)	<b>TIG Multi Connector port</b>
(2)	<b>Welding torch connection</b>
(3)	<b>(-) Current socket with bayonet latch</b>
(4)	<b>Polarity reverser</b>
(5)	<b>(+) Current socket with bayonet latch</b>

(1) **TIG Multi Connector port**  
included in the option Multiprocess or as a separate option OPT/s TMC 400/500  
optional for Fortis 400 C / 500 C

for connecting TIG welding torches, remote controls, etc.

(2) **Welding torch connection**  
for connecting the FSC welding torch

(3) **(-) Current socket with bayonet latch**  
for connecting the return lead cable for MIG/MAG welding;  
in conjunction with the option Multiprocess with integrated shielding gas connection

(4) **Polarity reverser**  
in conjunction with the option Multiprocess

To set the welding potential for MIG/MAG welding. No function for TIG and manual metal arc welding.

(5) **(+) Current socket with bayonet latch**  
in conjunction with the option Multiprocess or the option front current socket

---

(6) **MIG/MAG shielding gas connection socket**

---

(7) **TIG shielding gas connection socket**  
in conjunction with the option Multiprocess

---

(8) **RJ45 Ethernet connection**  
Option

---

(9) **Power switch**  
for switching the welding machine on and off

---

(10) **Mains cable with strain relief**

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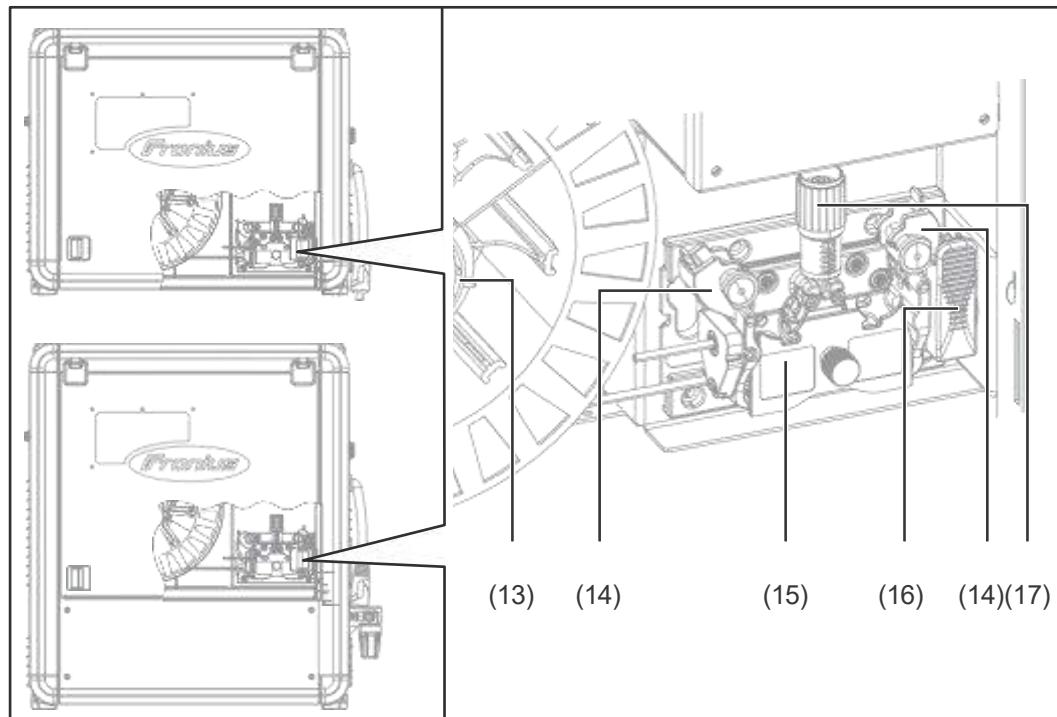
(11) **Wire spool cover**

---

(12) **Viewing window**

---

**4-roller wire drive**




---

No.	Function
(13)	<b>Wire spool holder with brake</b> For holding standard wire spools with a max. outer diameter of 300 mm (11.81 in.) and a max. weight of 19 kg (41.89 lbs.)
(14)	<b>Swivel levers</b> for holding the feed rollers
(15)	<b>Protective cover of the 4-roller drive</b>
(16)	<b>Welding torch clamping lever</b>
(17)	<b>Clamping lever</b> for adjusting the contact pressure

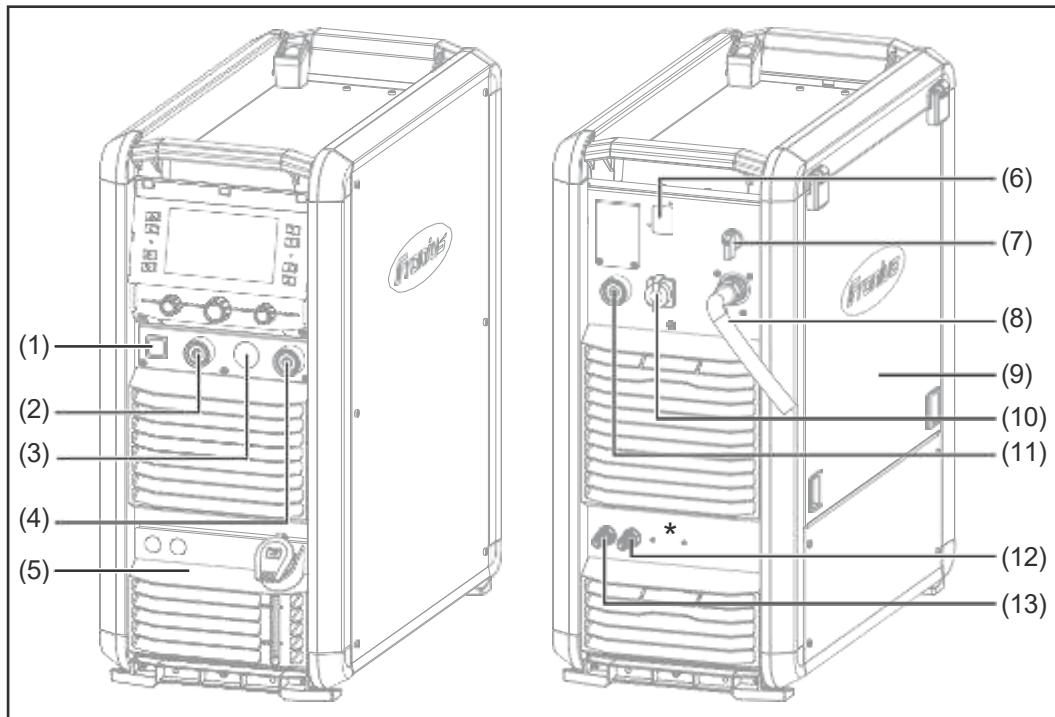
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For the welding machines Fortis 320 C /GW, Fortis 400 C /GW, and Fortis 500 C /GW, a cooling unit or a toolbox is optionally available.

For details on the optional cooling unit, see from page 53 onwards. For details on the optional toolbox, see from page 54 onwards.

**Welding ma-  
chines with sep-  
arate wirefeeder**

Fortis 320 /GW, Fortis 400 /GW, Fortis 500 /GW



**No. Function**

**(1) Dummy cover**

Optional TIG Multi Connector port

**(2) (-) Current socket with bayonet latch**

for connecting the return lead cable for MIG/MAG welding

**(3) Dummy cover**

**(4) Front current connection**

Option

**(5) Cooling unit**

Option

For details on the optional cooling unit, see from page 53 onwards.

**(6) Dummy cover**

Ethernet RJ45 connection option

**(7) Power switch**

for switching the welding machine on and off

**(8) Mains cable with strain relief**

**(9) Side cover**

**(10) Wirefeeder control cable connection**

for connecting the control cable from the interconnecting hosepack for MIG/MAG welding

**(11) (+) Current socket with bayonet latch**

for connecting the mains cable from the interconnecting hosepack for MIG/MAG welding

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**(12) Dummy cover**

without optional cooling unit or

**Coolant return connection (red)**

with optional cooling unit

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**(13) Dummy cover**

without optional cooling unit or

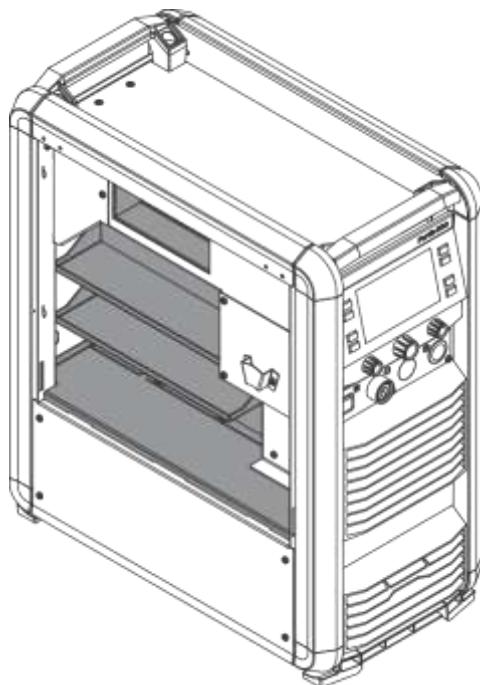
**Coolant supply connection (blue)**

with optional cooling unit

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\* Coolant filter not shown

**Storage compartments with open side cover**



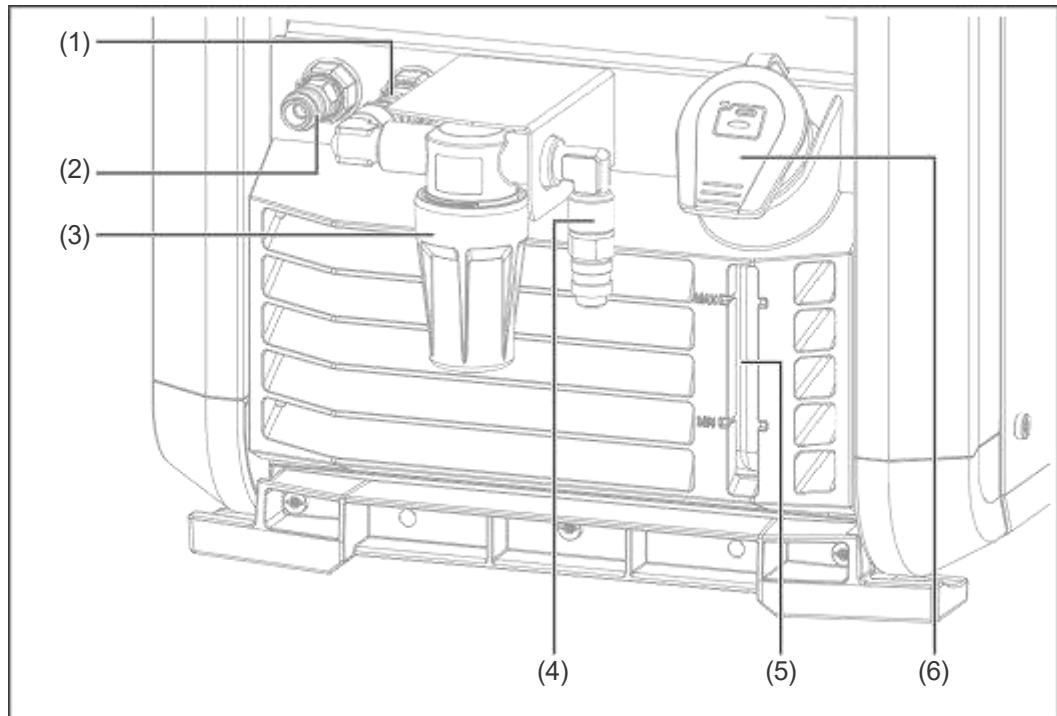
*Welding machine without cooling unit and without toolbox, side cover not shown*

For the welding machines Fortis 320 /GW, Fortis 400 /GW, and Fortis 500 /GW, a cooling unit or a toolbox is optionally available.

For details on the optional cooling unit, see from page 53 onwards. For details on the optional toolbox, see from page 54 onwards.

**Cooling unit option (OPT/s CU 1200)**

Fortis 320 C /GW, Fortis 400 C /GW, Fortis 500 C /GW Fortis 320 /GW,  
Fortis 400 /GW, Fortis 500 /GW



**No. Function**

**(1) Coolant return connection (red)**

**(2) Coolant supply connection (blue)**

The coolant connections can optionally or additionally also be attached to the rear.

For cooling units for welding machines with a separate wirefeeder, the coolant connections are fitted on the rear of the cooling unit as standard.

**(3) Coolant filter**

**(4) Coolant return connection**  
with a fitted coolant filter

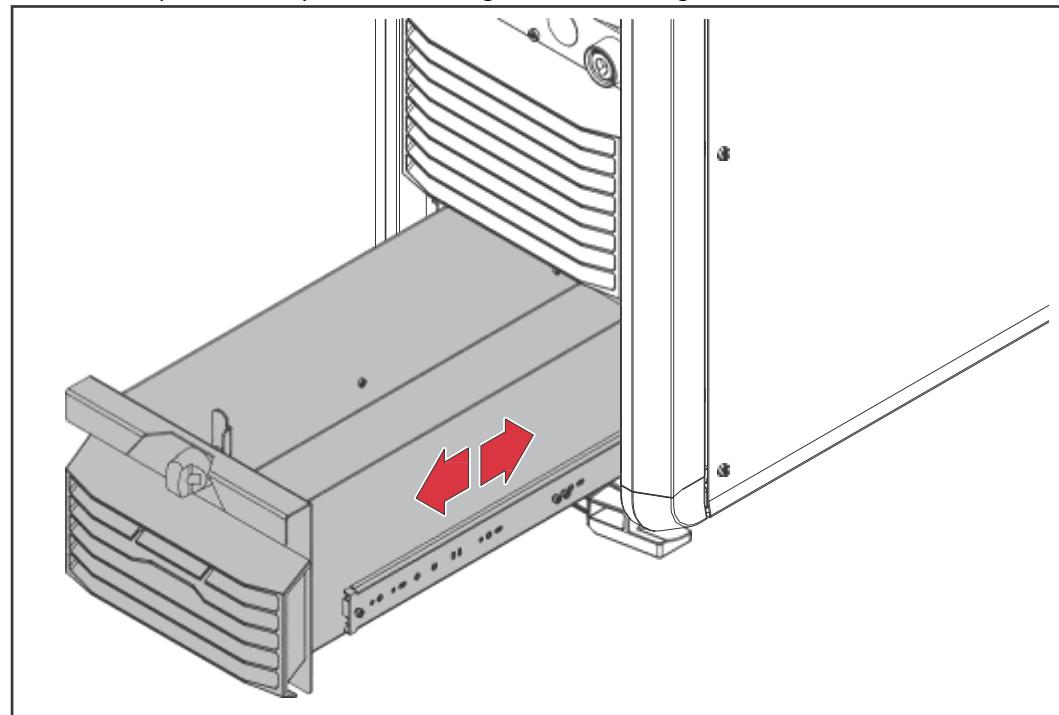
**(5) Viewing window of the coolant tank**

**(6) Filler pipe of the coolant tank**

**Toolbox option**

Fortis 320 C /GW, Fortis 400 C /GW, Fortis 500 C /GW Fortis 320 /GW, Fortis 400 /GW, Fortis 500 /GW

The toolbox option can only be installed on gas-cooled welding machines.



*Lockable toolbox*

A standard padlock with a shackle diameter of 6-8 mm is required to lock the toolbox.

## **Before installation and initial operation**



# Minimum equipment for welding operations

---

<b>General</b>	Depending on the welding process, a minimum level of equipment is required to work with the welding system. The following describes the welding processes and the corresponding minimum equipment for welding operations.
<b>Gas-cooled MIG/MAG welding</b>	For welding machines with Integrated wire drive: <ul style="list-style-type: none"><li>- Welding machine</li><li>- Return lead cable</li><li>- MIG/MAG welding torch, gas-cooled</li><li>- Shielding gas supply</li><li>- Wire electrode</li></ul> In addition, for welding machines with separate wirefeeder: <ul style="list-style-type: none"><li>- Wirefeeder</li><li>- Interconnecting hosepack</li></ul>
<b>Water-cooled MIG/MAG welding</b>	For welding machines with Integrated wire drive: <ul style="list-style-type: none"><li>- Welding machine with cooling unit</li><li>- Return lead cable</li><li>- MIG/MAG welding torch, water-cooled</li><li>- Shielding gas supply</li><li>- Wire electrode</li></ul> In addition, for welding machines with separate wirefeeder: <ul style="list-style-type: none"><li>- Wirefeeder</li><li>- Interconnecting hosepack</li></ul>
<b>TIG DC welding</b>	<ul style="list-style-type: none"><li>- Welding machine</li><li>- Return lead cable</li><li>- TIG gas-valve welding torch</li><li>- Shielding gas supply</li><li>- Filler metal, depending on application</li></ul>
<b>Manual metal arc welding</b>	<ul style="list-style-type: none"><li>- Welding machine</li><li>- Return lead cable</li><li>- Electrode holder with welding power-lead</li><li>- Stick electrodes</li></ul>
<b>Arc air gouging</b>	<ul style="list-style-type: none"><li>- Welding machine (400 / 500 A)</li><li>- Return lead cable 120 mm<sup>2</sup></li><li>- KRIS 13 arc air gouging torch</li><li>- Compressed air supply</li></ul>

# Before installation and initial operation

## Safety



### WARNING!

#### **Danger from incorrect operation and work that is not carried out properly.**

This can result in serious personal injury and damage to property.

- All the work and functions described in this document must only be carried out by technically trained and qualified personnel.
- Read and understand this document in full.
- Read and understand all safety rules and user documentation for this equipment and all system components.

## Generator-powered operation

The welding machine is generator-compatible.

The maximum apparent power  $S_{1\max}$  of the welding machine must be known in order to select the correct generator output.

The maximum apparent power  $S_{1\max}$  of the welding machine is calculated for 3-phase devices as follows:

$$S_{1\max} = I_{1\max} \times U_1 \times \sqrt{3}$$

$I_{1\max}$  and  $U_1$  according to the device rating plate and technical data

The generator apparent power  $S_{\text{GEN}}$  needed is calculated using the following rule of thumb:

$$S_{\text{GEN}} = S_{1\max} \times 1.35$$

A smaller generator can be used when not welding at full power.

**IMPORTANT!** The generator apparent power  $S_{\text{GEN}}$  must not be less than the maximum apparent power  $S_{1\max}$  of the welding machine!

### NOTE!

**The voltage delivered by the generator must never fall outside of the mains voltage tolerance range.**

The mains voltage tolerance is specified in the "Technical data" section.

---

**Information on  
system compo-  
nents**

The steps and activities described below include references to various system components, including:

- Trolleys
- Cooling units
- Wire-feed unit holders
- Wire-feed units
- Interconnecting hosepacks
- Welding torches
- etc.

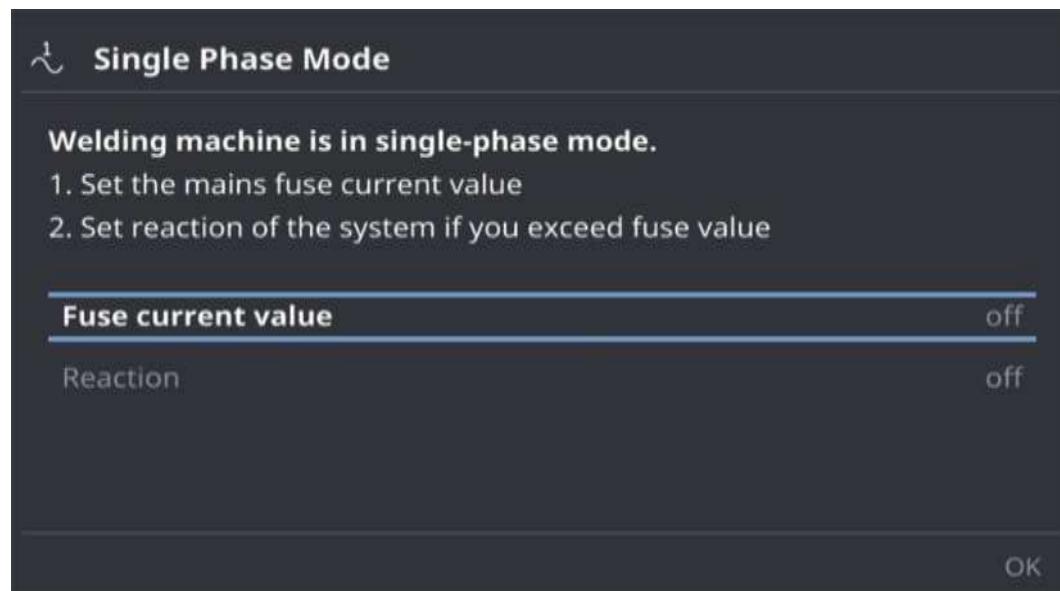
For more detailed information about installing and connecting the system components, please refer to the appropriate operating instructions.

# Single-phase power supply

## Single-phase power supply

The XT variants of the welding machines can also be operated with a single-phase power supply.

With a single-phase power supply, a corresponding message is shown on the display every time the welding machine is started up:



*Welding machine is in single-phase mode.  
Mains fuse and reaction must be checked or set.*

This message can be confirmed or disappears after a timer has expired.

Once the message has been confirmed/disappears, the symbol for single-phase mode remains on the display.

The symbol can change color, for example, if "warning" or "power limitation" has been set for the reaction.

For details on the mains fuse and reaction, see from page [226](#) onwards.

**IMPORTANT!** With a single-phase power supply, the output power of the welding machines is reduced as follows:

	Max. output power		
	MIG/MAG	TIG	MMA
Fortis 270 XT	max. 240 A	max. 240 A	< 240 A
Fortis 320 XT	max. 270 A	max. 270 A	< 270 A
Fortis 400 XT	max. 320 A	max. 320 A	< 320 A
Fortis 500 XT	max. 320 A	max. 320 A	< 320 A

For a single-phase power supply of the welding machine, the mains cable must be correctly connected.

For details on connecting a single-phase mains cable, see from page [67](#) onwards.

# Connecting the mains cable to the welding machine

## Specified mains cable

In the case of /nc and /XT welding machines, no mains cable is connected when delivered. Before commissioning, a mains cable corresponding to the connection voltage must be installed with a minimum cross-section according to the following table.

Welding machine	Mains cable
Fortis 270 C /nc	4G2.5
Fortis 270 C /XT/nc	
1 ~	3x AWG8 (3G6)
3 ~	4x AWG10 (4G4)
Fortis 320 C/nc	4G2.5
Fortis 320 /nc	
Fortis 320 C/XT/nc	
Fortis 320 /XT/nc	
1 ~	3x AWG8 (3G6)
3 ~	4x AWG8 (4G6)
Fortis 400 C/nc	4G4
Fortis 400 /nc	
Fortis 400 C/XT/nc	
Fortis 400 /XT/nc	
1 ~	3x AWG8 (3G6)
3 ~	4x AWG6 (4G10)
Fortis 400 C/600/nc	
Fortis 400 /600/nc	4x AWG11 (4G2.5)
Fortis 500 C/nc	
Fortis 500 /nc	4G6
Fortis 500 C/XT/nc	
Fortis 500 /XT/nc	
1 ~	3x AWG6 (3G10)
3 ~	4x AWG46 (4G10)
Fortis 500 C/600/nc	
Fortis 500 /600/nc	4x AWG12 (4G2.5)

## Safety



### WARNING!

#### Danger from work that is not carried out properly.

Serious personal injury and damage to property may result.

- The work described below may only be performed by trained specialist personnel.  
Follow national standards and guidelines.
-



### CAUTION!

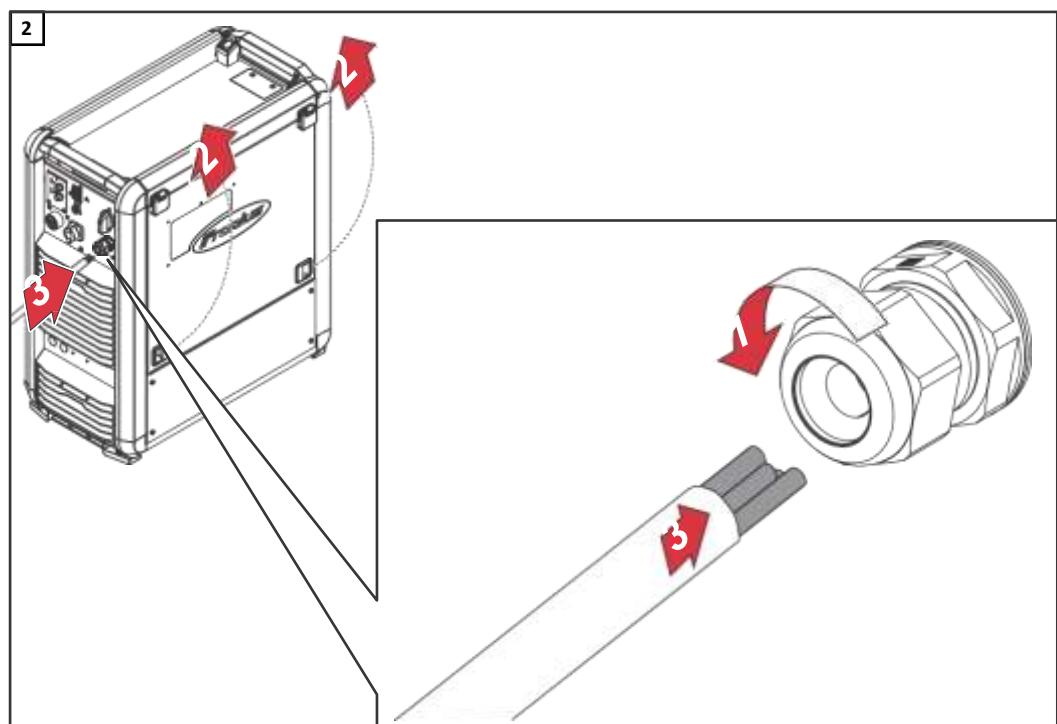
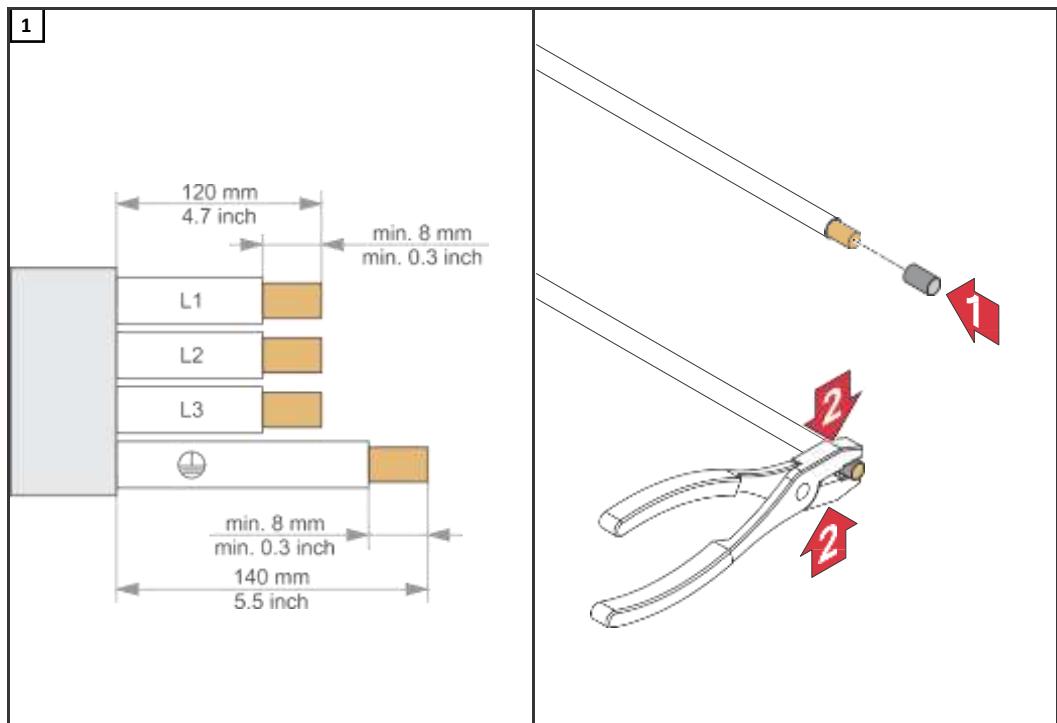
#### Danger from improperly prepared mains cable.

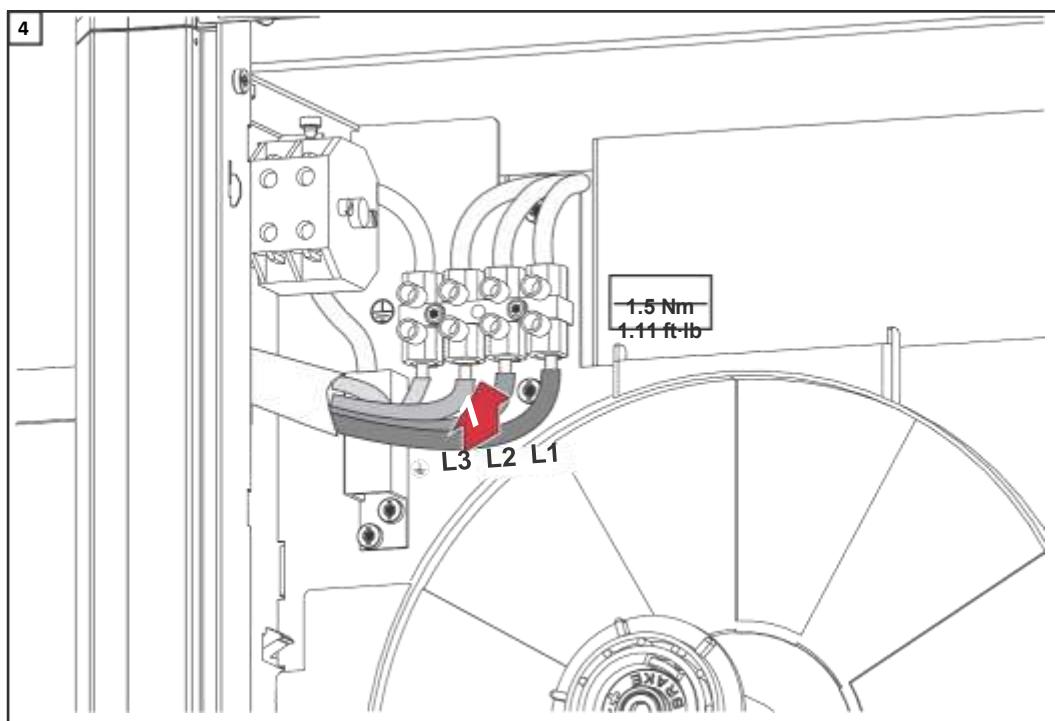
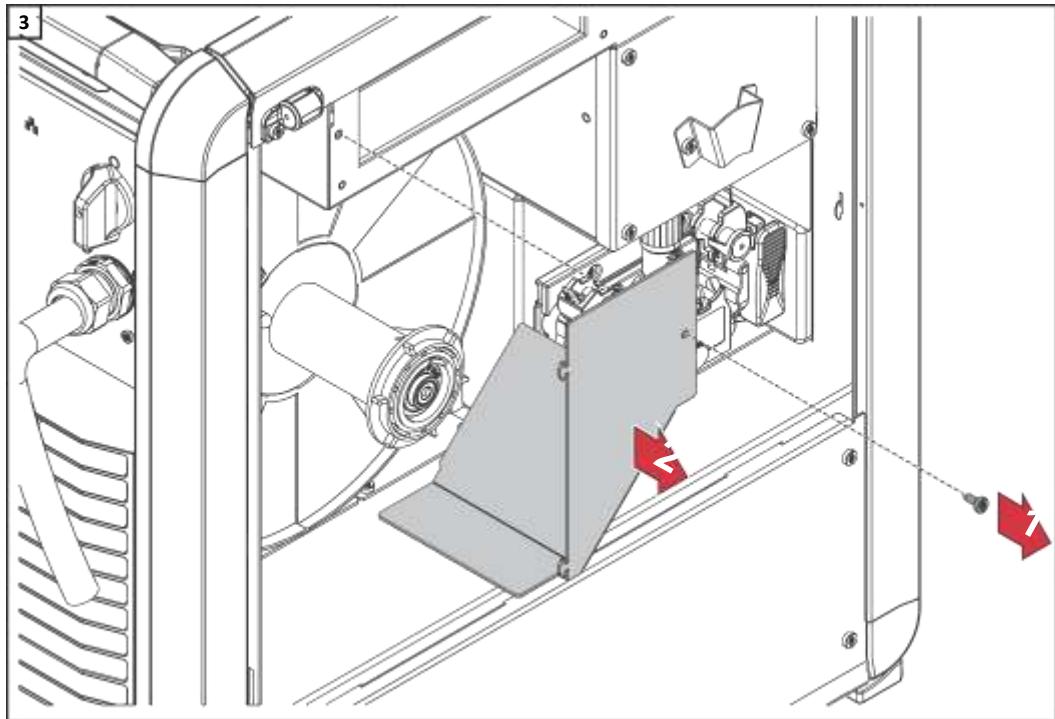
Short circuits and damage to property may result.

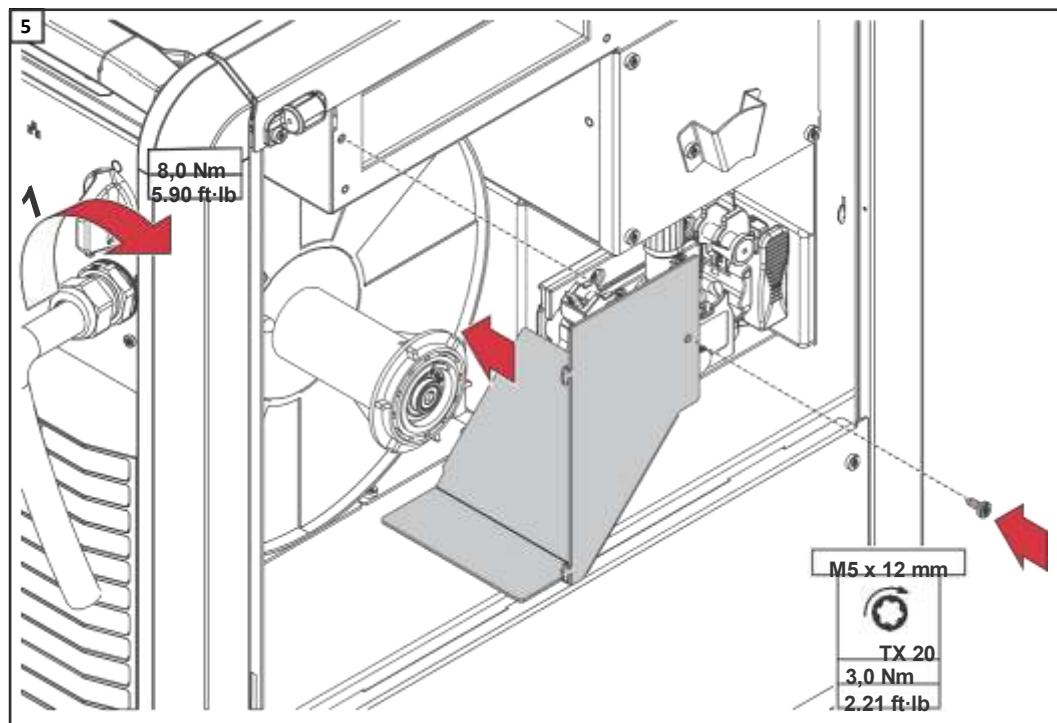
- Fit ferrules to all phase conductors and the ground conductor of the stripped mains cable.

### Connecting the mains cable to /nc welding machines

**IMPORTANT!** The ground conductor should be approx. 20-25 mm (0.8-1 in.) longer than the phase conductors.

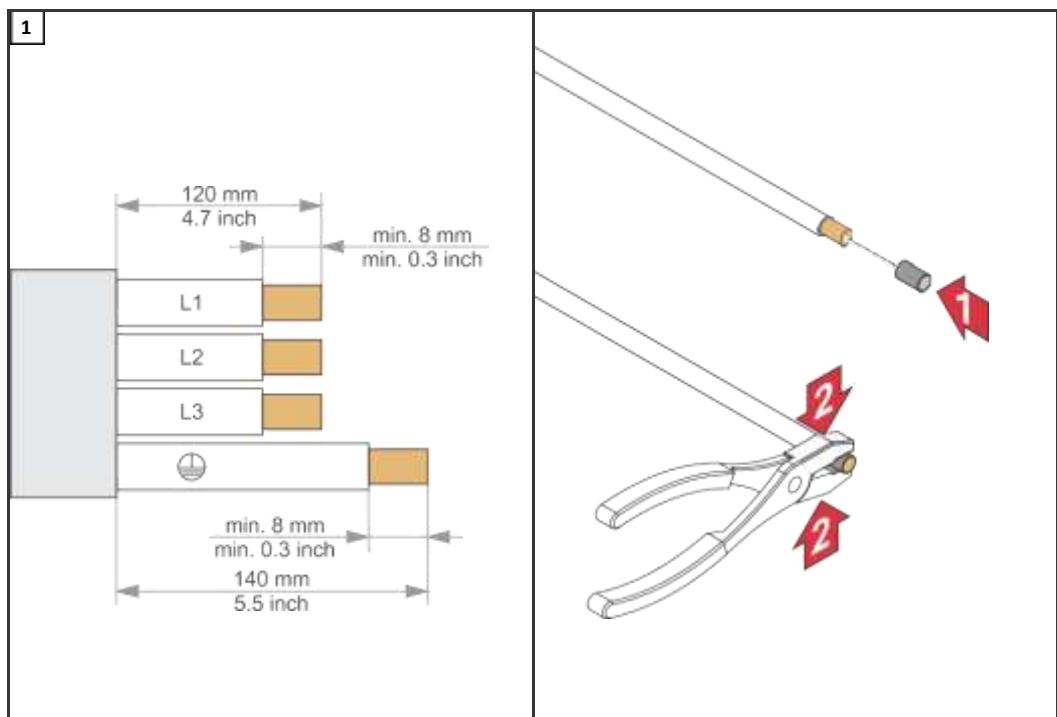


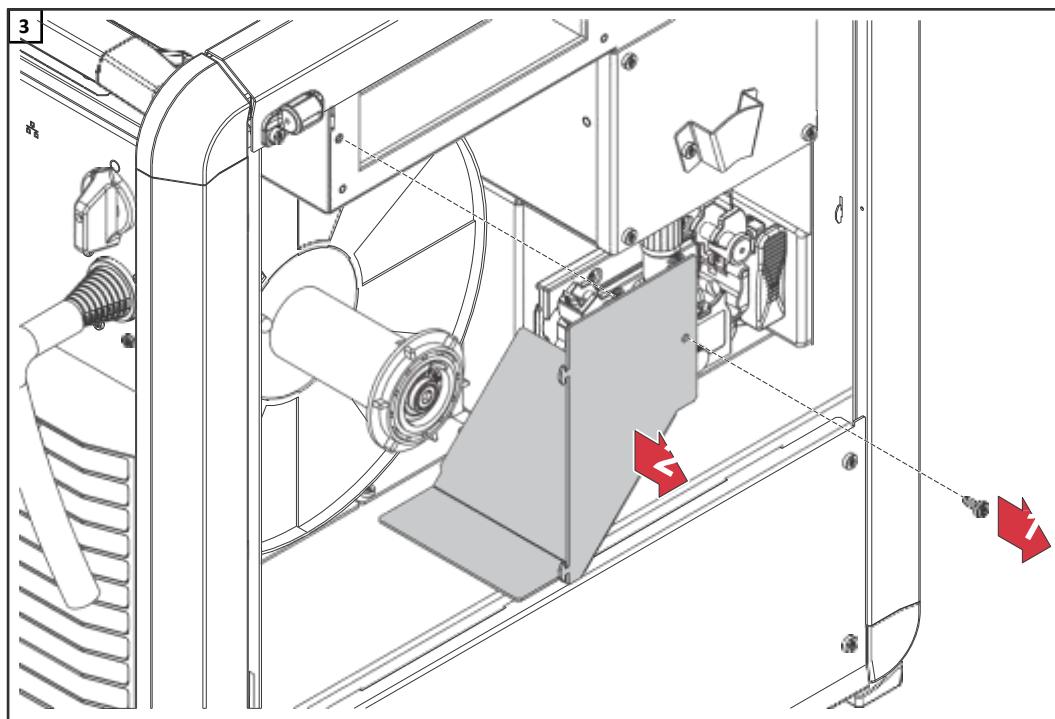
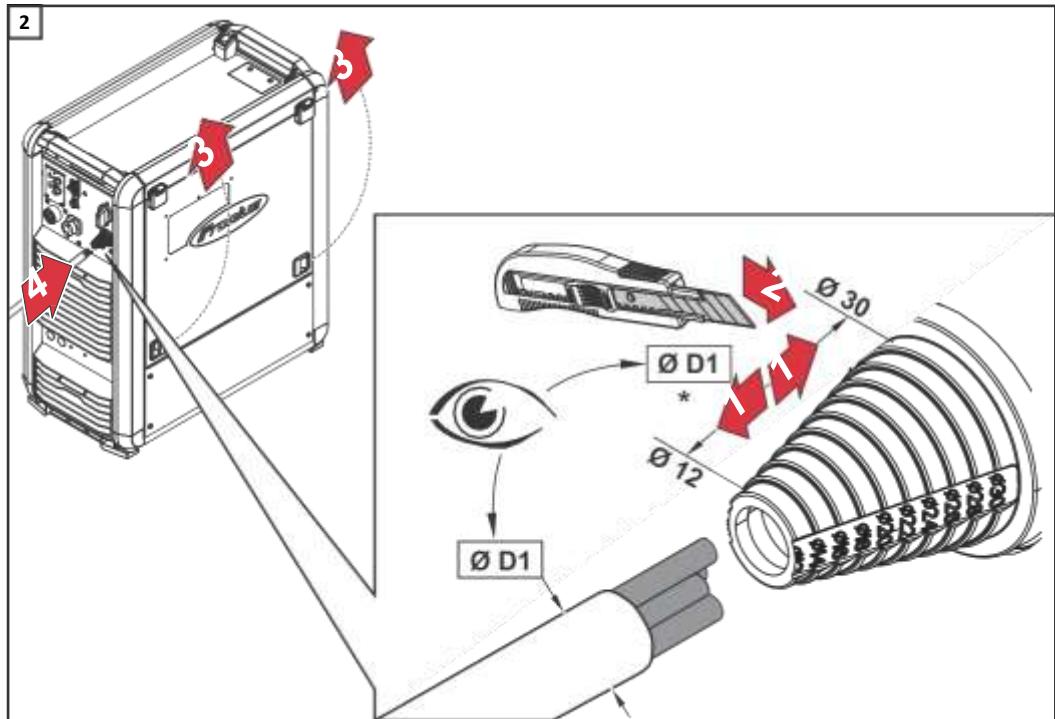


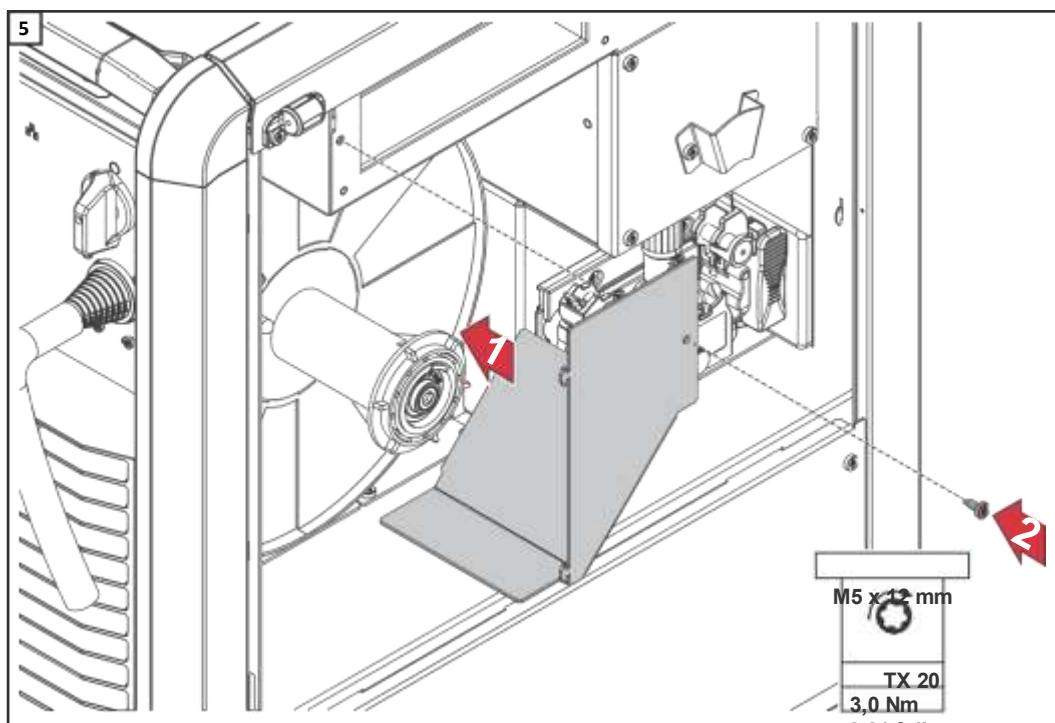
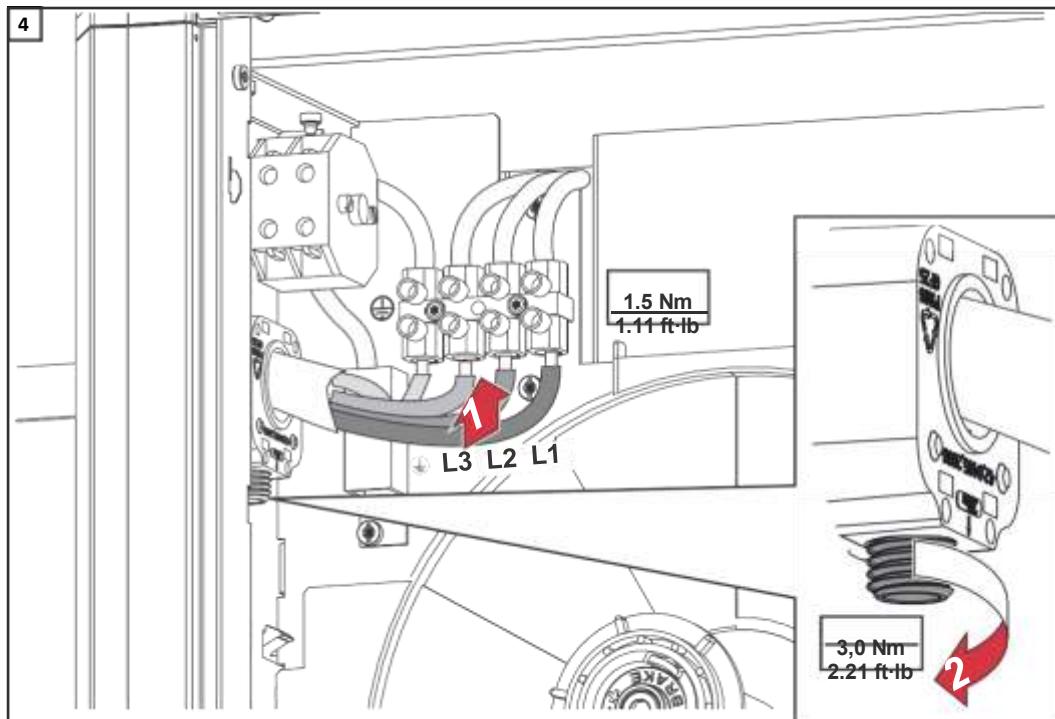


**Connecting the mains cable to /XT welding machines**

**IMPORTANT!** The ground conductor should be approx. 20-25 mm (0.8-1 in.) longer than the phase conductors.

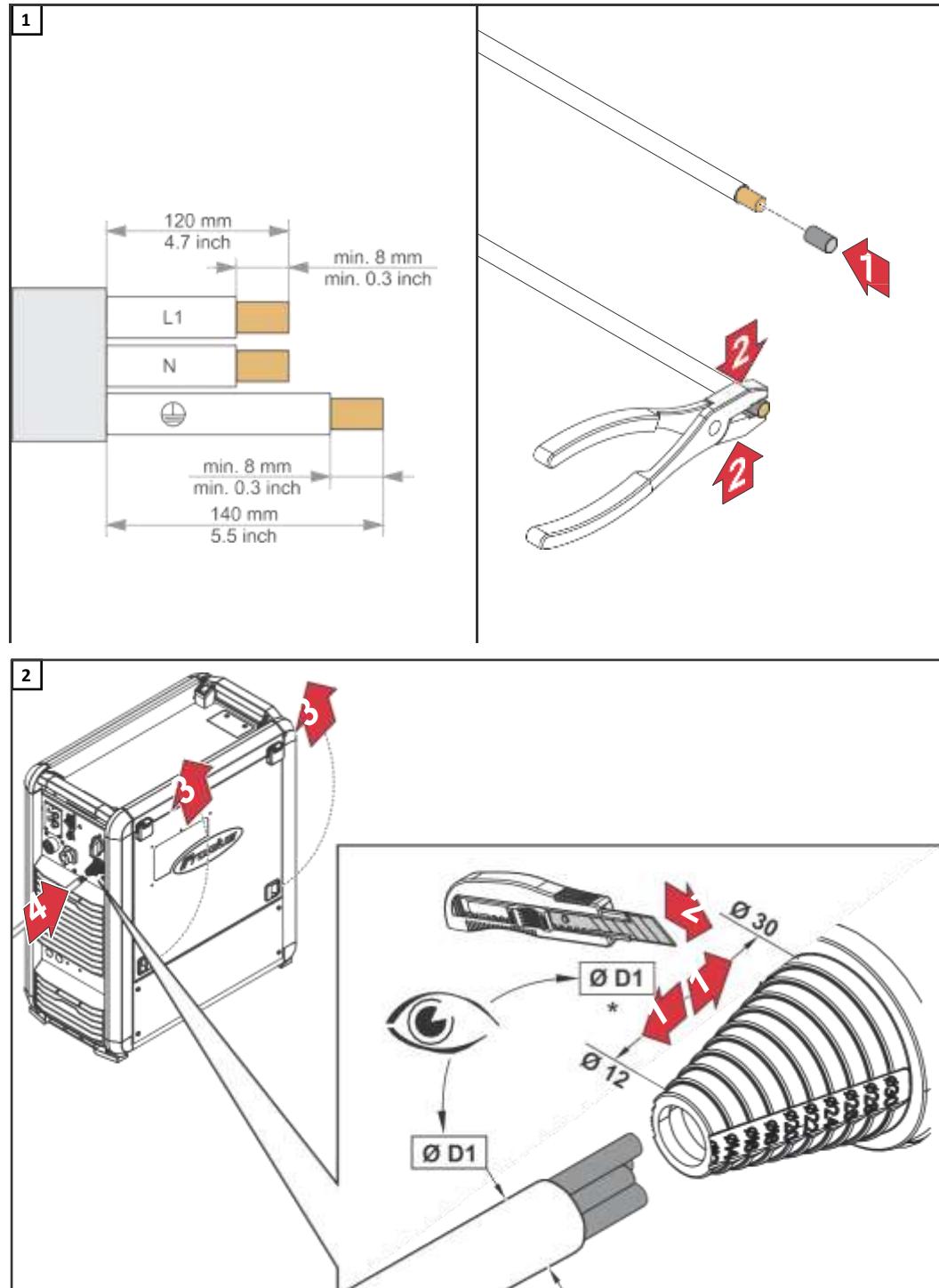


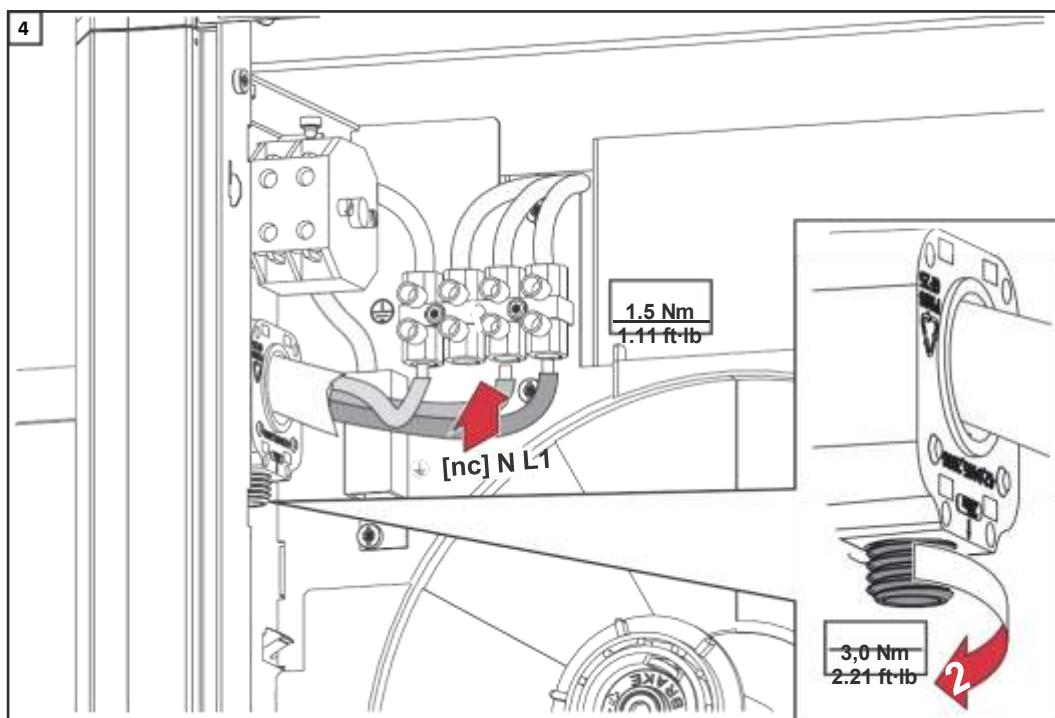
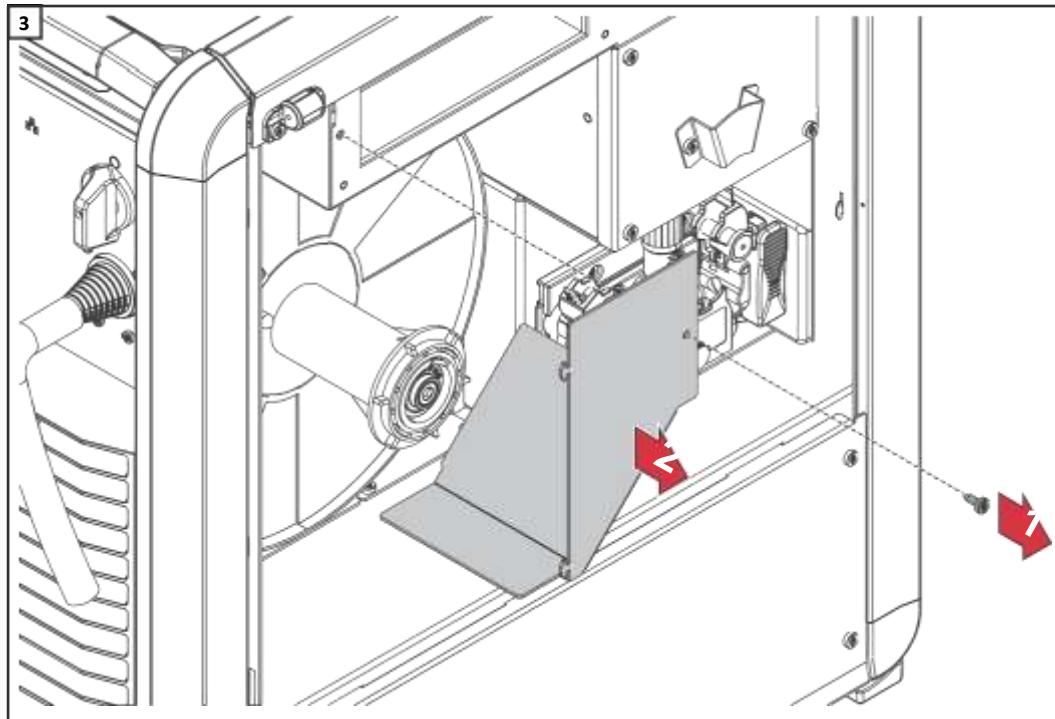




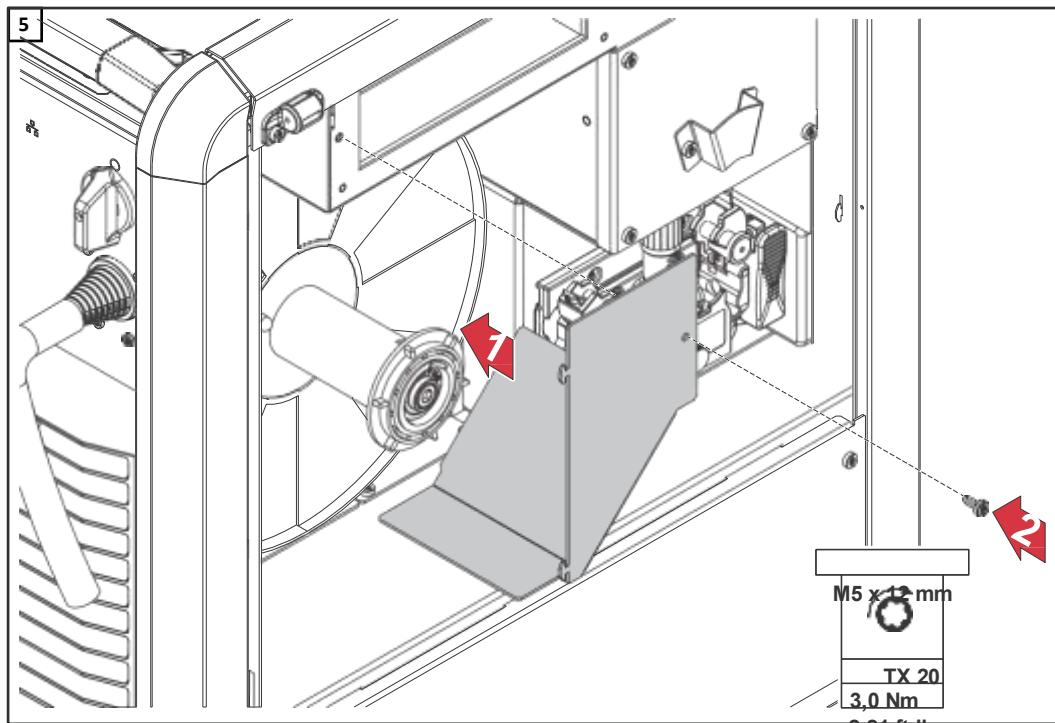
**Connecting the mains cable to /XT welding machines for single-phase operation**

**IMPORTANT!** The ground conductor should be approx. 20-25 mm (0.8-1 in.) longer than the phase conductors.





[nc] = the second block terminal from the left remains free.



# Transport and setup regulations

## Transporting individual devices



### WARNING!

#### Danger from electrical current.

Serious personal injuries may result.

- ▶ Do not lift or transport any active devices.
- ▶ Switch off and disconnect devices from the grid before transport or lifting. Close ground earth connections before transport.



### WARNING!

#### Danger from falling objects.

Serious personal injury and damage to property may result.

- ▶ Only use suitable transportation equipment from the manufacturer to transport devices by crane.
- ▶ Attach chains or ropes to all designated attachment points on the transportation equipment.
- ▶ The chains or ropes must form the smallest angle possible from vertical.
- ▶ Observe and comply with valid national and regional guidelines for accident prevention and hazards during transport and shipment.



### CAUTION!

#### Danger from damaged devices.

This can result in personal injury and damage to property.

- ▶ After transport and before commissioning, visually inspect the device for damage. Have any damage repaired by trained service technicians before commissioning the device.

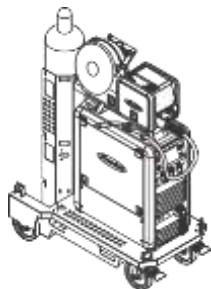
### NOTE!

#### The carrying handle on the device is only to be used for transport by hand.

- ▶ The carrying handle is not suitable for transport by crane, counterbalanced lift truck, or other mechanical lifting tools.

## Transporting welding systems

Example of a welding system with the following components:



- Trolley
- Cooling unit
- Welding machine
- Wirefeeder mount
- Wirefeeder
- Gas cylinder holder
- Shielding gas cylinder
- Welding torch



### WARNING!

#### Danger from devices or components falling.

Serious personal injury and damage to property may result.

- Before transporting the welding system, detach the wirefeeder and the shielding gas cylinder, and completely drain the coolant.
- Ensure that the remaining system components are securely seated on the trolley.
- Only use suitable transportation equipment from the manufacturer to transport welding systems by crane.
- Attach chains or ropes to all designated attachment points on the transportation equipment.
- The chains or ropes must form the smallest angle possible from vertical.
- Observe and comply with valid national and regional guidelines for accident prevention and hazards during transport and shipment.

## Checking lifting equipment



### WARNING!

#### Danger from devices and components falling as a result of damaged lifting equipment.

Could result in serious personal injury and damage to property.

- Regularly check all lifting equipment used for crane transport such as straps, buckles, chains, etc., for mechanical damage, corrosion, and changes due to other environmental influences.
- The inspection interval and scope of the inspection must comply with the relevant valid national standards and guidelines.

## Welding during crane transport

Welding during crane transport is possible and permissible if this is stated in the intended use of the device (for intended use, see from page 15 onwards).

## Setup regulations



### WARNING!

#### Danger from devices or welding systems toppling over.

Serious personal injury and damage to property may result.

- Set up the device securely on an even, solid surface. The maximum permitted tilt angle is 10°.
- Check all screw connections are tightly fastened after installation.



### WARNING!

#### **Danger from areas at risk of fire and explosion as well as from areas with increased electrical hazard.**

Serious personal injury and damage to property may result.

- Follow national and international regulations for areas at risk of fire and explosion.
- Follow national and international regulations for areas with increased electrical hazard.
- 



### CAUTION!

#### **Danger due to selecting an unsuitable installation location.**

May result in damage to property.

- Only set up and operate the device in accordance with the protection class shown on the rating plate.
- The ambient air must be free of dust, acids, corrosive gases or substances, or other similar substances.
- Do not set up and operate the device over 2000 m (6561 ft. 8.16 in.) above sea level.

The device has been tested according to protection class IP23. This means:

- Protection against solid foreign bodies larger than Ø 12.5 mm (0.49 in.)
- Protection against spraywater at any angle up to 60° from the vertical

The device can be set up and operated outdoors in accordance with protection class IP23.

Direct moisture (e.g., from rain) must be avoided.

# Mains connection

## Mains connection



### WARNING!

#### **Danger of electric shock due to insufficient mains connection.**

Could result in serious injury or death.

- Only connect the device to a grid with a ground conductor.
- Only connect the device to the grid via a plug-in system with a ground conductor contact.
- If operating the device on a grid without a ground conductor and on a socket without a ground conductor contact, observe all national regulations for protection by electrical separation

**IMPORTANT!** Ensure secure grounding of the mains connection.

Due to local regulations and national guidelines, a residual-current circuit breaker may be required when connecting a device to the public grid. The residual-current circuit breaker recommended for the device can be found in the technical data.

### NOTE!

#### **Devices with a high output can influence the energy quality of the grid due to their current consumption.**

- Before connecting the device to the mains, check with the grid operator whether or not the device is allowed to be connected.
- The maximum permissible grid impedance that is decisive for a mains connection is stated in the technical data.

## Fortis mains connection

- The devices are designed for the mains voltage stated on the rating plate.
- Devices with a rated welding voltage of 3 x 600 V and XT devices operated with 3 x 600 V must be operated on three-phase grids grounded at the neutral point.
- If the mains cable or mains plug has not been attached to your version of the appliance, these must be installed by qualified personnel according to national standards.
- The fuse protection of the mains lead is specified in the technical data.



### CAUTION!

#### **An inadequately dimensioned electrical installation can lead to serious damage to property.**

- The mains lead and its fuse protection should be designed to suit the existing power supply.  
The technical data on the rating plate should be followed.



# **Dangers when welding**



# Danger from incorrect operation or misuse

Danger from in-  
correct opera-  
and misuse



## WARNING!

### Danger from incorrect operation or misuse.

This can result in serious personal injury - including injury to third parties, damage to property, and impaired welding results.

- ▶ All persons involved in the commissioning, operation, maintenance, and servicing of the device must be appropriately qualified and have knowledge of welding.
- ▶ Read these Operating Instructions in full and follow them carefully and precisely.
- ▶ The Operating Instructions must always be kept to hand wherever the device is being used.
- ▶ Observe generally applicable and regional regulations regarding accident prevention and environmental protection.
- ▶

# Danger from grid current and welding current

## Danger from grid current and welding current



### WARNING!

#### Danger of electric shock.

Could result in serious injury or death.

- ▶ Do not touch voltage-carrying parts inside or outside the device.  
During MIG/MAG welding, the welding wire, the wire spool, the feed rollers, as well as all pieces of metal that are in contact with the welding wire, are live.
- ▶ Always place the wirefeeder on a sufficiently insulated base or use a suitable insulating wirefeeder mount.
- ▶ Use a dry backing bar or cover with sufficient insulation against the ground potential.
- ▶ The backing bar or cover must completely cover the entire area between the body and the ground potential.  
Only use undamaged, insulated, and adequately dimensioned cables and leads.
- ▶ Do not wrap cables or leads around your body or parts of the body. Never touch the welding wire, tungsten electrode, or the stick electrode when the welding machine is switched on.
- ▶ Ground the workpiece.  
Switch off unused devices.
- ▶ Before working on the device, switch off the device, remove the mains plug, and attach a clearly legible and understandable warning sign to prevent the mains plug from being connected and switched on again.  
After opening the device, ensure that all components are disconnected from the power supply – especially all electrically charged components.



### WARNING!

#### Danger due to electromagnetic fields.

This can result in damage to health and effects on the health of persons close by, e.g., those with pacemakers and hearing aids.

- ▶ Keep distances between welding power-leads and the head/torso of the welder as great as possible.
- ▶ Do not carry welding power-leads and hosepacks over your shoulder or wrap them around your body or body parts.
- ▶ Persons with pacemakers must seek advice from their doctor before standing in the immediate vicinity of the device and the welding process.



## CAUTION!

### Danger due to stray welding currents.

Overheating of components, fire, destruction of ground conductors, and damage to the device and other electrical equipment may result.

- Ensure that the workpiece clamp is securely connected to the workpiece. Secure the workpiece clamp as close to the spot to be welded as possible.
- Position the device with sufficient insulation against electrically conductive environments, e.g., insulation against electrically conductive floors or electrically conductive mounts.
- Ensure that the unused welding torch / electrode holder is adequately insulated when using power distribution boards, twin-head mounts, etc.
- In automated MIG/MAG applications, only guide the wire electrode from the welding wire drum, large spool, or wire spool to the wirefeeder with insulation.

### Danger due to electromagnetic emissions

Electromagnetic compatibility (EMC) describes the unwanted mutual influence of electrical/electronic devices.

The EMC device classification is stated on the rating plate of the device or in the technical data.

Despite compliance with the standard limit values for emissions, in certain cases electrical devices can influence each other in the intended application area.

Interference-prone equipment that could be affected by the device includes:

- Safety devices
- Mains leads, signal lines, and data transfer lines
- IT and telecommunications equipment
- Devices for measuring and calibrating
- Medical devices
- etc.



## CAUTION!

### Danger due to electromagnetic emissions.

Operational disruption and malfunctions as well as resulting damage may result.

- Use suitable grid filters.
- Keep welding power-leads as short as possible, route them close together and far from other lines.
- Perform equipotential bonding.
- Ground the workpiece, e.g., using suitable capacitors. Shield the entire welding system.
- Shield other devices in the vicinity.

# Danger from flying sparks, arc radiation, and noise

## Danger from flying sparks



### WARNING!

#### Danger from flying sparks.

Could result in fires and explosions.

- ▶ Never undertake welding near flammable materials.
- ▶ Flammable materials must be kept at least 11 meters (36 ft. 1.07 in.) from the arc or protected with a certified cover.
- ▶ Keep suitable, tested fire extinguishers on hand.
- ▶ Take appropriate measures to ensure that sparks and hot metal particles do not get into surrounding areas through small cracks and openings.
- ▶ Only undertake welding in areas at risk of fire and explosion, or on sealed tanks, drums, or pipes if these have been prepared in accordance with corresponding national and international standards.
- ▶ Do not undertake welding on containers in which gases, fuels, mineral oils, etc. are/were stored.
- ▶ Keep flammable vapors (such as solvent vapors) out of the arc radiation range.



### WARNING!

#### Danger from flying sparks and flying hot metal particles.

Could result in injury.

- ▶ Wear suitable protective clothing when dealing with the device. The protective clothing must be flame retardant, insulating, dry, and undamaged, must cover the whole body, and the pants must be cuffless.
- ▶ Wear rigid, wet-insulating footwear.
- ▶ Wear appropriate, electrically insulating, and heat protective gloves. Wear a safety helmet.

## Danger from arc radiation



### WARNING!

#### Danger from arc radiation, UV radiation, heat, and flying sparks that pose a risk of injury to the eyes and skin

Could result in injury.

- ▶ Use a face guard with a regulation-compliant filter insert.
- ▶ Wear regulation-compliant protective goggles with side protection behind the face guard.

## Danger due to noise



### CAUTION!

#### Danger due to increased noise exposure.

Could result in hearing damage.

- ▶ Use hearing protection during welding.

---

<b>Data on noise emission values</b>	<p>The device produces a maximum noise level of &lt;80 dB(A) (ref. 1pW) when idling and in the cooling phase following operation in relation to the maximum permitted operating point at standard loading in accordance with EN 60974-1.</p> <p>A workplace-specific emission value for welding (and cutting) cannot be specified because this value depends on the welding process and the environmental conditions. It is influenced by a wide range of parameters, such as the welding process itself (MIG/MAG, TIG welding), the selected current type (direct current, alternating current), the power range, the type of weld metal, the resonance properties of the workpiece, the workplace environment, and many other factors.</p>
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**Danger from welding operation**



**WARNING!**

**Danger from welding operation (blinding hazard, flying sparks, harmful welding fume, noise, etc.)**

Personal injury may result.

- ▶ Keep unauthorized people away during the operation of the devices and during the welding process.
- ▶ Inform people in the vicinity about all the dangers of the welding operation.
- ▶ Provide suitable protective equipment.
- ▶ Construct suitable protective walls and curtains.

# Danger from toxic gases and vapors

Danger from toxic gases and vapors



## WARNING!

### Danger from toxic gases and vapors.

Fumes produced during welding contain substances that cause cancer, as stated in monograph 118 from the International Agency for Research on Cancer.

- Use at-source extraction and a room extraction system.
- If possible, use a welding torch with an integrated extraction device. Keep your face out of the welding fume and gases produced.
- Do not breathe in fume or harmful gases.
- Ensure that there is a sufficient supply of fresh air. A ventilation flow rate of at least 20 m<sup>3</sup>/h (11.77 cfm) must be provided at all times.
- Use a welding helmet with air supply if there is insufficient ventilation.

# Danger due to missing safety equipment and moving components

## Danger due to missing safety equipment



### WARNING!

#### Danger due to missing, defective or circumvented safety equipment.

This can result in serious personal injury - including injury to third parties, damage to property, and impaired welding results.

- Only operate the device when all safety equipment is fully functional. Any safety equipment that is not fully functional must be repaired by an authorized specialist before the device is switched on.
- Never bypass or disable safety equipment.
- Before switching on the device, ensure that no one can be put in danger.

## Danger due to rotating parts



### CAUTION!

#### Danger due to rotating parts such as fans, gears, rollers, shafts or wire spools.

Personal injury may result.

- Keep hands, hair, loose clothing, and tools away from moving parts.
- Do not reach into rotating gears of the wire drive or into rotating drive parts.

## Danger due to missing covers



### CAUTION!

#### Danger due to missing or opened covers.

Personal injury may result.

- Before operation, make sure that all covers and side panels are present and have been correctly fitted.
- Ensure that all covers and side panels are closed during operation.
- Only open covers and side panels for the duration of assembly and maintenance activities.

# Danger from shielding gas cylinders and shielding gas supply

## Danger from shielding gas cylinders and shielding gas supply



### WARNING!

#### Danger from pressurized shielding gas cylinders.

Serious personal injury and damage to property can result from explosions.

- Protect pressurized shielding gas cylinders from high heat, mechanical impact, slag, open flames, sparks, and arcs.
- Do not weld pressurized shielding gas cylinders.
- Keep shielding gas cylinders away from welding or other circuits. Do not hang the welding torch on a shielding gas cylinder.
- Leave the protective cap on the valve of the shielding gas cylinder when the cylinder is not connected.
- Mount shielding gas cylinders vertically and secure them from falling in accordance with the instructions.
- Observe and follow the manufacturer's instructions and national and international provisions for shielding gas cylinders and accessories.
- Remove the shielding gas cylinder before transporting a welding system with trolley by crane.
- Observe the safety and maintenance information on the shielding gas cylinder or a



### WARNING!

#### Danger from shielding gas escaping without notice.

Shielding gas is colorless and odorless and, in the event of leaks, may replace the oxygen in the ambient air.

Could result in serious injury or death due to suffocation.

- Ensure that there is a sufficient supply of fresh air.  
There must be a ventilation flow rate of at least 20 m<sup>3</sup> per hour.
- Close the valve of the shielding gas cylinder or a central gas supply when no welding is taking place.
- Turn your face away from the outlet when a valve on a shielding gas cylinder is being opened.
- Check the shielding gas cylinder or central gas supply for uncontrolled gas leakage before each start-up.
- If an adapter is being used, use suitable Teflon tape to seal the thread of the shielding gas



### CAUTION!

#### Danger due to contaminated shielding gas.

This can result in damage to property and impaired weld results.

- The quality of the shielding gas must meet the following specifications: Solid particle size < 40 µm  
Pressure condensation point < -20 °C max. oil content < 25 m<sup>3</sup>/m<sup>3</sup>

# Danger due to hot parts and slag

Danger due to slag  
hot parts and



## CAUTION!

**Danger due to hot components, parts, and liquids.**

Could result in burns and injury.

- ▶ Do not touch the workpiece during and after welding.
- ▶ Allow hot components, hot parts, and hot liquids to cool before touching (e.g., the welding torch).
- ▶ If a cooling unit is being used, switch it off before disconnecting coolant hoses.



## CAUTION!

**Danger due to slag flying off cooling workpieces.**

Could result in burns and injury.

- ▶ Also wear protective equipment when reworking workpieces and ensure that other persons are sufficiently protected.



# **Commissioning**



# Commissioning of Fortis C

## Safety



### WARNING!

#### **Danger from electrical current.**

This can result in serious personal injury and damage to property.

- ▶ Before starting work, switch off all the devices and components involved and disconnect them from the grid.
- ▶ Secure all devices and components involved so they cannot be switched back on.



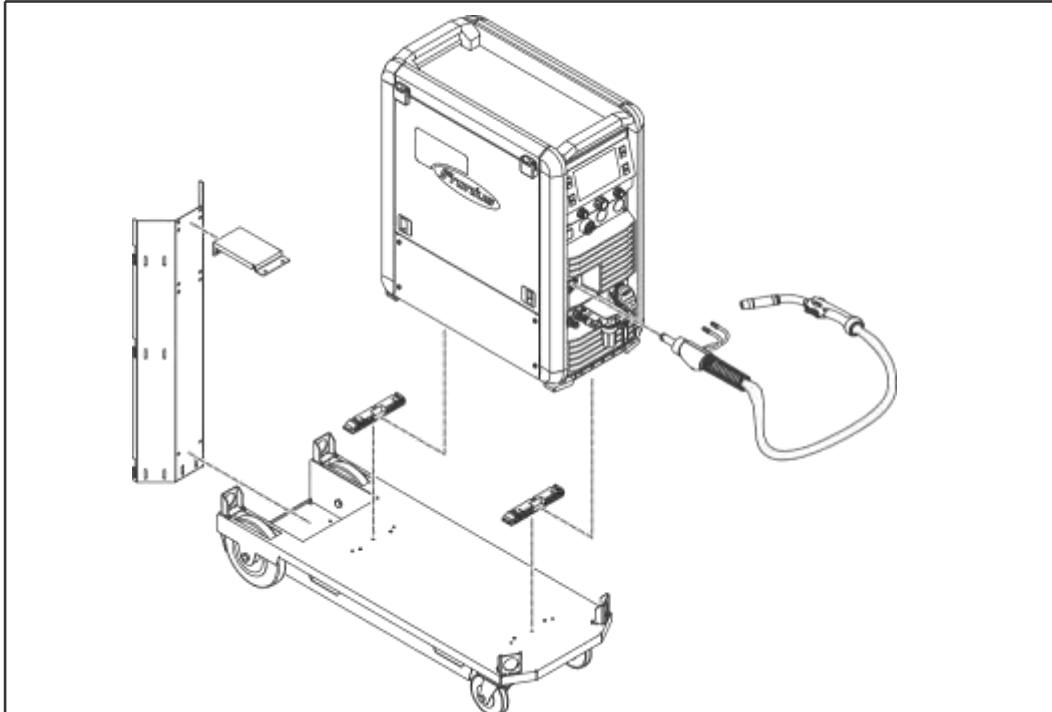
### WARNING!

#### **Danger of electrical current due to electrically conductive dust in the device.**

Serious personal injury and damage to property may result.

- ▶ Only operate the device if an air filter is fitted. The air filter is a very important safety device for achieving IP 23 protection.

## Fortis C: Assembling the system components (overview)



## Inserting/chan- ging feed rollers

In order to achieve optimum wire electrode feed, the feed rollers must be suitable for the diameter and alloy of the wire being welded.

### NOTE!

**Only use feed rollers which match the wire electrode.**

An overview of the available feed rollers and their possible uses can be found in the online spare parts catalog (O-ETK).



Online spare parts catalog (O-ETK): <https://spareparts.fronius.com>

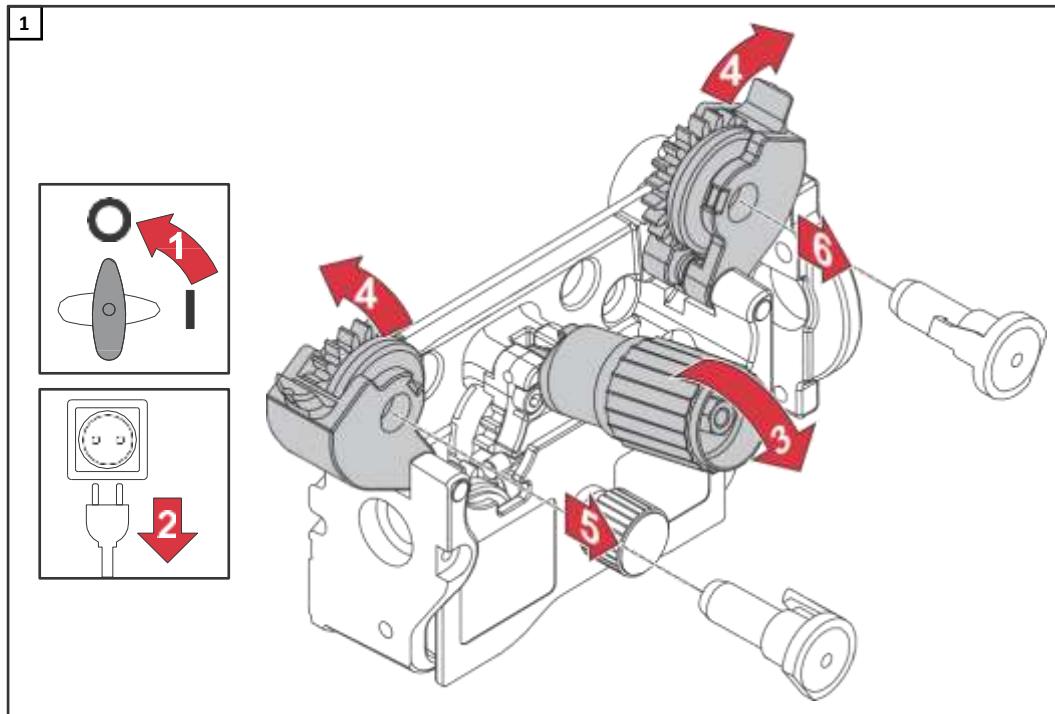


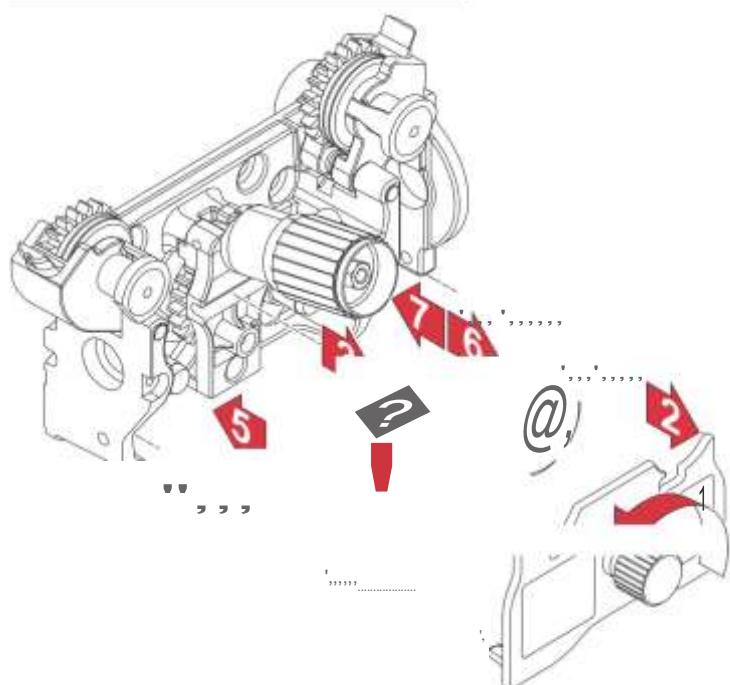
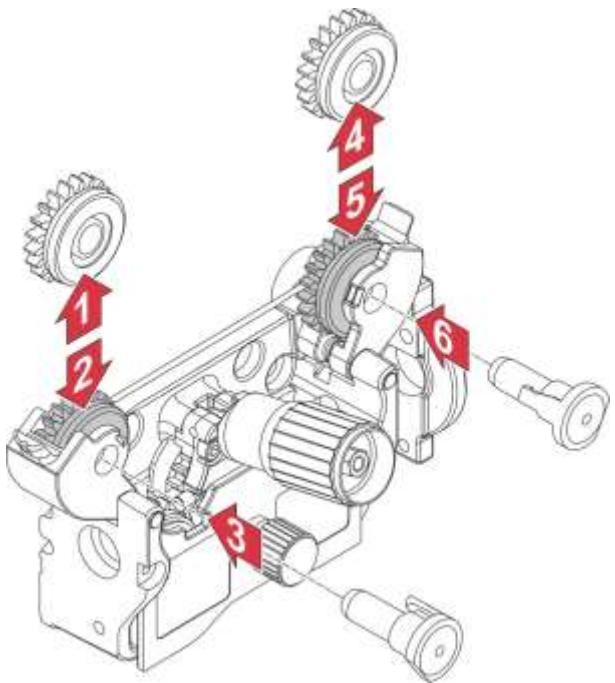
### CAUTION!

**Danger due to feed roller holders shooting upwards.**

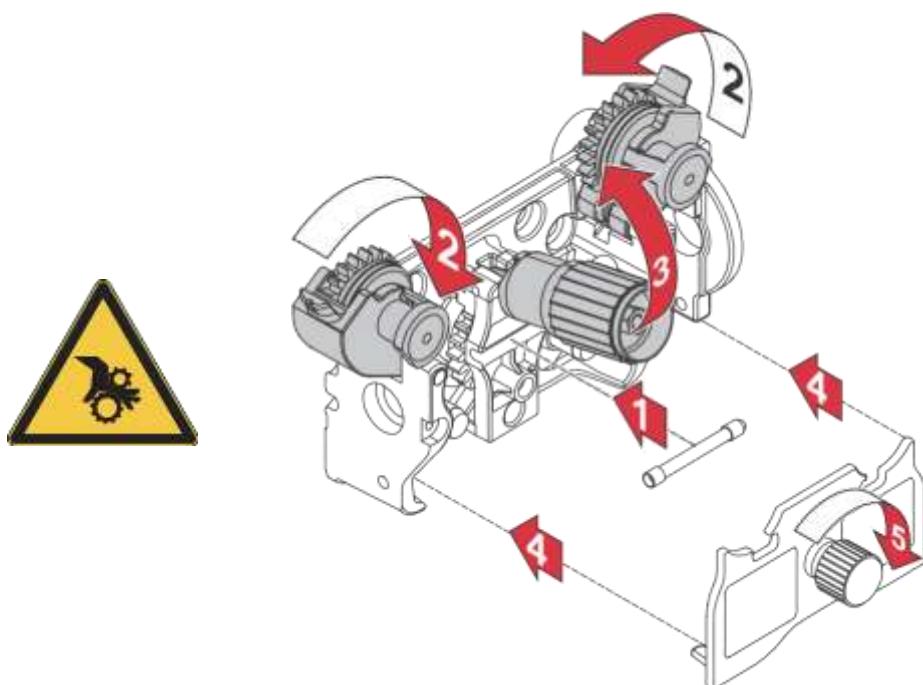
This can result in personal injury.

- When unlocking the lever, keep fingers away from the area to the left and right of the lever.





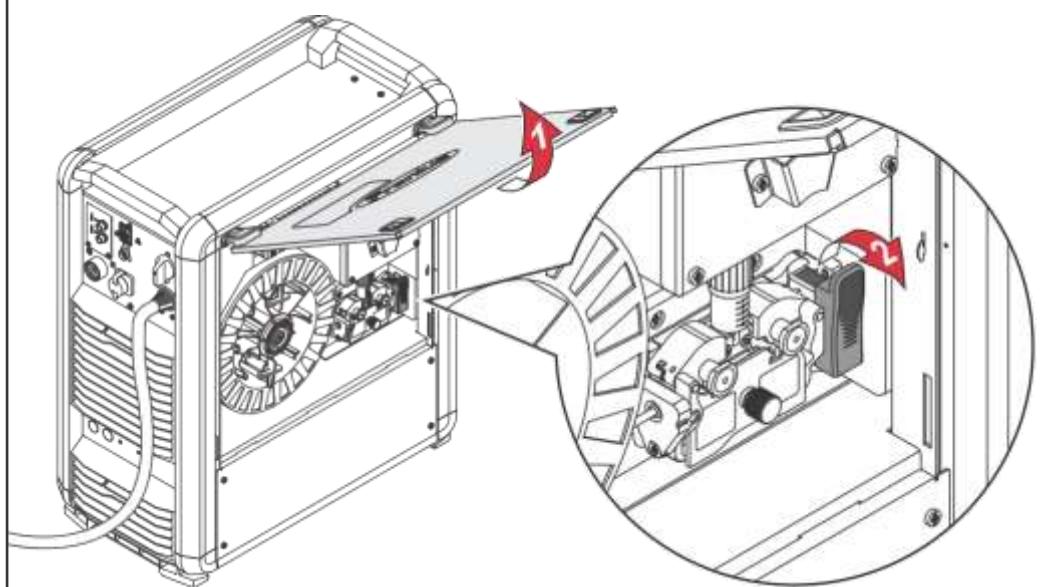
4

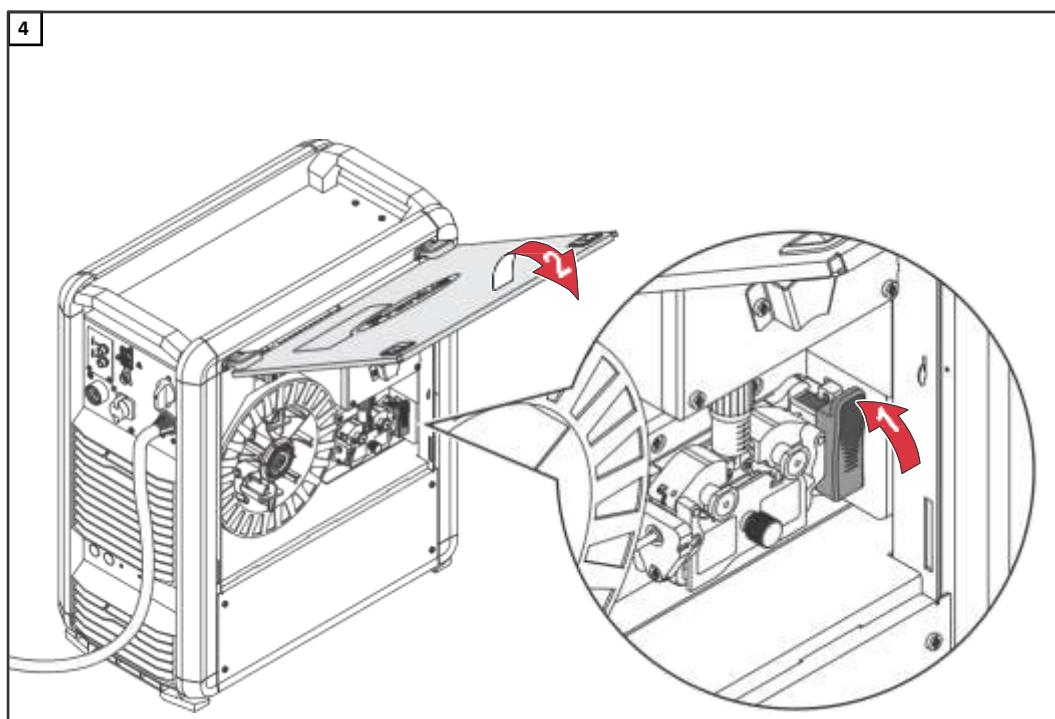
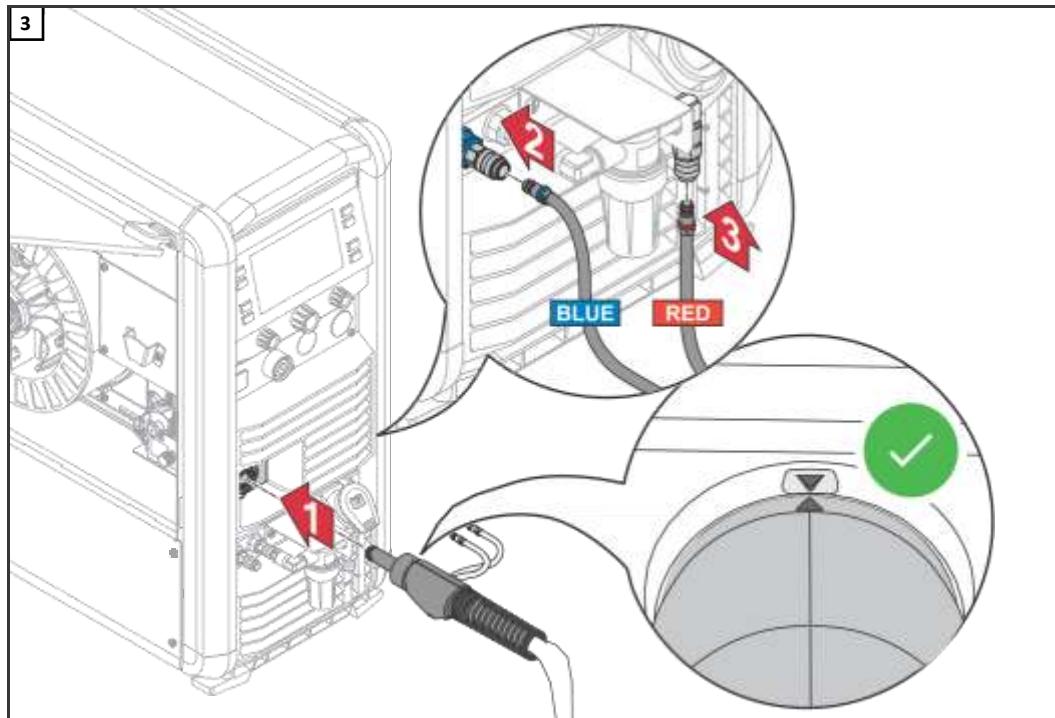


#### Connecting the welding torch

1 Before connecting the welding torch, check that all cables, leads, and hose-packs are undamaged and correctly insulated.

2





#### Connecting the gas cylinder

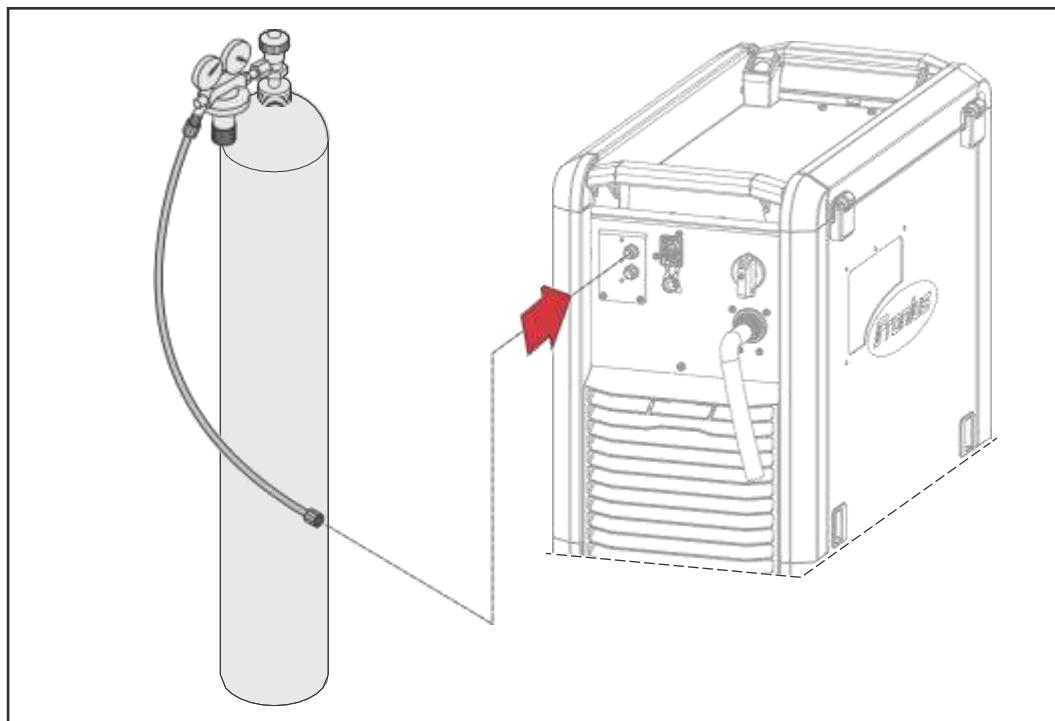


#### WARNING!

##### Danger from falling gas cylinders.

This can result in severe personal injury and damage to property.

- Place gas cylinders on a solid, level surface so that they remain stable. Secure gas cylinders to prevent them from falling over.
- Observe the safety rules of the gas cylinder manufacturer.



*Connecting the gas hose*

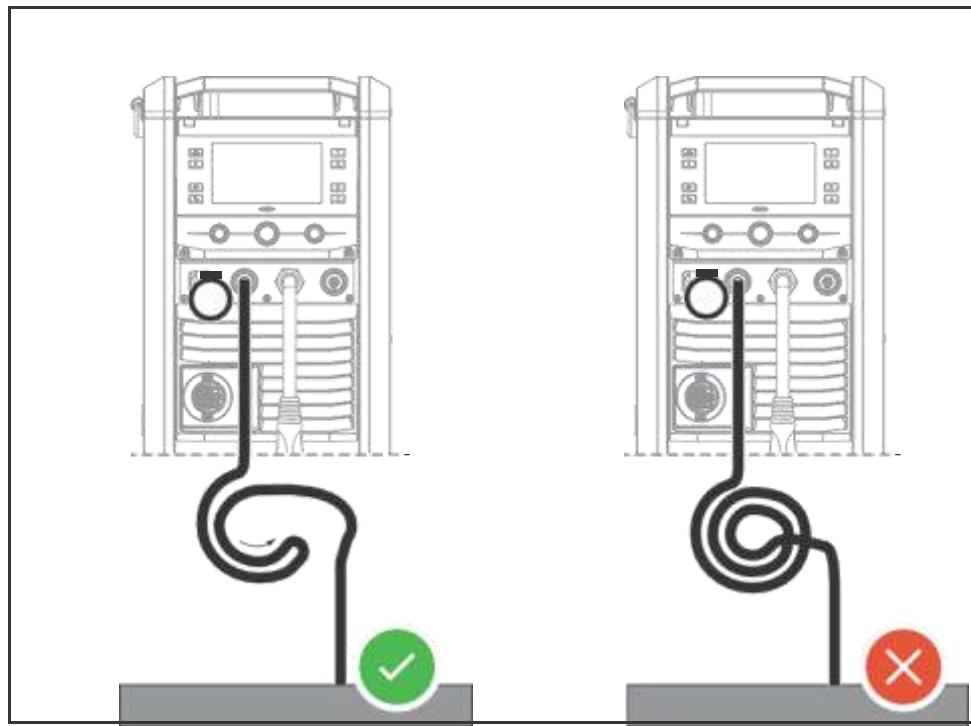
- 1** Place gas cylinder on a solid, level surface so that it remains stable
- 2** Secure gas cylinder against falling over, although not by the neck of the cylinder
- 3** Remove the protective cap from the gas cylinder Briefly open
- 4** the gas cylinder valve to remove any dirt Inspect the seal on the
- 5** gas pressure regulator
- 6** Screw the gas pressure regulator onto the gas cylinder and tighten it
- 7** Connect the gas pressure regulator to the shielding gas connection on the welding machine using a gas hose

## Establishing a ground earth connection

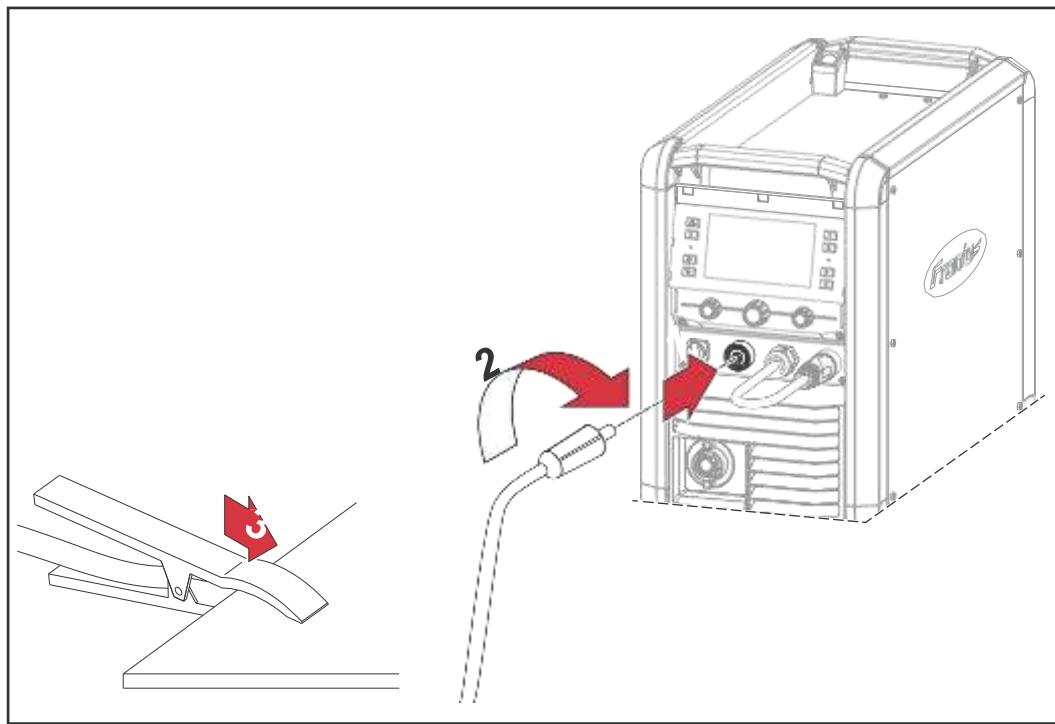
### NOTE!

**When establishing a ground earth connection, observe the following points:**  
Failure to do so may impair welding results and pulse welding.

- ▶ Use a separate return lead cable for each welding machine
- ▶ Keep positive cables and return lead cables together as long and as close as possible
- ▶ Physically separate the welding circuits of individual welding machines
- ▶ Do not route several return lead cables in parallel; if parallel routing cannot be avoided, keep a minimum distance of 30 cm between the welding circuits
- ▶ Keep the return lead cables as short as possible and use cables with a large cross-section
- ▶ Do not cross over return lead cables
- ▶ Avoid ferromagnetic materials between the return lead cables and the interconnecting hosepack
- ▶ Do not reel up long return lead cables—coil effect!  
Route long return lead cables in loops



- ▶ Do not route return lead cables in iron pipes, metal cable trays, or along steel beams; avoid cable ducts;  
(routing positive cables and return lead cables together in an iron pipe does not cause any problems)
- ▶ If several return lead cables are being used, separate the grounding points on the component as far as possible and do not allow crossed current paths between the individual arcs.



- 1** Insert the return lead cable into the (-) current socket If there is a polarity reverser:  
Insert the return lead cable into the free current socket
  
- 2** Lock return lead cable
- 3** Connect the other end of the return lead cable to the workpiece



#### CAUTION!

##### **Impaired welding results due to a ground earth connection being shared by several welding machines!**

If several welding machines are all welding one component, a common ground earth connection can have a significant effect on the welding results.

- Disconnect welding circuits!
- Provide a separate ground earth connection for each welding circuit! Do not use a common return lead cable!

Inserting the  
wire spool



**CAUTION!**

**Danger from springiness of spooled wire electrode.**

Could result in injury.

- When inserting the wire spool, hold the end of the wire electrode firmly to avoid injuries caused by the wire electrode springing back.



**CAUTION!**

**Danger from falling wire spool.**

Could result in injury.

- Ensure that the wire spool is fitted securely to the wire spool holder.

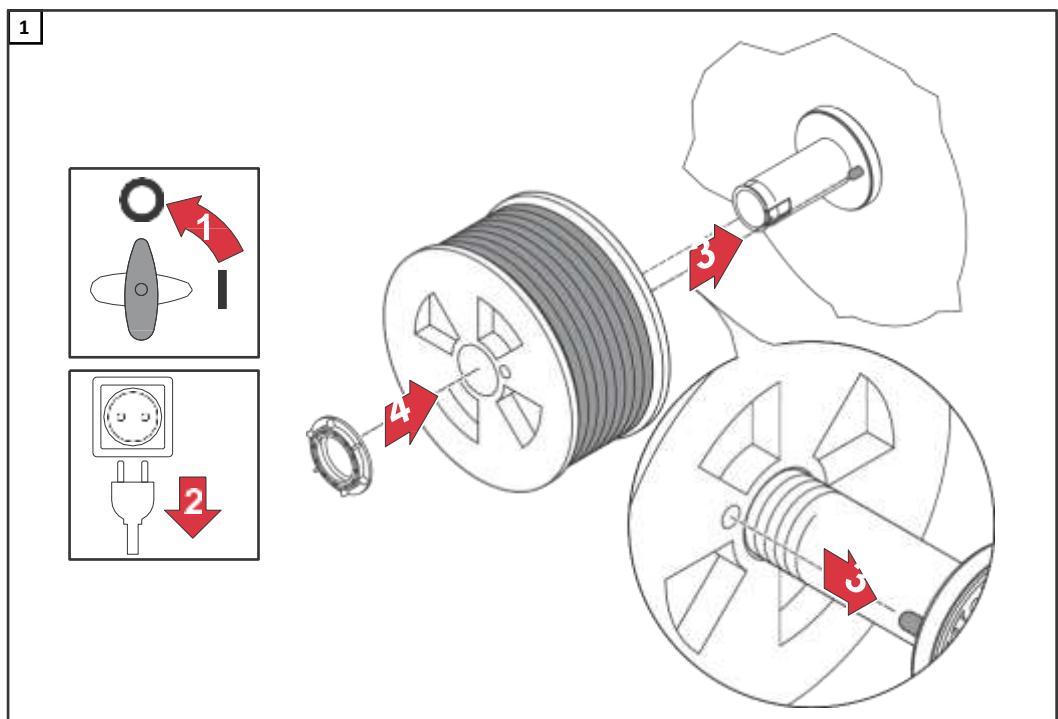
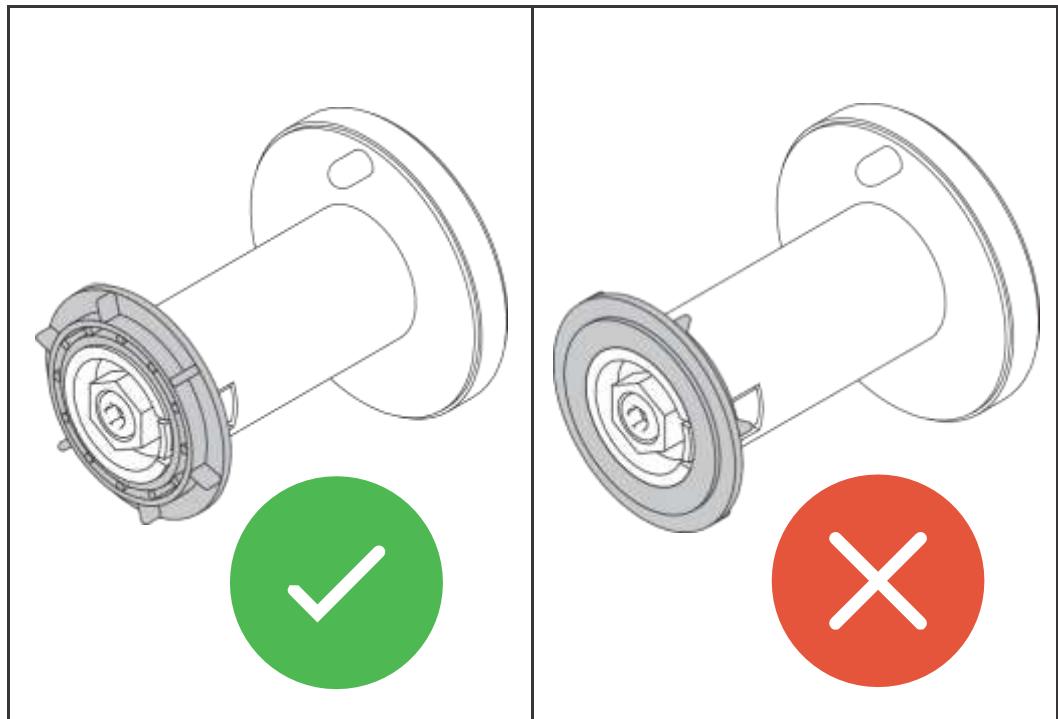


### CAUTION!

**Danger due to falling wire spool as a result of the locking ring being fitted the wrong way round.**

Could result in personal injury and functional impairments.

► Always position the locking ring as shown in the image below.



Installing the  
basket-type  
spool

**NOTE!**

**When working with basket-type spools, only use the basket-type spool adapter supplied with the device.**



**CAUTION!**

**Danger from springiness of spooled wire electrode.**

Personal injury may result.

- Wear safety goggles.
- When inserting the wirespool/basket-type spool, hold the end of the wire electrode firmly to avoid injuries caused by the wire electrode springing back.



**CAUTION!**

**Danger from falling basket-type spool.**

Could result in injury.

- Make sure that the basket-type spool with basket-type spool adapter is fitted securely to the wire spool holder.
- Place the basket-type spool on the adapter provided in such a way that the bars on the spool are inside the adapter guidewalls.

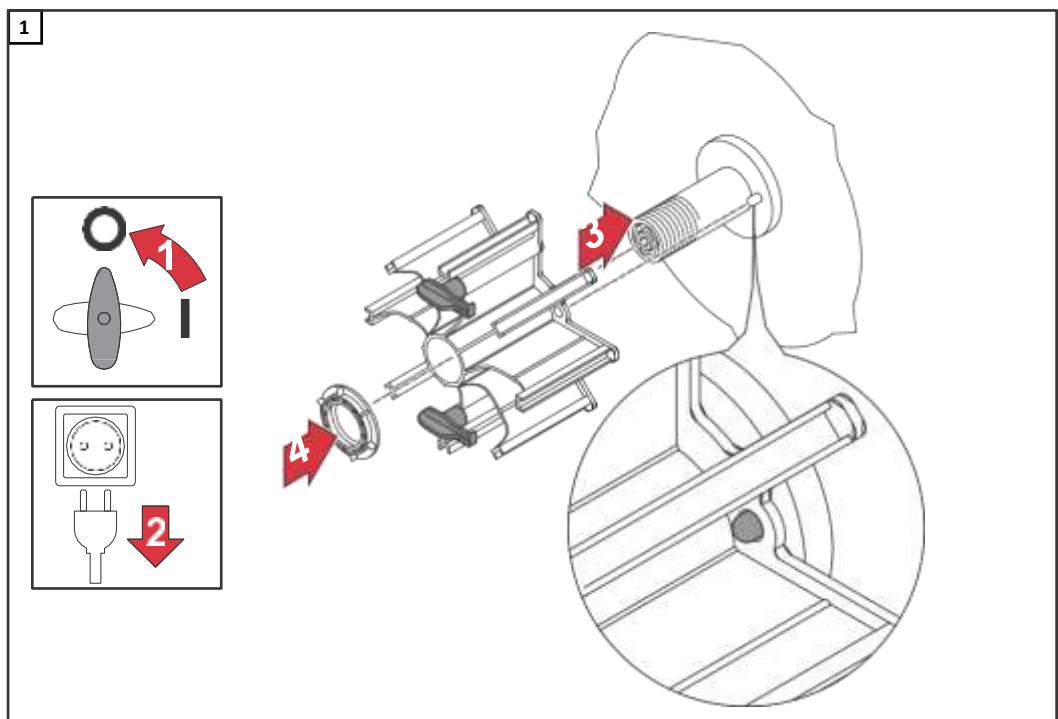
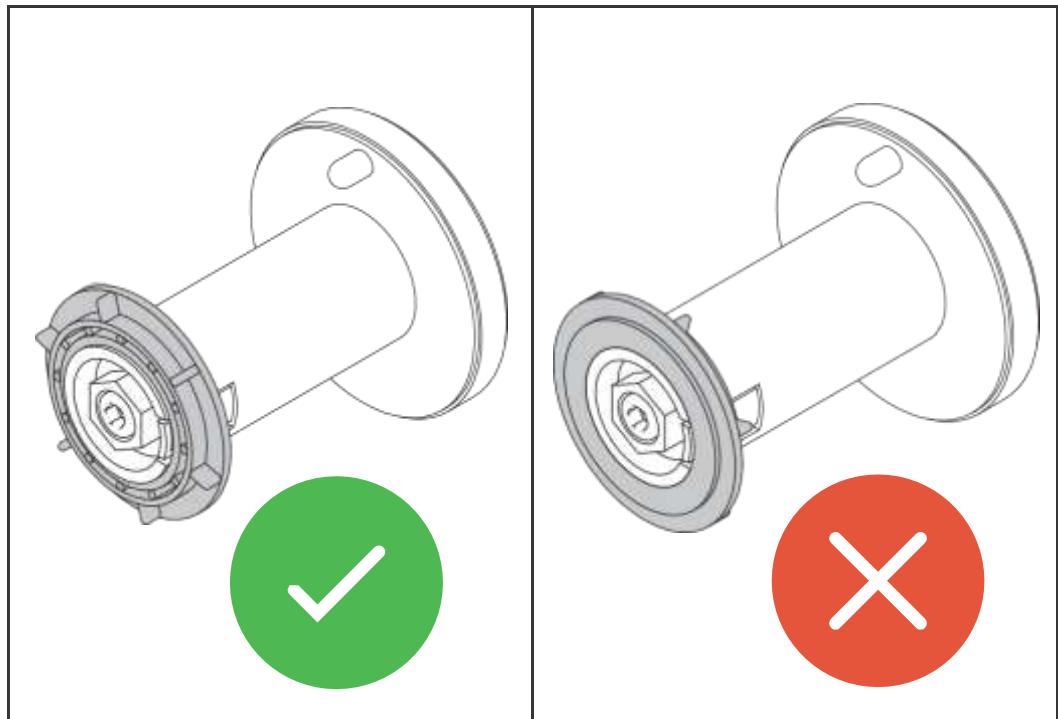


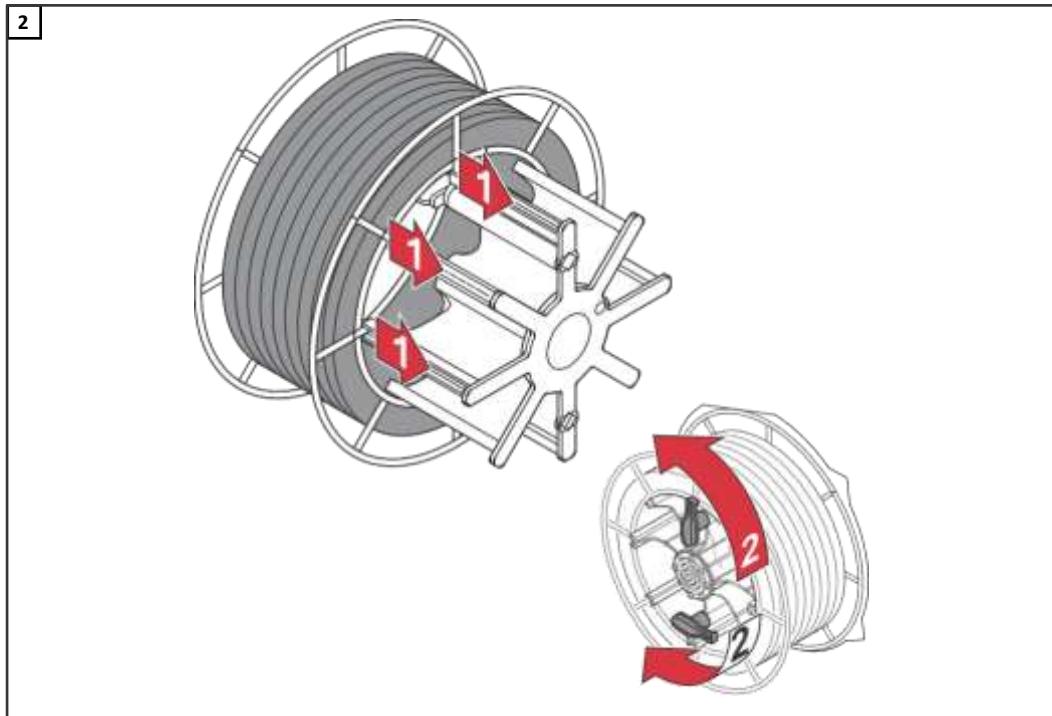
### CAUTION!

**Danger due to falling basket-type spool as a result of the locking ring being fitted the wrong way round.**

Could result in personal injury and functional impairments.

► Always position the locking ring as shown in the image below.



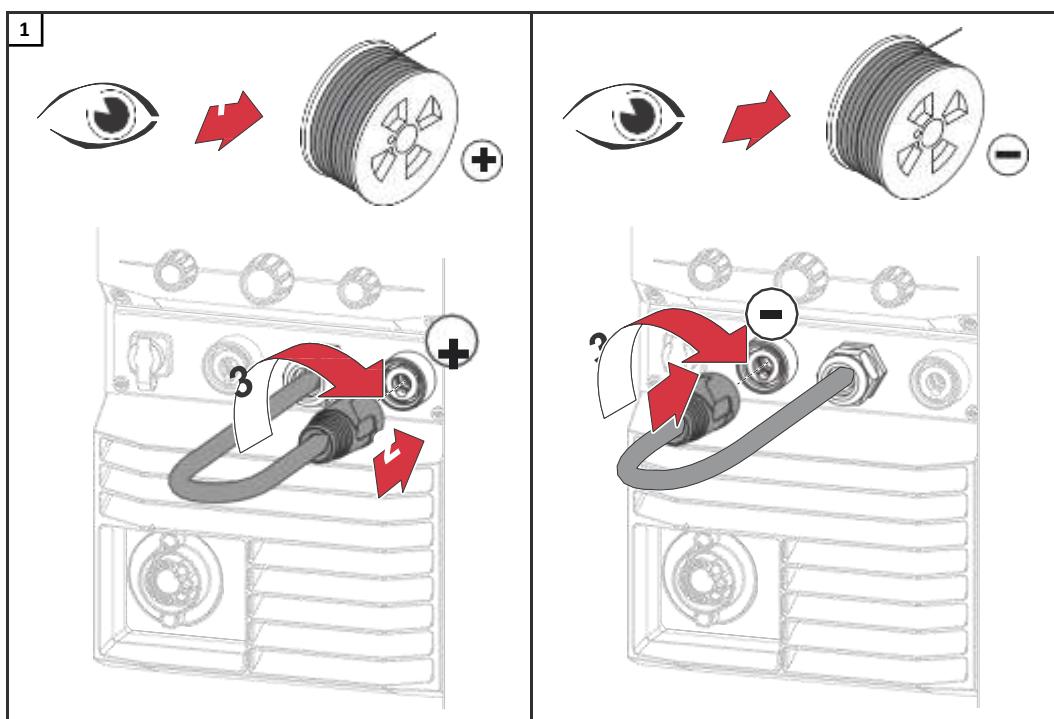


### Connecting the polarity reverser

#### NOTE!

If the polarity reverser is incorrectly connected, it can result in poor-quality weld properties or damage to the device.

- Connect the polarity reverser according to the wire electrode used. Check the wire electrode packaging to determine whether the wire electrode is for (+) or (-) welding.





**CAUTION!**

**Danger from springiness of spooled wire electrode.**

Personal injury may result.

- Wear safety goggles.
- When inserting the wirespool/basket-type spool, hold the end of the wire electrode firmly to avoid injuries caused by the wire electrode springing back.



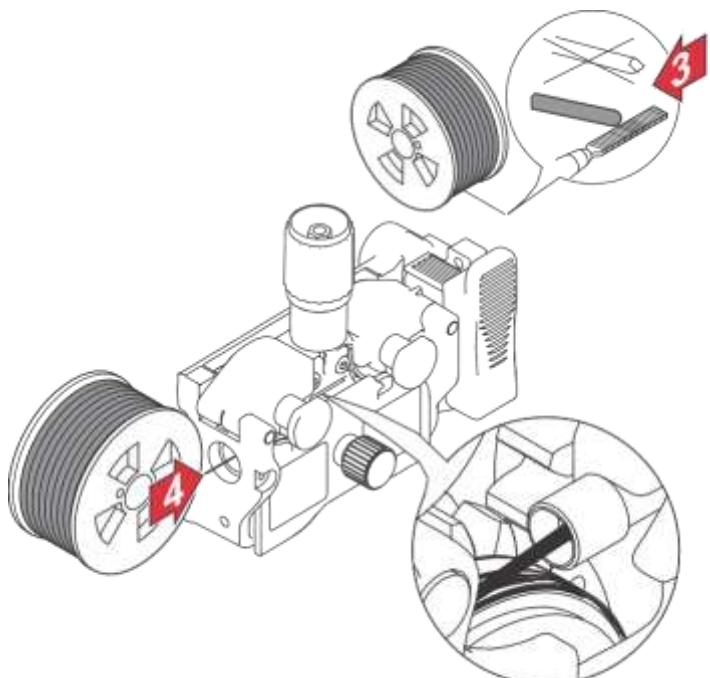
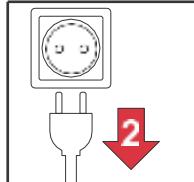
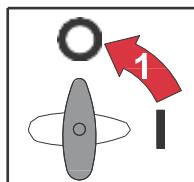
**CAUTION!**

**Danger due to sharp end of the wire electrode.**

This can damage the welding torch.

- Deburr the end of the wire electrode well before threading in.
- Lay out the torch hosepack as straight as possible.

1

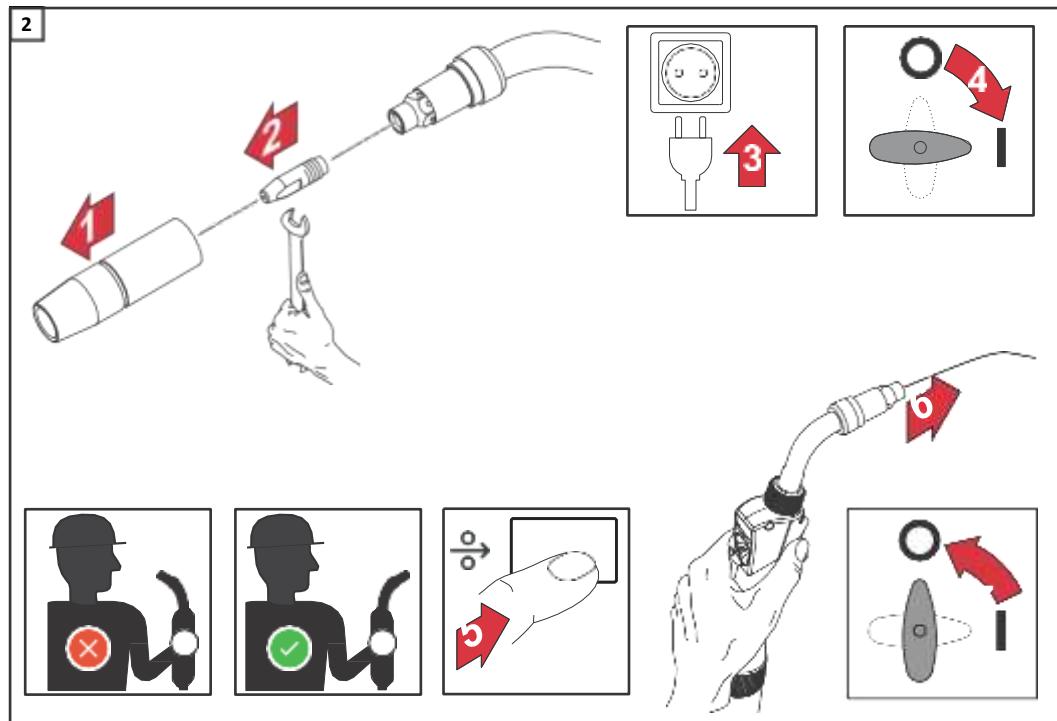


**CAUTION!**

**Danger due to emerging wire electrode.**

Personal injury may result.

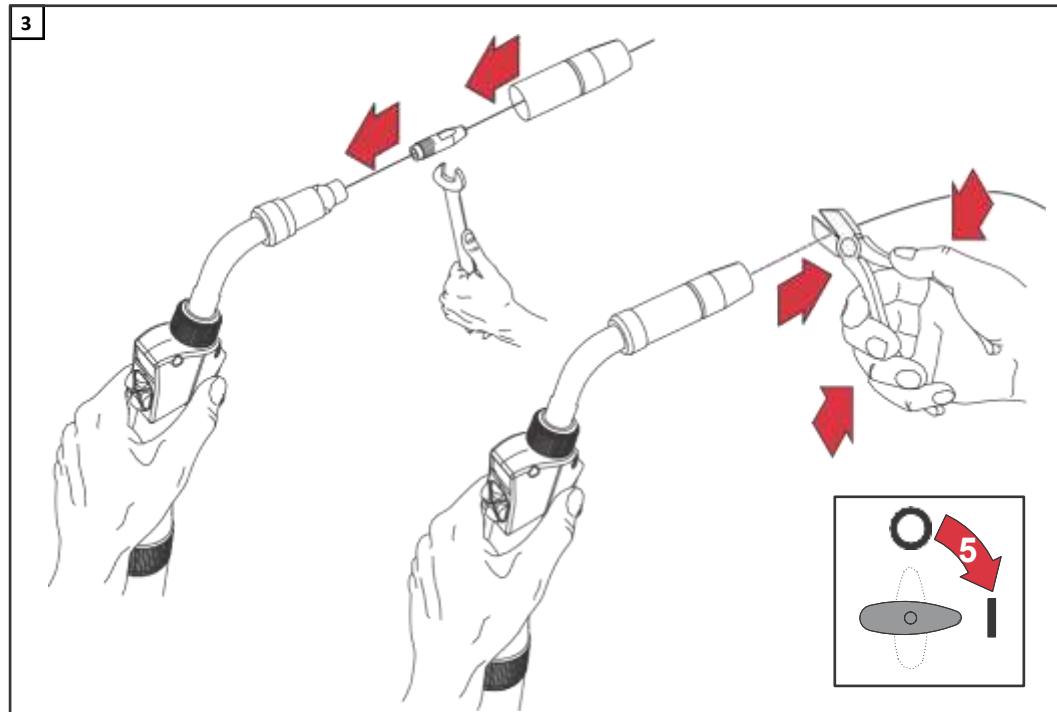
- Hold the welding torch so that the tip of the welding torch points away from the face and body.
- Wear suitable protective goggles.
- Do not point the welding torch at people.
- Ensure that the wire electrode can only intentionally make contact with electrically conductive objects.



**NOTE!**

**The wire electrode can be threaded by pressing a wire threading button provided in the welding system or by pressing the torch trigger.**

- The "Wire threading" dialog window is shown on the displays of the welding machine and wirefeeder.



**Instructions for wire threading**

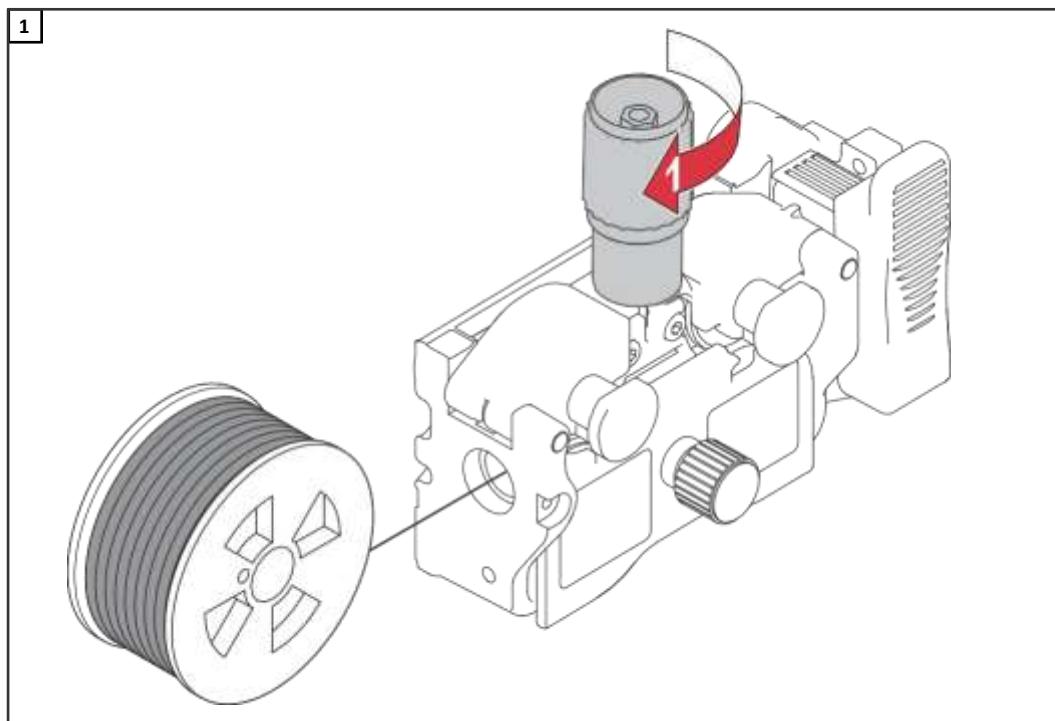
If contact is made with the ground during wire threading, the wire electrode is automatically stopped.

When the torch trigger is pressed once, the wire electrode moves forwards 1 mm.

**Setting the contact pressure**

**NOTE!**

Set the contact pressure in such a way that the wire electrode is not deformed but nevertheless ensures proper wirefeeding.



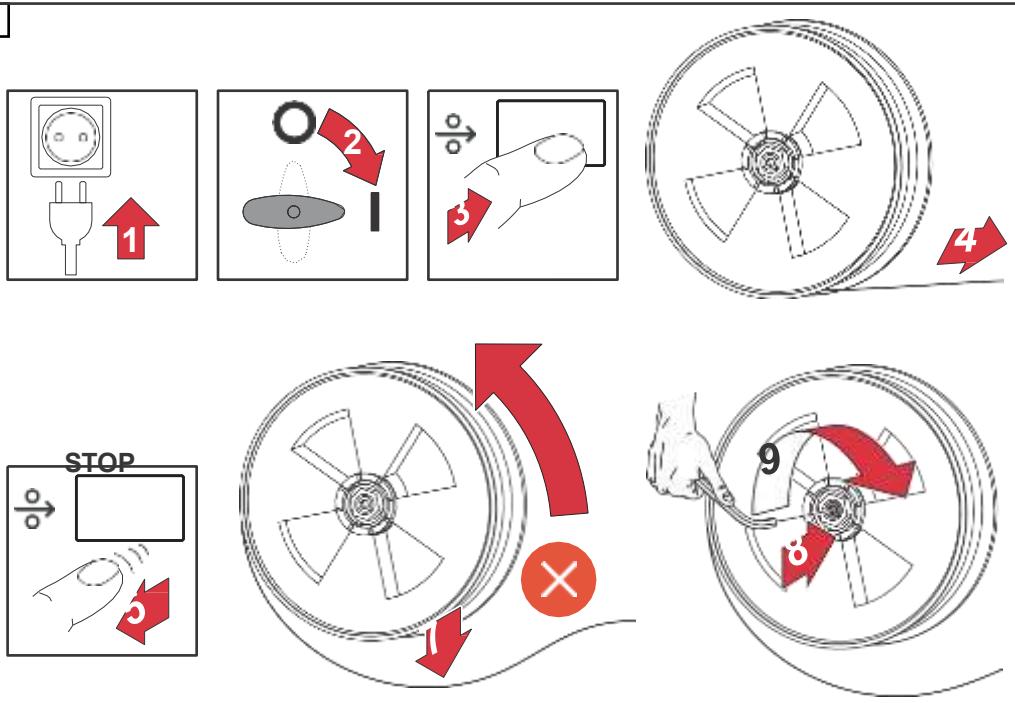
The standard values for the contact pressure can be found on the sticker on the 4-roller drive.

## Adjusting the brake

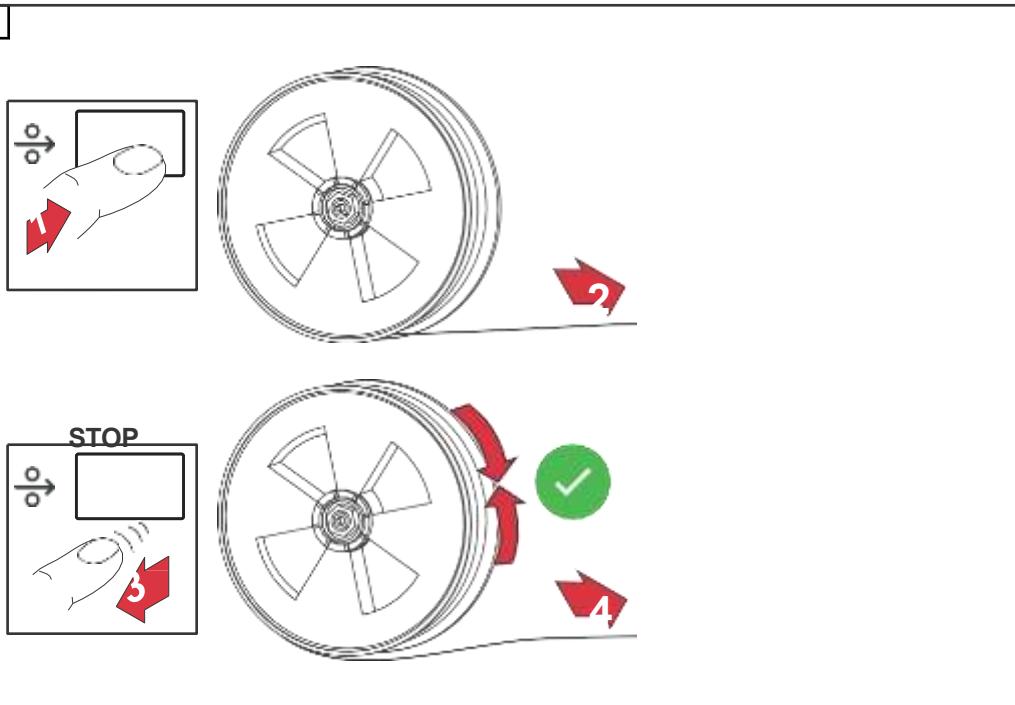
### NOTE!

After releasing the torch trigger, the wire spool must stop unreeling.  
Adjust the brake if necessary.

1



2



## Design of the brake

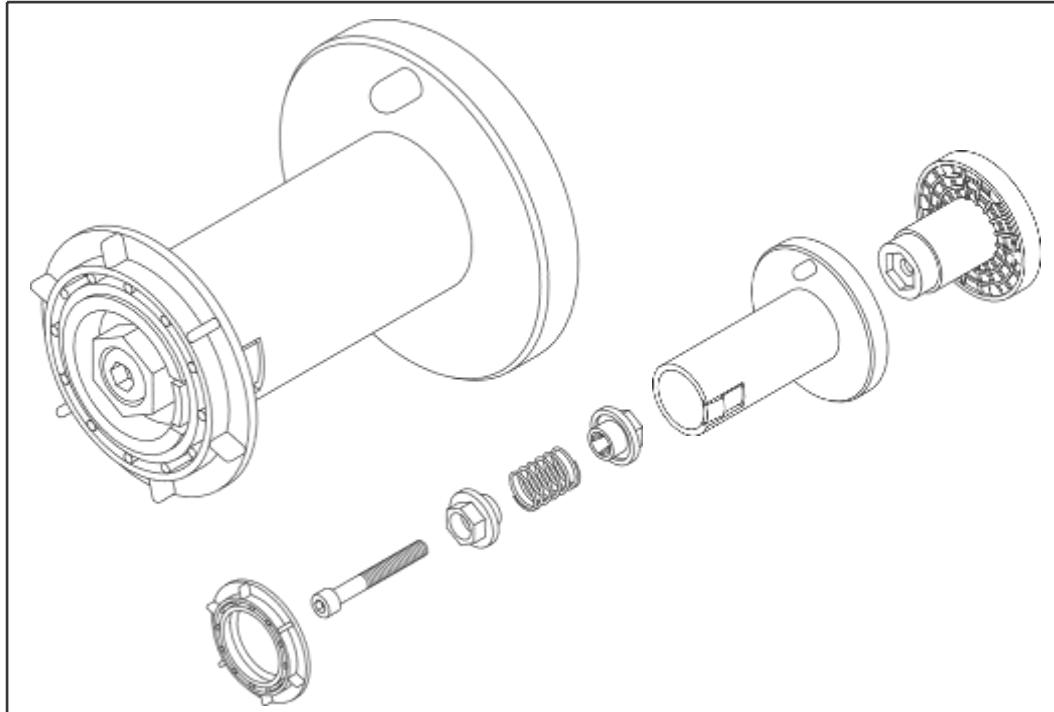


### CAUTION!

#### Danger from incorrect installation.

Personal injury and damage to property may result.

- Do not dismantle the brake.
- Maintenance and servicing of brakes is to be carried out by trained, qualified personnel only.



The brake is only available as a complete unit.

The illustration of the brake is for information purposes only.

## Performing R/L alignment

**IMPORTANT!** For optimum welding results, the manufacturer recommends carrying out an R/L alignment whenever the device is commissioned and whenever changes are made to the welding system.  
Further information on the R/L alignment can be found in the setup menu / MIG/ MAG / R/L alignment as of page [200](#).

# Commissioning Fortis with external wirefeeder

## Safety



### WARNING!

#### **Danger from electrical current.**

This can result in serious personal injury and damage to property.

- ▶ Before starting work, switch off all the devices and components involved and disconnect them from the grid.
- ▶ Secure all devices and components involved so they cannot be switched back on.



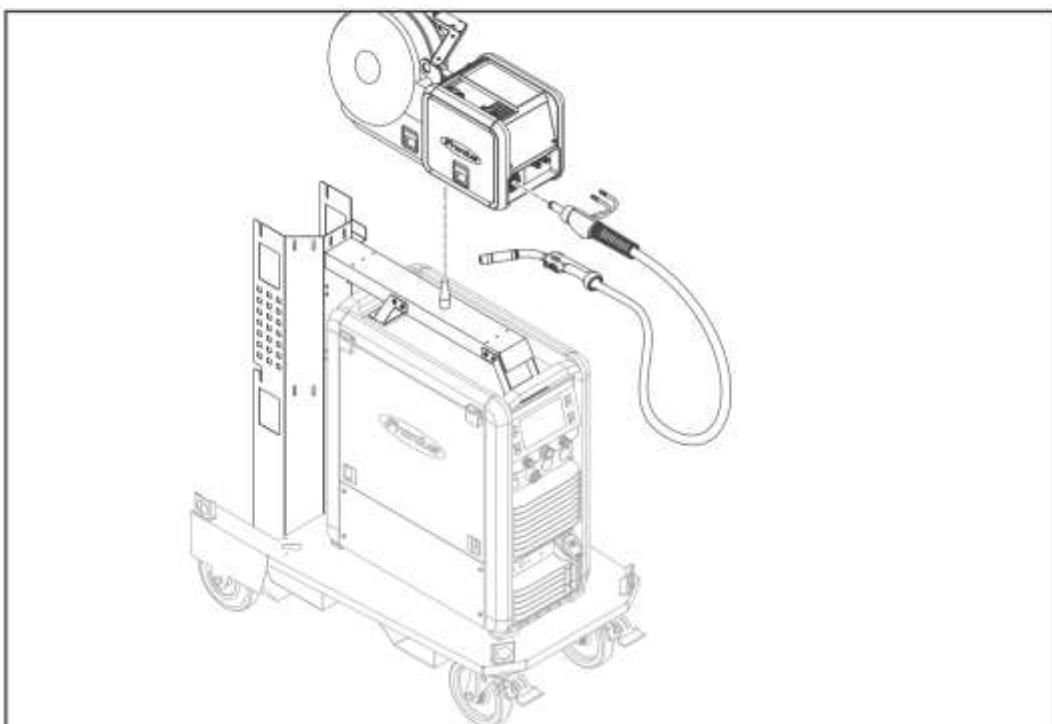
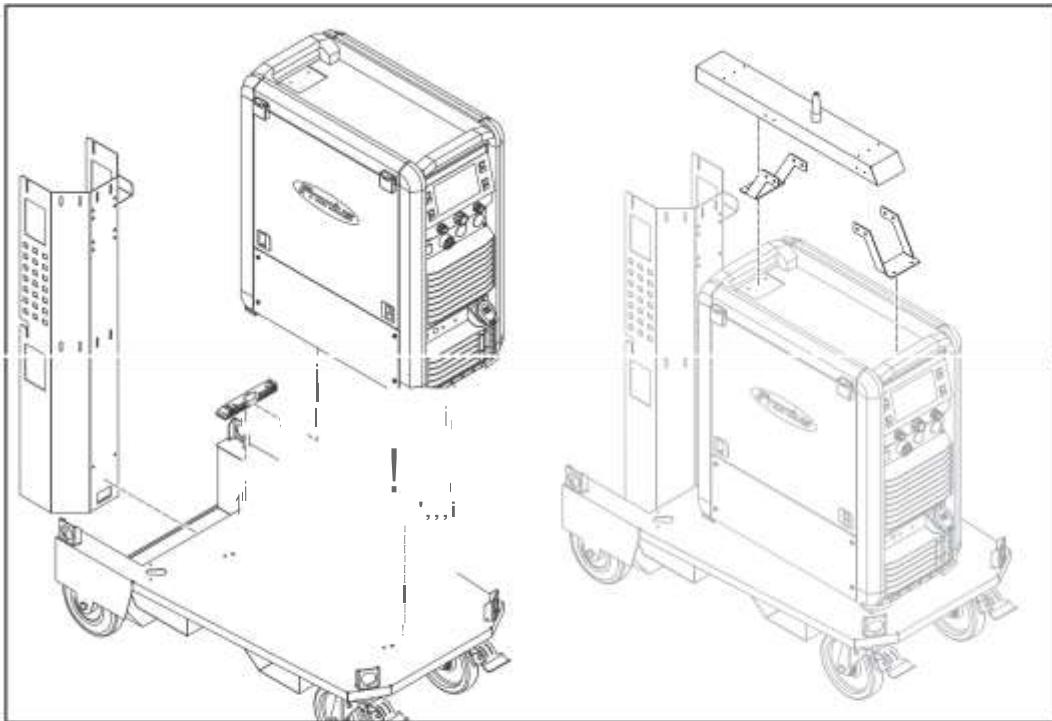
### WARNING!

#### **Danger of electrical current due to electrically conductive dust in the device.**

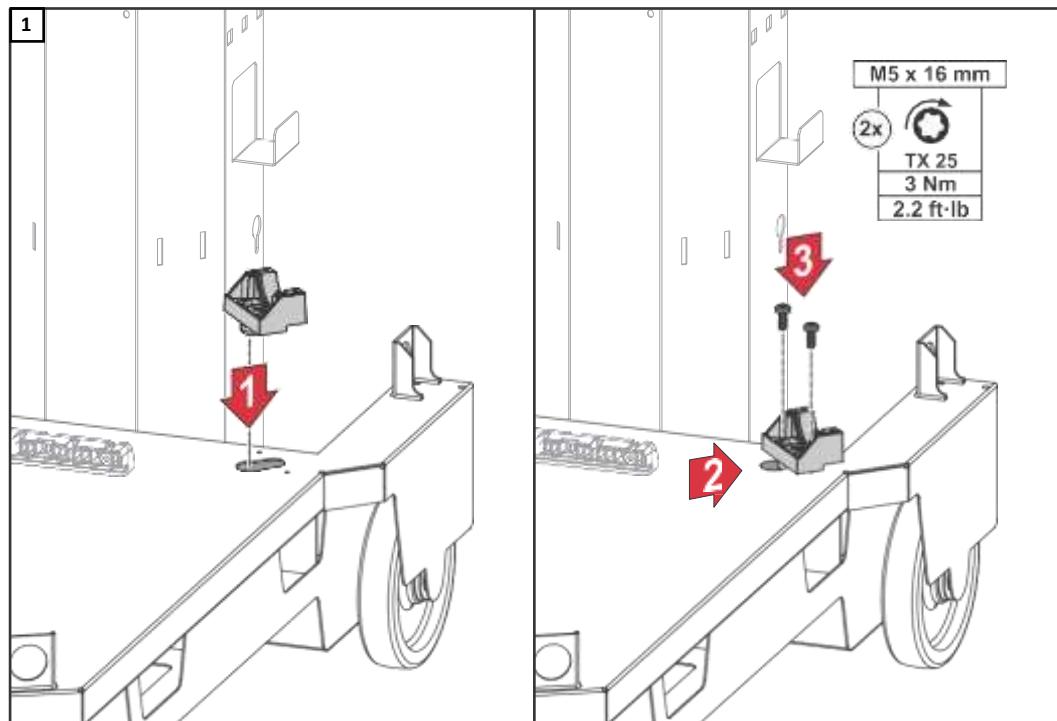
Serious personal injury and damage to property may result.

- ▶ Only operate the device if an air filter is fitted. The air filter is a very important safety device for achieving IP 23 protection.

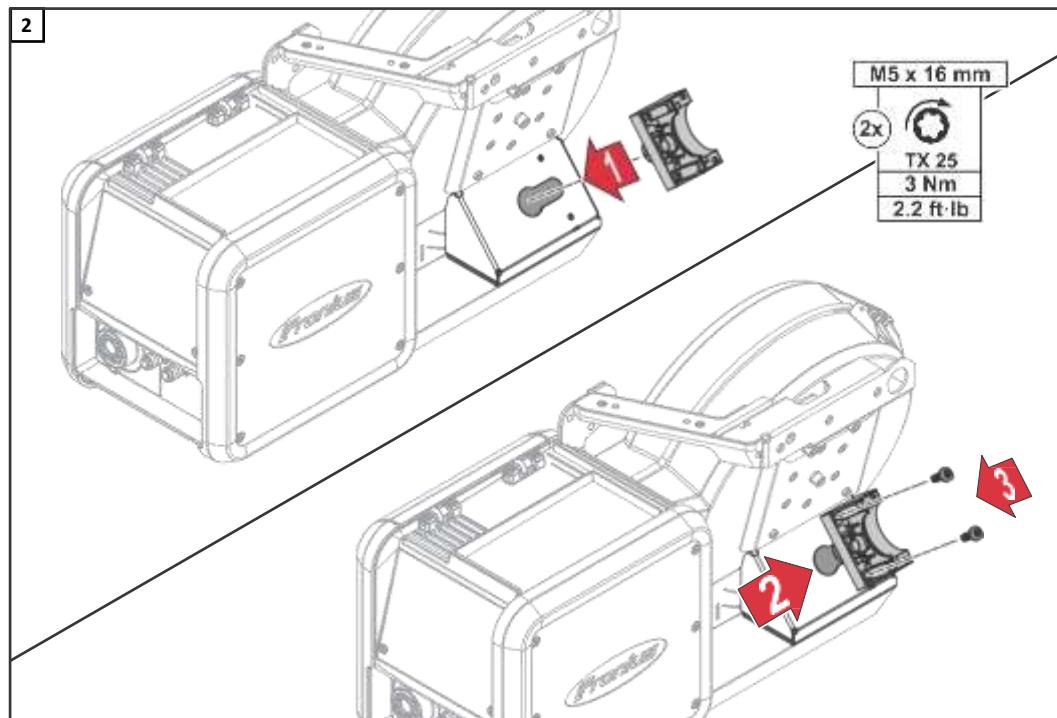
**Fortis: Assem- bling  
the system  
components  
(overview)**



**Attach the strain-relief device for the in- terconnecting hosepack**

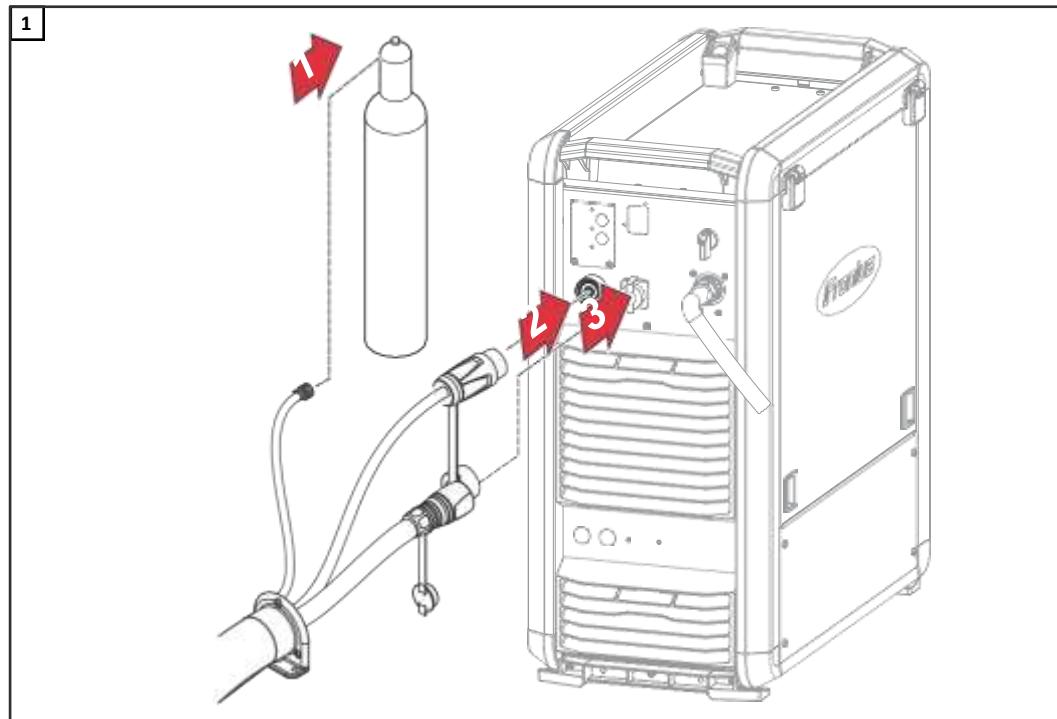


*Attach the strain-relief device to the trolley*

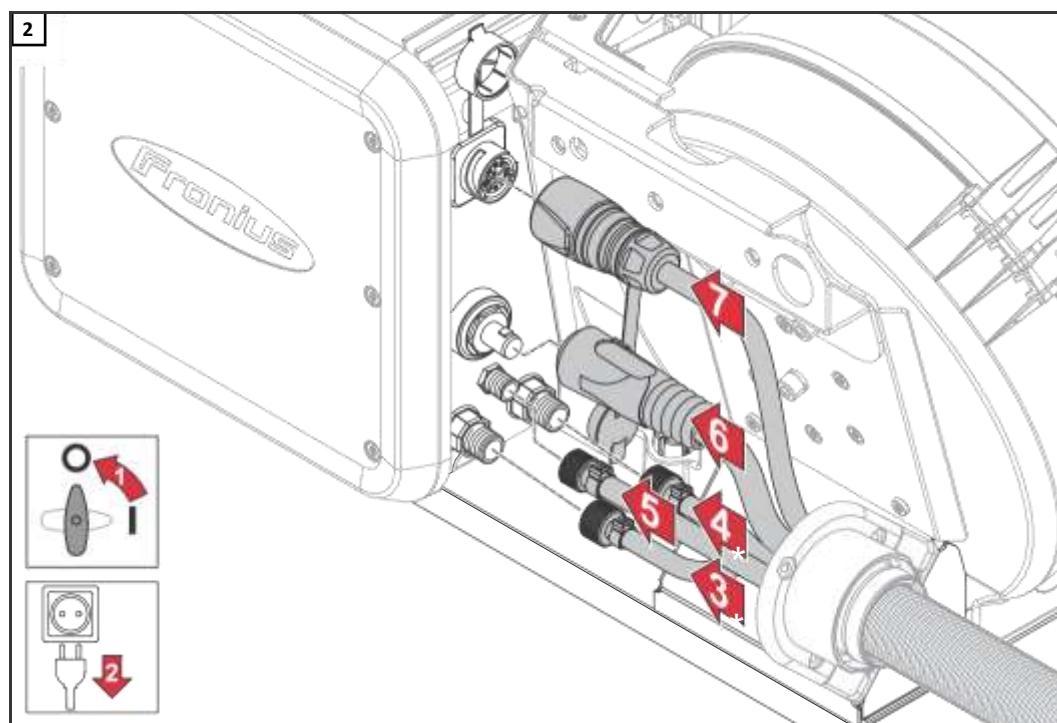


*Attach the strain-relief device to the wirefeeder*

Connecting the  
interconnecting  
hosepack



Connect interconnecting hosepack to the welding machine



Connect interconnecting hosepack to the wirefeeder

- \* only if the coolant connections are installed in the wirefeeder and only if the interconnecting hosepack is water-cooled

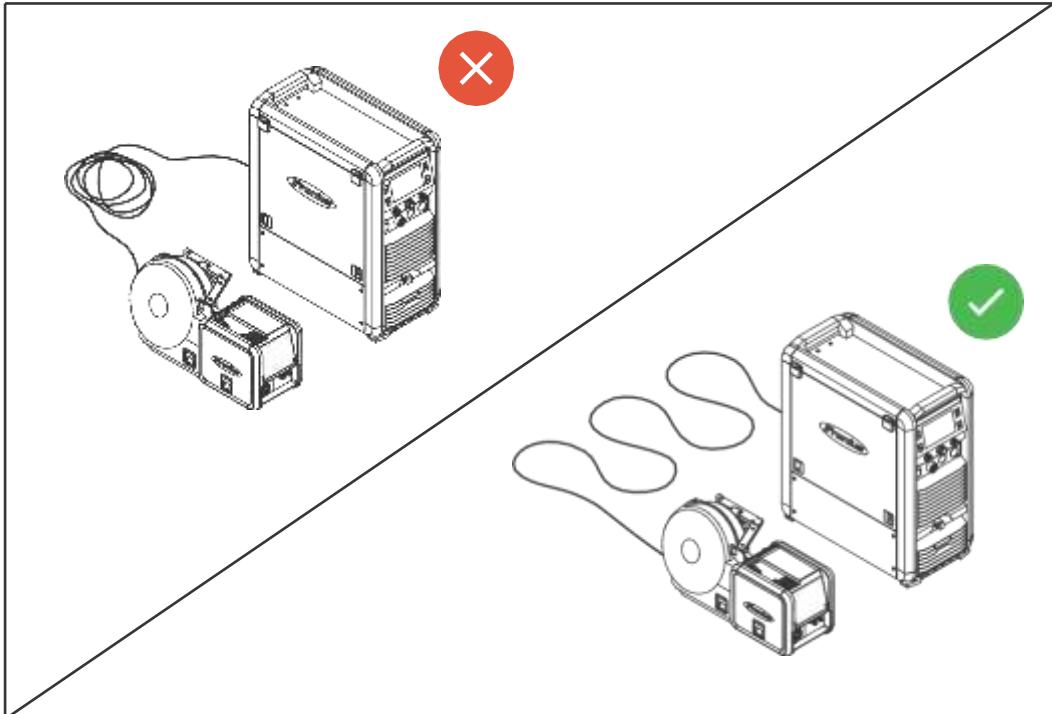
**Correct routing of the interconnecting hosepack**

**CAUTION!**

**Risk of overheating caused by an incorrectly routed interconnecting hosepack.**

The welding system components may be damaged.

- Do not form any loops when routing the interconnecting hosepack
- Do not cover the interconnecting hosepack
- Do not wind the interconnecting hosepack as you get near the gas cylinder and do not wrap it around the gas cylinder



*Correct routing of the interconnecting hosepack*

**IMPORTANT!**

- The duty cycle values (ED) of the interconnecting hosepacks can only be achieved if the hosepacks are correctly routed.
- If the routing of an interconnecting hosepack changes, carry out an R/L alignment (see page 200)!