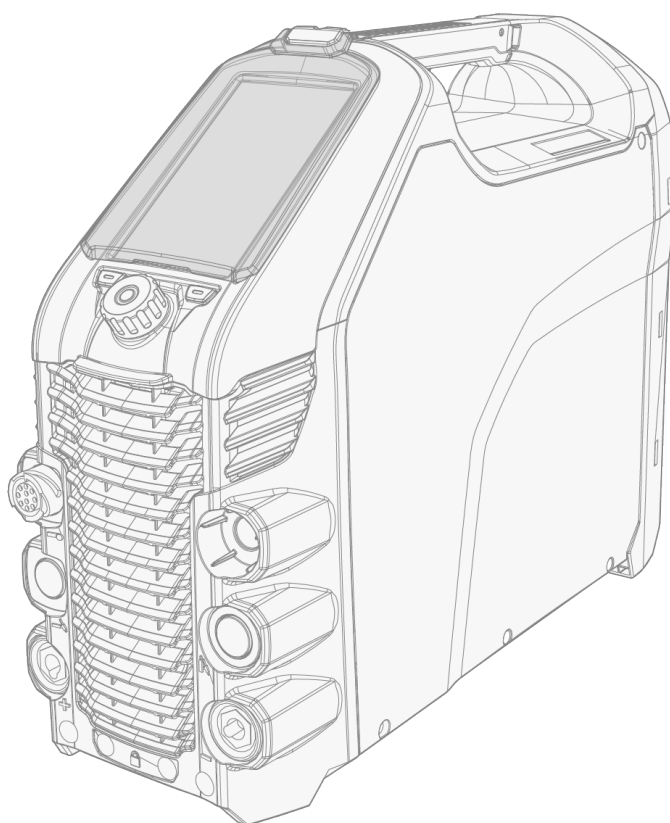


MASTER S 305

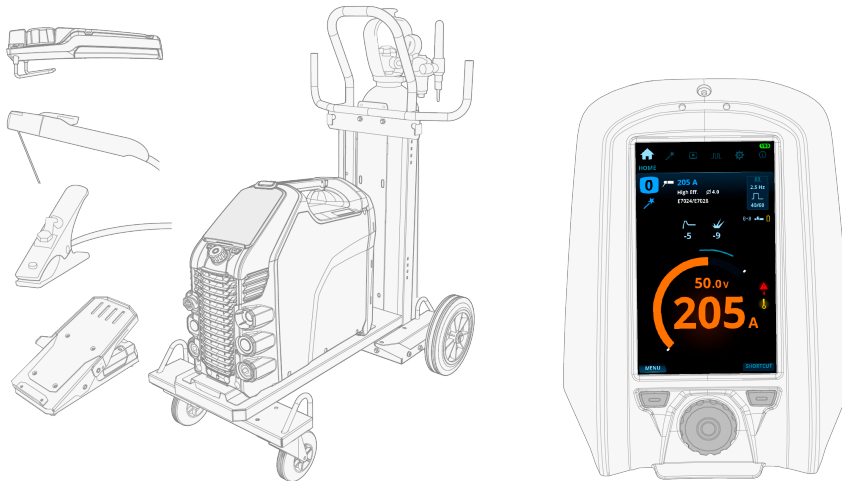


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1. GENERAL

These instructions describe the use of Kemppi's Master S 305 welding power source designed for demanding industrial use in MMA and TIG welding with direct current (DC). The system consists of a Master S 305 power source with an MTP35X control panel and an optional transport unit.



Important notes

Read the instructions through carefully. For your own safety, and that of your working environment, pay particular attention to the safety instructions delivered with the equipment.

Items in the manual that require particular attention in order to minimize damage and harm are indicated with the below symbols. Read these sections carefully and follow their instructions.



Note: Gives the user a useful piece of information.



Caution: Describes a situation that may result in damage to the equipment or system.



Warning: Describes a potentially dangerous situation. If not avoided, it will result in personal damage or fatal injury.

DISCLAIMER

While every effort has been made to ensure that the information contained in this guide is accurate and complete, no liability can be accepted for any errors or omissions. Kemppi reserves the right to change the specification of the product described at any time without prior notice. Do not copy, record, reproduce or transmit the contents of this guide without prior permission from Kemppi.


Other links

Kemppi symbols: [Userdoc](#).

General notices: [Userdoc](#).

1.1 WELDING SAFETY

Welding is always classified as hot work, and welding equipment typically contains high-voltage circuits. If you are not familiar with welding and welding principles, it is recommended that you acquire welding training or professional guidance before commencing welding. The welding equipment mentioned in this manual is intended for professional use in an industrial environment.

 *For your own safety, and that of your working environment, pay particular attention to the safety instructions delivered with the equipment.*

You can also access and download the safety instructions by using these links:

- [Safety](https://kemp.cc/safety/general)
(<https://kemp.cc/safety/general>)
- [Personal protection](https://kemp.cc/safety/ppe)
(<https://kemp.cc/safety/ppe>)
- [Welding guns and torches](https://kemp.cc/safety/torches)
(<https://kemp.cc/safety/torches>)

1.2 EQUIPMENT DESCRIPTION

Kemppi Master S 305 equipment is designed for professional industrial use. The equipment consists of a power source and a factory-installed control panel.

Available power source models:

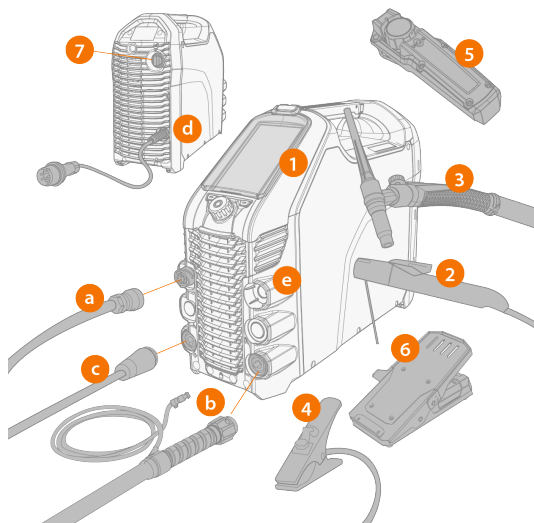
- Master S 305 G, generator compatible (300 A) *
- Master S 305 GM, multi-voltage and generator compatible (300 A)

* A dedicated VRD (Voltage Reduction Device) model version, where the VRD function is locked on, is also available.

Control panel:

- MTP35X control panel (7" TFT LCD display panel).

Equipment:



1. Master S 305 power source
2. Electrode holder
3. TIG torch (Flexlite TX 223GVD13)
4. Earth return cable and clamp
5. Remote control (wired or wireless)
6. Foot pedal remote control (wired or wireless)
7. Power ON/OFF switch.

Connections:

- a. External remote control connector
- b. DIX connector (-)
- c. DIX connector (+)
- d. Mains cable
- e. Empty holder for unused DIX connector.

EQUIPMENT IDENTIFICATION

Serial number

Serial number of the device is marked on the rating plate or in another distinctive location on the device. It is important to make correct reference to the serial number of the product when ordering spare parts or making repairs for example.

Quick Response (QR) code

The serial number and other device-related identification information may also be saved in the form of a QR code (or a barcode) on the device. Such code can be read by a smartphone camera or with a dedicated code reader device providing fast access to the device-specific information.

2. INSTALLATION



Do not connect the equipment to the mains before the installation is complete.



Do not attempt to move or hang the equipment mechanically (e.g. with a hoist) from the handle on the power source unit. The handle is meant only for manual lifting.



Place the machine on a horizontal, stable and clean ground. Protect the machine from rain and direct sunshine. Check that there is enough space for cooling air circulation in the machine vicinity.

Before installation

- Make sure to acknowledge and follow the local and national requirements regarding installation and use of high voltage units.
- Check the contents of the packages and make sure the parts are not damaged.
- Before you install the power source on site, see the requirements for the mains cable type and fuse rating given in the "Technical data" on page 47 chapter.




Only an authorized electrician is allowed to install the mains cable.


Distribution network



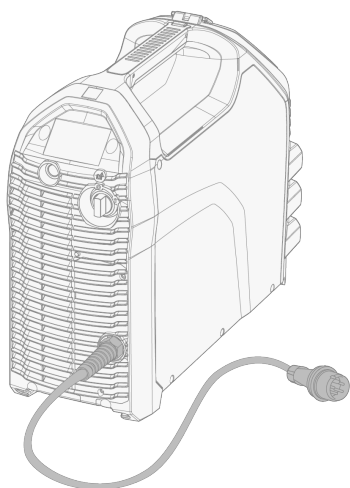
This Class A equipment is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. There can be potential difficulties in ensuring electromagnetic compatibility in those locations, due to conducted as well as radiated radio-frequency disturbances. However, Master S 305 complies with IEC 61000-3-12 and can also be connected to public low-voltage systems.

2.1 INSTALLING MAINS PLUG

 *Only an authorized electrician is allowed to install the mains cable and plug.*

 *Do not connect the machine to the mains before the installation is complete.*

Install the 3-phase plug according to the Master S 305 power source and site requirements. Refer also to "Technical data" on page 47 for power source specific technical information.



2.2 INSTALLING CONTROL PANEL

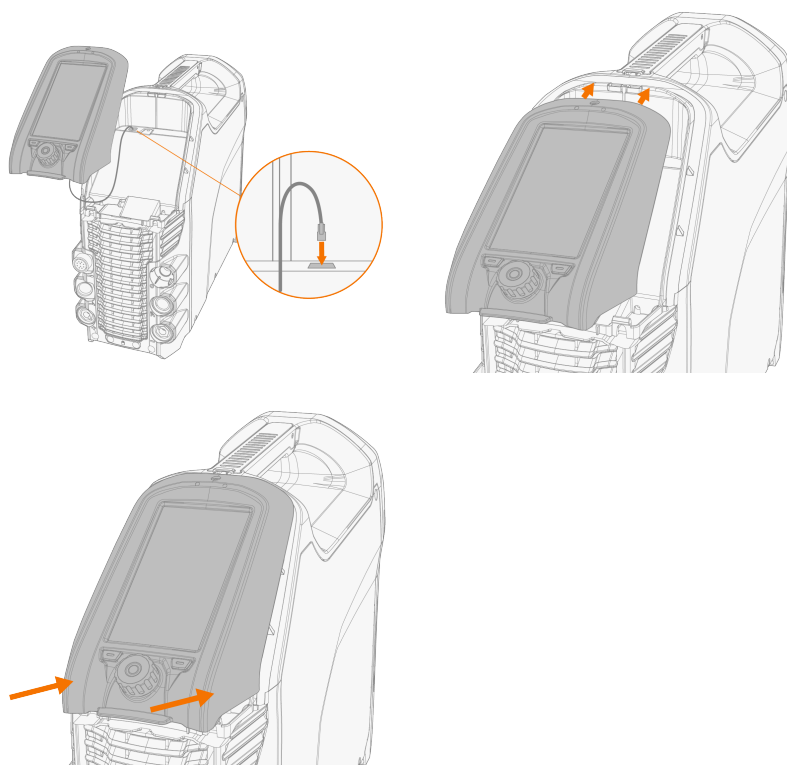
In Master S 305 the control panel is factory-installed.

Tools:

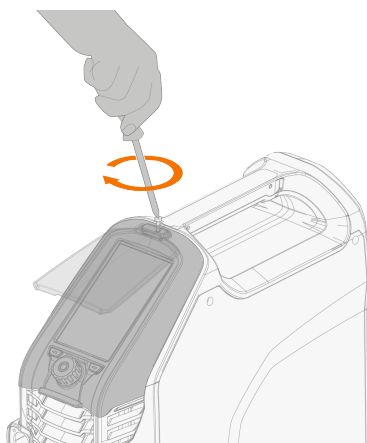
- Screwdriver, Torx head (T20).

1. Connect the control panel's cable and mount the control panel in place:

- >> Insert the top of the panel in the slot first, and then lower the bottom of the panel down.
- >> Push the bottom of the panel firmly so that it locks in place.



2. Secure the control panel together with the hinged panel cover in place with the screw provided.

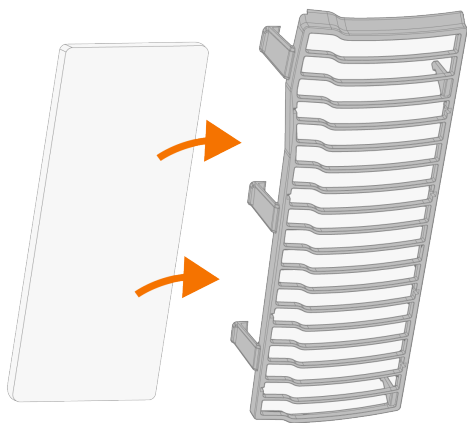


The hinged panel cover and the control panel are secured with the same screw.

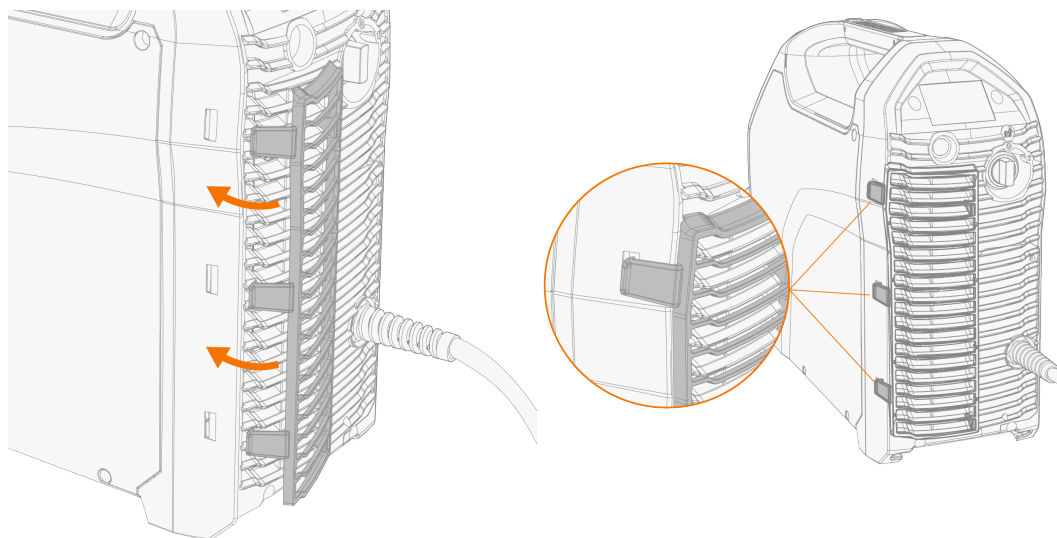
2.3 INSTALLING PARTICLE FILTER (OPTIONAL)

The optional particle filter is installed together with an additional filter frame as a pack.

1. Place the filter into the filter frame



2. Install the filter pack in front of the air inlet on the rear of the power source.



2.4 MOUNTING UNITS ON CART (OPTIONAL)

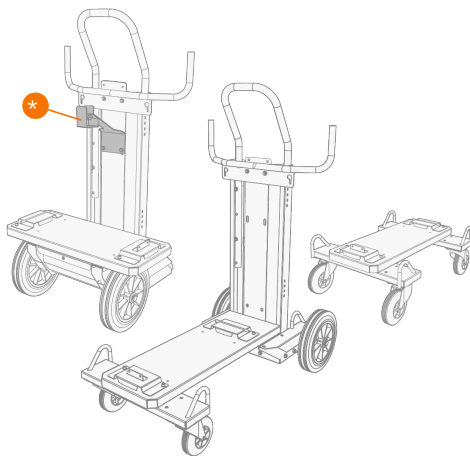
Three transport unit options are available: undercarriage P43MT, 4 wheel cart P45MT and 2 wheel cart T25MT.

Tools:

- Allen key set.

1. Assemble the transport unit according to the instructions delivered with it. With the T25MT cart, the welding equipment securing bracket (*) is attached once the welding equipment is installed on the cart.

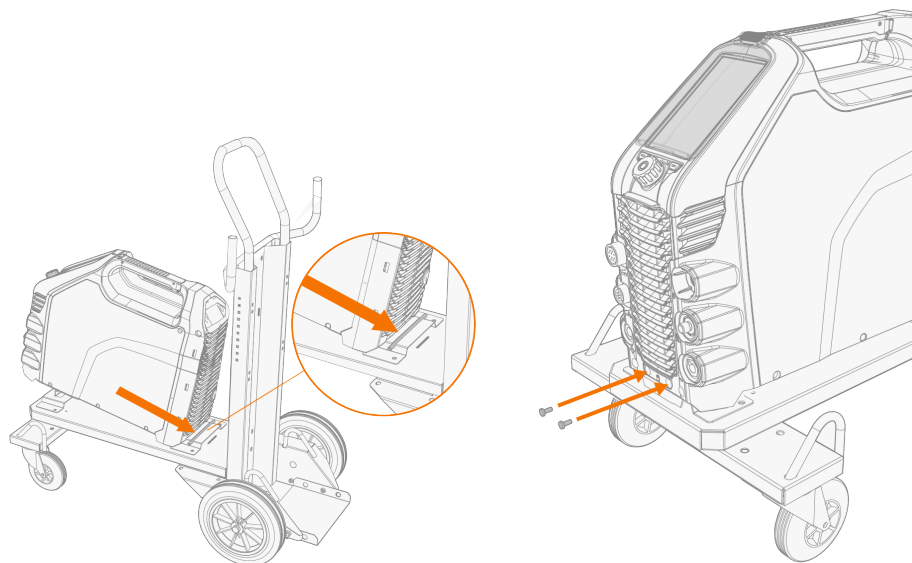
Transport units from left to right: T25MT, P45MT, P43MT.



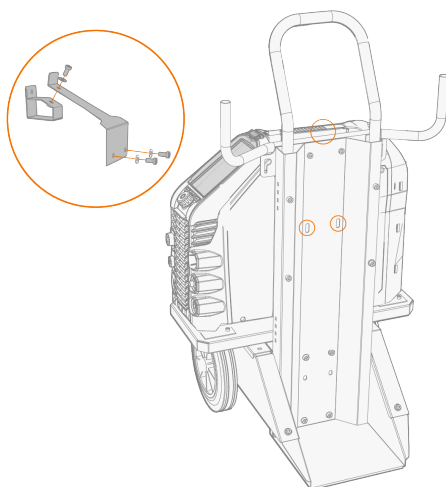
2. Move the unit on top of the cart so that the bar in the rear goes into the rear connection interface and lower the front onto the front connection interface. Secure the power source from the front with the screws (2 x M5x12) provided.




Do not attempt to move the power source with a hoist from its handle. The handle is meant for manual lifting only.



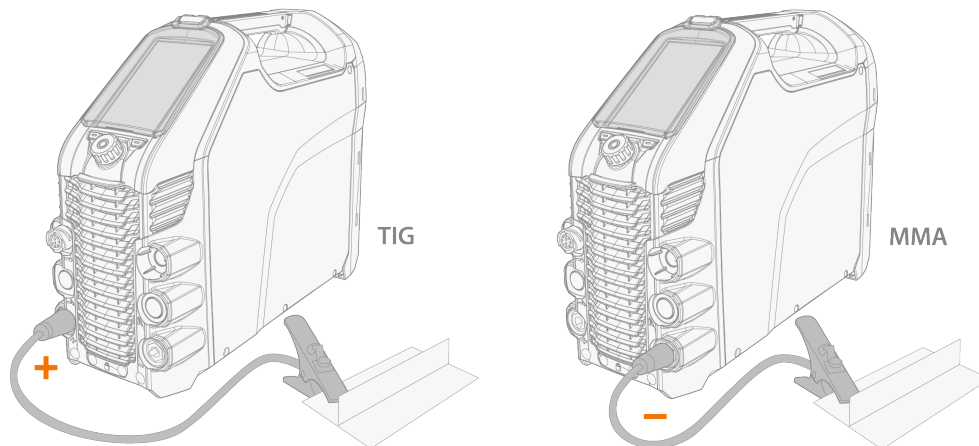
With the 2 wheel cart (T25MT), an additional securing bracket is attached to the power source handle. Secure the bracket to the cart with the screws provided (M8x16).




2.5 CONNECTING EARTH RETURN CABLE AND CLAMP

 *Keep the work piece connected to earth to reduce the risk of injury to users or damage to electrical equipment.*

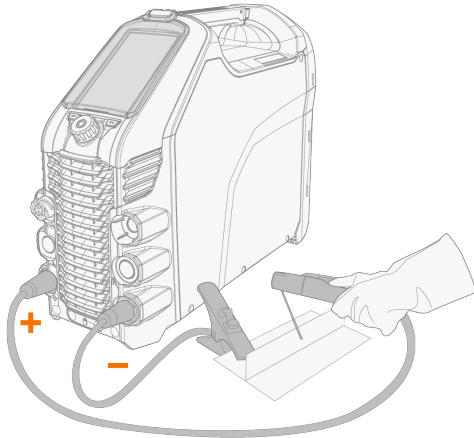
1. Connect the earth return cable to the power source.
2. Ensure the earth return clamp is secured tightly to the work piece or work surface.
3. Ensure that the clamp's contact surface is as large as possible.




 *In MMA welding the earth return cable can also be connected to the positive (+) connector, depending on the application.*

2.6 CONNECTING MMA ELECTRODE HOLDER

1. Connect the MMA electrode holder to the (+) connector on the power source.
2. Connect the earth return cable to the (-) connector on the power source.
3. Ensure the earth return clamp is secured tightly to the work piece or work surface.
4. Ensure that the clamp's contact surface is as large as possible.

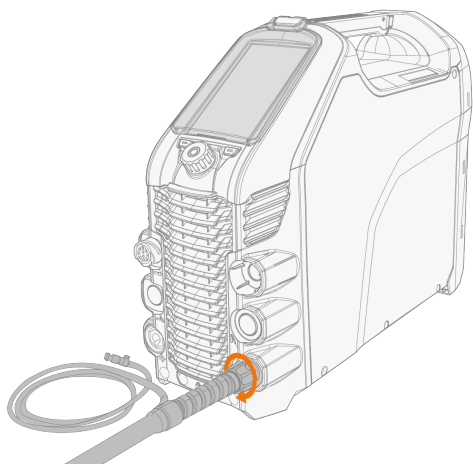


 *In MMA welding the cables can also be connected the other way round, depending on the welding polarity.*

2.7 CONNECTING TIG TORCH

For TIG welding with the Master S 305 power source, use the Flexlite TX 223GVD13 torch.



1. Assemble the TIG torch according to the instructions delivered with the torch.
2. Connect the TIG torch cable to the power source.

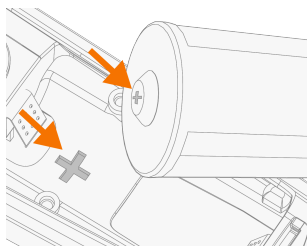


Tip: For Kemppi welding torches, refer also to userdoc.kemppi.com.

2.8 INSTALLING REMOTE CONTROL

Remote controls are optional. To enable remote operation, set the **Remote control mode** in the control panel settings (refer to "Settings view" on page 33).

-  *When the Remote mode is selected on the control panel, and both wireless and wired remotes are connected, the wired remote will be used.*
-  *Refer to the (+) and (-) signs on the battery holder and in the remote for the correct positioning of batteries.*

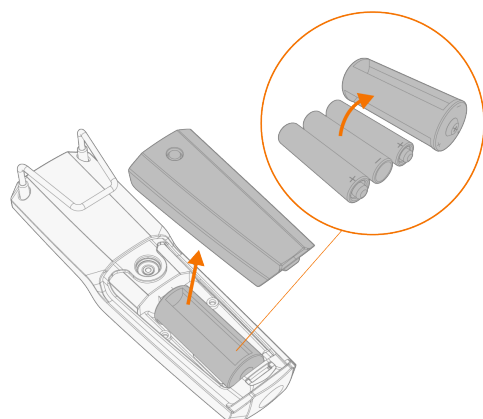


Tools:

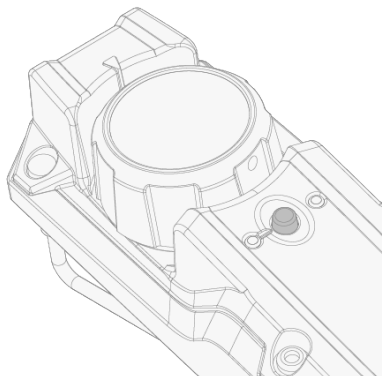
- Screwdriver, Torx head (T15).

Wireless hand remote control (HR45)

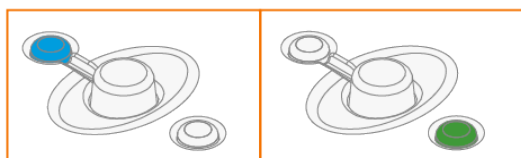
1. Take the remote control battery holder out. Install the batteries (3 x AAA) and put the holder back into the remote.



2. Turn on the **Wireless remote** in the control panel settings (refer to "Settings view" on page 33).
3. Keeping the wireless remote close to the power source, long press (3 sec.) the wireless remote pairing button on the remote.



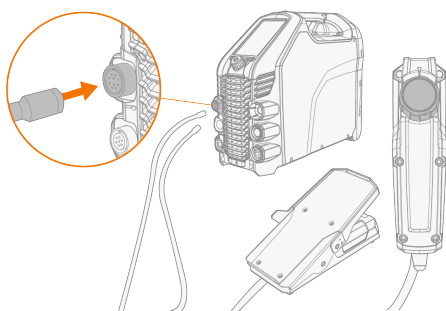
4. Once connected, the blue LED on the left of the connection button is lit. The green LED blinks when the battery is low.



5. To enable remote operation, select Remote mode in the control panel settings.

Remote control with cable (HR43, FR43)

1. Connect the remote control cable to the power source.

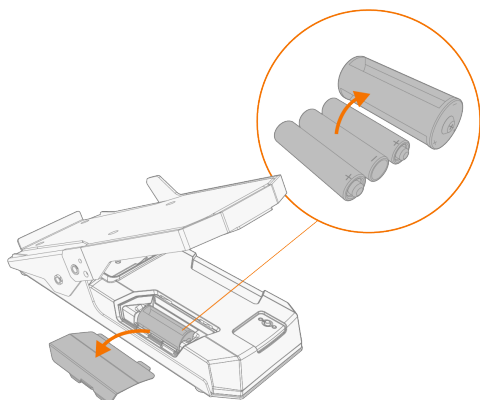


Wireless foot pedal (FR45)

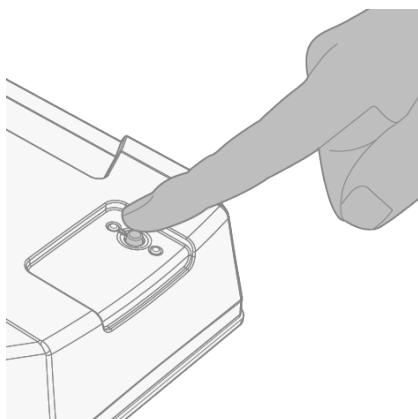


Refer to the (+) and (-) signs on the battery holder and in the remote for the correct positioning of batteries.

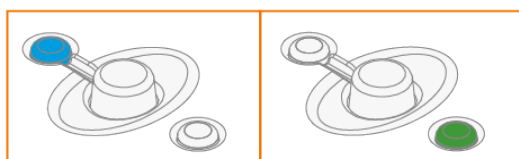
1. Take the foot pedal battery holder out. Install the batteries (3 x AAA) and put the holder back into the foot pedal.



2. Turn on the **Wireless remote** in the control panel settings (refer to "Settings view" on page 33).
3. Keeping the wireless remote close to the power source, long press (3 sec.) the wireless remote pairing button on the foot pedal.




4. Once connected, the blue LED next to the button is lit. The green LED blinks when the battery is low.




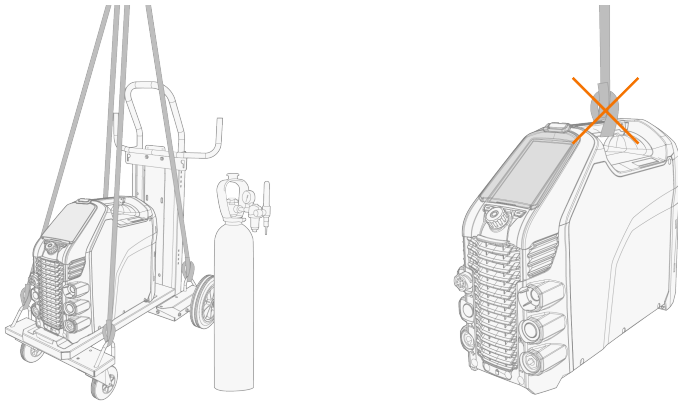
Tip: You can set minimum and maximum values for the remote current adjustment in the control panel settings.

2.9 MOVING EQUIPMENT BY LIFTING

If you need to lift the welding equipment, pay special attention to the safety measures. Also follow the local regulations. The welding equipment can be lifted with a mechanical hoist when the equipment is installed securely on the cart.

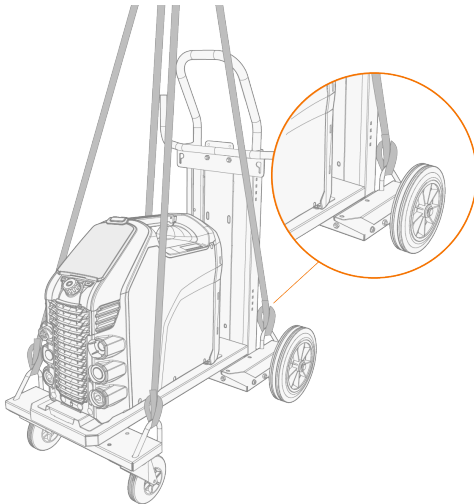
 **If a gas bottle is installed on the cart, DO NOT attempt to lift the cart with the gas bottle in place.**

 **DO NOT attempt to lift the equipment with a hoist from the handle.**



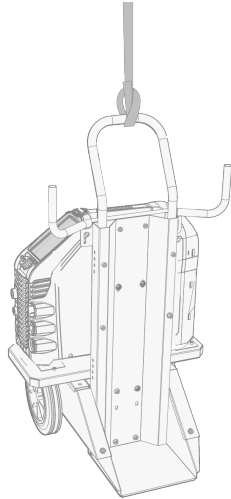
4 wheel cart (P45MT):

1. Ensure that the welding equipment is properly secured to the cart.
2. Connect the 4-legged chain or straps from the hoist hook to the four lifting points on the cart on both sides of the welding equipment.









2 wheel cart (T25MT):

1. Ensure that the welding equipment is properly secured to the cart.
2. Connect the hoist hook to the lifting handle on the cart.



3. OPERATION

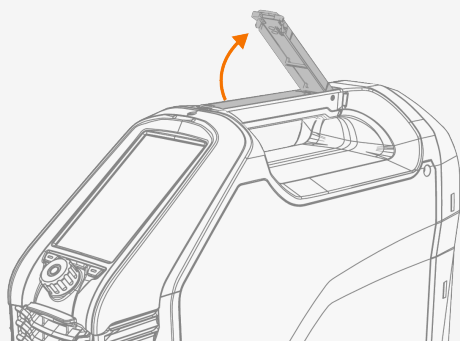
Before using the equipment, ensure that all the necessary installation actions have been completed according to your equipment setup.

-  *Welding is forbidden in places where there is an immediate fire or explosion hazard!*
-  *Welding fumes may cause injury, take care of sufficient ventilation during welding!*
-  *Check that there is enough space for cooling air circulation in the machine vicinity.*
-  *If the welding equipment is left unused for a longer period, disconnect the mains plug from the mains.*
-  *Do not use the mains plug as a power ON/OFF switch.*
-  *Always check before use that all cables are in serviceable condition. Ensure that the connectors are correctly fastened. Loose connectors can impair welding performance and damage connectors.*

For technical data and general guidance for selecting initial TIG welding parameters, refer to "TIG guide tables" on page 52.

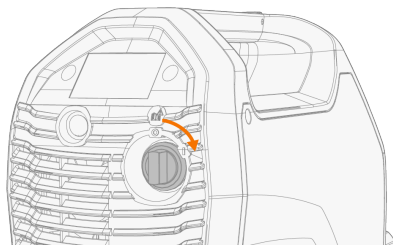
For troubleshooting, refer to "Troubleshooting" on page 45.

Tip: There is a small locker inside the power source handle, under the lid, that can be used for storing small consumables. The device QR code can also be found here.



3.1 OPERATING POWER SOURCE

1. Turn the power source ON. The power switch is located in the rear.



2. Wait approximately 15 seconds for the system to start up.

For control panel operation, refer to "Operating control panel MTP35X" on the next page.

3.2 OPERATING CONTROL PANEL MTP35X

Control panel MTP35X has a 7" TFT LCD display. The MTP35X control panel includes, for example, memory channels, Weld Assist, option for customized welding processes, and assisting graphics.

Controls:

The control knob can be turned and used as a push button to select functions and items on the screen. In addition to the control knob, there are two function buttons just below the panel display on both sides of the control knob.



1. Control knob and control knob button


- In home view, turning this knob adjusts the welding current (A)
- In other views, turning this knob switches between adjustable parameters and adjusts the selected parameter's value
- The control knob functions also as a push button, when the green light is lit in the knob center
- Used to navigate through the control panel views and selections.


2. Menu button (left function button)

- This is used to access the view menu
- With certain control panel settings and features this also acts as a 'back' or 'cancel' button.

3. Custom function button (right function button)

- This button can be used as a user-programmable shortcut
- With certain control panel settings and features this also acts as a 'back' or 'cancel' button.

 The MTP35X control panel displays notifications, warnings and error messages with additional information directly on the screen. Refer also to "Troubleshooting" on page 45 section in this manual for more information on solving error situations.

 For welding process and control panel feature descriptions, refer to "Welding processes and features" on page 53.

Control panel views:

- "Home view" on the next page
- "Weld Assist view" on page 26

- "Memory channels view" on page 31
- "Pulse view" on page 31
- "Settings view" on page 33
- "Info view" on page 35

To navigate between different control panel views:

1. Press the menu button (2).
2. Browse to the target view by turning the control knob (1).
3. Select the view by pressing the knob (1).

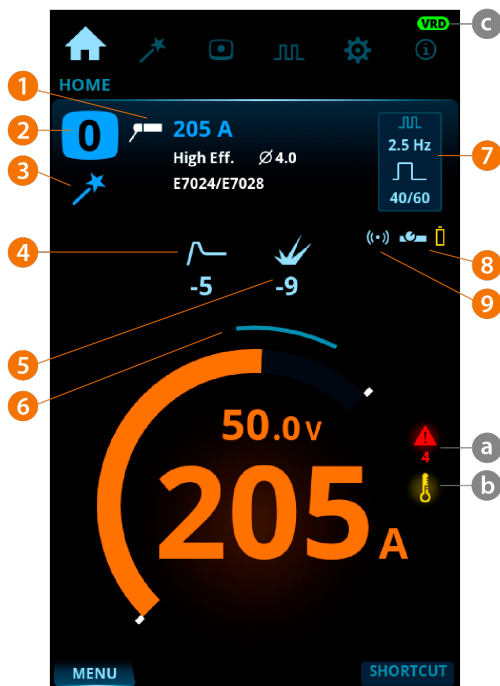
Tip: You can switch between the home view and the previously used view by long pressing the menu button (2).

3.2.1 HOME VIEW

Home view is the control panel work mode after the initial machine and control panel start-up. When in Home view, the welding current can be adjusted directly by turning the control knob.

Home view in MMA

Depending on your welding settings, the following are shown:



1. Welding process
2. Memory channel
3. Weld Assist symbol
4. Hot start
5. Arc force
6. Recommended welding current range for the selected electrode
7. Pulse parameters
8. Wireless remote and its battery status

9. Remote mode (ON/OFF).

Warning and notification symbols:

a. General notification

- Yellow: This is a warning that requires attention
- Red: There is an error that prevents welding
- Error code is shown below the symbol

b. Operating temperature

- Red: Welding equipment has overheated

c. VRD (voltage reduction device)

- VRD symbol on: VRD is on
>> This is always on in power source models where the VRD function is locked on.
- VRD symbol red (blinking): There is a fault with VRD that prevents welding
- VRD symbol off: VRD is off.

Home view in TIG

Depending on your welding settings, the following are shown:



1. Welding process
2. Memory channel
3. Weld Assist symbol
4. Ignition mode (Lift TIG ignition)
5. Welding current
6. Wireless remote and its battery status
7. Remote mode (ON/OFF).

Warning and notification symbols:

a. General notification

- Yellow: This is a warning that requires attention
- Red: There is an error that prevents welding
- Error code is shown below the symbol

b. Operating temperature

- Red: Welding equipment has overheated

c. VRD (voltage reduction device)

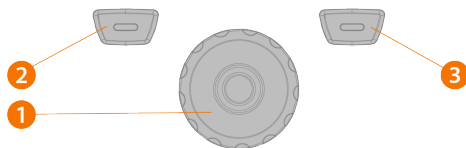
- VRD symbol on: VRD is on
>> This is always on in power source models where the VRD function is locked on.
- VRD symbol red (blinking): There is a fault with VRD that prevents welding
- VRD symbol off: VRD is off.

Tip: You can switch between the home view and the previously used view by long pressing the menu button.

3.2.2 WELD ASSIST VIEW

Weld Assist is a wizard-like utility for easy selection of welding parameters. The utility walks the user step-by-step through the selection of required parameters, presenting the selections in an easily understandable way for a non-technical user.

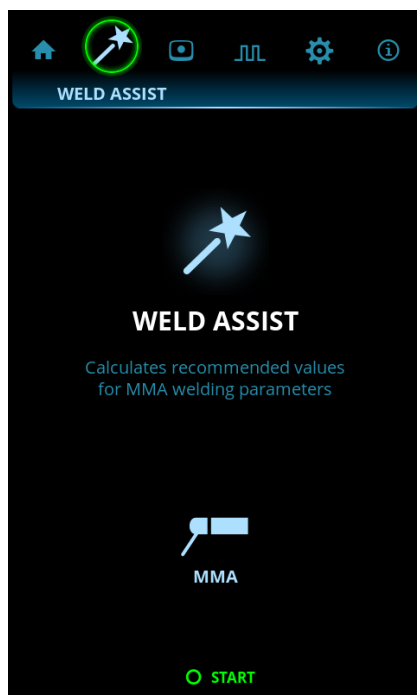
The Weld Assist feature is available with both MMA and TIG welding. In Weld Assist, the selections are made with the control knob (1) and with the two function buttons (2, 3):



Tip: You can go back step by step in Weld Assist by pressing the left function button (2). Selecting Cancel with the right function button (3), you can cancel Weld Assist recommendations and return to the beginning.

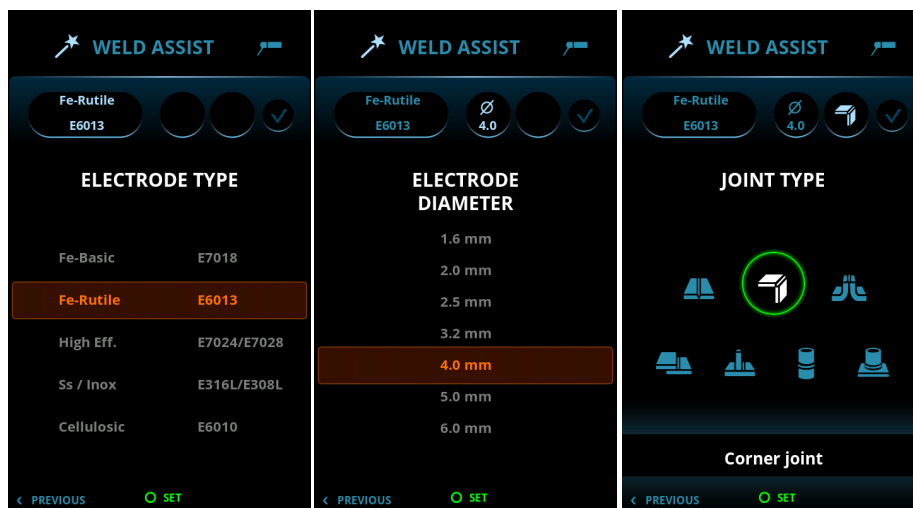
Using Weld Assist with MMA welding

1. Go to the **Weld Assist** view and select 'Start' with the control knob button (1).

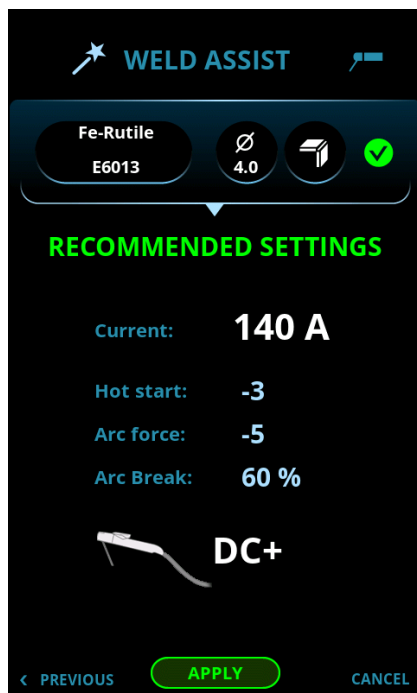


2. Select:

- >> The electrode type: Fe-Basic / Fe-Rutile / High Eff. / Ss (stainless steel)/Inox / Cellulosic.
- >> The electrode diameter (1.6 ... 6 mm).
- >> The welding joint type: butt joint / corner joint / lap joint / fillet joint / tube joint / tube+plate joint.



3. Confirm the Weld Assist's recommendation for welding settings by selecting 'Apply'.



Weld Assist automatically sets the following parameters for you:

- Current: 10 ... 300 A
- Hot start
- Arc force
- Arc break
- DC+ indicates polarity (in this case the electrode holder is connected to the positive (+) DIX connector).

 All these parameters can still be modified as per normal for the actual welding.

Using Weld Assist with TIG welding

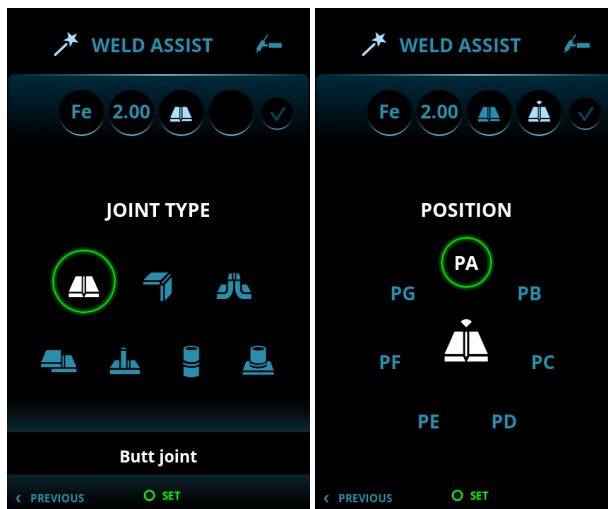
1. Go to the **Weld Assist** view and select 'Start' with the control knob button (1).



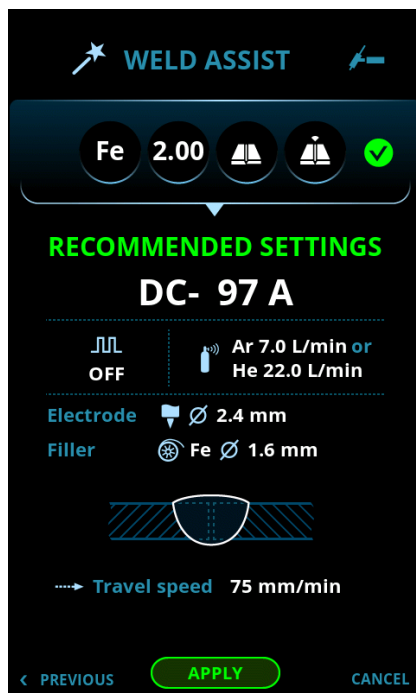
2. Select:

- >> The material you are about to weld: Fe (mild steel) / Ss (stainless steel).
- >> The welded material's thickness (0.5 ... 10 mm).
- >> The welding joint type: butt joint / corner joint / edge joint / lap joint / fillet joint / tube joint / tube+-plate joint.
- >> The welding position: PA / PB / PC / PD / PE / PF / PG.





3. Confirm the Weld Assist's recommendation for welding settings by selecting 'Apply'.



Weld Assist automatically sets the following parameter for you:

- Current: 3 ... 300 A

 The parameter can still be modified as per normal for the actual welding.

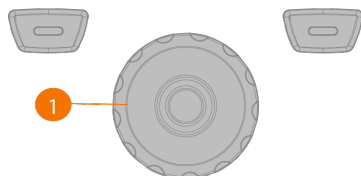
Weld Assist gives you a recommendation for these:

- Shielding gas flow
- Electrode: Diameter
- Filler (if used): Material and diameter
- Number of passes: Number and/or visualization
- Travel speed: mm/min.

3.2.3 MEMORY CHANNELS VIEW

Memory channel is a place to store predefined welding parameter settings for future use. A welding machine can include a number of preset and user-defined channels.

In the **Channels** view, the selections are made with the control knob (1):



To browse through channels and select channels:

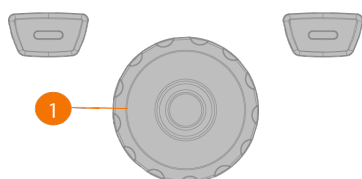
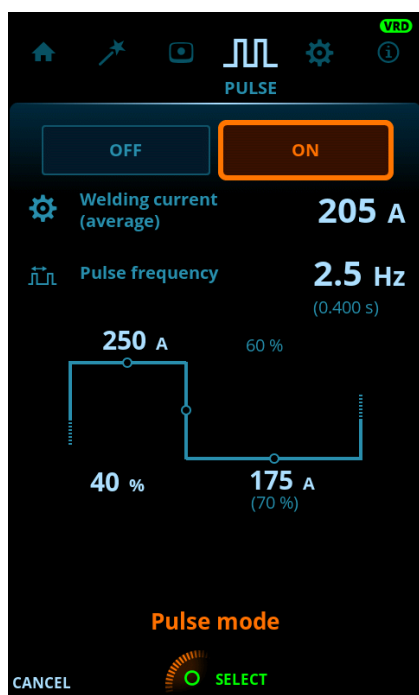
1. Go to the **Channels** view.
2. Turn the control knob (1) to switch between channels. The highlighted channel is automatically selected.

To save or delete channels:

1. Turn the control knob (1) to highlight a channel.
2. Open the channel actions menu by pressing the control knob button (1). The available actions are shown: Cancel, Save changes, Save to and Delete.
3. Select an action with the control knob (1).

3.2.4 PULSE VIEW

In the **Pulse** view, the selections are made with the control knob (1):



To adjust parameters:

1. Go to the **Pulse** view.
2. Turn the control knob (1) to browse through the parameters.
3. Select a parameter for adjustment by pressing the control knob button (1).
4. Adjust the parameter by turning the control knob (1).
5. Close the parameter setting by pressing the control knob button (1).

Adjustable parameters:

Parameter	Value	Note
Pulse mode	OFF/ON	When OFF is selected, pulse settings are not visible. When ON is selected, pulse settings are visible and adjustable.
Average current	Min = Current limit min, Max = Machine-specific	These values depend also on other pulse parameters. Maximum average current is also limited by the machine specifications.
Pulse frequency	0.2 Hz ... 10 Hz, 0.1 Hz step 10 Hz ... 300 Hz, 1 Hz step (Default = 2.5 Hz)	

Non-adjustable parameters:

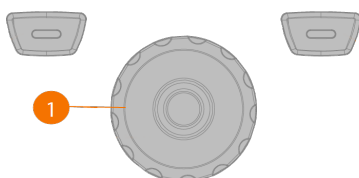
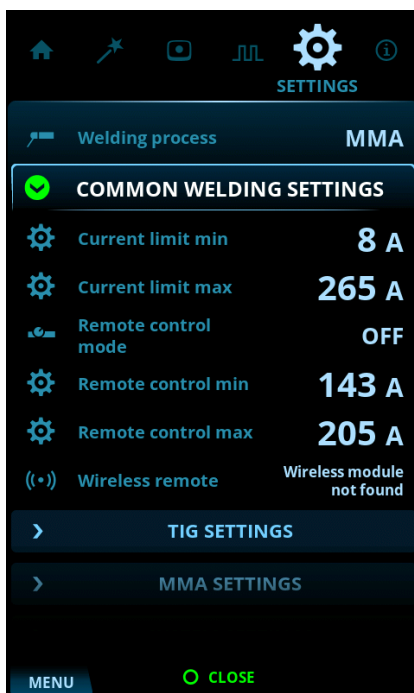
Parameter	Value	Note
Pulse ratio	40%	
Pulse base current	70%	
Pulse current	Adjusted automatically	

These values depend also on other pulse parameters. The maximum pulse current is also limited by the machine specifications.

"Welding processes and features" on page 53

3.2.5 SETTINGS VIEW

In the **Settings** view, the selections are made with the control knob (1):



To adjust settings:

1. Go to the **Settings** view.
2. Turn the control knob (1) to browse through the settings groups and parameters.
3. Select a parameter to be adjusted or changed by pressing the control knob button (1).
4. Adjust or change the setting by turning the control knob (1).
5. Close the parameter setting by pressing the control knob button (1).



Some of the settings are e.g. current mode and welding process specific and are visible or not visible in the settings menu accordingly.

Common welding settings:

Parameter	Value	Note
Welding process	TIG / MMA (Default = TIG)	Selecting a welding process changes automatically to the last active channel for the selected process.
Current limit min	TIG: 2 A / MMA: 8 A, step 1 A *	
Current limit max	TIG: power source's nominal value MMA: power source's max. MMA current, step 1 A *	
Remote control mode	OFF / Remote (Default = OFF)	When a remote control is selected, the welding current adjustment on the control panel is disabled.
Remote control min	Min = "Current limit min", Max = "Current limit max"	
Remote control max	Min = "Current limit min", Max = "Current limit max"	
Wireless remote	Pairing starts automatically when selected	New pairing information replaces the old information. Pairing status is shown as the settings value.

TIG settings:

Parameter	Value	Note
Lift TIG current	5 A ... 40 A / Auto, step 1 A (Default = Auto = 10 A)	
Slight upslope	OFF / ON (Default = OFF)	
TIG antifreeze	OFF / ON (Default = OFF)	

MMA settings:

Parameter	Value	Note
Welding current	Min/Max = Normal welding current limits	
Hot start	-10 ... +10, step 1 (Default = 0)	
Arc force	-10 ... +10, step 1 (Default = 0)	
MMA antifreeze	OFF / ON (Default = OFF)	

VRD mode	OFF / ON (Default = OFF)	This setting can be locked so that the user cannot change it. In the equipment models where the VRD mode is locked permanently to ON (e.g. AU model), the VRD option is still visible in the settings, but it cannot be changed.
Arc break	50 % ... 100 %, step 10 % (Default = 90 %)	100 % setting uses all of the voltage reserve enabling the longest arc possible.

System settings:

Parameter	Value	Note
Brightness	10 % ... 100 %, step 1 % (Default = 100 %)	
Weld data time	1 s ... 10 s, step 1 s (Default = 5 s)	
Screen saver	Default = Kemppti logo	An alternative screen saver image can be used. For more information, refer to "Screen saver" on page 37.
Date	Date setting (DD/MM/YYYY)	
Time (24h)	Time setting (HH:MM)	
Language	Language setting	
Show Weld Assist	ON / OFF (Default = ON)	
Factory reset...	Cancel / Start (Default = Cancel)	Settings item that activates the factory reset to restore factory settings on the device. Once the factory reset is complete, the power source must be restarted manually.

* Current range adjustable by welder in TIG welding:

- 2 A ... 305 A, 1 A step
- Default = Nominal value of the power source.

* Current range adjustable by welder in MMA welding:

- 8 A ... 305 A, 1 A step
- Default = MMA maximum current of the power source.

"Welding processes and features" on page 53

3.2.6 INFO VIEW

In the **Info** view you can see information about the equipment usage as well as software version for example.



Included in the Info view:

- Usage counters
- Error status and error log
- Latest welds
- Power source type and model
- Power source and control panel software versions.

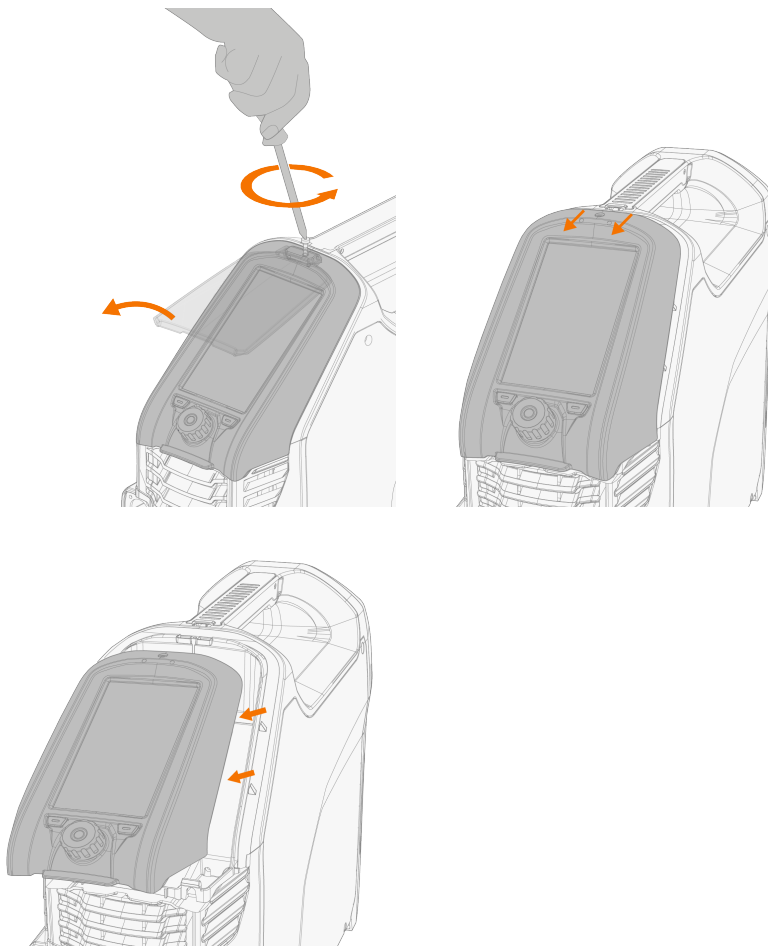
3.2.7 SCREEN SAVER


The screen saver image shown during start-up and when the control panel has been idle for a predefined time can be changed using the screen saver tool at kemp.cc/screensaver. To make the change, you'll need the image file you are planning to use and a USB memory stick.

Tools:


- Screwdriver, Torx head (T20).

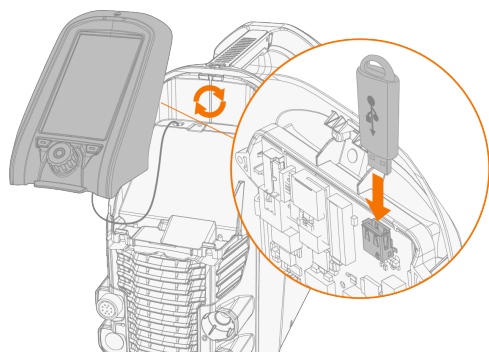
1. On a web browser, go to kemp.cc/screensaver.
2. Following the on-screen instructions, upload, edit and download the new screen saver image onto a USB memory stick.
3. Detach the control panel from the power source:
 - >> Remove the top screw and panel cover.
 - >> First pull the top of the control panel slightly and then the rest of the panel.



 Do not disconnect the control panel cable. The power source and control panel must be turned on.

4. Connect the USB memory stick to the USB connector on the rear side of the control panel. The control panel detects your USB memory stick automatically and shows a list of available images.

 Always connect and disconnect the USB device in a straight angle to avoid any additional stress to the USB connector.



5. Following the on-screen instructions, and using the control panel controls, select the image on the USB memory stick you want to use as a screen saver.
6. Remove the USB memory stick and install the control panel back in place. Refer to "Installing control panel" on page 9 for more information.



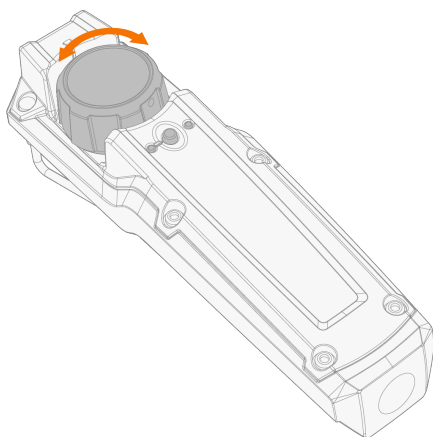
To delete a custom screen saver image from the control panel memory, or to use the KempPi logo instead, go to "Settings view" on page 33.

3.3 REMOTE CONTROL

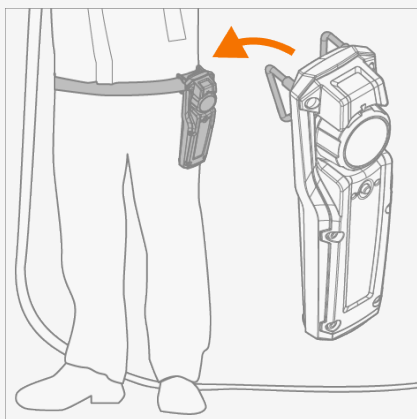
For installing remote control, refer to "Installing remote control" on page 16.

Hand remote control:

To adjust the welding current, turn the knob on the remote control.

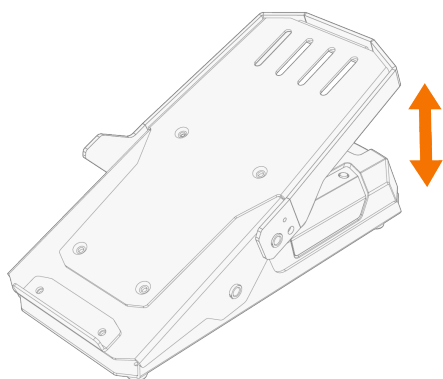


Tip: The remote control comes equipped with a handy clip for hanging the remote onto your belt.

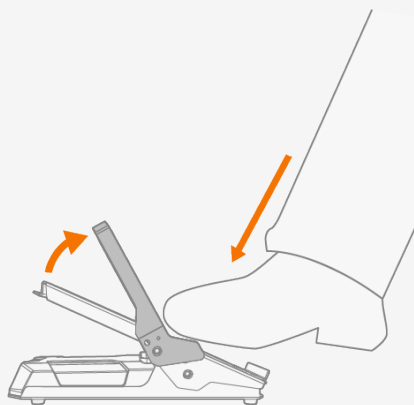


Foot pedal remote control:

To adjust the welding current, press the pedal.



Tip: To shift the foot pedal position on the floor, use the foot pedal handle.



4. MAINTENANCE

4.1 DAILY, PERIODIC AND ANNUAL MAINTENANCE

When considering and planning routine maintenance, consider the operating frequency of the welding system and the working environment.

Correct operation of the welding machine, regular maintenance, and the use of original Kemppi spare parts and consumables help you avoid unnecessary downtime and equipment failure, while also maximizing the equipment's service life.

For repairs, find your closest Kemppi service workshop at www.kemppi.com or contact your dealer.



Only an authorized electrician is allowed to carry out electrical work.



Only qualified service personnel is allowed to carry out periodic and annual maintenance.



Disconnect the power source from the mains before handling electrical cables and connectors.



Do not use pressure washing devices.



Where applicable, use the correct tension torque when fastening loose parts.

Daily maintenance

Welding equipment's daily maintenance:

- Check that all covers and components are intact.
- Check all the cables, hoses and connectors. Do not use them if they are damaged.
- Ensure that the connectors are correctly fastened. Loose connectors can impair welding performance and damage connectors.

Weekly maintenance

Welding equipment's weekly maintenance:

- Clean the outside parts of the units from dust and dirt, for example, with a soft brush and vacuum cleaner.
- Clean the ventilation grills. Do not use compressed air, there is a risk that the dirt will compact even more tightly into the gaps of the cooling profiles.

Periodic maintenance

Welding equipment's periodic maintenance, every 1–6 months:

- Check the electrical connectors of the equipment at least every 6 months. Clean oxidized parts and tighten loose connectors.
- Update the welding system to the latest firmware and software versions, as applicable.

Annual maintenance

The annual maintenance must be carried out by an authorized Kemppi service workshop. Kemppi service workshops complete the welding system maintenance according to your Kemppi service agreement. Find your closest service workshop at www.kemppi.com.

Welding equipment's annual maintenance program includes:

- Cleaning the equipment.
- Maintenance of the welding tools.
- Checking the connectors and switches.
- Checking all electrical connections.
- Checking the power source mains cable and plug.

- Repairing defective parts and replacing defective components.
- Maintenance test.
- Testing the operation and calibrating the performance values when needed.
- Updating the welding system to the latest firmware and software versions, and installing new welding software.
- If a cooling unit is used: Checking and cleaning the cooling liquid pump. The pump is dismantled and cleaned thoroughly, and if there has been any leakage in the pump's axle seal point, the axle seal is replaced. The axle seal is subject to wear and may need replacement periodically to maintain proper sealing.

For Kempfi welding torch maintenance, refer to your welding torch's instructions (available also at user-doc.kemppi.com).

4.2 DISPOSAL



Do not dispose of any electrical equipment with normal waste!

In observance of WEEE Directive 2012/19/EU on waste of electrical and electronic equipment and European Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment, and their implementation in accordance with national law, electrical equipment that has reached the end of its life must be collected separately and taken to an appropriate environmentally responsible recycling facility. The owner of the equipment is obliged to deliver a decommissioned unit to a regional collection center, as per the instructions of local authorities or a KempPi representative. By applying these European Directives you improve the environment and human health.

For more information:



4.3 TROUBLESHOOTING



The problems and the possible causes listed are not definitive, but suggest some typical situations that may turn up during normal use of the welding system. For further information and assistance, contact your nearest Kempfi service workshop.

If you have received an error code, refer also to "Error codes" on the next page.

General:

The welding system does not power up

- Check that the mains cable is plugged in properly.
- Check that the mains switch of the power source is at the ON position.
- Check that the mains power distribution is on.
- Check the mains fuse and/or the circuit breaker.
- Check that the earth return cable is connected.

The welding system stops working

- The torch may have overheated. Wait for it to cool down.
- Check that none of the cables is loose.
- The power source may have overheated. Wait for it to cool down and see that the cooling fans work properly and the air flow is unobstructed.

Welding torch:

The torch overheats

- Make sure the torch body is properly connected.
- Make sure that the welding parameters are within the range of the welding torch. If different torch components have separate limits for the maximum current; the lower one of these is the maximum current that can be used.
- Make sure you are using original Kempfi consumable and spare parts. Incorrect spare part materials may also cause overheating.
- Make sure the connectors are clean, undamaged and properly fastened.

Weld quality:

Dirty and/or poor weld quality

- Check that the shielding gas has not run out.
- Check that the shielding gas flow is unobstructed.
- Check that the gas type is correct for the application.
- Check the polarity of the torch/electrode.
- Check that the welding procedure is correct for the application.
- Check that the filler material is correct type/diameter for the application and clean
- Check that the electrode is correct size/type and correctly shaped for the application
- Check that the base material is clean
- Check that the groove type is correct for the application.

Tip: For checking the correct welding settings, you can also use Weld Assist.

Varying welding performance

- Check that the welding torch is physically intact and the nozzle is clear of any obstructions.
- Check that the welding torch is not overheating.
- Check that the earth return clamp is properly attached to a clean surface of the workpiece.

4.3.1 ERROR CODES

Error code	Error description	Possible reason	Proposed action
1	Power source not calibrated	Power source calibration has been lost.	Restart the power source. If problem persists, contact Kemppi service. Note: The equipment operation is limited when this error occurs.
2	Too low mains voltage	Voltage in mains network is too low.	Restart the power source. If problem persists, contact Kemppi service.
3	Too high mains voltage	Voltage in mains network is too high.	Restart the power source. If problem persists, contact Kemppi service.
4	Power source is overheated	Too long welding session with high power.	Do not shut down, let the fans cool the machine. If fans are not running, contact Kemppi service.
17	Phase is missing from mains supply	One or more phases are missing from the mains supply.	Check the mains cable and its connectors. Check the voltage of mains supply.
34	Unknown welding load	An unknown load connected to DIX connectors.	Remove any unintended resistive load connected to the welding equipment and restart the power source.
35	Too high mains current	Current drawn from the mains is too high.	Reduce welding power.
36	DC-link under-voltage	DC-link voltage is too low.	Check the mains voltage and/or the supply cable.
37	DC-link over-voltage	DC-link voltage is too high.	Check the mains voltage.
38	Mains voltage too high or too low	Mains voltage is too high or too low.	Check the mains voltage and/or the supply cable.
40	VRD error	Open circuit voltage exceeds the VRD limit.	Restart the power source. If problem persists, contact Kemppi service.
81	Welding program data missing	Welding program data has been lost.	Restart the power source. If problem persists, contact Kemppi service.
244	Internal memory failure	Initialization failed.	Restart welding system. If problem persists, contact Kemppi service.
250	Internal memory failure	Memory communication failed.	Restart welding system. If problem persists, contact Kemppi service.

5. TECHNICAL DATA

Technical data:

"Master S 305 power sources" on the next page

Additional information:

"TIG guide tables" on page 52

"Welding processes and features" on page 53

"Ordering codes" on page 56

5.1 MASTER S 305 POWER SOURCES

Master S 305 G

Master S 305 G		
Feature		Value
Mains connection voltage		380...460 V ± 10 %
Mains connection phases		3~50/60 Hz
Mains connection cable type		4G, H07RN-F
Mains connection cable size		2.5 mm ²
Rated maximum input power [S_{1max}]		12 kVA
Mains fuse		16 A
No-load voltage (MMA) [U_r]		50 V
No-load voltage (MMA) VRD [$U_r VRD$]		23 V
Open circuit voltage (MMA)		50 V
Effective supply current [I_{1eff}]		12...10 A
Maximum supply current [I_{1max}]		18...15 A
Output, duty cycle % at rated max current, TIG		30 %
Output at +40 °C, rated max current, TIG		300 A
Output at +40 °C, 60% TIG		260 A
Output at +40 °C, 100% TIG		220 A
Output, duty cycle % at rated max current, MMA		30 %
Output at +40 °C, rated max current, MMA		300 A
Output at +40 °C, 60% MMA		260 A
Output at +40 °C, 100% MMA		220 A
Output range, TIG welding current/voltage		3 A / 1 V ... 300 A / 22 V
Output range, MMA welding current/voltage		10 A / 10 V ... 300 A / 63 V
Power factor at rated maximum current	λ	0.89
Efficiency at rated maximum current	η	87 %
Minimum short-circuit power of supply network [S_{SC}]		2.1 MVA
Welding connection type		DIX
Stick electrode diameter range		1.6...7 mm
Wired communication type		Analog, Kemppi Remote-Bus
Wireless communication type		Bluetooth
Transmitter frequency and power		2400...2483.5 MHz, 10 dBm
Operating temperature range		-20...40 °C
Storage temperature range		-40...60 °C
Recommended minimum generator power [S_{gen}]		20 kVA
EMC class		A

Degree of protection		IP23
External dimensions	<i>L x W x H</i>	544 x 205 x 443 mm
Weight without accessories		21.4 kg
Standards		IEC 60974-1,-3,-10, IEC 61000-3-12, GB 15579.1

Master S 305 GM

Master S 305 GM		
Feature		Value
Mains connection voltage		380...460 V $\pm 10\%$
Mains connection voltage	MV low range	220...230 V $\pm 10\%$
Mains connection phases		3~50/60 Hz
Mains connection cable type		4G, H07RN-F
Mains connection cable size		2.5 mm ²
Rated maximum input power [S_{1max}]		12 kVA
Mains fuse		16 A
No-load voltage (MMA) [U_r]		50 V
No-load voltage (MMA) VRD [$U_r VRD$]		23 V
Open circuit voltage (MMA)		50 V
Effective supply current [I_{1eff}]		12...10 A
Effective supply current [I_{1eff}]	@MV low range	16...15 A
Maximum supply current [I_{1max}]		18...15 A
Maximum supply current [I_{1max}]	@MV low range	27...25 A
Output, duty cycle % at rated max current, TIG		30 %
Output at +40 °C, rated max current, TIG		300 A
Output at +40 °C, 60% TIG		260 A
Output at +40 °C, 100% TIG		220 A
Output at +40 °C, rated max current, TIG	@MV low range	260 A
Output at +40 °C, 60% TIG	@MV low range	230 A
Output at +40 °C, 100% TIG	@MV low range	175 A
Output, duty cycle % at rated max current, MMA		30 %
Output at +40 °C, rated max current, MMA		300 A
Output at +40 °C, 60% MMA		260 A
Output at +40 °C, 100% MMA		220 A
Output, duty cycle % at rated max current, MMA	@MV low range	40 %
Output at +40 °C, rated max current, MMA	@MV low range	260 A
Output at +40 °C, 60% MMA	@MV low range	230 A
Output at +40 °C, 100% MMA	@MV low range	175 A
Output range, TIG welding current/voltage		3 A / 1 V ... 300 A / 22 V

Output range, MMA welding current/voltage		10 A / 10 V ... 300 A / 63 V
Output range, TIG welding current/voltage	@MV low range	3 A / 1 V ... 260 A / 21 V
Output range, MMA welding current/voltage	@MV low range	10 A / 10 V ... 260 A / 39 V
Power factor at rated maximum current	λ	0.89
Efficiency at rated maximum current	η	87 %
Minimum short-circuit power of supply network [S_{SC}]		2.1 MVA
Welding connection type		DIX
Stick electrode diameter range		1.6...7 mm
Wired communication type		Analog, Kempfi Remote-Bus
Wireless communication type		Bluetooth
Transmitter frequency and power		2400...2483.5 MHz, 10 dBm
Operating temperature range		-20...40 °C
Storage temperature range		-40...60 °C
Recommended minimum generator power [S_{gen}]		20 kVA
EMC class		A
Degree of protection		IP23
External dimensions	$L \times W \times H$	544 x 205 x 443 mm
Weight without accessories		22.6 kg
Standards		IEC 60974-1,-3,-10, IEC 61000-3-12, GB 15579.1

Master S 305 G AU (VRD locked on)

Master S 305 G AU	
Feature	Value
Mains connection voltage	380...460 V \pm 10 %
Mains connection phases	3~50/60 Hz
Mains connection cable type	4G, H07RN-F
Mains connection cable size	2.5 mm ²
Rated maximum input power [S_{1max}]	12 kVA
Mains fuse	16 A
No-load voltage (MMA) [U_r]	23 V
No-load voltage (MMA) VRD [$U_r VRD$]	23 V
Open circuit voltage (MMA)	23 V
Effective supply current [I_{1eff}]	12...10 A
Maximum supply current [I_{1max}]	18...15 A
Output, duty cycle % at rated max current, TIG	30 %
Output at +40 °C, rated max current, TIG	300 A
Output at +40 °C, 60% TIG	260 A

Output at +40 °C, 100% TIG		220 A
Output, duty cycle % at rated max current, MMA		30 %
Output at +40 °C, rated max current, MMA		300 A
Output at +40 °C, 60% MMA		260 A
Output at +40 °C, 100% MMA		220 A
Output range, TIG welding current/voltage		3 A / 1 V ... 300 A / 22 V
Output range, MMA welding current/voltage		10 A / 10 V ... 300 A / 63 V
Power factor at rated maximum current	λ	0.89
Efficiency at rated maximum current	η	87 %
Minimum short-circuit power of supply network [S_{SC}]		2.1 MVA
Welding connection type		DIX
Stick electrode diameter range		1.6...7 mm
Wired communication type		Analog, Kemppi Remote-Bus
Wireless communication type		Bluetooth
Transmitter frequency and power		2400...2483.5 MHz, 10 dBm
Operating temperature range		-20...40 °C
Storage temperature range		-40...60 °C
Recommended minimum generator power [S_{gen}]		20 kVA
EMC class		A
Degree of protection		IP23
External dimensions	$L \times W \times H$	544 x 205 x 443 mm
Weight without accessories		21.4 kg
Standards		IEC 60974-1,-3,-10, IEC 61000-3-12, AS 60974.1-2006, GB 15579.1




Wireless communication type:

- Control panel MTP35X

- Remote controls HR45, FR45

NO: These devices are not allowed to be used within a 20 km radius of the centre of Ny-Ålesund at Svalbard, Norway. This restriction applies to any 2-32 GHz transmitter operation.

5.2 TIG GUIDE TABLES

 The table in this chapter is given only as a general guidance. The information provided is based solely on the use of WC20 (grey) electrode and Argon gas.

TIG welding (DC)

Welding current range DC		Electrode (WC20)	Gas nozzle		Gas flow rate
Min. A	Max. A	ø mm	number	ø mm	l/min (Argon)
5	80	1.0	4 / 5	6.5 / 8.0	5...6
70	140	1.6	4 / 5 / 6	6.5 / 8.0 / 9.5	6...7
140	230	2.4	6 / 7	9.5 / 11.0	7...8
225	330	3.2	7 / 8 / 10	11.0 / 12.5 / 16	8...10

5.3 WELDING PROCESSES AND FEATURES

Master S

A

Arc break

Determines the point where the arc is extinguished in relation to the arc length in MMA welding. The purpose is to optimize the welding termination for each electrode type to prevent the arc from being accidentally extinguished during welding and to avoid burn marks to the weld piece when the welding is stopped.

Arc force

Adjusts short circuit dynamics (roughness) of MMA welding by changing, for example, current levels.

Arc time

Tells how long the welding arc has been on.

B

Base current

The lower current level of the pulse cycle. In TIG welding, its main tasks are to cool down the weld pool and to maintain the arc.

D

DC TIG

Direct current TIG welding process, where the polarity of the electrode is either positive or negative throughout the welding process. Negative polarity (DC-) allows high penetration, whereas positive polarity (DC+) is used only in special applications.

H

Hot start

Welding function that uses higher welding current at the start of the weld. After the Hot start period the current drops to normal welding current level. The values for Hot start current level and its duration are preset manually. This facilitates the start of the weld especially with aluminum materials.

L

Lift TIG current

Contact current in the beginning of Lift TIG ignition.

Lift TIG ignition

Ignition mode in TIG welding. In Lift TIG ignition you briefly touch the work piece with the electrode, then press the trigger and lift the electrode to a small distance from the work piece. The Lift TIG ignition must be activated in the control panel. Also known as "Touch ignition" or "Contact ignition".

M

Memory channel

Place to store predefined welding parameter settings. A welding machine can include a number of preset channels. Users can create new channels for their own welding jobs and modify or delete them. Makes parameter selection easier, and in some cases allows transferring settings from one welding machine to another.

MMA

Manual arc welding process that uses a consumable electrode. The electrode is covered with flux material that protects the weld area from oxidation and contamination.

MMA antifreeze

A function which automatically decreases the welding current significantly when electrode is touching the workpiece. Can be used for avoiding MMA electrode getting too hot when it's in contact with the workpiece.

P

Pulse current

The higher current level of the pulse cycle. In TIG welding, its main task is to create weld pool or increase the heat of the weld pool.

Pulse frequency

Determines how many pulse cycles is created per second (Hz).

Pulse ratio

Determines how big part of the whole pulse cycle time is spent on pulse current.

Pulse welding

In pulse welding the current is pulsed between base and pulse current.

S

Slight upslope

This is a function that automatically creates a slight upslope to prevent electrode wearing caused by sudden current rises with high welding currents. This function has an effect only when the welding current is 100 A or more.

T

TIG

Manual welding process that typically uses a non-consumable tungsten electrode, a separate filler material, and an inert shielding gas to protect the weld area from oxidation and contamination during the welding process. The use of a filler material is not always mandatory in TIG welding.

TIG antifreeze

A function which automatically decreases the welding current significantly when electrode is touching the workpiece. Can be used for example to avoid unwanted dilution from electrode to welded metal.

V**VRD (voltage reduction device)**

A safety device used in welding equipment to reduce the open-circuit voltage to maintain below a certain voltage value. This reduces the risk of electric shock particularly in dangerous environments, such as closed or damp spaces. VRD may also be required by law in certain countries or regions.

W**Weld Assist**

A wizard-like utility for easy selection of welding parameters. The utility walks the user step-by-step through the selection of required parameters, presenting the selections in an easily understandable way for a non-technical user. Available in MTP35X control panel in MasterTig product family.

6. ORDERING CODES

For ordering codes, refer to [Kempfi.com](https://kempfi.com).