



TÄYDELLISTÄ HITSAUSTA

CMT TWIN

/ Operating Instructions

Dear reader,

Introduction

Thank you for the trust you have placed in our company and congratulations on buying this high-quality Fronius product. These instructions will help you familiarise yourself with the product. Reading the instructions carefully will enable you to learn about the many different features it has to offer. This will allow you to make full use of its advantages.

Please also note the safety rules to ensure greater safety when using the product. Careful handling of the product will repay you with years of safe and reliable operation. These are essential prerequisites for excellent results.

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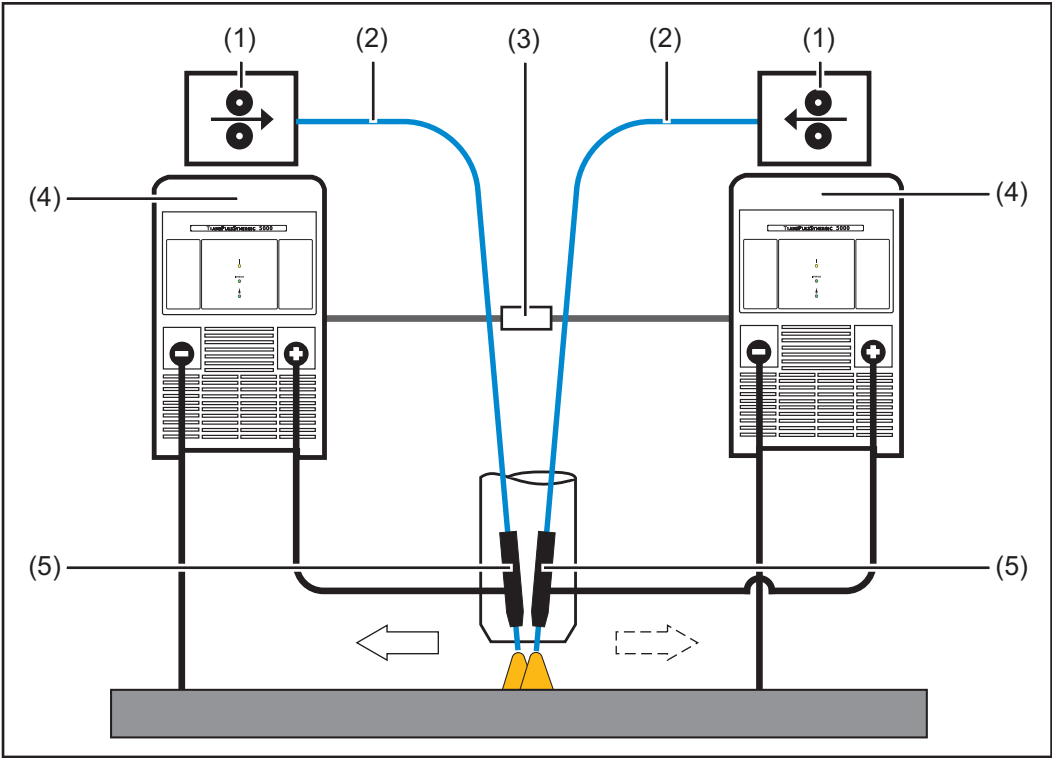
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General

System concept CMT Twin is a high performance welding process that combines the advantages of CMT welding and Twin welding. In addition to numerous other benefits, it offers a very high welding speed and simple control of the process.

- Functional principle**
- The wire is fed by two separate wire-feed units and Robacta Drive CMT drive units
 - The wire-feed units and drive units are supplied by two independent power sources
 - The wire electrodes are brought together in the torch neck in such a way that two independent welding potentials are created



No.	Explanation
(1)	Wire-feed unit 1 and 2
(2)	Wire electrode 1 and 2
(3)	LHSB-HUB
(4)	Power source 1 and 2
(5)	Separate welding potential

Configurations CMT Twin can be used in a variety of configurations depending on requirements. The available configurations comprise:

- wearing parts optimised for CMT Twin
- dedicated characteristics on the RCU 5000i

Refer to the "Installation and commissioning" section for more information about the individual configurations.

Dimensioning of the robot

Dimension the robot so that it is able to accommodate the Robacta Twin Compact Pro torch neck and associated mounting bracket plus 2 Robacta Drive CMT drive units and 1 metre of the relevant hosepacks.



NOTE! The total weight of these components is 7.5 kg (16.53 lb.).

Measures to increase system availability

To increase system availability, we recommend the following welding torch cleaning devices:

Robacta Reamer Twin

Mechanical welding torch cleaner, suitable for all base materials, such as steel, aluminium, CrNi steels, copper, etc.

Robacta Reamer V Twin

Mechanical welding torch cleaner, suitable for all base materials, such as steel, aluminium, CrNi steels, copper, etc.

Robacta TC 1000 Twin

Electromagnetic welding torch cleaner for ferromagnetic base materials

Note for TimeTwin welding using a CMT Twin system

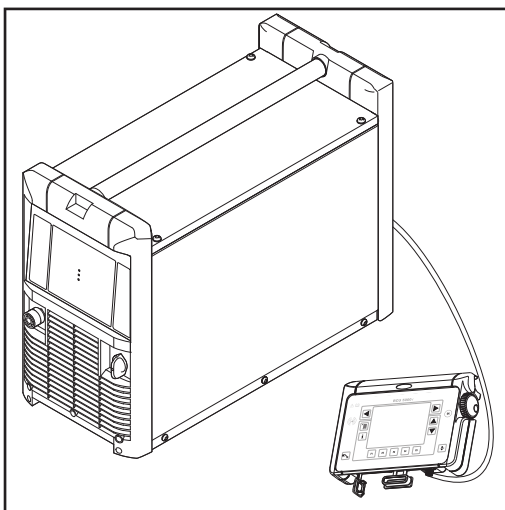
NOTE! When welding the TimeTwin process using a CMT Twin system, the "TimeTwin Digital" software needs to be enabled on both power sources.



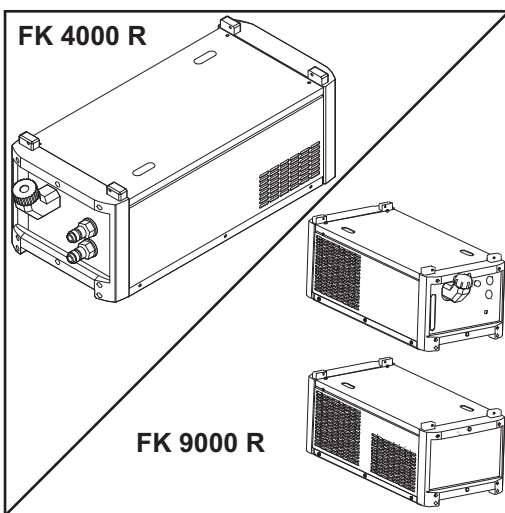
NOTE! Pulse synchronous welding can only be performed using TimeTwin characteristics.
It is not possible with CMT Twin characteristics.

System components required

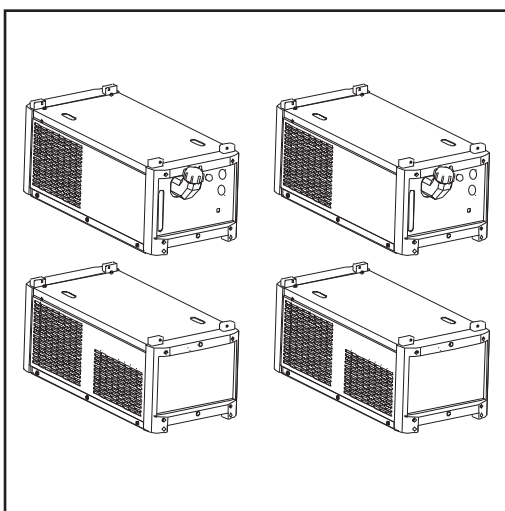
System components required



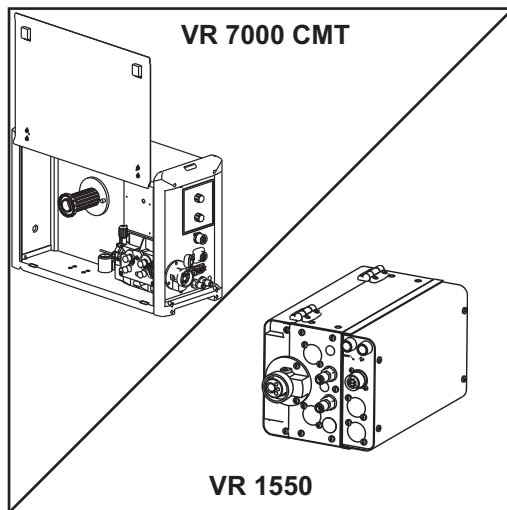
- 2 TPS 5000 CMT
 - with DSP software version 5.01.063 or higher
- 2 RCU 5000i
 - with database version 908 or higher



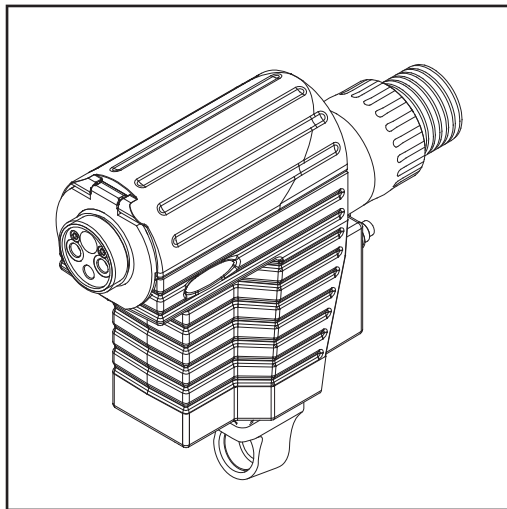
- Use 2 FK 4000 R or 1 FK 9000 for:
- hosepack lengths of up to 4.25 m (14.76ft.)
 - 100 % duty cycle (10min/40°C) at 360 A



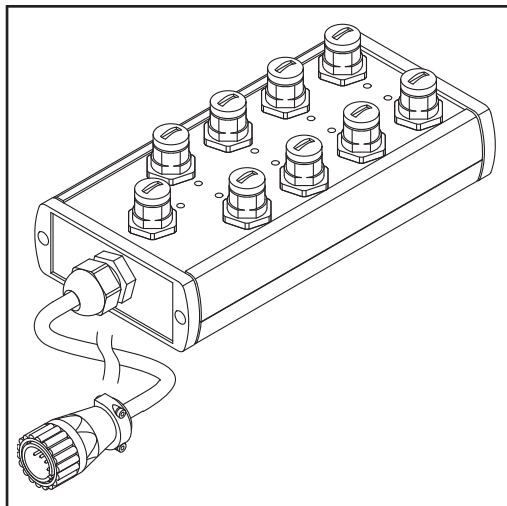
- Use 2 FK 9000 for:
- hosepack lengths from 4.25 m - 8.25 m (14.76 ft. - 27.07 ft.)
 - 100 % duty cycle (10min/40°C) at 360 A



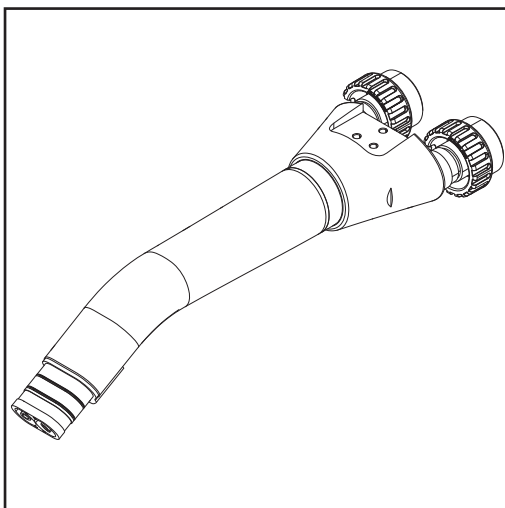
- 2 VR 7000 CMT or 2 VR 1550



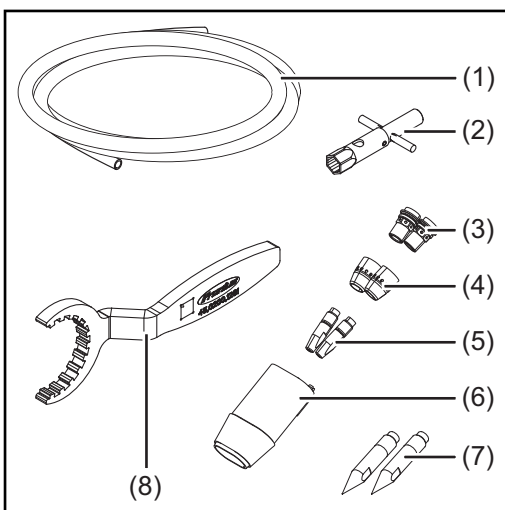
- 2 Robacta Drive CMT drive units with wire buffer and hosepacks



- 1 LHSB-HUB



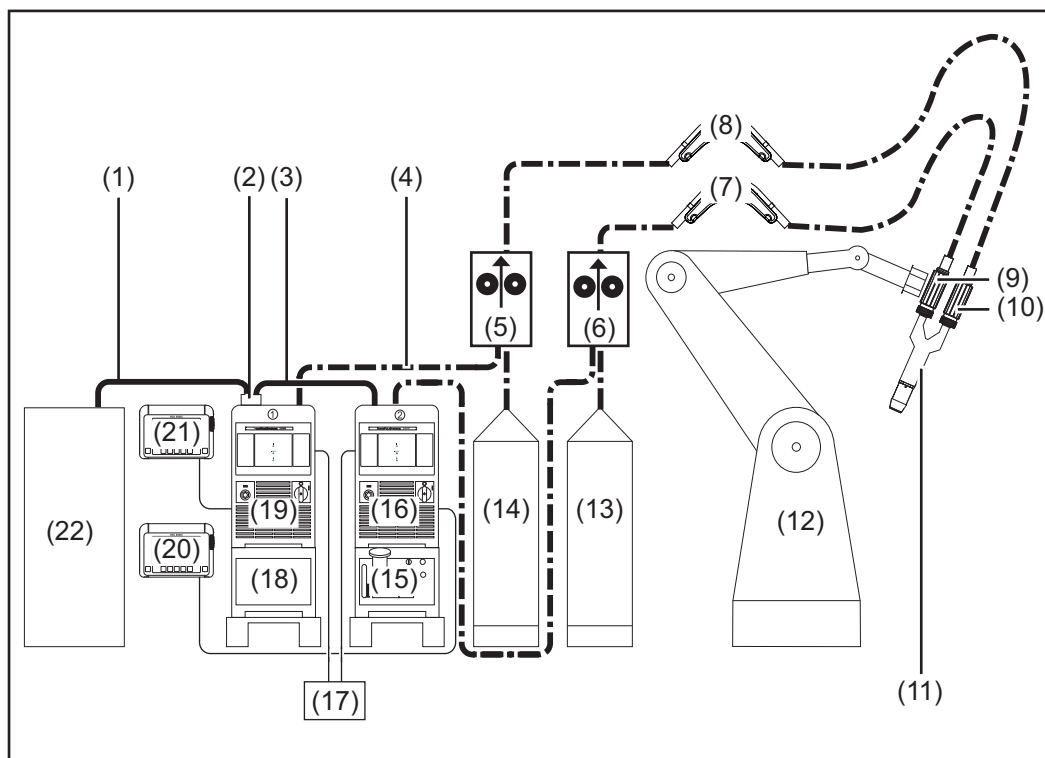
- 1 Robacta Twin Compact Pro torch neck and mounting bracket



- (1) 2 inner liners
- (2) 1 wrench for nozzle fitting and contact tip
- (3) 2 nozzle fittings
- (4) 2 spatter guards
- (5) 2 contact tips
- (6) 1 gas nozzle
- (7) 2 TCP tips
- (8) 1 wrench for union nut on drive units

- Robot interface for connecting power source to the robot control

Application example



(1)	Connection to robot control	(12)	Robot
(2)	Robot interface	(13)	Drum coil
(3)	Connection to robot interface	(14)	Drum coil
(4)	Interconnecting hosepack	(15)	FK 9000 R or FK 4000 R cooling unit
(5)	VR 7000 CMT or VR 1550	(16)	TPS 5000 CMT power source
(6)	VR 7000 CMT or VR 1550	(17)	LHSB-HUB
(7)	Wire buffer	(18)	FK 9000 R or FK 4000 R cooling unit
(8)	Wire buffer	(19)	TPS 5000 CMT power source
(9)	Robacta Drive CMT drive unit	(20)	RCU 5000i
(10)	Robacta Drive CMT drive unit	(21)	RCU 5000i
(11)	Robacta Twin Compact Pro torch neck	(22)	Robot control

Installation and commissioning

Safety

Observe the following safety instructions for all work described in these operating instructions.



WARNING! Work that is carried out incorrectly can cause serious injury or damage. All the work described below must only be carried out by trained and qualified personnel. Do not carry out any of the work described below until you have fully read and understood the following documents:

- these operating instructions
- all the operating instructions for the system components, especially the safety rules



WARNING! Machines that start up automatically can cause serious injury and damage. In addition to these operating instructions, the safety rules issued by the manufacturers of the robot and welding systems must also be observed. For your personal safety, ensure that all protective measures have been taken and will remain in place while you are in the working area of the robot.



WARNING! Work that is carried out incorrectly can cause serious injury or damage. Before starting the work listed below:

- turn the mains switch of both power sources to the "O" position
- disconnect both power sources from the mains
- put up an easy-to-understand warning sign to stop anybody inadvertently switching it back on again



WARNING! Risk of serious injury and damage from articles being dropped. All the screw connections described below:

- must be checked after fitting to ensure they are tight
- must be checked after unusual events (e.g. a crash) to ensure they are tight
- must be checked regularly to ensure they are tight

Notes regarding the installation of Fronius system components

Installation and commissioning of Fronius system components



NOTE! Install and commission Fronius system components (power source, wire-feed unit, cooling unit, hosepack, RCU 5000i, LHSB-HUB, etc.) according to the operating instructions of the relevant device.

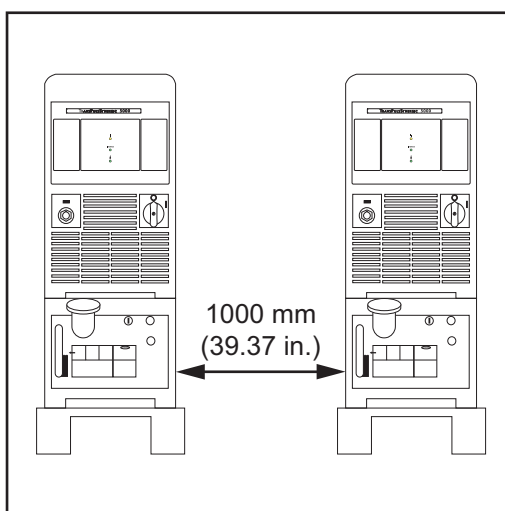
Setup regulations for the power sources



NOTE! If the power sources are used with two FK 4000 R, ensure a minimum gap of 1000 mm (39.07 in.) between the power sources in order to guarantee a sufficient supply of fresh air to the cooling units.

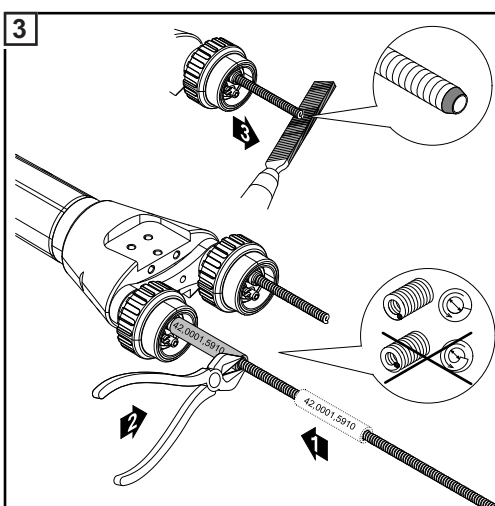
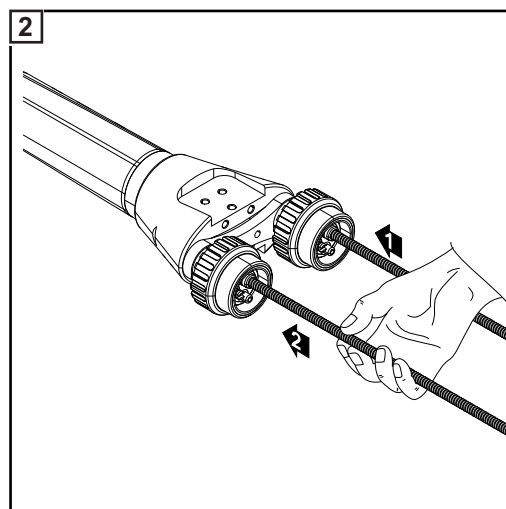
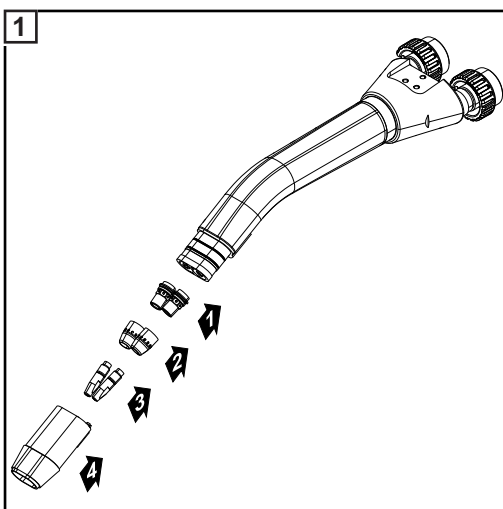


NOTE! If the power sources are used with two FK 9000 R, ensure a minimum gap of 1000 mm (39.07 in.) between the power sources in order to guarantee a sufficient supply of fresh air to the cooling units.



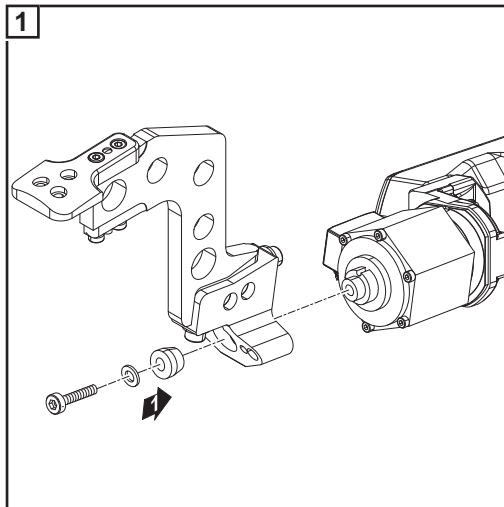
Fitting wearing parts to the torch neck

Fitting wearing parts to the torch neck

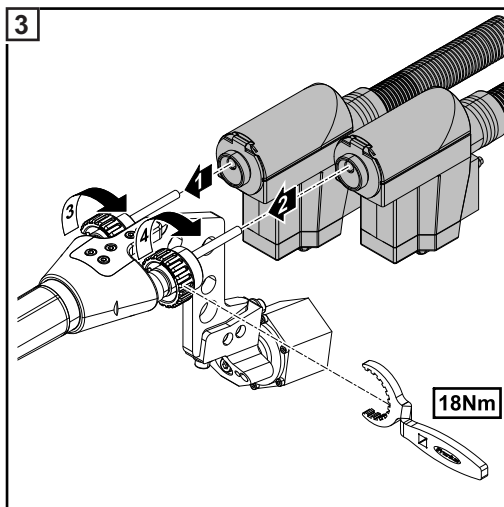
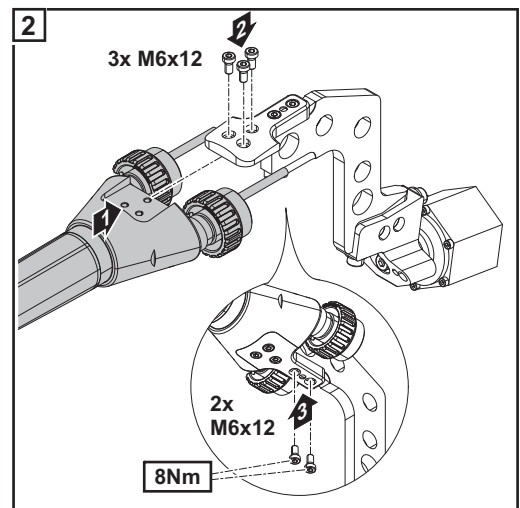
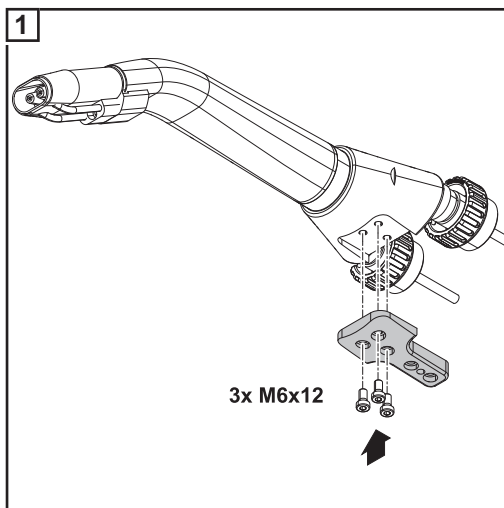


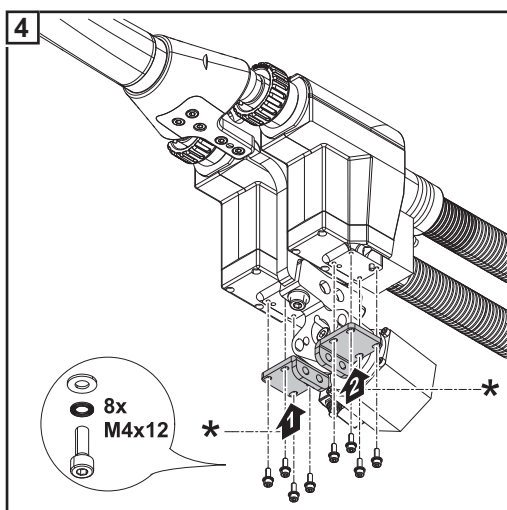
Fitting the mounting bracket and torch neck

Fitting the mounting bracket to the robot

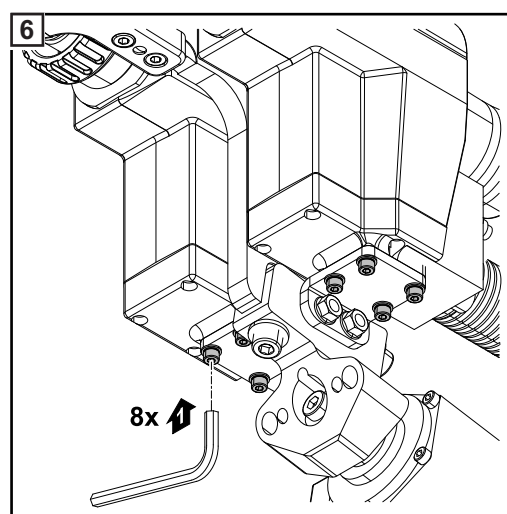
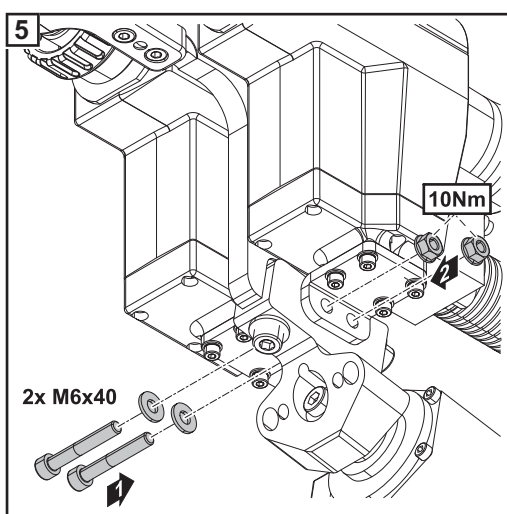


Screw the torch neck and drive units to the mounting bracket





* Only screw in loosely to begin with - do not tighten. Only tighten the screws once all components have been properly aligned with each other - step 6. This will avoid placing the drive units under excessive strain.



Fitting the wire buffer holder and wire buffer

Safety



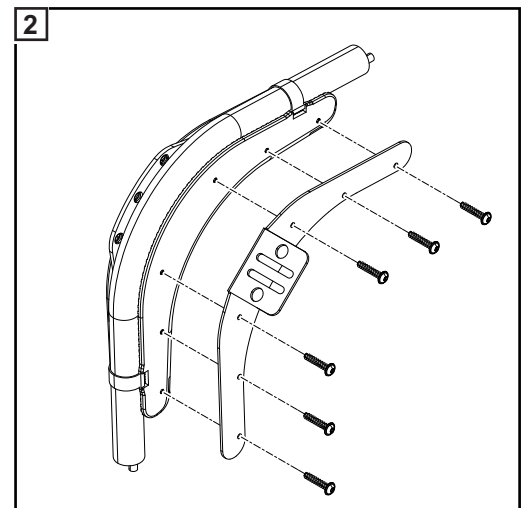
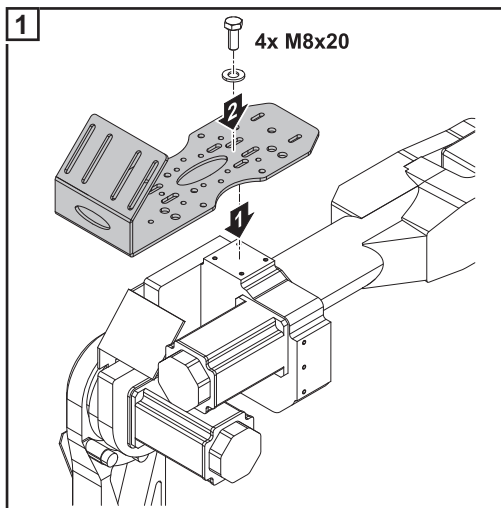
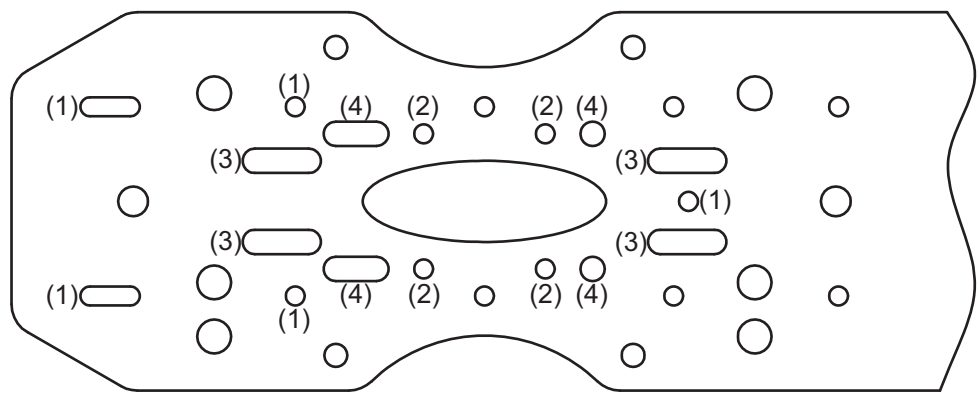
WARNING! Risk of serious injury and damage from articles being dropped. All screw connections between the robot, wire buffer holder and wire buffer:

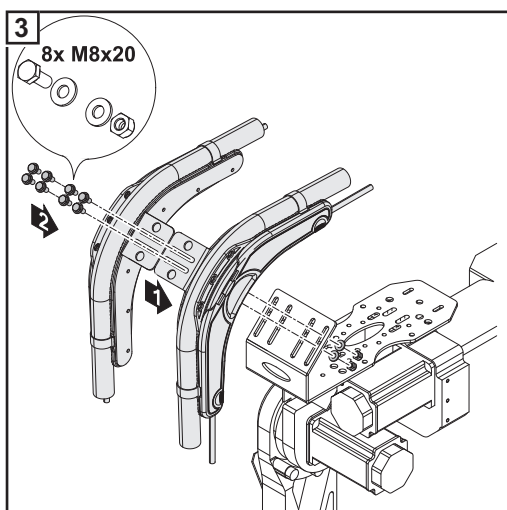
- must be checked after fitting to ensure they are tight
- must be checked after unusual events (e.g. a crash) to ensure they are tight
- must be checked regularly to ensure they are tight

Fitting the wire buffer holder and wire buffer to the robot

Overview of holes in wire buffer holder base plate:

(4) = Motoman UP 20 (2) = Fanuc M20ia
(1) = Motoman HP 20 (3) = Kuka KR16, KR16/KS





**Fitting the wire
buffer holder and
wire buffer to an
ABB robot**

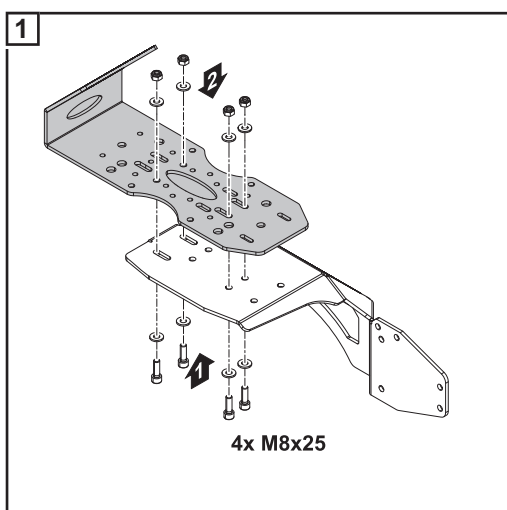
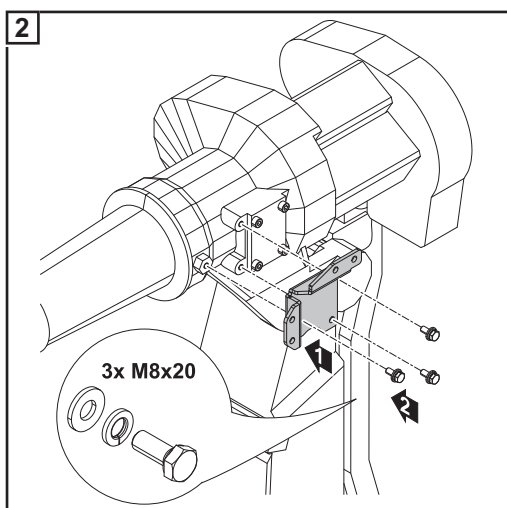


ABB IRB 2400:



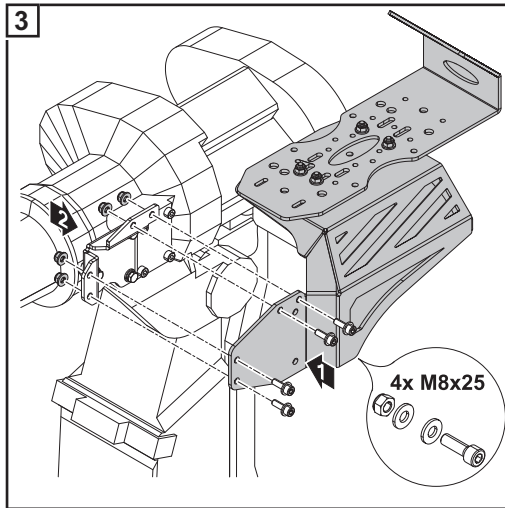
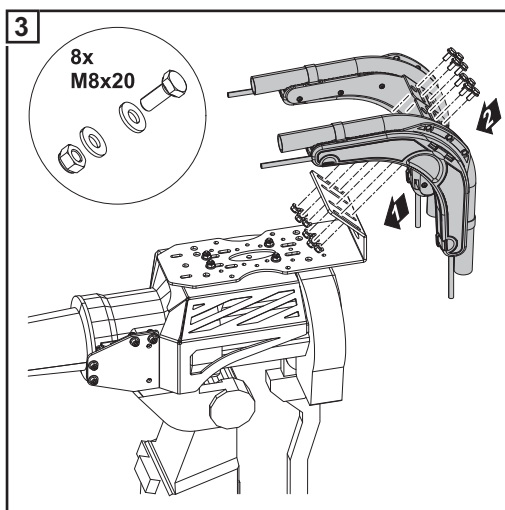
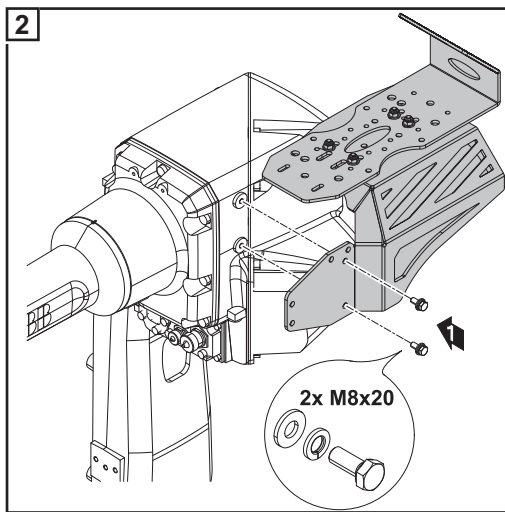
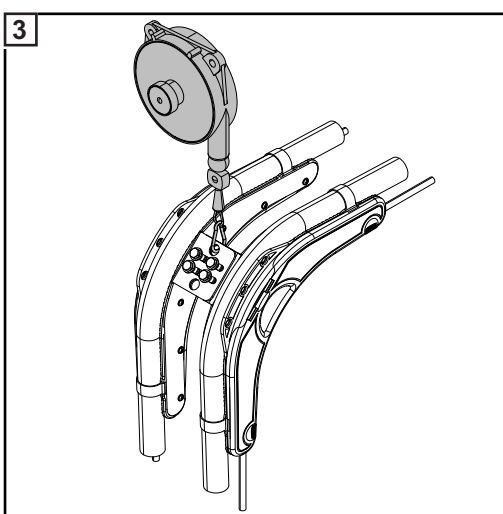
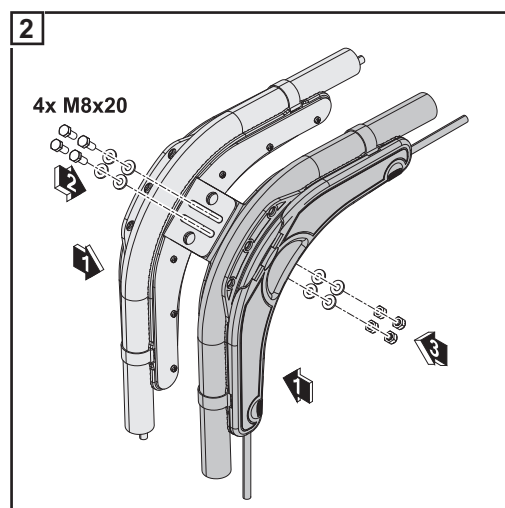
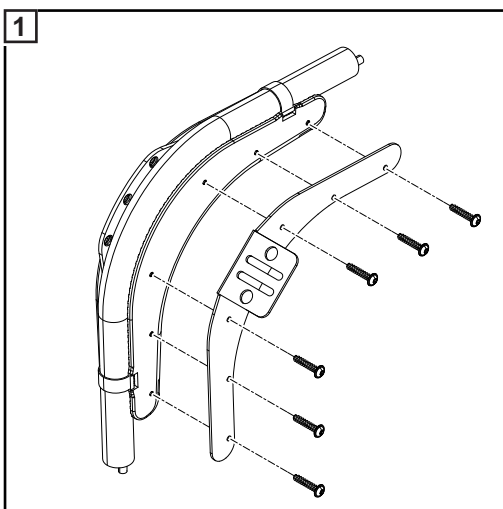


ABB IRB 2600:



**Fitting the wire
buffer holder and
wire buffer to the
balancer**

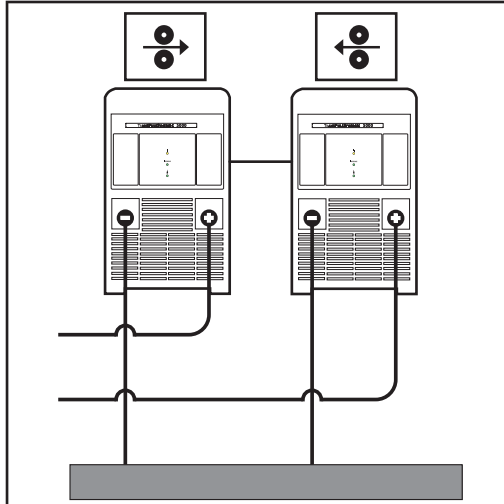


Earth connection

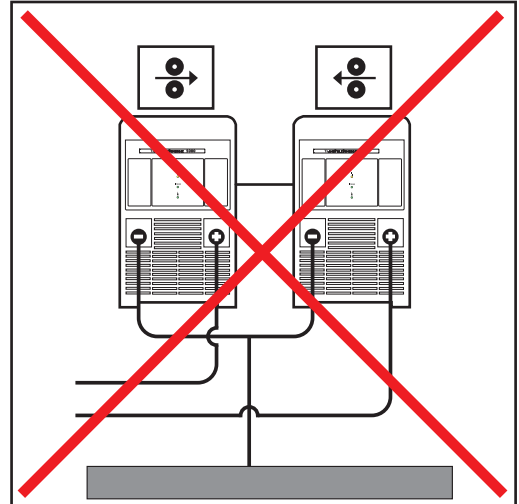
Earth connection



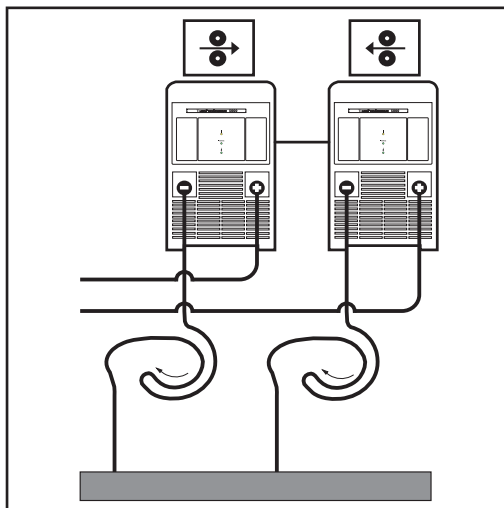
NOTE! Each power source must have its own dedicated earthing cable routed as shown.



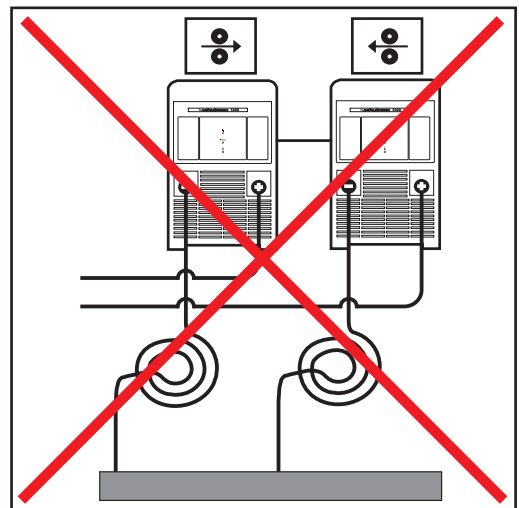
Separate earthing cable



Shared earthing cable, earthing socket

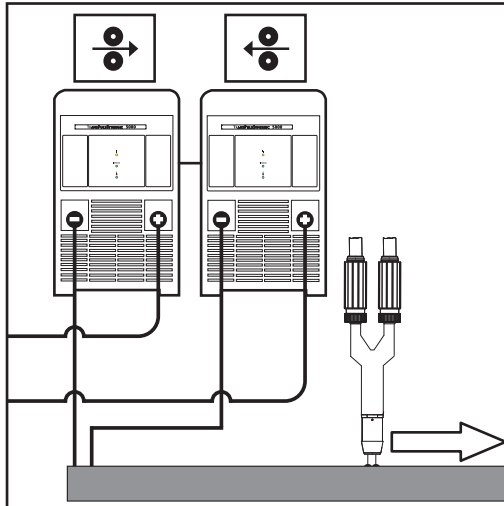


Separate earthing cable laid in a loop



Earthing cable coiled

Recommendation to minimise arc blow

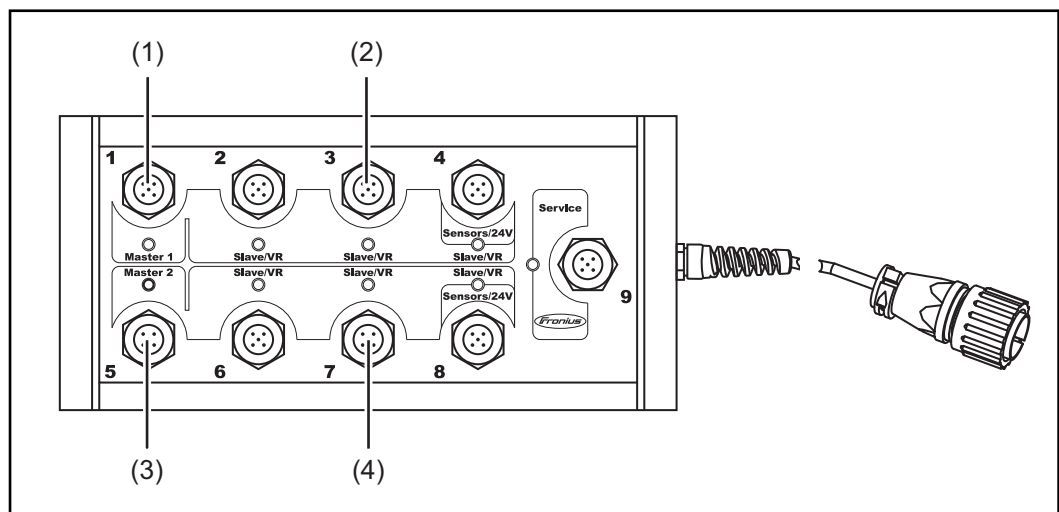


NOTE! To minimise arc blow, weld away from the earthing connections.

Connecting the LHSB-HUB with the power sources and wire-feed units

Connecting the LHSB-HUB with the power sources and wire-feed units

- 1** Connect the lead power source to connection (1) on the LHSB-HUB
- 2** Connect the wire-feed unit of the lead power source to connection (2) on the LHSB-HUB
- 3** Connect the trail power source to connection (3) on the LHSB-HUB
- 4** Connect the wire-feed unit of the trail power source to connection (4) on the LHSB-HUB
- 5** Connect the LHSB-HUB to the LocalNet port on the lead power source



Connecting to the robot control

Connecting to the robot control

- 1 Use one of the following configurations to connect the welding system to the robot control.
Refer to the operating instructions for the respective interface for instructions on connecting the welding system to the robot control.

Robot interfaces for CMT Twin

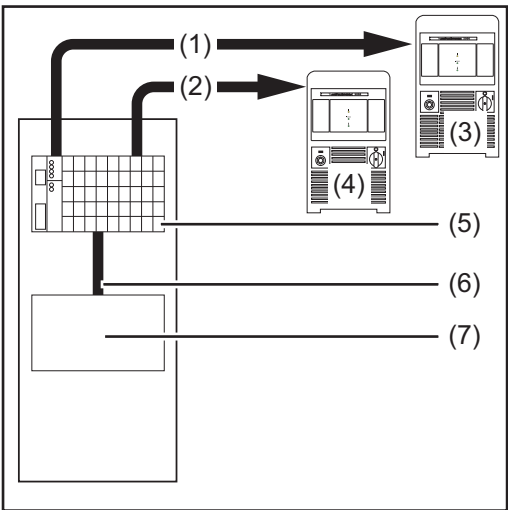
There are two special robot interfaces for CMT Twin available for connecting to the robot control:

- Twin Standard I/O Job (0-24 V digital)
- Twin Standard I/O Synergic / Job (0-24 V digital, 0-10 V analogue)

Each of these "Twin interfaces" features an integral programmable logic controller (PLC). The signals are connected logically by the PLC. Both power sources are therefore triggered simultaneously by a signal from the robot control. Only one "Twin interface" is required for two power sources. The "Twin interface" is installed in the switch cabinet.

Example setup:

No.	Part/device	No.	Part/device
(1)	LocalNet connection	(5)	Twin interface
(2)	LocalNet connection	(6)	Connection to robot control
(3)	Power source	(7)	Robot control
(4)	Power source		



Standard robot interfaces

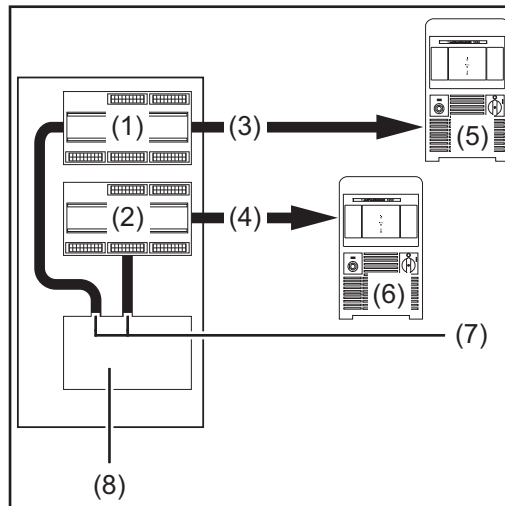
The following standard robot interfaces can be used to connect to the robot control for CMT Twin:

- ROB 3000 (0-24 V digital)
- ROB 4000 (0-24 V digital, 0-10 V analogue)
- ROB 5000 (0-24 V digital, 0-10 V analogue)

Signals must be connected logically by the robot control when standard robot interfaces are used. Two identical robot interfaces are required for two power sources. The two standard robot interfaces are installed in the switch cabinet. Robot interfaces "1" and "2" are connected to power sources "1" and "2" via LocalNet.

Example setup:

No.	Part/device	No.	Part/device
(1)	Standard interface	(5)	Power source
(2)	Standard interface	(6)	Power source
(3)	LocalNet connection	(7)	Connection to robot control
(4)	LocalNet connection	(8)	Robot control



Fieldbus systems for CMT Twin

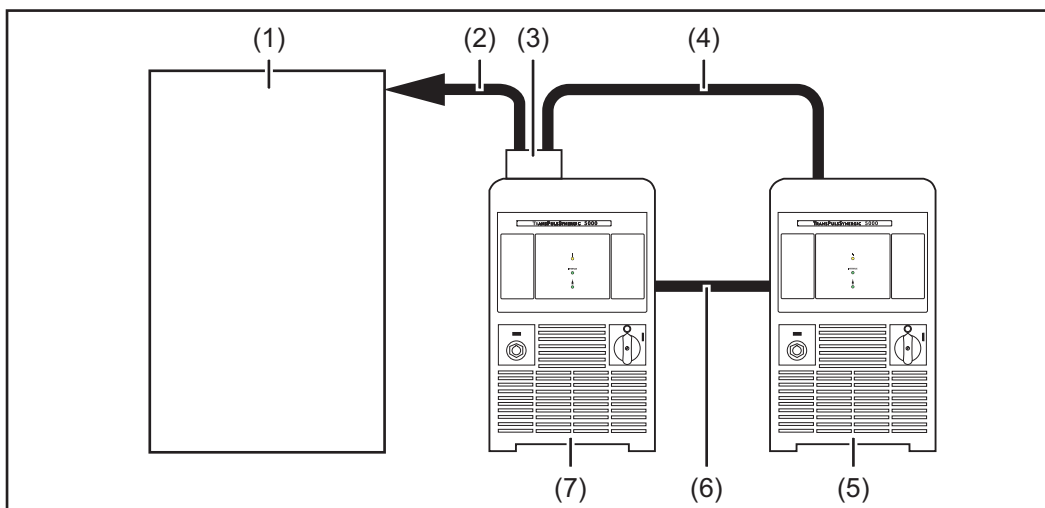
The following Twin fieldbus systems can be used to connect to the robot control for CMT Twin:

- Twin DeviceNet fieldbus robot interface
- Twin CANopen fieldbus robot interface
- Twin Interbus CU fieldbus robot interface
- Twin Profibus fieldbus robot interface

An integral PLC is also a feature of the "Twin fieldbus systems" as well as the "Twin interfaces". The signals are connected logically by this PLC. Both power sources are therefore triggered simultaneously by a signal from the robot control. Only one "Twin fieldbus system" is required for two power sources. The "Twin fieldbus system" is fitted to one of the power sources. The connection to the second power source is provided via LocalNet and the connection to the robot control passes through the fieldbus.

Example setup:

No.	Part/device	No.	Part/device
(1)	Robot control	(5)	Power source
(2)	Fieldbus connection	(6)	LHSB-HUB
(3)	Twin fieldbus system	(7)	Power source
(4)	LocalNet connection		



Standard fieldbus systems

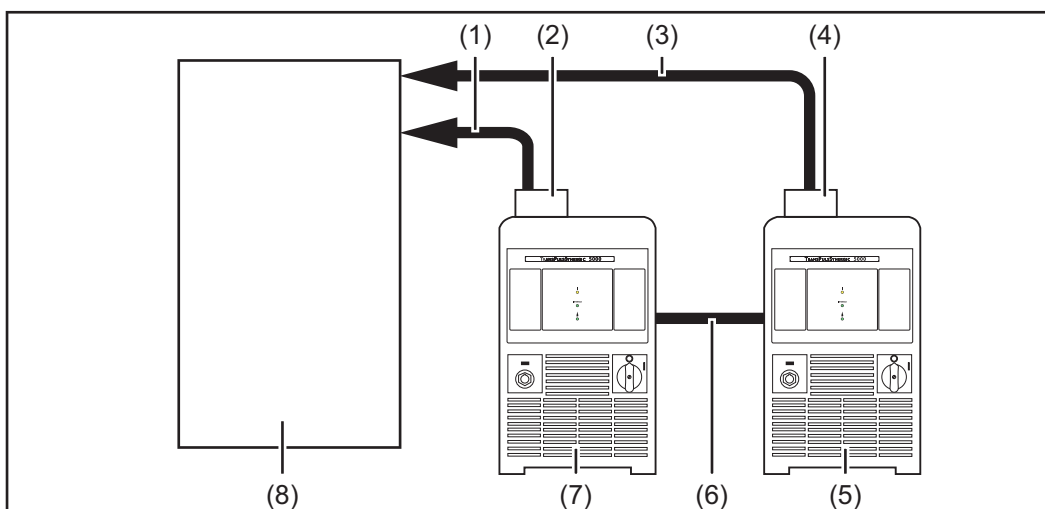
The following standard fieldbus systems can be used to connect to the robot control for CMT Twin:

- DeviceNet fieldbus robot interface
- CanOpen fieldbus robot interface
- Interbus CU fieldbus robot interface
- Interbus LWL fieldbus robot interface
- Profibus 1.5 MB fieldbus robot interface

Signals must be connected logically by the robot control when standard fieldbus systems are used. Two identical standard fieldbus systems are required for two power sources. The two standard fieldbus systems are fitted to the power sources. The robot control is connected to the power sources via the fieldbus.

Example setup:

No.	Part/device	No.	Part/device
(1)	Fieldbus connection	(5)	Power source
(2)	Standard fieldbus system	(6)	LHSB-HUB
(3)	Fieldbus connection	(7)	Power source
(4)	Standard fieldbus system	(8)	Robot control



**Description of
signal statuses**



NOTE! During twin-wire welding (CMT Twin), the signal statuses have no influence on which power source operates as the lead or trail power source.

This is decided by the characteristic selection on the RCU 5000i.

Description of "Twin master selection" signal statuses

Power source 1	Power source 2	Effect
0	0	Power source 1 welds, power source 2 is inactive
1	0	Both power sources weld
0	1	Both power sources weld
1	1	Power source 2 welds, power source 1 is inactive

Check compatibility of power sources and remote controls

Safety



WARNING! If the equipment is used or tasks are carried out incorrectly, serious injury or damage may result. All the work described below must only be carried out by trained and qualified personnel. Do not carry out any of the work described below until you have fully read and understood the following documents:

- these operating instructions
- all the operating instructions for the system components, especially the safety rules



CAUTION! The power sources must be switched on for the following work. This poses a risk of injury and material damage due to:

- welding current
- unintentional ignition of an arc
- emerging wire electrodes

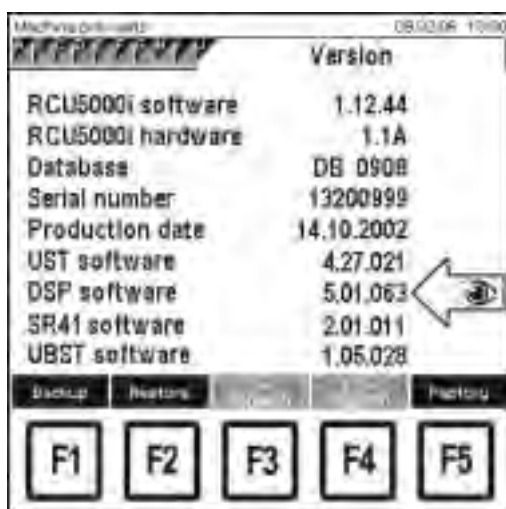
Until all work is completed, ensure that:

- welding is not initiated by any power source
- the wire electrodes are not fed out

Checking power source compatibility



NOTE! Check the compatibility of both power sources.



- 1 Open "Machine pre-sets" on the RCU 5000i menu
- 2 Select the "Version" screen
- 3 Check that the power source DSP software version is 5.01.063 or higher
 - If not, the power source cannot be used for CMT Twin applications

Checking the RCU 5000i database version



NOTE! Check the database version of both RCU 5000i devices.



- 1 Open "Machine pre-sets" on the RCU 5000i menu
- 2 Select the "Version" screen
- 3 Check that the RCU 5000i database version is DB 0908 or higher
- 4 If not, update the RCU 5000i firmware

Checking the characteristics version

Safety



WARNING! If the equipment is used or tasks are carried out incorrectly, serious injury or damage may result. All the work described below must only be carried out by trained and qualified personnel. Do not carry out any of the work described below until you have fully read and understood the following documents:

- these operating instructions
- all the operating instructions for the system components, especially the safety rules



CAUTION! The power sources must be switched on for the following work. This poses a risk of injury and material damage due to:

- welding current
- unintentional ignition of an arc
- emerging wire electrodes

Until all work is completed, ensure that:

- welding is not initiated by any power source
- the wire electrodes are not fed out

Checking the characteristics version



NOTE! The welding start-up configured for CMT Twin is only available with characteristics version V2.9.4. Check the characteristics version to ensure that the welding start-up configured for CMT Twin is available for the respective welding system.



- 1 Use the adjusting dial to select "MIG/MAG synergic welding" from the RCU 5000i menu
- 2 Press the OK button



- The last "Data" screen called up appears



- 3 In the relevant "Data" screen, press F4 "Filler metal"
 - The 1st screen in the wizard appears ("Select a filler metal")
- 4 Apply the desired CMT Twin settings depending on the application



- The "Welding program" screen is displayed again once the relevant settings have been made
- 5 Check that characteristics version V2.9.4 or higher is displayed
- 6 If not, update the RCU 5000i firmware

L/R alignment - aligning welding circuit inductivity and welding circuit resistance

Safety



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- these operating instructions
- all the operating instructions for the system components, especially the safety rules



CAUTION! The power sources must be switched on for the following work. This poses a risk of injury and material damage due to:

- welding current
- unintentional ignition of an arc
- emerging wire electrodes

Until all work is completed, ensure that:

- welding is not initiated by any power source
- the wire electrodes are not fed out

L/R alignment using RCU 5000i



NOTE! Optimum welding results are only achieved up to a welding circuit inductivity of 30 μH (at a mains voltage of 400 V). Welding circuit inductivity in excess of 30 μH must be reduced.

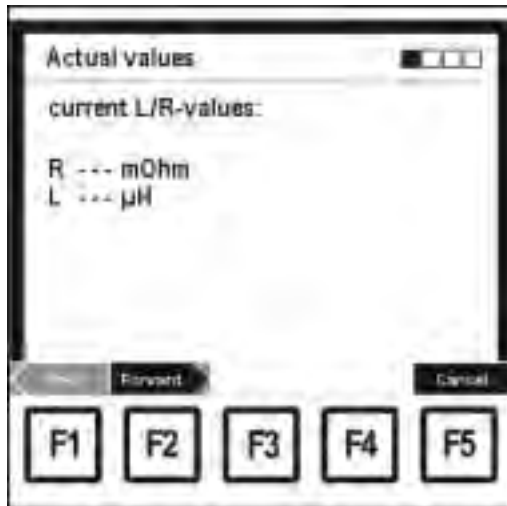
The following measures may be taken to reduce welding circuit inductivity:

- Keep the torch hosepack, interconnecting hosepack and earthing cable as short as possible
- Lay the torch hosepack, interconnecting hosepack and earthing cable parallel to each other



Machine pre-sets: e.g. "MIG/MAG" screen

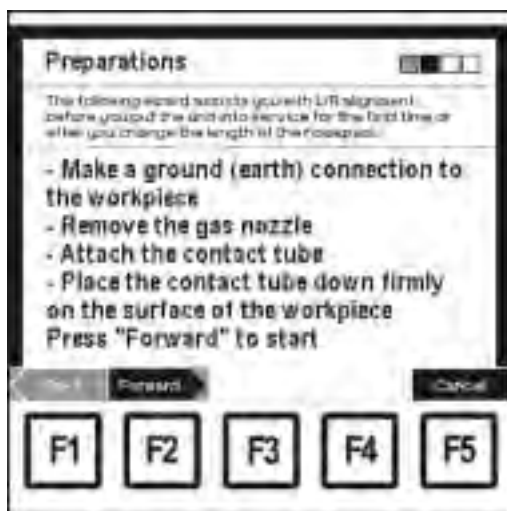
- 1 Open "Machine pre-sets" on the RCU 5000i menu
- 2 Select the "MIG/MAG" screen
- 3 Press F4 "L/R alignment"



"Actual values" screen

- The 1st screen in the wizard appears ("Actual values")

4 Press F2 "Forward"



"Preparations" screen

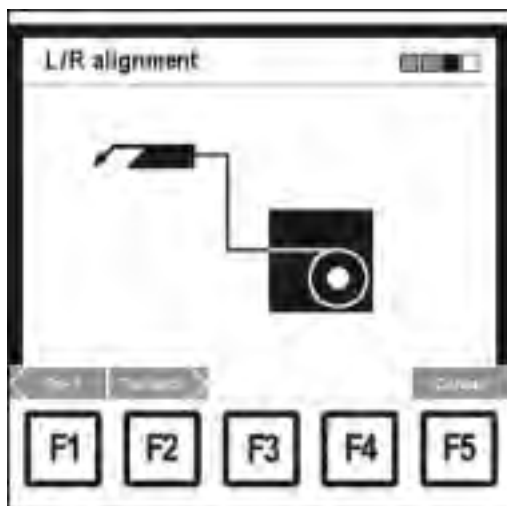
- The 2nd screen in the wizard appears ("Preparations")

5 Follow the instructions given in the "Preparations" screen



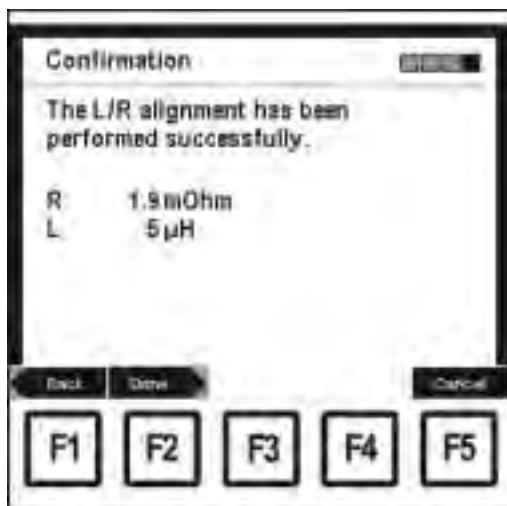
NOTE! The contact between the earthing clamp and workpiece must take place on a cleaned workpiece surface.

6 Press F2 "Forward":



"L/R alignment" screen

- LR alignment is started, the 3rd screen in the wizard appears ("L/R alignment")



"Confirmation" screen

- Once the L/R alignment is complete, the values obtained for welding circuit resistance (R) and inductivity (L) appear in the 4th screen of the wizard ("Confirmation").

7 Press F2 "Done"



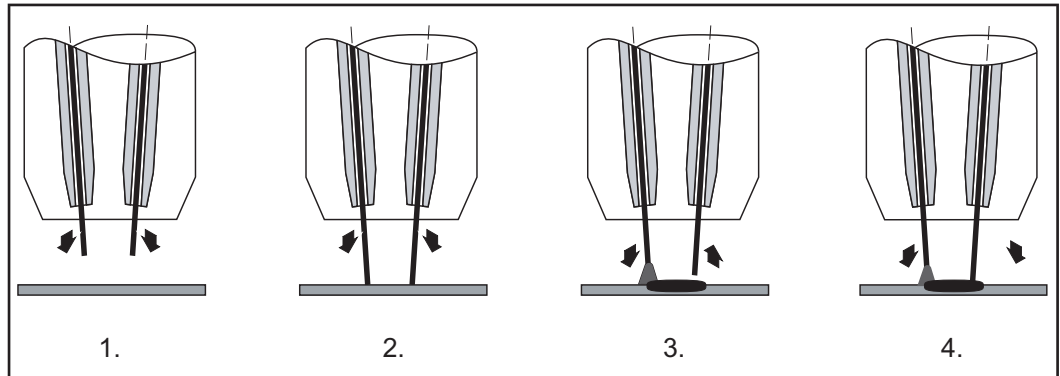
Machine pre-sets: e.g. "MIG/MAG" screen

- The last "Data" screen called up appears.

Welding start-up

Welding start-up sequence

The welding start-up sequence for CMT Twin is as follows:



Welding start-up sequence

1. Both wire electrodes move towards the workpiece
2. Both wire electrodes touch the workpiece
3. The lead wire electrode commences the welding process, while the trail wire electrode moves away from the workpiece and waits for the start signal from the lead wire electrode = welding start delay
4. Once the trail wire electrode receives the start signal, it then also starts the welding process



NOTE! The welding start-up configured for CMT Twin is only available with characteristics version V2.9.4. Refer to the "Checking the characteristics version" section for instructions on how to check the characteristics version.

Safety



WARNING! If the equipment is used or tasks are carried out incorrectly, serious injury or damage may result. All the work described below must only be carried out by trained and qualified personnel. Do not carry out any of the work described below until you have fully read and understood the following documents:

- these operating instructions
- all the operating instructions for the system components, especially the safety rules



CAUTION! The power sources must be switched on for the following work. This poses a risk of injury and material damage due to:

- welding current
- unintentional ignition of an arc
- emerging wire electrodes

Until all work is completed, ensure that:

- welding is not initiated by any power source
- the wire electrodes are not fed out

Welding start-up settings



NOTE! When welding using two processes (one pulse wire electrode, one CMT wire electrode), the welding process begins with the wire electrode performing the pulse process.

NOTE! If both wire electrodes are to weld with the CMT process, then the following must be selected for each wire electrode in the "Filler metal/Select a shielding gas" menu on the RCU 5000i:



- which wire electrode is the lead electrode (wire electrode 1)



- which wire electrode is the trail electrode (wire electrode 2)

Start delay parameter correction



The "Start delay" parameter is corrected to delay welding from the trail electrode until the lead electrode has melted the material. The trail electrode therefore welds in the weld pool and not on the solid material, delivering an optimum start to the weld seam.

Setting range: 0 - 5 (0 - 2.5 seconds)

Pulse/CMT welding

Process description pulse/CMT welding

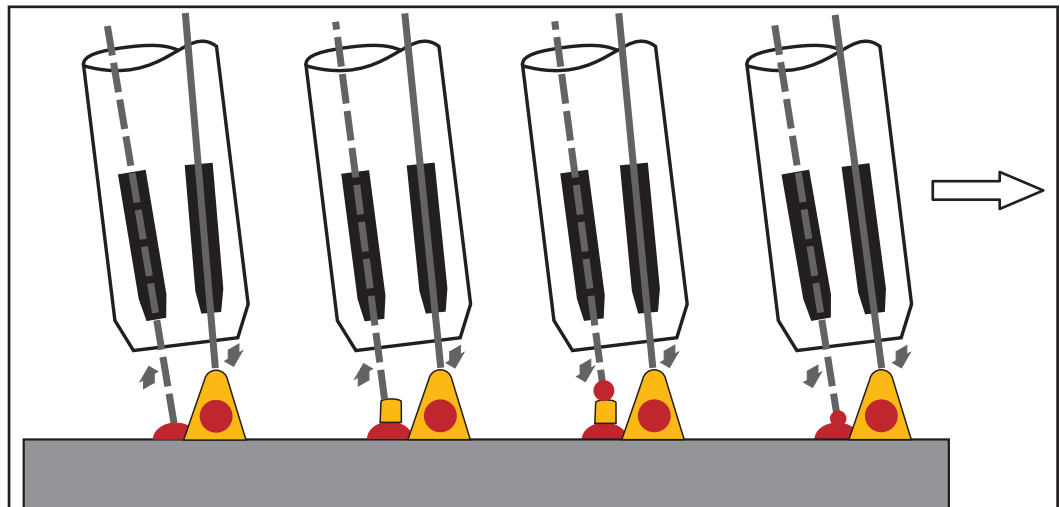
Properties of lead wire electrode (pulse):

- deep fusion penetration
- high deposition rate

Properties of trail wire electrode (CMT):

- extremely good filling of the weld seam
- improved process stability

Symbol	Explanation
---	Trail wire electrode (CMT)
—	Lead wire electrode (pulse)
	Weld pool
	Pulsed arc with droplet transfer
	Start of arc burn phase
	Droplet melting phase
	Droplet detachment
	Welding direction



NOTE! The pulse/CMT combination may be used in both welding directions.

CMT/CMT welding

Process description CMT/CMT welding



NOTE! Different characteristics are used for each wire electrode in this process variant.

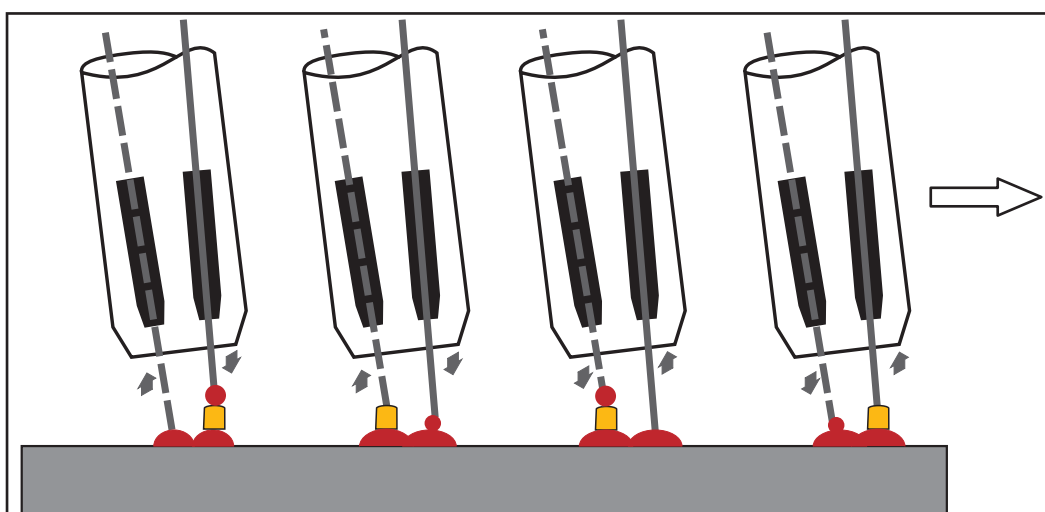
Properties of lead wire electrode (CMT):

- shorter arc than the trail wire electrode
- higher arc power than the trail wire electrode
- starts the welding process

Properties of trail wire electrode (CMT):

- arc tuned to the weld pool

Symbol	Explanation
---	Trail wire electrode (CMT)
—	Lead wire electrode (CMT)
	Weld pool
	Droplet melting phase
	Start of arc burn phase
	Droplet detachment
	Welding direction



NOTE! The CMT/CMT combination may be used in both welding directions.

Single-wire welding

Special features and advantages

A signal is emitted from the robot control that triggers welding from one power source only (single-wire welding). Depending on the position of the torch neck or the out-of-position weld seam, single-wire welding can be performed from either the lead or trail power source. The second power source is paused.



NOTE! If using FK 4000 R cooling units, both units must be switched to continuous operation in order to perform single-wire welding:
Parameter C-C (Cooling unit Control) = "On" on power source "1" and power source "2".



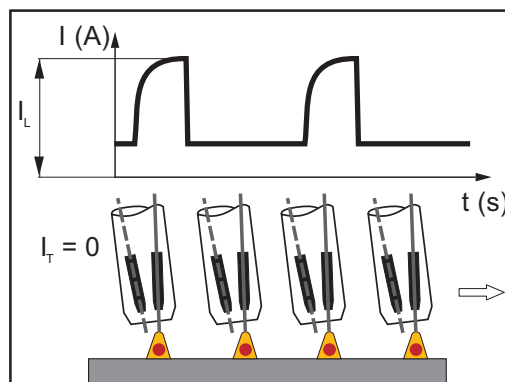
NOTE! To ensure a full gas shield during single-wire welding, the solenoid valve on the paused power source must be open.

In systems using Twin interfaces, the solenoid valve is actuated from the robot control. For standard interfaces and fieldbus systems, the solenoid valve must be actuated directly.

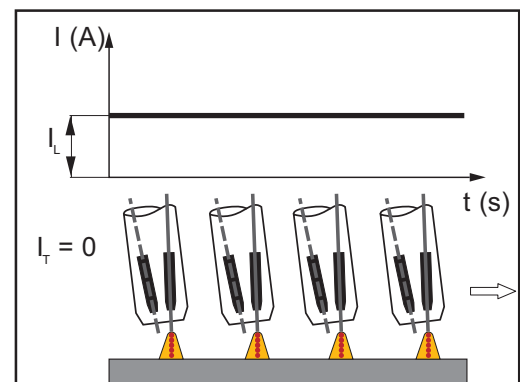
Material transfer

Pulse/standard

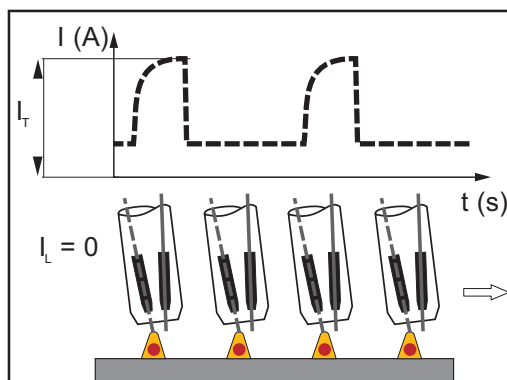
Symbol	
---	Trail wire electrode
—	Lead wire electrode
	Pulsed arc with droplet transfer
	Standard arc
I_L	Welding current of lead power source
I_T	Welding current of trail power source
	Welding direction



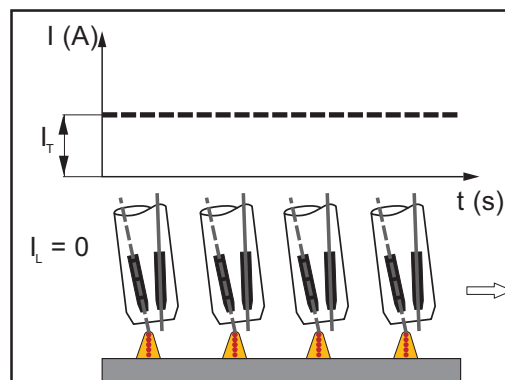
Pulse (single-wire, lead power source): Welding current/time curve and schematic representation of the material transfer



Standard (single-wire, lead power source): Welding current/time curve and schematic representation of the material transfer



Pulse (single-wire, trail power source): Welding current/time curve and schematic representation of the material transfer

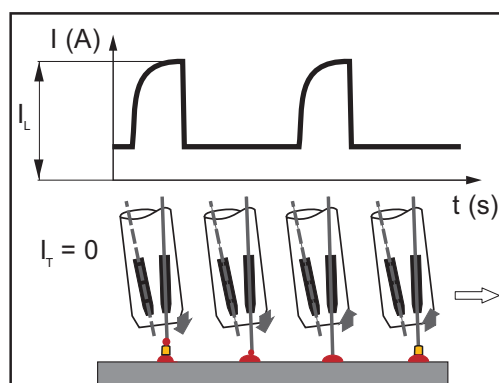


Standard (single-wire, trail power source): Welding current/time curve and schematic representation of the material transfer

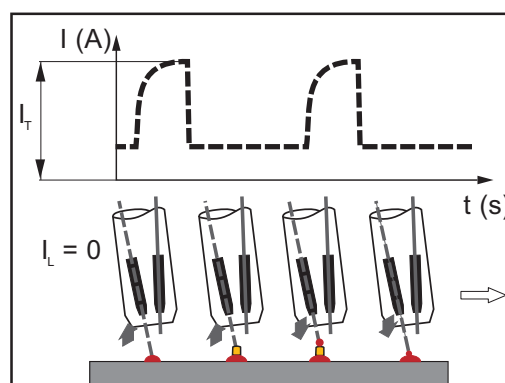
CMT

Symbol

---	Trail wire electrode
—	Lead wire electrode
	Weld pool
	Droplet melting phase
	Start of arc burn phase
	Droplet detachment
I_L	Welding current of lead power source
I_T	Welding current of trail power source
	Welding direction



CMT (single wire, lead power source): Welding current/time curve and schematic representation of the material transfer



CMT (single-wire, trail power source): Welding current/time curve and schematic representation of the material transfer

Applying the 'HD' ('Heavy Duty') configuration

Available characteristics

Characteristic number	Welding process	Material	Wire diameter	Shielding gas
1474	Pulse	G3Si1	1.2	M21 Ar+18% CO ₂
1476	CMT	G3Si1	1.2	M21 Ar+18% CO ₂
1477	CMT	G3Si1	1.2	C1 100% CO ₂ Lead
1478	CMT	G3Si1	1.2	C1 100% CO ₂ Trail

Description of characteristics

Characteristic number	Welding process	Weld seam profile	Characteristic	Combination of characteristics
1474	Pulse	Fillet weld thick-gauge sheet	High frequency pulsed arc; short arc length; optimised for fillet welds	1474 Lead with 1476 Trail
1476	CMT	Fillet weld thick-gauge sheet	CMT arc length with greater arc proportion; optimised for better weld seam formation on thick-gauge sheets	
1477	CMT	Fillet weld light-gauge sheet/thick-gauge sheet	Lead CMT characteristic; starts welding first; higher arc power; for welding with 100% CO ₂ , optimised for fillet welds	1477 Lead with 1478 Trail
1478	CMT	Fillet weld light-gauge sheet/thick-gauge sheet	Trail CMT characteristic; arc burn time modified for improved weld seam formation when welding with 100% CO ₂	

Configuring the system



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- these operating instructions
- all the operating instructions for the system components, especially the safety rules

- 1 Ensure that the wearing parts from the "HD" original equipment kit have been fitted



CAUTION! The power sources must be switched on for the following work. This poses a risk of injury and material damage due to:

- welding current
- unintentional ignition of an arc
- emerging wire electrodes

Until all work is completed, ensure that:

- welding is not initiated by any power source
- the wire electrodes are not fed out



NOTE! The work described below is performed on both power sources using the RCU 5000i.



2 Use the adjusting dial to select "MIG/MAG synergic welding" from the RCU 5000i menu

3 Press the OK button



- The last "Data" screen called up appears



- 4 In the relevant "Data" screen, press F4 "Filler metal"
 - The 1st screen in the wizard appears ("Select a filler metal")
- 5 Depending on the application, apply the settings for both power sources on both RCU 5000i devices

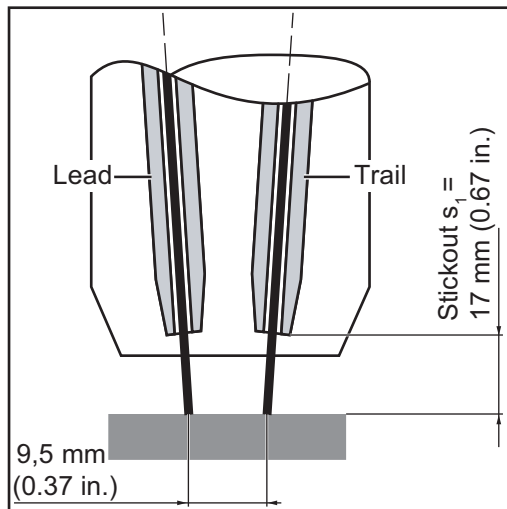


NOTE! If both wire electrodes are to weld using the CMT process, then the following must be selected for each wire electrode (each power source) on the RCU 5000i:

- which wire electrode is the lead electrode
- which wire electrode is the trail electrode

Refer to the "Welding start-up" section for further details.

Stick out



Stick out and distance of the wire electrodes

Use 'Speed' configuration

Available characteristics

Characteristic number	Welding process	Material	Wire diameter	Shielding gas
1470	Pulse	G3Si1	1.0	M21 Ar+18% CO ₂
1471	CMT	G3Si1	1.0	M21 Ar+18% CO ₂
1472	Pulse	G3Si1	1.2	M21 Ar+18% CO ₂
1473	CMT	G3Si1	1.2	M21 Ar+18% CO ₂
1479	CMT	G3Si1	1.2	M21 Ar+18% CO ₂
1500	CMT	G3Si1	1.2	C1 100% CO ₂ Lead
1501	CMT	G3Si1	1.2	C1 100% CO ₂ Trail
1510	Pulse	AlMg5	1.2	I1 100% Argon
1511	CMT	AlMg5	1.2	I1 100% Argon
1522	Pulse	AlMg5	1.6	I1 100% Argon
1523	CMT	AlMg5	1.6	I1 100% Argon

Description of characteristics

Characteristic number	Welding process	Weld seam profile	Characteristic	Combination of characteristics
1470	Pulse	Lap joint, fillet weld light-gauge sheet	High frequency pulsed arc; arc length kept short; optimised for high welding speeds	1470 Lead with 1471 Trail
1471	CMT	Lap joint, fillet weld light-gauge sheet	CMT arc length extremely short; arc burn phase adjusted to prevent notches	
1472	Pulse	Lap joint, fillet weld light-gauge sheet	High frequency pulsed arc; arc length kept short	1472 Lead with 1473 Trail or 1479 Trail
1473	CMT	Lap joint light-gauge sheet	CMT arc length extremely short; arc burn phase adjusted to prevent notches	
1479	CMT	Fillet weld light-gauge sheet	Longer CMT arc to achieve a wider seam formation for fillet welds	
1500	CMT	Lap joint light-gauge sheet	Lead CMT characteristic; starts welding first; higher arc power; for welding with 100% CO ₂	1500 Lead with 1501 Trail
1501	CMT	Lap joint light-gauge sheet	Trail CMT characteristic; extremely short CMT arc length; arc burn phase adjusted to prevent notches; welding with 100% CO ₂	

Characteristic number	Welding process	Weld seam profile	Characteristic	Combination of characteristics
1510	Pulse	Lap joint, fillet weld light-gauge sheet	High frequency pulsed arc; arc length kept short; optimised for high welding speeds and aluminium	1510 Lead with 1511 Trail
1511	CMT	Lap joint, fillet weld light-gauge sheet	CMT arc; higher current in the arc-on phase; optimised for aluminium	
1522	Pulse	Fillet weld	High frequency pulsed arc; arc length kept short; optimised for high welding speeds and aluminium, wire diameter 1.6 mm	1522 Lead with 1523 Trail
1523	CMT	Fillet weld	CMT arc; higher current in the arc-on phase; optimised for aluminium, wire diameter 1.6 mm	

Configuring the system



WARNING! If the equipment is used or tasks are carried out incorrectly, serious injury or damage may result. All the work described below must only be carried out by trained and qualified personnel. Do not carry out any of the work described below until you have fully read and understood the following documents:

- these operating instructions
- all the operating instructions for the system components, especially the safety rules

- 1 Ensure that the wearing parts from the "Speed" original equipment kit have been fitted



CAUTION! The power sources must be switched on for the following work. This poses a risk of injury and material damage due to:

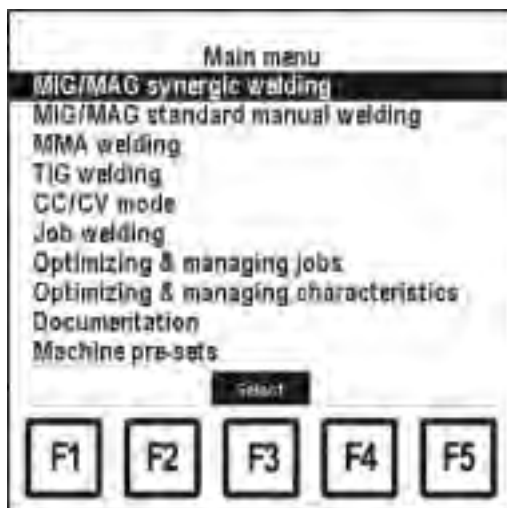
- welding current
- unintentional ignition of an arc
- emerging wire electrodes

Until all work is completed, ensure that:

- welding is not initiated by any power source
- the wire electrodes are not fed out



NOTE! The work described below is performed on both power sources using the RCU 5000i.



- 2 Use the adjusting dial to select "MIG/MAG synergic welding" from the RCU 5000i menu
- 3 Press the OK button



- The last "Data" screen called up appears



- 4 In the relevant "Data" screen, press F4 "Filler metal"
 - The 1st screen in the wizard appears ("Select a filler metal")
- 5 Depending on the application, apply the settings for both power sources on both RCU 5000i devices

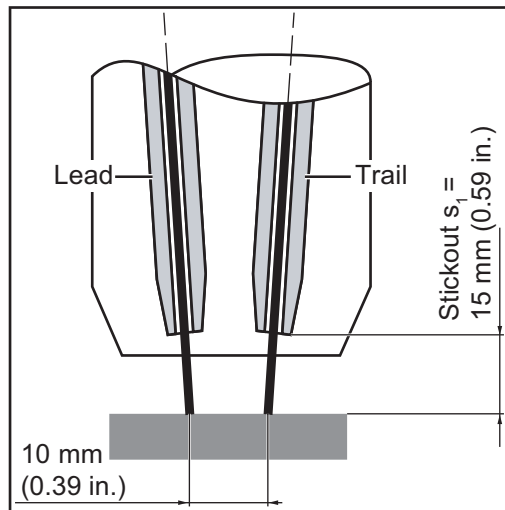


NOTE! If both wire electrodes are to weld using the CMT process, then the following must be selected for each wire electrode (each power source) on the RCU 5000i:

- which wire electrode is the lead electrode
- which wire electrode is the trail electrode

Refer to the "Welding start-up" section for further details.

Stick out



Stick out and distance of the wire electrodes

Use 'Root' configuration

Available characteristics

Characteristic number	Welding process	Material	Wire diameter	Shielding gas
1524	Pulse	G3Si1	1.2	M21 Ar+18% CO ₂
1525	CMT	G3Si1	1.2	M21 Ar+18% CO ₂ Lead
1526	CMT	G3Si1	1.2	M21 Ar+18% CO ₂ Trail

Description of characteristics

Characteristic number	Welding process	Weld seam profile	Characteristic	Combination of characteristics
1524	Pulse	Root pass	Pulsed arc; optimised for root pass	1524 Lead with 1525 Trail or 1526 Trail
1525	CMT	Root pass	Lead CMT characteristic; CMT arc with greater arc proportion	1525 Lead with 1526 Trail
1526	CMT	Root pass	Trail CMT characteristic; CMT arc with less arc pressure on the weld pool	

Configuring the system



WARNING! If the equipment is used or tasks are carried out incorrectly, serious injury or damage may result. All the work described below must only be carried out by trained and qualified personnel. Do not carry out any of the work described below until you have fully read and understood the following documents:

- these operating instructions
- all the operating instructions for the system components, especially the safety rules

1 Ensure that the wearing parts from the "HD" original equipment kit have been fitted



CAUTION! The power sources must be switched on for the following work. This poses a risk of injury and material damage due to:

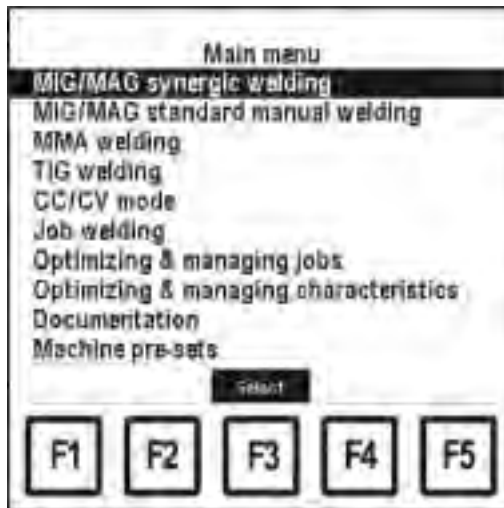
- welding current
- unintentional ignition of an arc
- emerging wire electrodes

Until all work is completed, ensure that:

- welding is not initiated by any power source
- the wire electrodes are not fed out



NOTE! The work described below is performed on both power sources using the RCU 5000i.



2 Use the adjusting dial to select "MIG/MAG synergic welding" from the RCU 5000i menu

3 Press the OK button



- The last "Data" screen called up appears



4 In the relevant "Data" screen, press F4 "Filler metal"

- The 1st screen in the wizard appears ("Select a filler metal")

5 Depending on the application, apply the settings for both power sources on both RCU 5000i devices



NOTE! If both wire electrodes are to weld using the CMT process, then the following must be selected for each wire electrode (each power source) on the RCU 5000i:

- which wire electrode is the lead electrode
- which wire electrode is the trail electrode

Refer to the "Welding start-up" section for further details.

Standard welding parameter values for fillet welds

Standard welding parameter values for fillet welds



NOTE! The following specifications are standard values determined under laboratory conditions.

Filler metal and welding position:

Shielding gas: M21 Ar+18% CO₂, 2 x 12 l/min

Wire electrode: G3Si1, 1.2 mm

Welding position: PB

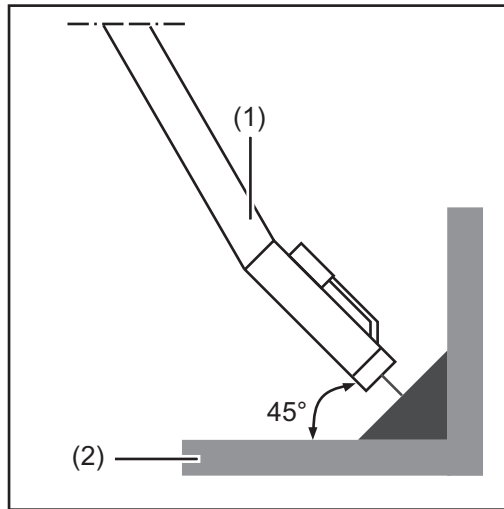
Sheet thickness (mm)	a dimension (mm)	Wire electrode / welding process	Wire feed speed (m/min)	Current (A)	Voltage (V)	Characteristics used	Welding speed (m/min)	Energy input (kJ/cm)	Deposition rate (kg/h)	Micrograph
3	2.8	Lead / Pulse	16	420	28.0	1472*	3	2.7	13.3	
		Trail / CMT	10	275	19.0	1479*				
4	3	Lead / Pulse	16	420	28.0	1472*	2.5	3.2	13.3	
		Trail / CMT	10	275	19.0	1479*				
6	3.5	Lead / Pulse	15.5	410	28.0	1474**	1.8	4.3	13	
		Trail / CMT	10	280	19.0	1476**				
8	4	Lead / Pulse	15.5	415	27.5	1474**	1.5	5	12.5	
		Trail / CMT	9	225	19.0	1476**				
10	5	Lead / Pulse	15	380	27.0	1474**	1	6.9	12.3	
		Trail / CMT	9	220	18.5	1476**				
12	6	Lead / Pulse	15	390	28.0	1472***	0.6	6.9	11.7	
		Trail / CMT	8	215	17.0	1479***				

* 'Speed' configuration used

** 'HD' configuration used

*** 'HD' configuration wearing parts, characteristics from 'Speed' configuration used - the characteristics from the Speed configuration were used to prevent an undesired "run-off" of the weld pool

Alignment of welding torch relative to the workpiece



Side view of welding torch/workpiece

- Welding torch (1) at a 45° angle to the workpiece (2)
- Welding torch (1) at a 5° angle to the welding direction
- both wire electrodes parallel to the welding direction

Standard welding parameter values for lap joints

Standard welding parameter values for lap joints



NOTE! The following specifications are standard values determined under laboratory conditions.

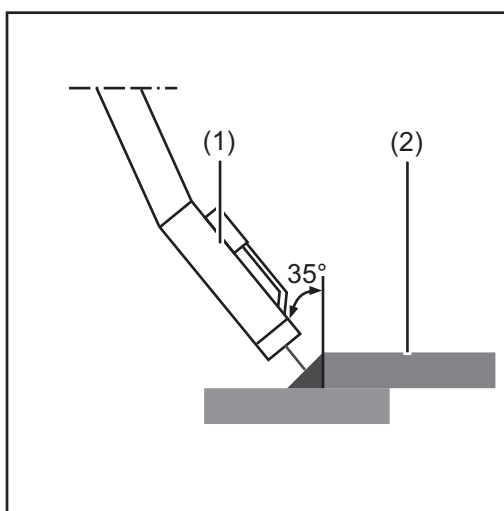
Filler metal and welding position:

Shielding gas: M21 Ar+18% CO₂, 2 x 12 l/min
 Wire electrode: G3Si1, 1.2 mm
 Welding position: PB

Sheet thickness (mm)	Wire electrode	Wire feed speed (m/min)	Current (A)	Voltage (V)	Characteristics used	Welding speed (m/min)	Energy input (kJ/cm)	Deposition rate (kg/h)	Micrograph
2	Lead	15	370	28.0	1472*	3.6	3.7	11.2	
	Trail	6	210	14.0	1473*				
3	Lead	15.5	390	28.5	1472*	3	4	11.7	
	Trail	6.5	225	15.0	1473*				

* 'Speed' configuration used

Alignment of welding torch relative to the workpiece

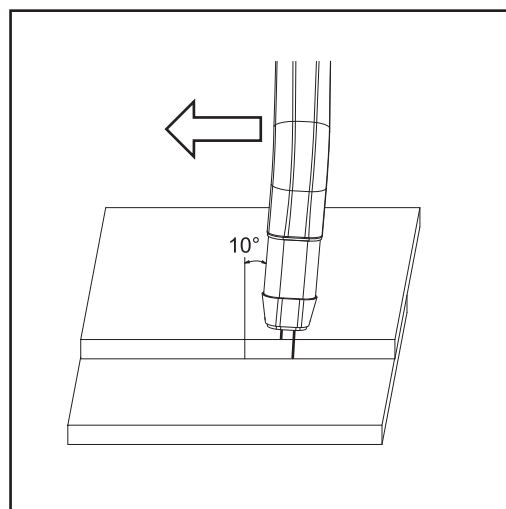
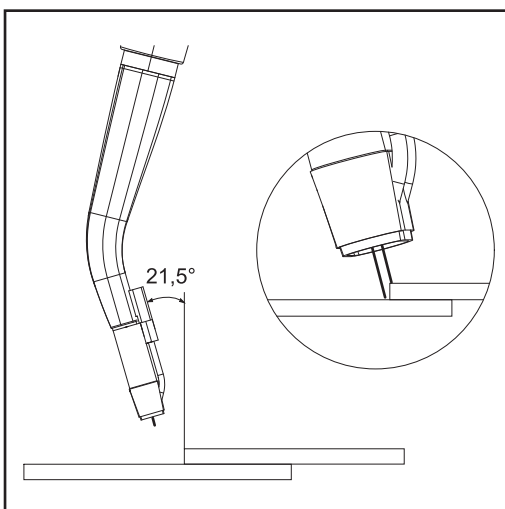


Side view of welding torch/workpiece

- Welding torch (1) at a 35° angle to the workpiece (2)
- Welding torch (1) at a 5° angle to the welding direction
- both wire electrodes parallel to the welding direction



NOTE! If notches appear in the weld seam on the top sheet, adopting the welding torch alignment shown below can prevent these notches from occurring.



Prerequisites for welding

Safety



WARNING! Work that is carried out incorrectly can cause serious injury or damage. The activities described below must only be carried out by trained and qualified personnel. Do not carry out the activities described below until you have fully read and understood the following documents:

- these operating instructions
- all the operating instructions for the system components, especially the safety rules

Prerequisites for welding

Prerequisites for CMT Twin welding:

- wearing parts fitted to the torch neck
- all system components fitted and installed properly
- compatibility of power sources and remote control systems confirmed
- characteristics version checked
- L/R alignment - welding circuit inductivity and welding circuit resistance aligned
- welding system connected to robot control
- welding system configured in line with the application

Maahantuonti ja myynti:

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