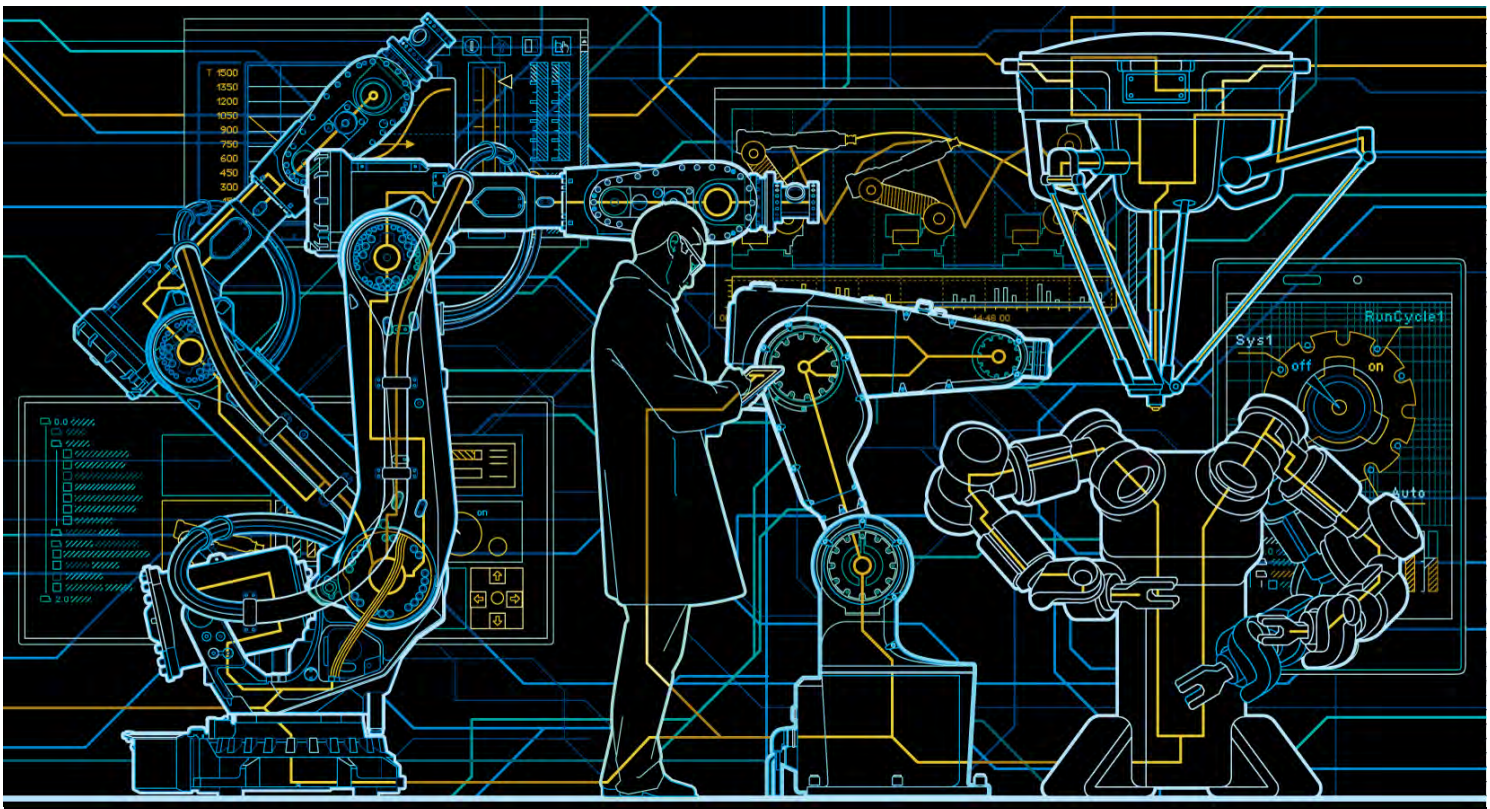

Application manual
Programming Fronius power source

Power and productivity
for a better world™

Trace back information:
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Application manual

Programming Fronius power source

RobotWare 6.03

Document ID: 3HAC050971-001

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ABB AB
Robotics Products
Se-721 68 Västerås
Sweden

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Overview of this manual

About this manual

This manual contains information on how to:

- Administrate power source jobs.
- Monitor power source runtime information.
- Backup and restore of jobs defined in the power source.

This manual also describes the ABB Robotics IRC5 interface for:

- Fronius TS/TPS 4000/5000 Power Source models with DeviceNet interface. The functionality is part of the option 650-9.
- Fronius Power Sources with EtherNet/IP interface. The power source must meet the following requirements:
  - EtherNet/IP communication interface with software version 1.07.25 or later
  - PowerMAG OS version 4.30.18 or later

Usage

This manual describes:

- How to program power source jobs
- How to maintain the power source jobs
- How to install and set up the Fronius power source

Who should read this manual?

This manual is intended for:

- Installation personnel
- Arc welding operators
- Maintenance personnel

Prerequisites

The reader must be familiar with:

- Configuring ABB robot systems.
- Using ABB robots.

References

Reference	Document ID
Application manual - Arc and Arc Sensor	*3HAC050988-001*
Introduction and Safety - Arc Welding Products	*3HEA801212-001*
Technical reference manual - System parameters	*3HAC050948-001*
Technical reference manual - RAPID Instructions, Functions and Data types	*3HAC050917-001*
Application manual - EtherNet/IP Scanner/Adapter	*3HAC050998-001*

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Revisions

Revision	Description
-	Released with RobotWare 6.0.
A	Released with RobotWare 6.01. • Title is changed from *Programming Fronius TPS Integrated Power Source* to *Programming Fronius power source*. • Added chapters *Installation*, *System parameters*, *Fronius interface modes*, and *Fronius error codes* that were previously published as *Application manual - Fronius 4000/5000 IRC5 Interface*, *3HEA802920-001*. • Added *TCP Speed Control*.
B	Released with RobotWare 6.02. • Added text, in section *Fronius Weld Schedules on page 25*, about available jobs if Fronius RCU is connected.
C	Released with RobotWare 6.03. • Added note to group output ProgramPort GO, not to use program number 0 or 1.

Product documentation, IRC5

Categories for user documentation from ABB Robotics

The user documentation from ABB Robotics is divided into a number of categories. This listing is based on the type of information in the documents, regardless of whether the products are standard or optional.

All documents listed can be ordered from ABB on a DVD. The documents listed are valid for IRC5 robot systems.

Product manuals

Manipulators, controllers, DressPack/SpotPack, and most other hardware is delivered with a **Product manual** that generally contains:

- Safety information.
- Installation and commissioning (descriptions of mechanical installation or electrical connections).
- Maintenance (descriptions of all required preventive maintenance procedures including intervals and expected life time of parts).
- Repair (descriptions of all recommended repair procedures including spare parts).
- Calibration.
- Decommissioning.
- Reference information (safety standards, unit conversions, screw joints, lists of tools).
- Spare parts list with exploded views (or references to separate spare parts lists).
- Circuit diagrams (or references to circuit diagrams).

Technical reference manuals

The technical reference manuals describe reference information for robotics products.

- *Technical reference manual - Lubrication in gearboxes*: Description of types and volumes of lubrication for the manipulator gearboxes.
- *Technical reference manual - RAPID overview*: An overview of the RAPID programming language.
- *Technical reference manual - RAPID Instructions, Functions and Data types*: Description and syntax for all RAPID instructions, functions, and data types.
- *Technical reference manual - RAPID kernel*: A formal description of the RAPID programming language.
- *Technical reference manual - System parameters*: Description of system parameters and configuration workflows.

Continues on next page

Application manuals

Specific applications (for example software or hardware options) are described in **Application manuals**. An application manual can describe one or several applications.

An application manual generally contains information about:

- The purpose of the application (what it does and when it is useful).
- What is included (for example cables, I/O boards, RAPID instructions, system parameters, DVD with PC software).
- How to install included or required hardware.
- How to use the application.
- Examples of how to use the application.

Operating manuals

The operating manuals describe hands-on handling of the products. The manuals are aimed at those having first-hand operational contact with the product, that is production cell operators, programmers, and trouble shooters.

The group of manuals includes (among others):

- *Operating manual - Emergency safety information*
- *Operating manual - General safety information*
- *Operating manual - Getting started, IRC5 and RobotStudio*
- *Operating manual - Introduction to RAPID*
- *Operating manual - IRC5 with FlexPendant*
- *Operating manual - RobotStudio*
- *Operating manual - Trouble shooting IRC5*, for the controller and manipulator.

Safety

Safety of personnel

When working inside the robot controller it is necessary to be aware of voltage-related risks.

A danger of high voltage is associated with the following parts:

- Devices inside the controller, for example I/O devices, can be supplied with power from an external source.
- The mains supply/mains switch.
- The power unit.
- The power supply unit for the computer system (230 VAC).
- The rectifier unit (400-480 VAC and 700 VDC). Capacitors!
- The drive unit (700 VDC).
- The service outlets (115/230 VAC).
- The power supply unit for tools, or special power supply units for the machining process.
- The external voltage connected to the controller remains live even when the robot is disconnected from the mains.
- Additional connections.

Therefore, it is important that all safety regulations are followed when doing mechanical and electrical installation work.

Safety regulations

Before beginning mechanical and/or electrical installations, ensure you are familiar with the safety regulations described in *Operating manual - General safety information*[1].

[1] This manual contains all safety instructions from the product manuals for the manipulators and the controllers.

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1 Introduction to Fronius IRC5 interface

About Fronius TPS 4000/5000 IRC5 interface

This guide describes the ABB Robotics IRC5 interface for:

- Fronius TS/TPS 4000/5000 power source models with DeviceNet interface
- Fronius Power Sources with EtherNet/IP interface

The functionality described in this interface is part of the sub-option 650-9 Fronius.

The power source has to meet the following requirements:

- EtherNet/IP communication interface with software version 1.07.25 or later
- PowerMAG OS version 4.30.18 or later

Overview of Fronius

The TPS and TS welding machines are totally digitized, microprocessor-controlled inverter power sources. An interactive power source manager is coupled with a digital signal processor, and together they control and regulate the entire welding process. The actual data is measured continuously, and the machine responds quickly to changes. The control algorithms developed by Fronius ensure that the specified welding target is maintained. This helps make the welding process stable and repeatable.

Fronius robotics welding products:

- Welding Power Source (TPS/TS 4000 and 5000)
- Wire feed Systems (VR1500)
- Data Documentation (Jobexplorer and Weld Office)
- Push Pull Welding Torches (Robacta Drive)
- Remote Control Units (RCU 4000 and 5000)
- Interface (Bus Systems and standard discrete)

For more technical data, see the documentation from Fronius.

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2 Installation

2.1 Hardware

DeviceNet setup

The default addressing for the option *650-9 Fronius* interface is 20. If there is more than one Fronius power supply then the DeviceNet address will increment by 5 for each unit.

Name	Type of Unit	Connected to Bus	Unit Identification Label	Unit Trustlevel	Unit Startup State	Store Unit State at Power Fail	DeviceNet Address
ioFronius2	Virtual	Virtual1		1 - Error when lost	Enabled	No	N/A
ioTc1	Virtual	Virtual1		1 - Error when lost	Enabled	No	N/A
Board_B	d328	DeviceNet1		1 - Error when lost	Enabled	No	11
Board_A	d327A	DeviceNet1		1 - Error when lost	Enabled	No	10
B_POS_21	IO712	DeviceNet1		1 - Error when lost	Enabled	No	21
B_POS_SIM	Virtual	Virtual1		1 - Error when lost	Enabled	No	N/A
ioFroniusSim1	Virtual	Virtual1	RWArc Simulated welder	1 - Error when lost	Enabled	No	N/A
ioFronius1	BK5200	DeviceNet1		1 - Error when lost	Enabled	No	20
GAP	Virtual	Virtual1	GAP DefaultEIO	1 - Error when lost	Enabled	No	N/A
DRV_4	LOCAL_GENERIC	Local	D611 Cont. board	2 - Loss accepted	Disabled	No	N/A
DRV_3	LOCAL_GENERIC	Local	D611 Cont. board	2 - Loss accepted	Disabled	No	N/A
DRV_2	LOCAL_GENERIC	Local	D611 Cont. board	2 - Loss accepted	Disabled	No	N/A
DRV_1	LOCAL_GENERIC	Local	D611 Cont. board	2 - Loss accepted	Disabled	No	N/A
PANEL	LOCAL_GENERIC	Local	D630 Panel board	2 - Loss accepted	Enabled	No	N/A

xx1500000435

Beckhoff configuration

Make sure that the DeviceNet cables are terminated correctly with resistors.

xx1500000436

xx1500000437

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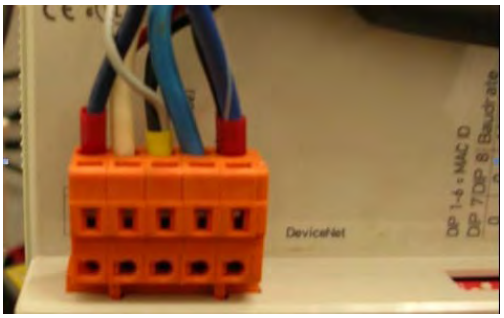
Set the Baud Rate to 500 kbps.



xx1500000438

Wago Connector description from left to right. Pin 1. 24 Volts

Pin 2. Can High

Pin 3. Ground Shield Pin 4. Can Low

Pin 5. O Volts

EtherNet/IP setup

This is a short overview on setting up EtherNet/IP. For more information, see *Application manual - EtherNet/IP Scanner/Adapter*.

Industrial standard equipment must be used for all third part equipment (switch, cables, etc.). Separate the signal cables from the power cables to minimize disturbances.

To connect the power source with the controller, there are two possibilities: over the LAN port or over an EtherNet board.

Using the LAN port

The Fronius welder with EtherNet/IP is pre-configured with IP adresses "xxx" and should be physically connected to the LAN2 port.

If multiple welders are used in a MultiMove setup, then an industrial switch should be connected to LAN2 and the welders should then be connected to that switch.

If LAN3 is preferred instead of LAN2, then LAN3 must be configured to be on the subnet 192.168.125.x. This is done in the configuration editor. Define *X5* as *LAN*, in the topic *Communication*, type *Static VLAN*.

For more information about network configuration, see *Technical reference manual - System parameters* and *Application manual - EtherNet/IP Scanner/Adapter*.

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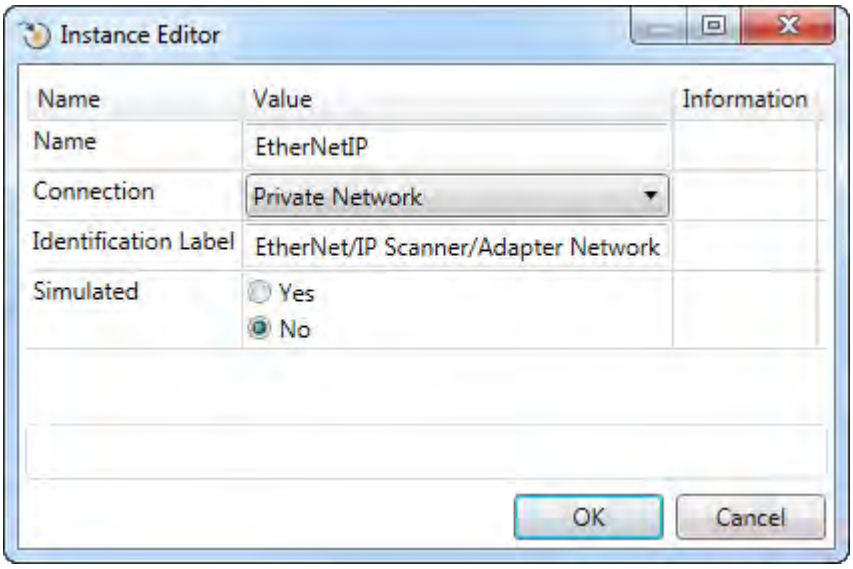
Industrial network

In this example the power source is connected to port 1 on the EtherNet board.



xx1500000642

Device configuration

The following table shows the default IP addresses for the configuration of the unit.

Robot task	IP address
T_ROB1	192.168.125.161
T_ROB2	192.168.125.162
T_ROB3	192.168.125.163
T_ROB4	192.168.125.164

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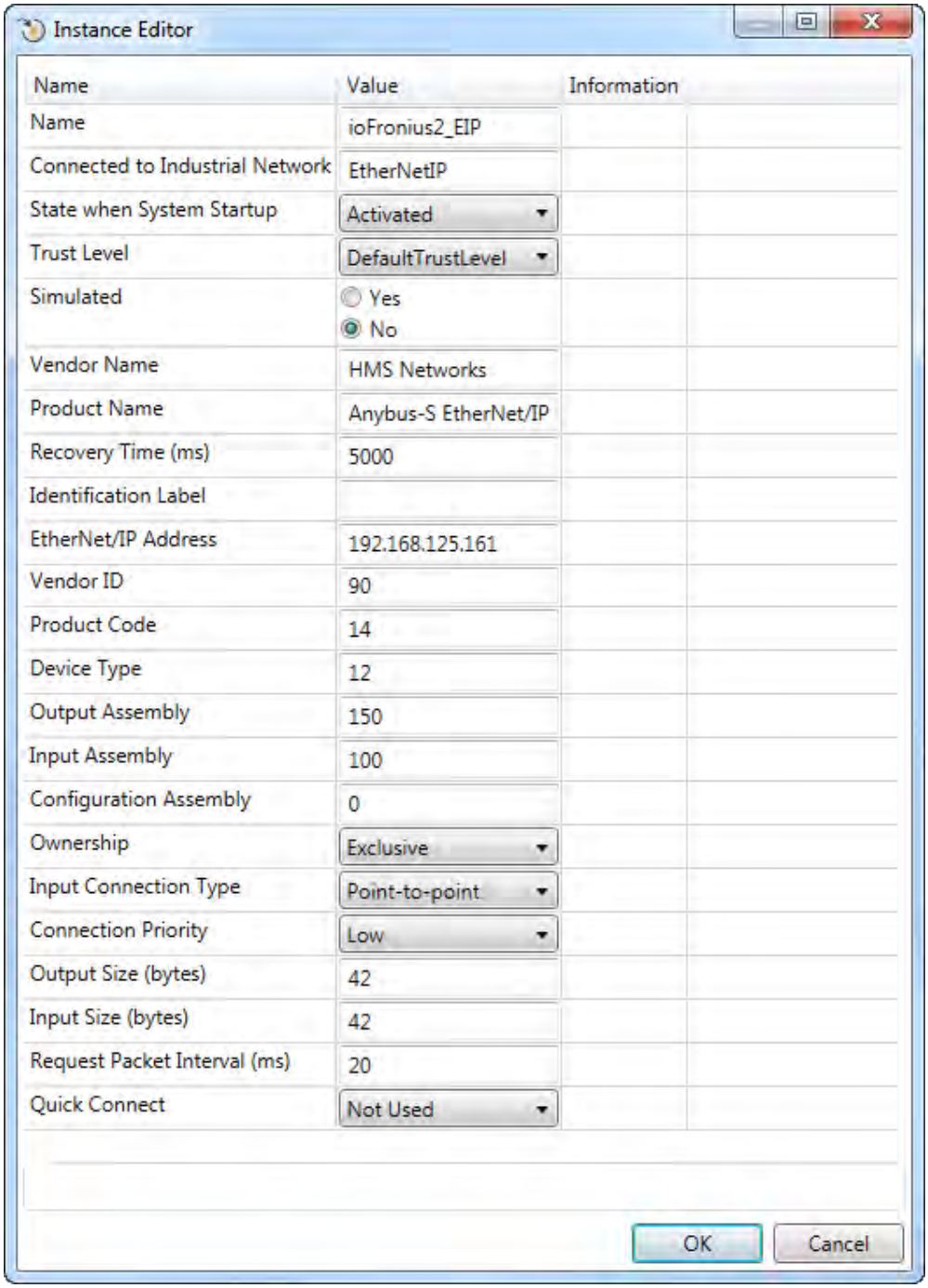

xx1500000643

Note

Make sure that the IP address is defined for the power source.

2.2 Software

Prerequisites

- IRC5 controller
- RobotWare 6.01 or higher
- Option [633-4] Arc or [633-4] Arc MultiProcess
- Power source type option [650-9] Fronius
- - Sub-option DeviceNet or
  - Sub-option EtherNet/IP

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3 System parameters

3.1 DeviceNet

Overview

The *Fronius Equipment Class* and settings are activated if the following power source type is selected for the robot system.

- Power Source option 650-9 Fronius

This option has advanced support for the Fronius TPS 4000/5000 power source that includes:

- Support for three welding modes:
  - Job Mode
  - Job Mode with Correction
  - Program Mode
  - TCP Speed Control
- Error code presentation on FlexPendant for errors originating from a group output signal from the power source.

Fronius Equipment Properties

The *Fronius Equipment Properties* can be defined in RobotWare Arc.

Parameter	Data type	Description
Name	string	The name of the *Fronius Equipment Properties*.
Use Equipment Standard IO	string	The name of the *Equipment Standard IO* to use.
Use Fronius Equipment IO	string	The name of the *Fronius Equipment IO* to use.
Mode	string	The mode of the welder. The following modes are selectable: • Program Mode • Job Mode • Job Mode with Correction • TCP Speed Control Default value: Job Mode with Correction.
Heat on	bool	When the arc is ignited, the seam will generally not have reached the correct temperature. Preheating can thus be used at the start of the weld to define higher weld data values. The values to be used are. If the preheating parameter is changed, the contents of `seamdata` will also change. Default value: `FALSE`.
Heat as time	bool	Specifies if the heat phase should use the `seamdata` parameters `heat_time` or `heat_distance`. `TRUE` means that `heat_time` is used and visible in the `seamdata`. `FALSE` means that `heat_distance` and `heat_speed` is used and visible in the `seamdata`. Default value: `FALSE`.
Cool time on	bool	Enables masking of `cool_time` component in `seamdata`. Default value: `TRUE`.

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Parameter	Data type	Description
Fill on	bool	Specifies whether a crater fill is to be used in the final phase. This means that the end crater that can form in the completed weld will be filled in with extra filler material. If the Crater fill parameter is changed, the contents of `seamdata` will also change. Default value: FALSE.
Arc Preset	num	Delays the power control signal with this time (seconds). This gives the analog reference signals and group output signals enough time to stabilize before the weld is started. Default value: 0.
Ignition timeout	num	The maximum time (in seconds) permitted for igniting the welding arc. Default value: 1.
Weld off timeout	num	The maximum time (in seconds) permitted for shutting off the welding arc. Default value: 10.
Auto inhibition on	bool	If this flag is set, weld inhibition will be allowed in AUTO mode, otherwise not allowed. Default value: FALSE.
Time to feed 15mm wire	num	The time in seconds to feed 15 mm of wire. Default value: 1.
Enable supervision on VC	bool	Enables signal supervision in the virtual controller. Default value: FALSE.

Arc Equipment Standard IO

The *Arc Equipment Standard IO* signals can be defined in RobotWare Arc.

Parameter	Data type	Description
Name	string	The name of the *Arc Standard IO*.
StopProc	signaldi	Digital input signal for stopping program execution. This signal affects arc welding instructions only. A high signal means that program execution will stop as soon as an arc welding instruction is executed.
ProcessStopped	signaldo	Digital output signal used to indicate that the weld has been interrupted. A high signal means that the weld has been interrupted either because of a welding defect or because of a normal program stop.
ManFeedInput	signaldi	Digital input signal for manual wire feed. A high signal means that the welding equipment has manual wire feed enabled.
WeldInhib	signaldi	Digital input signal for program execution without welding. A high signal means that welding is inhibited.
WeaveInhib	signaldi	Digital input signal for program execution without weaving. A high signal means that weaving is inhibited.
TrackInhib	signaldi	Digital input signal to inhibit tracking. (Not seen on FlexPendant). A high signal means that the tracking is inhibited.
GunOk	signaldi	Digital input signal for supervision of the torch. A high signal means that the torch is OK.
SupervGun	signaldo	Digital output signal for indication of torch errors. A high signal means that an error has occurred.

Continues on next page

Parameter	Data type	Description
AWError	signaldo	Digital output signal for indication of welding defects. A high signal means that an error has occurred. If a normal program stop occurs in the middle of a weld, no high signal will be generated.

Fronius Equipment IO

The *Fronius Equipment IO* can be defined in RobotWare Arc.

Parameter	Data type	Description
Name	string	The name of the *Arc Equipment Analogue Inputs*.
ArcEst DI (required)	signaldi	Digital input signal for supervision of the welding arc. A high signal means that the welding arc is ignited.
MainCurrentOK DI	signaldi	Digital input for supervision of the Main Current. A high signal means that the Main current is OK
WaterOk DI	signaldi	Digital input signal for supervision of the water. A high signal means that the water is OK.
GasOk DI	signaldi	Digital input signal for supervision of the protective gas. A high signal means that the protective gas is OK.
Internal Wirestick-Err (required)	signaldi	Digital input signal for supervision of the wire stick status. A high signal means that an error has occurred.
Internal Wirestick-ON (required)	signaldo	Digital output signal to indicate wire stick errors.
WelderReady DI (required)	signaldi	Digital input signal for WelderReady.
WelderCommOk DI (required)	signaldi	Digital input signal for Welder Communication Ok.
Internal Welder-Ready DI	signaldi	Internal digital input signal that indicates if the welder is ready
PowerOutO-fRange DI	signaldi	Digital input for supervision of Power Out of Range. A high signal means that the power is out of range.
GasOn DO (required)	signaldo	Digital output signal for control of the gas flow. A high signal means that the gas flow is active.
WeldOn DO (required)	signaldo	Digital output signal for control of the weld voltage. A high signal means that the weld voltage control is active.
FeedOn DO (required)	signaldo	Digital output signal for activation of the wire feed. A high signal means wire feed forward.
FeedOnBwd DO (required)	signaldo	Digital output signal for backward activation of the wire feed. A high signal means wire feed backward.
RobotReady DO (required)	signaldo	Digital output signal indicating that the robot is ready.
WelderErrReset DO (required)	signaldo	Digital output signal to reset the welder.
Internal Welder-Ready DO	signaldo	Internal digital output signal that indicates if the welder is ready.
Touch Sense DO (required)	signaldo	Digital output for Touch Sense.

Continues on next page

Parameter	Data type	Description
Update Weld Schedules DO (required)	signaldo	Digital output used for retrieving weld schedules from the welder and save them to file.
Supervision Welder DO	signaldo	Digital output signal that indicates welder supervision.
SupervArc DO	signaldo	Digital output signal for indication of welding arc errors. A high signal means that an error has occurred.
SupervWater DO	signaldo	Digital output signal for indication of cooling water errors. A high signal means that an error has occurred.
SupervGas DO	signaldo	Digital output signal for indication of protective gas errors. A high signal means that an error has occurred.
SupervWireStick DO	signaldo	Digital output signal for indication of wire feed errors. A high signal means that an error has occurred.
TcpSpeedCtrl DO	signaldo	Digital output for activating the TCP Speed mode.
VoltReference AO (required)	signalao	Analog output signal for analog voltage reference. If weld voltage is defined, the component `voltage` is available. Also referred to as *ArcLength*.
FeedReference AO (required)	signalao	Analog output signal for analog wire feed reference. If wire feed is defined, the component `wirefeed` in `welddata` is available. Also referred to as *Power*.
ControlPort AO (required)	signalao	Analog output to control the welder. Also referred to as *Dynamic*.
BurnBackCorrection AO (required)	signalao	Analog output for burn back correction. Also referred to as *BurnBackCorrection*.
Internal TcpSpeed AO	signalao	Internal analog output signal representing the actual robot TCP speed.
TcpSpeed AO	signalao	Analog output signal sent to the Fronius power source.
VoltageMeas AI	signalai	Analog input signal for voltage measurement.
CurrentMeas AI (required)	signalai	Analog input signal for current measurement.
SynWireFeed AI (required)	signalai	Analog input signal for synergic wire feed.
MotorCurrentMeas AI	signalai	Analog input signal for motor current measurements.
JobPort GO (required)	signalgo	Group output signal for sending the job number to the welder.
ProgramPort GO (required)	signalgo	Group output signal for sending the program number to the welder. **Note:** Program number 0 and 1 are occupied and cannot be used.
ModePort GO (required)	signalgo	Group output signal for sending the mode number to the welder.
WelderErrorCodes GI (required)	signalgi	Group input signal for the error codes from the welder.

Parameters marked with *(required)* means that the signal must be defined to be able to weld.

Continues on next page

Fronius Weld Schedules

Parameter	Data type	Description
Name	string	The name of the *Fronius Weld Schedule*, in the format: Robottaskname_arcsystem_mode_job, for example T_ROB1_1_2_1
Description	string	Description of job number, for example *Job 1*
WirefeedLow	float	The low limit of wire feed from the welder.
WirefeedHigh	float	The high limit of wire feed from the welder.
CurrentLow	float	The low limit of current from the welder.
CurrentHigh	float	The high limit of current from the welder.

CAUTION

These data are mirroring data from the power source to improve the performance of the interface. Do not edit them!

If the Fronius RCU is connected to the Fronius TPS PowerSource, the available 99 jobs in the PowerSource is replaced with 999 jobs in the RCU. The EIO mapping of the JobNumber port needs to be changed according to this, to be able to activate the correct job number in the PowerSource. Note that this change is only valid when running the Fronius TPS in JobMode.

3.2 EtherNet/IP

Fronius Arc Equipment Properties

Parameter	Data type	Description
Name	string	The name of the *Fronius Equipment Properties*.
Use Equipment Standard IO	string	The name of the *Equipment Standard IO* to use.
Use Fronius Equipment IO	string	The name of the *Fronius Equipment IO* to use.
Mode	string	The mode of the welder. The following modes are selectable: The following modes are selectable: • Program Mode • Job Mode • Job Mode with Correction • TCP Speed Control Default value: Job Mode with Correction.
Ignition on	bool	Specifies if ignition data specified in `seamdata` is to be used at the start of the weld phase. At the start it is often beneficial to define higher weld data values for a better ignition. If the ignition data parameter is changed, the contents of `seamdata` will also change. Default value: `FALSE`.
Heat on	bool	When the arc is ignited, the seam will generally not have reached the correct temperature. Preheating can thus be used at the start of the weld to define higher weld data values. The values to be used are ???. If the preheating parameter is changed, the contents of `seamdata` will also change. Default value: `FALSE`.
Heat as time	bool	Specifies if the heat phase should use the `seamdata` parameters `heat_time` or `heat_distance`. `TRUE` means that `heat_time` is used and visible in the `seamdata`. `FALSE` means that `heat_distance` and `heat_speed` is used and visible in the `seamdata`. Default value: `FALSE`.
Cool time on	bool	Enables masking of `cool_time` component in `seamdata`. Default value: `TRUE`.
Fill on	bool	Specifies whether a crater fill is to be used in the final phase. This means that the end crater that can form in the completed weld will be filled in with extra filler material. If the Crater fill parameter is changed, the contents of `seamdata` will also change. Default value: `FALSE`.
Arc Preset	num	Delays the power control signal with this time (seconds). This gives the analog reference signals and group output signals enough time to stabilize before the weld is started. Default value: 0.
Ignition timeout	num	The maximum time (in seconds) permitted for igniting the welding arc. Default value: 1.
Weld off timeout	num	The maximum time (in seconds) permitted for shutting off the welding arc. Default value: 10.
Override On	bool	Not used.

Continues on next page

Parameter	Data type	Description
Auto inhibition on	bool	If this flag is set, weld inhibition will be allowed in AUTO mode, otherwise not allowed. Default value: FALSE.
Time to feed 15mm wire	num	The time in seconds to feed 15 mm of wire. Default value: 1.
Enable supervision on VC	bool	Enables signal supervision in the virtual controller. Default value: FALSE.

Arc Equipment Standard IO

Parameter	Data type	Description
Name	string	The name of the *Arc Standard IO*.
StopProc	signaldi	Digital input signal for stopping program execution. This signal affects arc welding instructions only. A high signal means that program execution will stop as soon as an arc welding instruction is executed.
ProcessStopped	signaldo	Digital output signal used to indicate that the weld has been interrupted. A high signal means that the weld has been interrupted either because of a welding defect or because of a normal program stop.
ManFeedInput	signaldi	Digital input signal for manual wire feed. A high signal means that the welding equipment has manual wire feed enabled.
WeldInhib	signaldi	Digital input signal for program execution without welding. A high signal means that welding is inhibited.
WeaveInhib	signaldi	Digital input signal for program execution without weaving. A high signal means that weaving is inhibited.
TrackInhib	signaldi	Digital input signal to inhibit tracking. (Not seen on FlexPendant.) A high signal means that the tracking is inhibited.
GunOk	signaldi	Digital input signal for supervision of the torch. A high signal means that the torch is OK.
SupervGun	signaldo	Digital output signal for indication of torch errors. A high signal means that an error has occurred.
AWError	signaldo	Digital output signal for indication of welding defects. A high signal means that an error has occurred. If a normal program stop occurs in the middle of a weld, no high signal will be generated.

Fronius Equipment IO

Parameter	Data type	Description
Name	string	The name of the *Arc Equipment Analog Inputs*.
ArcEst DI (required)	signaldi	Digital input signal for supervision of the welding arc. A high signal means that the welding arc is ignited.
ArcEstLabel	string	Arc Supervision level. Allowed values MINOR, MAJOR, or INFO.
MainCurrentOK DI	signaldi	Digital input for supervision of the Main Current. A high signal means that the Main current is OK

Continues on next page

Parameter	Data type	Description
WaterOk DI	signaldi	Digital input signal for supervision of the water. A high signal means that the water is OK.
GasOk DI	signaldi	Digital input signal for supervision of the protective gas. A high signal means that the protective gas is OK.
Internal Wirestick-Err (required)	signaldi	Digital input signal for supervision of the wire stick status. A high signal means that an error has occurred.
Internal Wirestick-ON (required)	signaldo	Digital output signal to indicate Wirestick errors.
WelderReady DI (required)	signaldi	Digital input signal for WelderReady.
WelderCommOk DI (required)	signaldi	Digital input signal for Welder Communication Ok.
Internal Welder-Ready DI	signaldi	Internal digital input signal that indicates if the welder is ready.
PowerOutO-fRange DI	signaldi	Digital input for supervision of Power Out of Range. A high signal means that the power is out of range.
GasOn DO (required)	signaldo	Digital output signal for control of the gas flow. A high signal means that the gas flow is active.
WeldOn DO (required)	signaldo	Digital output signal for control of the weld voltage. A high signal means that the weld voltage control is active.
FeedOn DO (required)	signaldo	Digital output signal for activation of the wire feed. A high signal means wire feed forward.
FeedOnBwd DO (required)	signaldo	Digital output signal for backward activation of the wire feed. A high signal means wire feed backward.
RobotReady DO (required)	signaldo	Digital output signal indicating that the robot is ready.
WelderErrReset DO (required)	signaldo	Digital output signal to reset the welder.
Internal Welder-Ready DO	signaldo	Internal digital output signal that indicates if the welder is ready.
Touch Sense DO (required)	signaldo	Digital output for Touch Sense.
Update Weld Schedules DO (required)	signaldo	Digital output used for retrieving weld schedules from the welder and save them to file.
Supervision Welder DO	signaldo	Digital output signal that indicates welder supervision.
SupervArc DO	signaldo	Digital output signal for indication of welding arc errors. A high signal means that an error has occurred.
SupervWater DO	signaldo	Digital output signal for indication of cooling water errors. A high signal means that an error has occurred.
SupervGas DO	signaldo	Digital output signal for indication of protective gas errors. A high signal means that an error has occurred.
SupervWireStick DO	signaldo	Digital output signal for indication of wire feed errors. A high signal means that an error has occurred.
TcpSpeedCtrl DO	signaldo	Digital output for activating the TCP Speed mode.

Continues on next page

Parameter	Data type	Description
VoltReference AO (required)	signalao	Analog output signal for analog voltage reference. If weld voltage is defined, the component voltage is available. Also referred to as *ArcLength*.
FeedReference AO (required)	signalao	Analog output signal for analog wire feed reference. If wire feed is defined, the component `wirefeed` in `welddata` is available. Also referred to as *Power*.
ControlPort AO (required)	signalao	Analog output to control the welder. Also referred to as *Dynamic*.
BurnBackCorrection AO (required)	signalao	Analog output for burn back correction. Also referred to as *BurnBackCorrection*.
Internal TcpSpeed AO	signalao	Internal analog output signal representing the actual robot TCP speed.
TcpSpeed AO	signalao	Analog output signal sent to the Fronius power source.
VoltageMeas AI	signalai	Analog input signal for voltage measurement.
CurrentMeas AI (required)	signalai	Analog input signal for current measurement.
SynWireFeed AI (required)	signalai	Analog input signal for synergic wire feed.
MotorCurrentMeas AI	signalai	Analog input signal for motor current measurements.
JobPort GO (required)	signalgo	Group output signal for sending the job number to the welder.
ProgramPort GO (required)	signalgo	Group output signal for sending the program number to the welder. **Note:** Program number 0 and 1 are occupied and cannot be used.
ModePort GO (required)	signalgo	Group output signal for sending the mode number to the welder.
WelderErrorCodes GI (required)	signalgi	Group input signal for the error codes from the welder.

Parameters marked with *required* means that the signal must be defined to be able to weld.

Fronius Weld Schedules

Parameter	Data type	Description
Name	string	The name of the *Fronius Weld Schedule*, in the format: Robottaskname_arcsystem_mode_job, for example, T_ROB1_1_2_1.
Schedule Name	string	Name of the job, for example *Job 1*
Description	string	Description of job number, for example *Job 1*
Settings	float	Internal data
Settings2	float	Internal data
Wire Size	float	The size of the wire used in the job.

Continues on next page

These data are mirroring data from the power source to improve the performance of the interface. You should not edit them!

4 Fronius Interface modes

4.1 Overview

Interface modes

The Fronius TPS 4000/5000 welder has four interface modes that can be used depending on the welding application. The `welddata` components will automatically be customized to the selected interface mode.

Interface modes	Description
Job Mode	The welding parameters (with the exception of pre flow, post flow, and purge time) are stored and set in the power supply using jobs. The job number (0-99) is set in the Weld Data.
Job Mode with Correction	The welding parameters are stored and set in the power supply (with the exception of pre-flow, post-flow, and purge time). Corrections can be made to the arc length, wire feed speed, and the pulse power/dynamic in the Weld Data. The job number (0-99) is set in the weld data.
Program Mode	All of the welding parameters are set and stored in the robot controller. The program (also known as a synergic line or a wave form) is stored in the power supply. The program is selected in the Weld Data and all of the welding parameters are set in the Seam and Weld Data. This interface allows the operator to make all weld settings from the FlexPendant rather than the power supply.
TCP Speed Control	The welding power is calculated on the basis of the throat thickness and the robot welding speed. If the robot moves faster the welding power will be increased. If the robot moves slower the welding power will be decreased. The adjustment of the throat thickness is valid for the pulse and standard welding mode for all types of welding wires (steel, aluminum...) and is optimized for fillet welding.

Setting the interface mode

The interface mode can be set in the **Configuration Editor** in RobotStudio or on the FlexPendant.

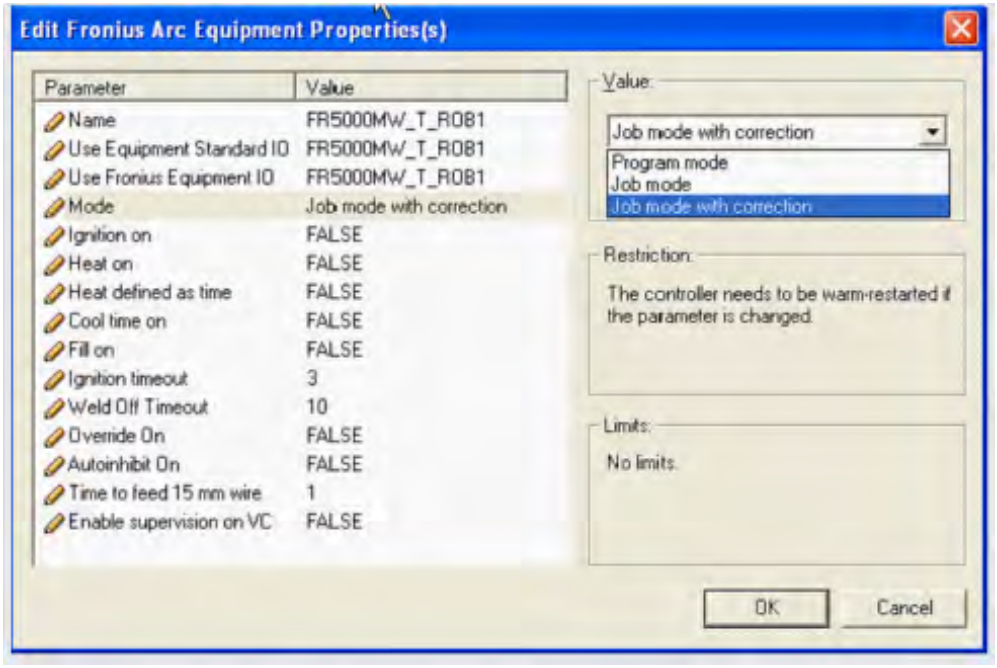
1. In the **Configuration Editor**, select the topic **Process**.
2. Select the type **Fronius Arc Equipment Properties**.
3. Select the robot and set the desired interface mode.
4. Restart the controller.

Continues on next page

4.1 Overview

Continued

The configuration editor on the FlexPendant



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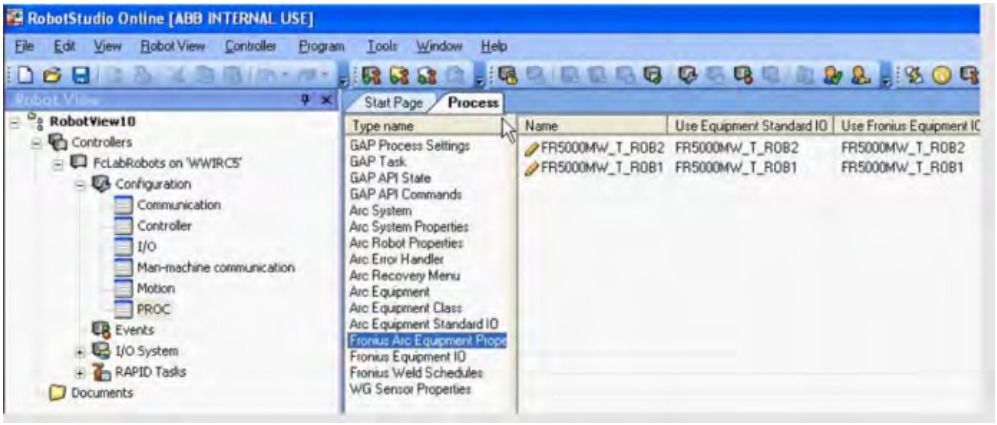
The configuration editor in RobotStudio



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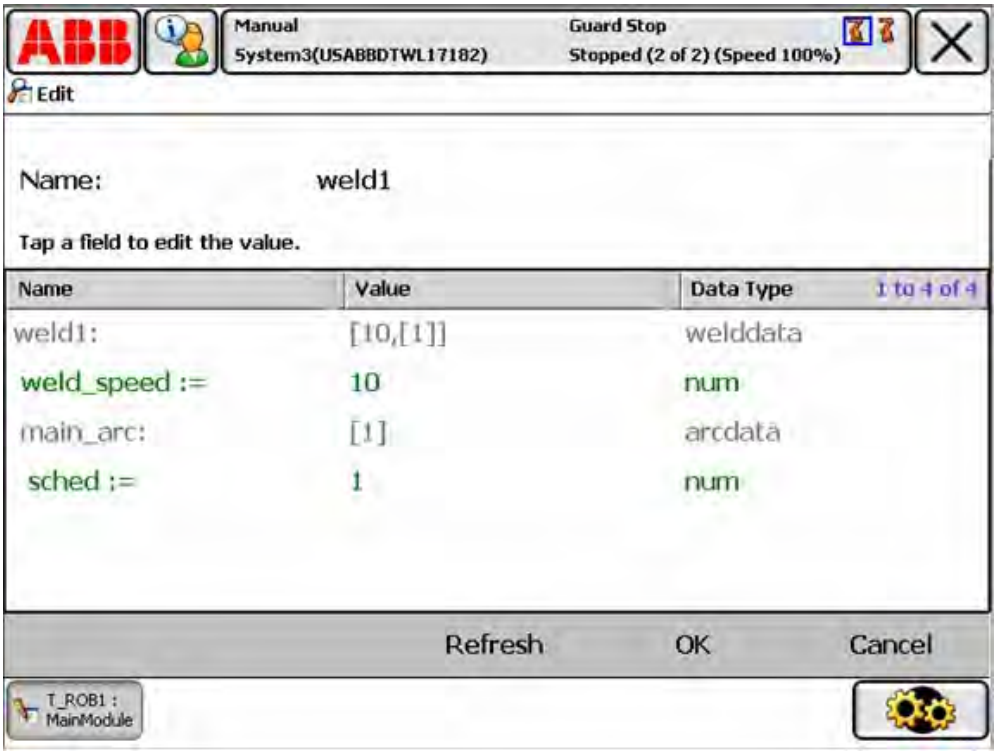
4.2 Job Mode

Weld Data parameters

Parameters	Description
weld_speed	This parameter is the speed of the TCP of the tool during the weld instruction. This speed overrides the speed argument of the weld instruction during welding if the program is stepped through using step FWD or BWD.
sched	The parameter *sched* is equivalent to a Fronius job. For example *sched 1* is Fronius job 1. Jobs are stored in the Fronius power source. The Fronius TPS and TS machine can store 100 jobs. Each job stores all of the necessary parameters to make a weld. The job parameters must be set in the Fronius equipment.



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4.3 Job Mode with Correction

Weld Data parameters

Parameters	Description
weld_speed	This parameter is the speed of the TCP of the tool during the weld instruction. This speed overrides the speed argument of the weld instruction during welding if the program is stepped through using step FWD or BWD.
sched	The parameter *sched* is equivalent to a Fronius job. For example *sched 1* is Fronius job 1. Jobs are stored in the Fronius power source. The Fronius TPS and TS machine can store 100 jobs. Each job stores all of the necessary parameters to make a weld. The job parameters must be set in the Fronius equipment.
voltage	Arc-length correction boundary for arc length upwards and downwards -30% to +30% of the value set for `AL.1` in the job for the power supply. Example `AL.1` in the Fronius Job is set to +10 and +30 (voltage) is set in your weld data. Your resultant value for `AL.1` is 13. **Note** Arc Length Control must be set in the power supply for the voltage setting in the weld data to have an effect.
wirefeed	Correction of the wire feed speed. The range is -100 to 100. A value of 0 must be set if no correction to the wire feed speed is wanted. This means that a wire feed parameter of 100 will give you the maximum value of the *Pch*, and a wire feed value of -100 will give you the lowest *Pcl* value. It is also possible set an actual wire feed speed for the correction setting. The wire feed value must fall in-between the PCH and PCL job setting, see *Changing the wire feed correction settings on page 35*. **Note** *Pch* and/or *Pcl* must be set in the power supply for the wire feed setting in the weld data to have an effect. **Note** The default wire feed unit is mm/sec. The wire feed unit can also be set in inches/min. See *Changing the unit for the wire feed speed on page 35*.
control	Arc-force dynamic correction (constant voltage or synergic) or pulse correction (pulsed arc). The range is -5 to +5.

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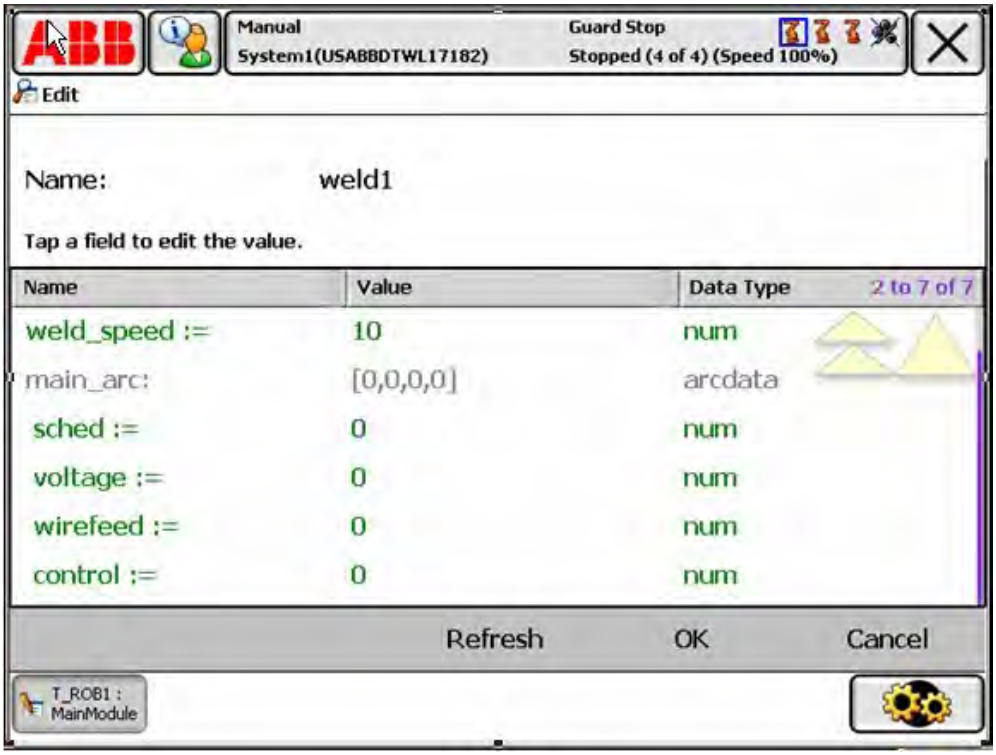

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Changing the wire feed correction settings

The Wirefeed Correction settings can be changed from percentage to wire feed speed by loading Fronius weld schedules and using them as jobs.

1. Set the signal *soFr1UpdateSched* to high.

   This will create a file on the robot controller in the folder Home/Arc/ConfigTemplates/FroniusTPS4K5K. There will be one file for each welding robot, for example, FronWeldSched_T_ROB1_1.cfg for T_ROB1 and FronWeldSched_T_ROB2_1.cfg for T_ROB2.
2. Load the configuration files using RobotStudio or the FlexPendant. Select **Load parameters and replace duplicates**.
3. Restart the controller.

The parameter *wirefeed* in weld data is now an actual speed, not a percentage value (%). The wire feed speed must be set in the correct range. This range is set in the Fronius Synergic line.

Changing the unit for the wire feed speed

The default unit for wire feed is mm/s. The unit can be changed by selecting SI_UNITS, US_UNITS, or WELD_UNITS in the ARC_SYSTEM parameters.

Note

If the wire feed is set up as percentage, then the unit conversion will not work, so in this case SI_UNITS must be used.

4.4 Program Mode

Weld Data parameters

Parameters	Description
weld_speed	This parameter is the speed of the TCP of the tool during the weld instruction. This speed overrides the speed argument of the weld instruction during welding if the program is stepped through using step FWD or BWD.
sched	The parameter *sched* is equivalent to a Fronius program. The Fronius power supply has programs for many different types of materials, wire diameters, and transfer modes. The program (also known as a synergic line or a wave form) is stored in the power supply. The range is 1 to 127.
mode	The parameter *mode* has a range of 0 to 7, but for GMAW with Fronius program mode only use the modes listed below. 0 = Synergic mode 1 = Pulse (CC mode) 4 = Constant Voltage (CV mode)
voltage	This parameter is the same as arc length when welding in synergic mode or pulse. The range is -30 to +30. This parameter is voltage when welding in constant voltage mode. The range will vary depending on wire type and diameter.
wirefeed	The range is 0 to 100. A value of 50 must be set if no correction to the wire feed speed is wanted. This means that a wire feed parameter of 100 will give you the maximum value of the *Pch*, and a wire feed value of 0 will give you the lowest *Pcl* value. It is also possible set an actual wire feed speed for the correction setting. The wire feed value must fall in-between the PCH and PCL job setting, see *Changing the wire feed correction settings on page 35*. **Note** *Pch* and/or *Pcl* must be set in the power supply for the wire feed setting in the weld data to have an effect. **Note** The default wire feed unit is mm/sec. The wire feed unit can also be set in inches/min. See *Changing the unit for the wire feed speed on page 35*.
control	Arc-force dynamic correction (constant voltage or synergic) or pulse correction (pulsed arc). The range is -5 to +5.

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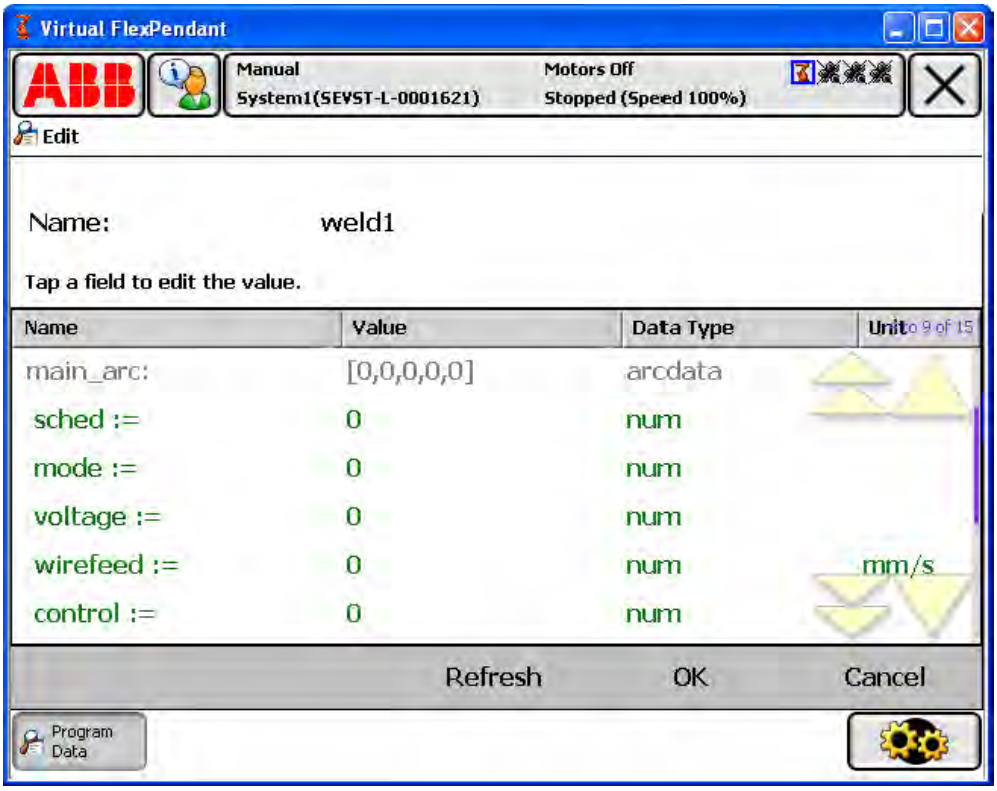

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4.5 TCP Speed Control

4.5.1 Functional description

Introduction

Normally the welding power is calculated from the wire feed speed and the selected characteristic. With the function *TCP Speed*, the welding power is calculated on the basis of the throat thickness and the robot welding speed. If the robot moves faster the welding power will be increased. If the robot moves slower the welding power will be decreased. The adjustment of the throat thickness is valid for the pulse and standard welding mode for all types of welding wires (steel, aluminum...) and is optimized for fillet welding.

If the power source cannot reach desired throat thickness or the robot speed is too high the output signal *Power out of Range* is set.

TCP Speed Control is an additional mode for the Robotware option *650-9 Fronius*.

Prerequisites

For general prerequisites, see *Prerequisites on page 19*.

Fronius system prerequisites:

- Fieldbus Interface (Beckhoff Module, EthernetIP, Modbus...)
- Software revision within the Powersource V4.26.14
- Hardware revision Beckhoff Coupler Standard (KL6021-0010) V2.1.13
- Hardware revision Beckhoff Coupler Seamsearching (KL6021-0012) V2.0.3
- Software UBST V1.06.25

Limitations

- TCP Speed Control cannot be used with *Integrated Version*
- *TCP Speed Control* can only be used if the welder is in *Program Mode*
- Twin Arc Interfaces are not yet supported by Fronius
- The following modes are supported by Fronius
- - Mode 0 Standard
  - Mode 1 Pulse
- *Job Mode* and *JobMode with correction* is not yet supported by Fronius
- The maximum TCP speed that can be handled is 33 mm/s (199 cm/min)
- The maximum throat size is 20

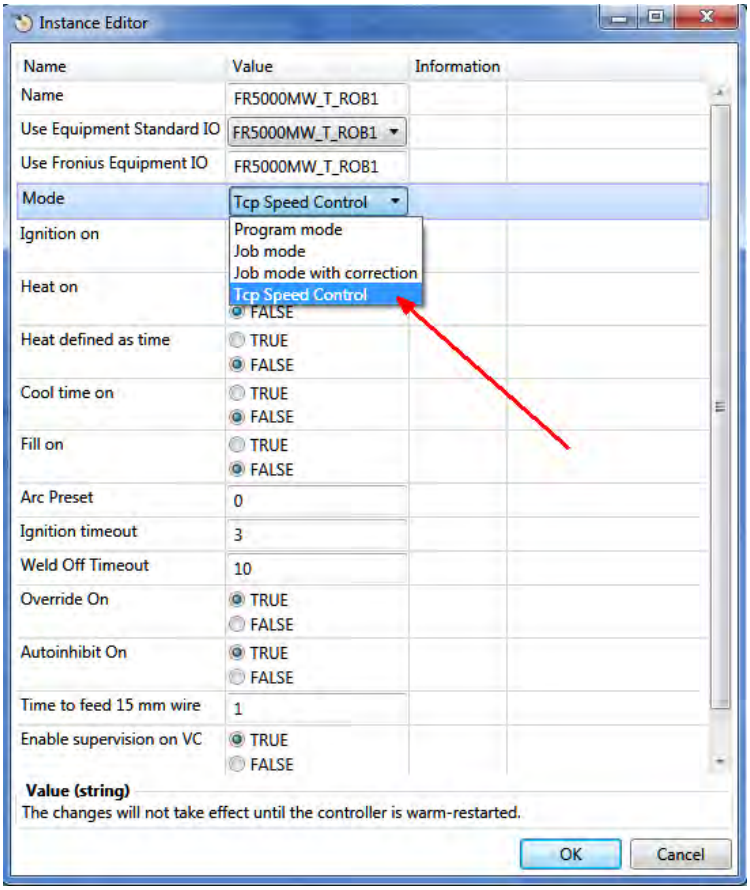
4.5.2 Activating TCP Speed Control

Activating TCP Speed Control

The TCP Speed function can be activated in the system parameters, in the type *Fronius Arc Equipment Properties* in the topic *Process*.

Note

The controller must be restarted after the mode is changed.



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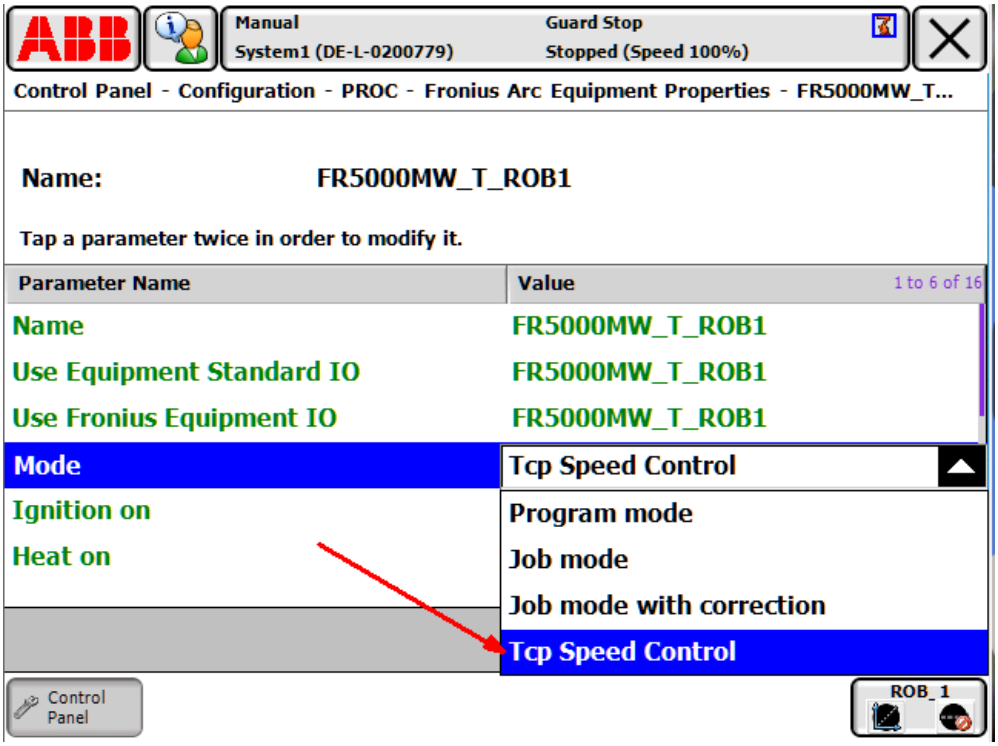
4.5.2 Activating TCP Speed Control

Continued



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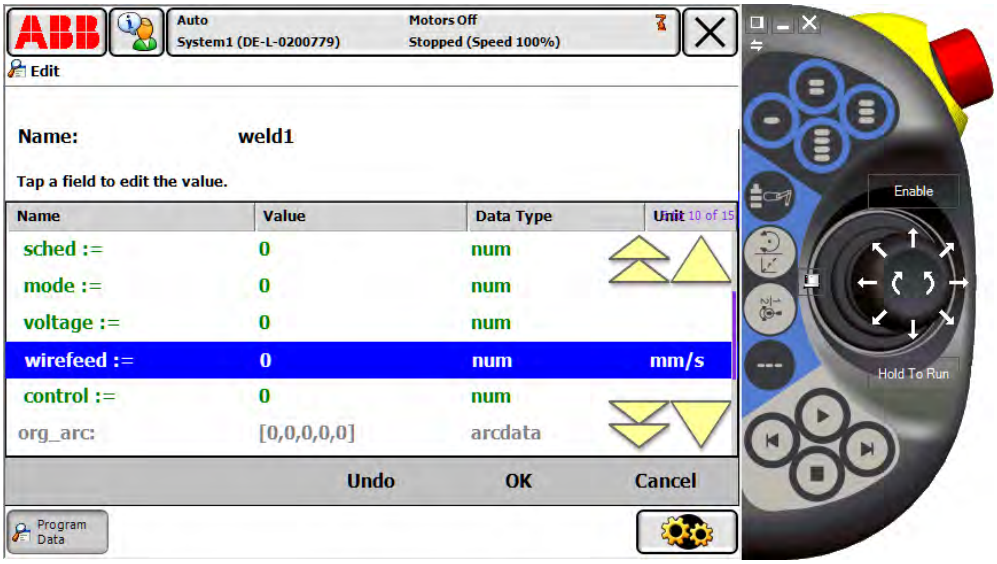
4.5.3 TCP Speed Control mode

Introduction

The *TCP Speed Control* mode is similar to the *Program Mode* with the exception that the *wirefeed speed* component of the active weld data becomes the throat size (also known as the A-size or Z-size) with a min/max value of 0-20 mm.

Weld Data Parameters



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Parameters	Description
weld_speed	This parameter is the speed of the TCP of the tool during the weld instruction. This speed overrides the speed argument of the weld instruction during welding if the program is stepped through using step FWD or BWD.
sched	The parameter *sched* is equivalent to a Fronius program. The Fronius power supply has programs for many different types of materials, wire diameters, and transfer modes. The program (also known as a synergic line or a wave form) is stored in the power supply. The range is 1 to 127.
mode	The parameter *mode* has a range of 0 to 7, but for GMAW with Fronius program mode only use the modes listed below. 0 = Synergic mode 1 = Pulse (CC mode)
voltage	This parameter is the same as arc length when welding in synergic mode or pulse. The range is -30 to +30.
wirefeed	This parameter represent the throat thickness. The range is 0 – 20 regardless of the configured units (SI_UNIT / WELD_UNIT / US_UNIT).
control	Arc-force dynamic correction (constant voltage or synergic) or pulse correction (pulsed arc). The range is -5 to +5.

Continues on next page

4.5.3 TCP Speed Control mode
Continued

Seam Data Parameters

The recommend mode is to set all process times in RobotWare Arc. Therefore the *Ignition On* flag and *FillOn* flag should be set in the *Fronius Arc Equipment Properties*. Also the *Ignition Move Delay* flag can be activated if necessary (in *Arc System Properties*/*Arc Robot Properties*).

Doing so will unmask ignition data and fill data in all Seam Data.

Default components in Seam Data

The following parameters are always visible in Seam Data.

Parameters	Description
purge_time	The time the gas is turned on prior to reaching the start point of the weld. It is used to purge the hoses of air. This does not increase cycle time because RobotWare Arc starts this purge flow at whatever time is given here, prior to moving to the start point of the weld. Units are in seconds.
preflow_time	The time of gas flow when the robot is at the start point before triggering the weld contactor. Units are in seconds.
bback_time	Burn-back time is the period after the weld is complete, but the arc remains on to burn the wire back closer to the contact tip. The range is -200 to + 200 ms (factory setting: 0). The wire will burn-back closer to the tip with a longer amount of time.
postflow_time	This component determines the amount time of gas flow at the end of the weld before leaving the end point. Units are in seconds.

Ignition components in Seam Data

If the *Ignition On* flag is set the following parameters are added:

Parameters	Description
sched	The parameter *schedule* is equivalent to a Fronius program. The Fronius power supply has programs for many different types of materials, wire diameters, and transfer modes. The program (also known as a synergic line or a wave form) is stored in the power supply. The range is 1 to 127.
mode	The parameter *mode* has a range of 0 to 7, but for GMAW with Fronius *TCP Speed Control* only use the modes listed below. • 0 = Synergic mode • 1 = Pulse (CC mode)
voltage	This parameter is the same as arc length correction when welding in synergic mode or pulse. The range is -30 to +30.
wirefeed	This parameter represent the throat thickness. The range is 0 – 20 regardless of the configured units (SI_UNIT / WELD_UNIT / US_UNIT).
control	Arc-force dynamic correction (constant voltage or synergic) or pulse correction (pulsed arc). The range is +5 to -5

Crater fill components in Seam Data

If the *Fill On* flag is set the following parameters are added:

Parameters	Description
Fill_time	The crater-filling time (in seconds) at the end phase of the weld.

Continues on next page

Parameters	Description
sched	The parameter *schedule* is equivalent to a Fronius program. The Fronius power supply has programs for many different types of materials, wire diameters, and transfer modes. The program (also known as a synergic line or a wave form) is stored in the power supply. The range is 1 to 127.
mode	The parameter *mode* has a range of 0 to 7, but for GMAW with Fronius *TCP Speed Control* only use the modes listed below. • 0 = Synergic mode • 1 = Pulse (CC mode)
voltage	This parameter is the same as arc length correction when welding in synergic mode or pulse. The range is -30 to +30.
wirefeed	This parameter represent the throat thickness. The range is 0 – 20 regardless of the configured units (SI_UNIT / WELD_UNIT / US_UNIT).

Ignition move delay in Seam Data

If the *Igniton Move Delay On* flag is set a component is added to the ignition component of Seam Data.

Parameters	Description
Ign_move_delay	The delay (in seconds) from the time the arc is considered stable at ignition until the heating phase is started. The ignition references remain valid during the ignition movement delay.

Process times set inside robot Seam Data

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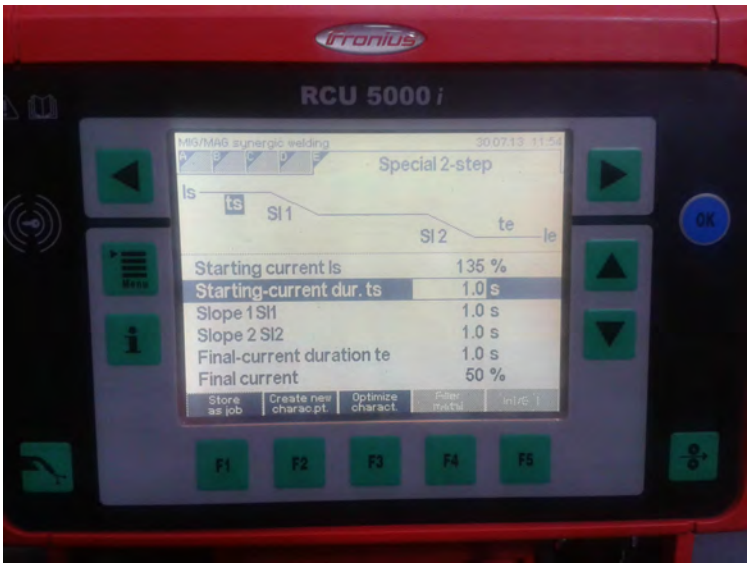
RobotWare Arc has full control over the welding process if all process times are set in seam data. The robot move to the start position and purges gas prior reaching the start point. Once the arc is stable the *Ignition_Move_delay* timer start to tick. (This will not affect the ignition timeout parameter; the timer start to tick after the arc is stable.) Different parameters can be used for the ignition phase if necessary (*Arc Length correction*, *Dynamic Correction*).

Continues on next page

4.5.3 TCP Speed Control mode
Continued

The fill timer start to tick once the robot reached the end position. Crater fill is active as long as the configured time in seam data. Different parameters can be used for the fill phase if necessary (*Arc Length correction*, *Dynamic Correction*).

All process times in the Fronius welder should be turned off. This is done by turning off the *Starting-current duration* (ts) and *Final-current duration* (te). The parameters are off as default but should be verified if any timeout errors occur during the ignition phase or crater fill phase.



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If those timers are off the feedback signal from the welder *ArcEst* and *MainCurrent OK* occur almost at the same time once the *PowerOn* output is set from the robot.

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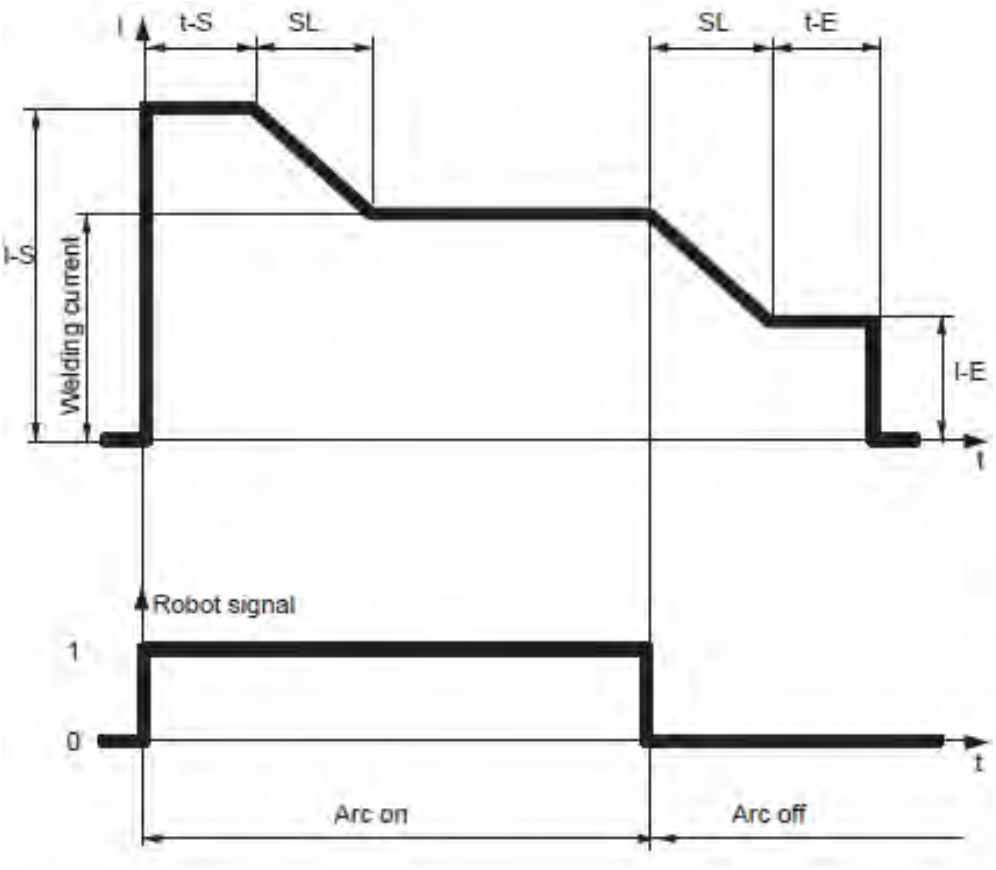
The following graph illustrates the mode of the *Special 2-step mode* which is active in the welder.



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I-S	Starting-current phase
SL	Slope
I-E	Crater-fill phase
t-S	Starting-current duration
t-E	Final-current duration

The t-S time (Start current time) can be done by using the `ignition_move_Delay` component in seam data.

The t-E time (End current time) can be done using the `fill_time` component in seam data.

Note

The slope times can currently not be set from the robot.

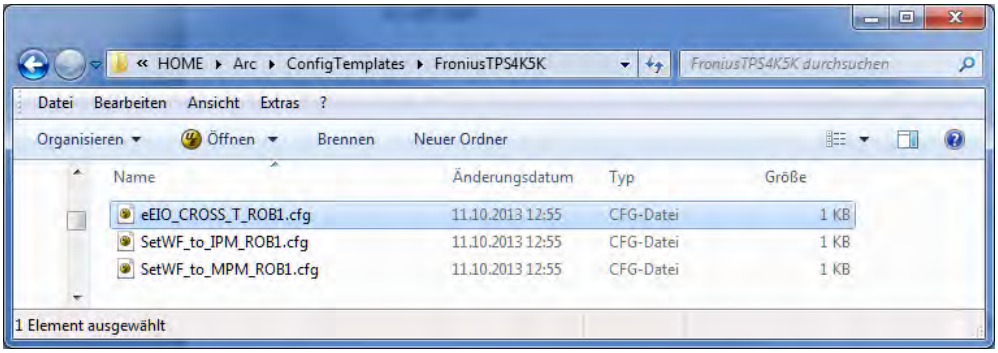
Continues on next page

4.5.3 TCP Speed Control mode
Continued

Process times set inside the welder

If you want to set up the process times for the *Special 2-step mode* inside the welder, make sure to turn off the *IgnitionOn* and *FillOn* flag in the type *Fronius Arc System Properties*. The *Ignition move Delay* should also be turned off. *Gas purging/Pre flow* can still be set in seam data.

Cross-connections can be used in order to get the *Special 2-step mode* behavior. These cross-connections can be loaded from the home directory of the system. (`\HOME\Arc\ConfigTemplates\FroniusTPS4K5K`)



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The robot will start to move once the *ArcOn* output is set and both feedback signals *ArcStable* and *Main Current OK* are active. The *Main Current Signal* will become active after the *Start time* (t-S) and the *Slope time* is executed.

On the other hand the robot has to wait at the end position until the *Slope Time* and *Fill time* are executed inside the welder. Therefore *ArcStable* is kept high until the feedback signal *Process active* is set low.

Cross-connection for *Ignition* behavior:

```
-Res "siFr1ArcEst" -Act1 "diFr1MainCurrent" -Oper1 "AND" -Act2
"diFr1ArcStable"
```

Cross-connection for *Crater Fill*:

```
-Res "sdiFr1CraterFill" -Act1 "sdiFr1CraterFill" -Oper1 "OR"
-Act2 "siFr1ArcEst"
```

Start signal (*ArcEst*):

```
-Res "sdiFr1ArcOK" -Act1 "sdiFr1CraterFill" -Oper1 "OR" -Act2
"siFr1ArcEst"
```

Note

Make sure that the *Ignition TimeOut* parameter in *Fronius Arc Equipment Properties* is high enough to avoid any ignition timeout errors.

```
Ignition timeout = (t-S) + (SlopeTime) + 0.1 sec
```

Continues on next page

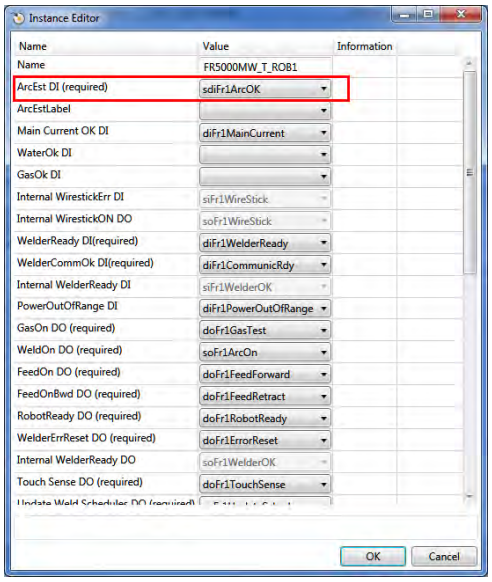
Note

Make sure that the *Weld Off Timeout* parameter in *Fronius Arc Equipment Properties* is high enough to avoid any timeout errors during the fill phase.

```
Weld Off timeout = (t-E) + (SlopeTime) + 0.1 sec
```

Note

Do not forget to connect the *sdiFr1ArcOK* signal in *Fronius Equipment IO* to the *ArcEst DI* instance.



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5 Fronius Interface application

5.1 Overview

Supported power sources

Fronius Interface is a programming and administrative interface for Fronius power sources on the FlexPendant. To be able to use this interface, the power source has to meet the following requirements:

- EtherNet/IP communication interface with software version 1.07.9 or later
- PowerMAG-OS version 4.3018 or later

Limitations

The option *Fronius* cannot be used together with the Fronius RCU5000i.

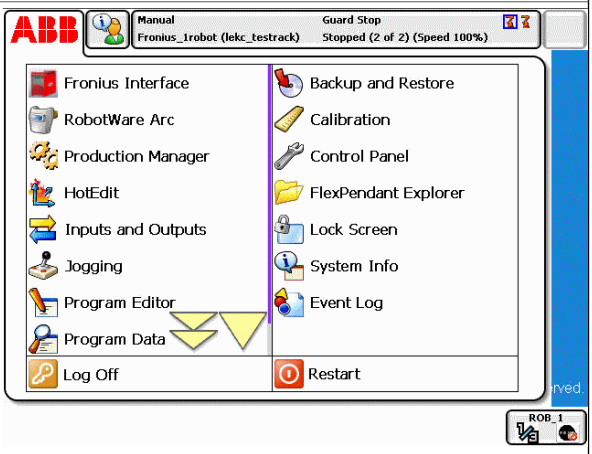
If the RCU is connected before the FP application "Fronius TPS Integrated" is started, all functionality except runtime data is disabled. If the RCU is connected to the power source after the FP application "Fronius TPS Integrated" had been started, functionality is not disabled, but all job related functionality will collide with the RCU functionality and result in unpredictable data.

The user is strongly recommended to restart the FP application "Fronius TPS Integrated" after attaching an RCU to the power source.

5.2 Starting the interface

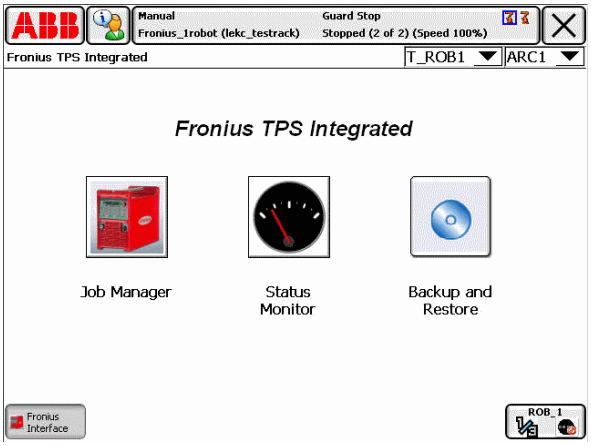
Starting the Fronius Interface application

Use this procedure to start the Fronius Interface on the FlexPendant.

	Action	Information
1	Tap the **ABB** menu.	
2	Tap **Fronius Interface**.	 en1100000106

Main view

Once the interface is loaded, the main view of the Fronius Interface is displayed (a desktop with 3 icons). The power source functions can be accessed from this window.



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5.3 Selecting the arc welding system

General

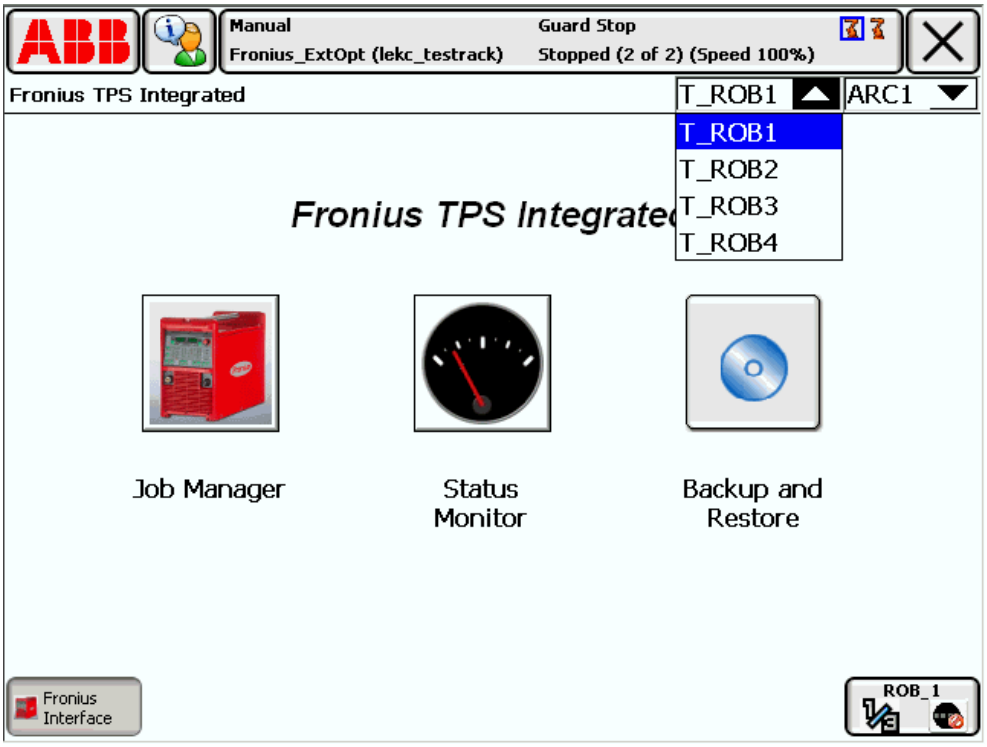
The selection of the arc welding system determines on which equipment the interface is operating on.

To select a certain arc welding system you first have to select the robot and then an arc welding system, that is defined for that robot. For each robot there may exist up to 3 different arc welding systems.

The selection of the arc welding system is only possible from the main view. This selection will then be used in all other views and menus within the Fronius Interface. The active selection is displayed in the upper right corner of each view.

Selecting the robot

To select the robot, use the drop-down list box to the left in the upper right corner of the main view. The list box allows you to select all robots that have at least one arc welding system defined.



en1100000108

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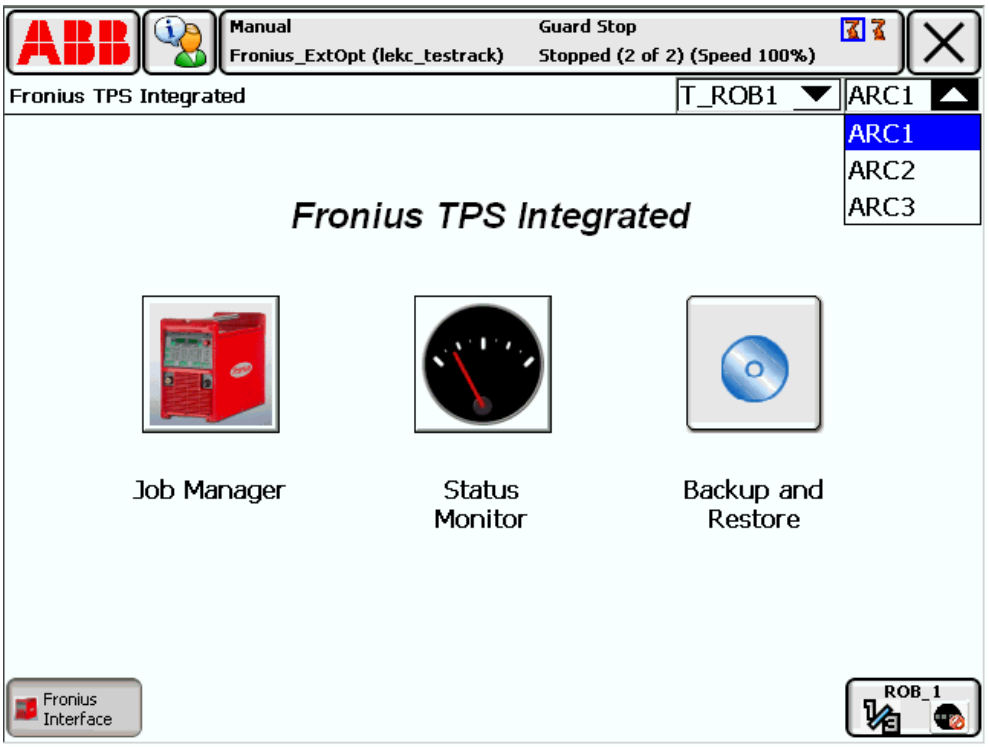
Selecting the arc welding system

To select the arc welding system, use the drop-down list box to the right in the upper right corner of the main view. The list box allows you to select from all arc welding systems that are defined for the currently selected robot.



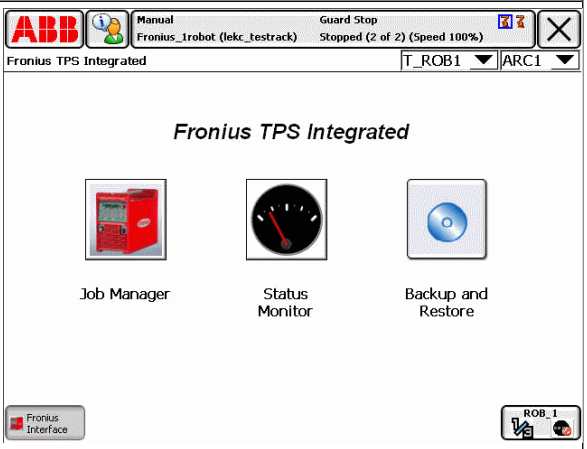
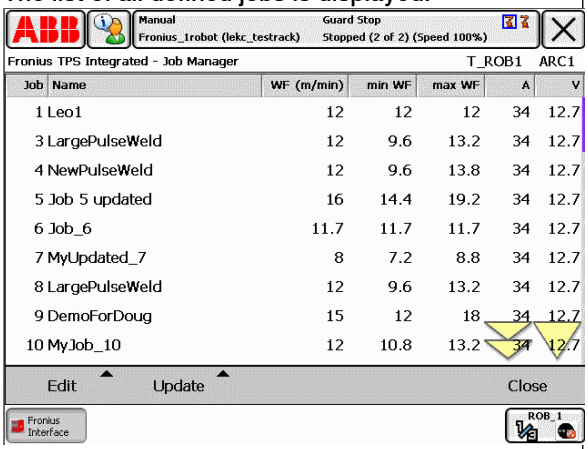
en1100000109

6 Fronius Interface views

6.1 Job Manager

6.1.1 The Job Manager view

Opening the Job Manager

	Action	Info/illustration
1	Tap the **Job Manager** button in the main view to open the **Job Manager**.	 en1100000107 The list of all defined jobs is displayed.  en1100000110

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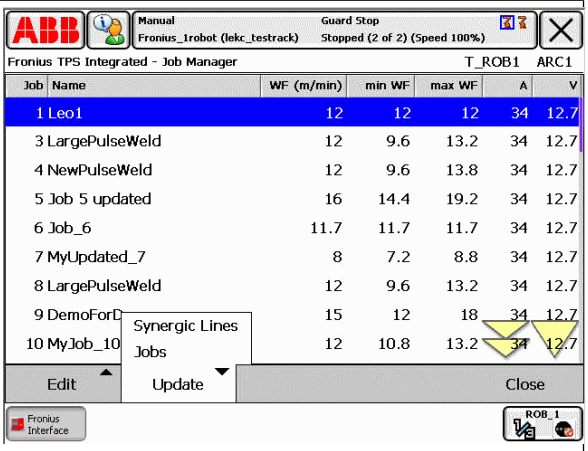
6.1.1 The Job Manager view
Continued

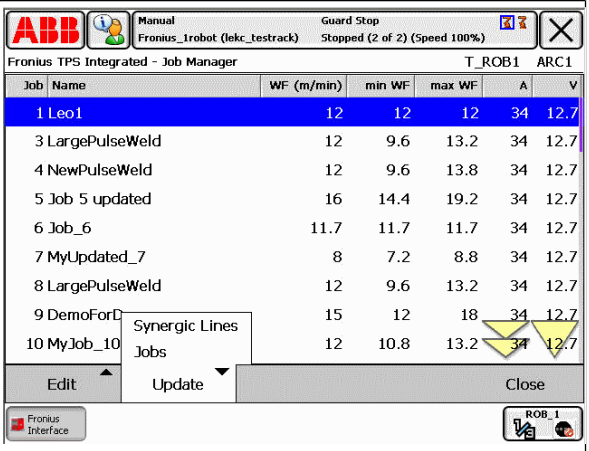
Update the synergic lines

The first time after configuration of a new robot system, you have to get information about materials, gas and wire dimensions for which synergic lines are defined in the power source.

	Action	Info/illustration
1	In the **Job Manager**, tap the **Update** menu and select **Synergic Lines**.	 en1100000111 The update may take a few minutes.

Update the job list

The first time after configuration of a new robot system, you have to get all jobs that are defined in the power source. This is done by selecting **Update** and then **Jobs**.

	Action	Info/illustration
1	In the **Job Manager**, tap the **Update** menu and select **Jobs**.	 en1100000111 The update may take a few minutes. The time depends on how many jobs are defined in the power source.

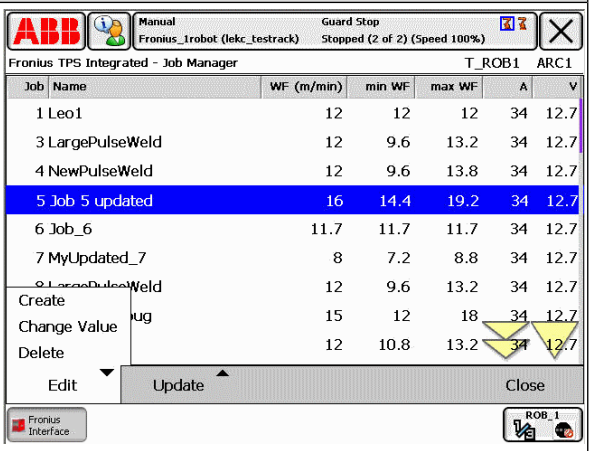
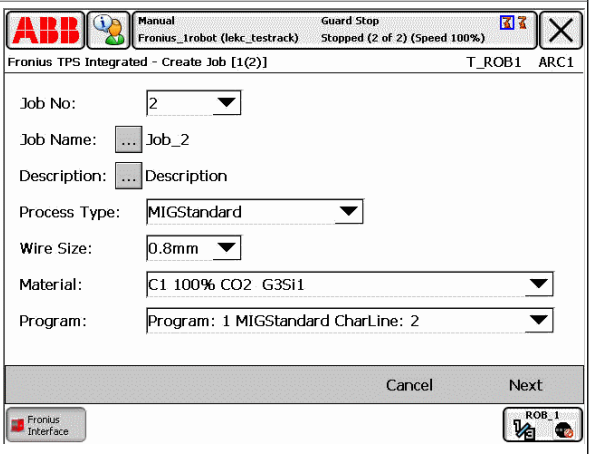
6.1.2 Handling jobs

Creating a new job

Note

A new job number should be numeric from 0 to 89.

If the new job number is the same as one of the used job numbers, the job will be replaced with default parameters.

	Action	Info/illustration
1	In the **Job Manager**, tap the **Edit** menu and select **Create**.	 en1100000114 The first view of a two step wizard to create a job is displayed.
2	In the first view of the job creation wizard, do the following: • select a job number • edit the job name • edit the job description • select the process type • select the wire size • select the material/gas combination • select the synergic line When you are satisfied, tap **Next**.	 en1100000115

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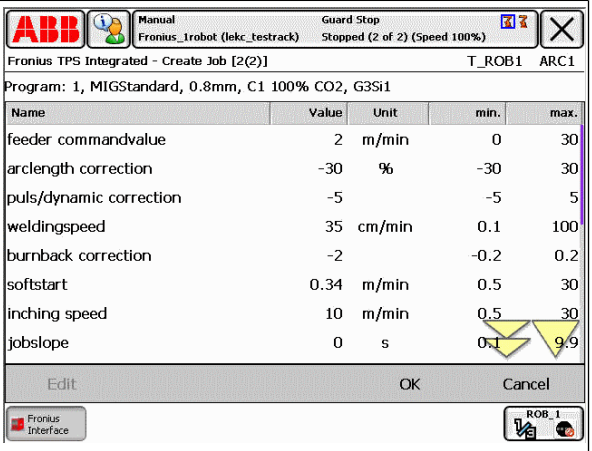
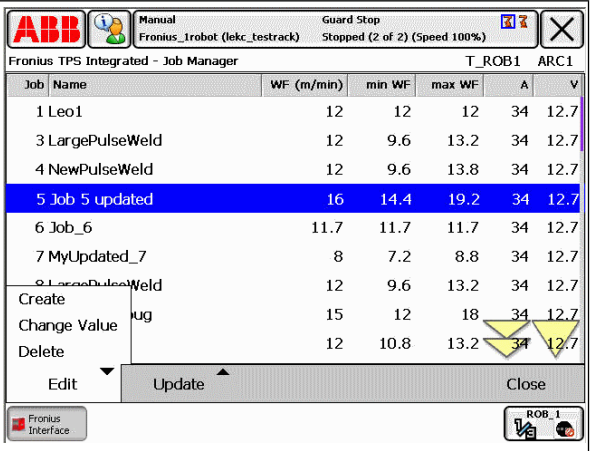
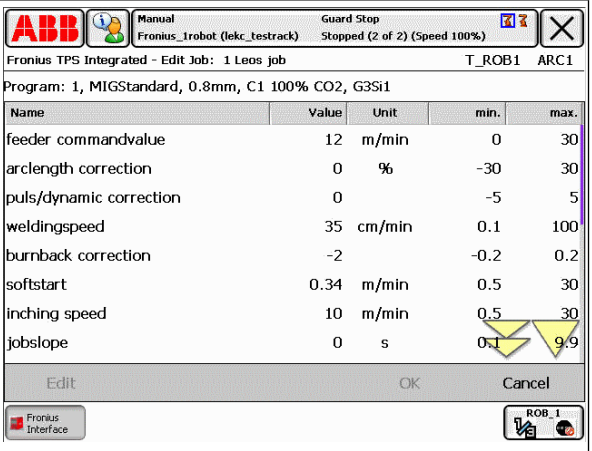
6.1.2 Handling jobs

Continued

	Action	Info/illustration
3	In the second view of the job creation wizard, change the default values of the job. When you are satisfied, tap **OK** to save the job in the power source.	 en1100000116

Editing a job

	Action	Info/illustration
1	In the **Job Manager**, tap **Edit** and select **Change Value** to edit the job selected in the Job Manager **Job List**. A list of parameters that can be edited will be opened.	 en1100000114
2	Select the parameter you want to edit and tap **Edit**.	 en1100000117

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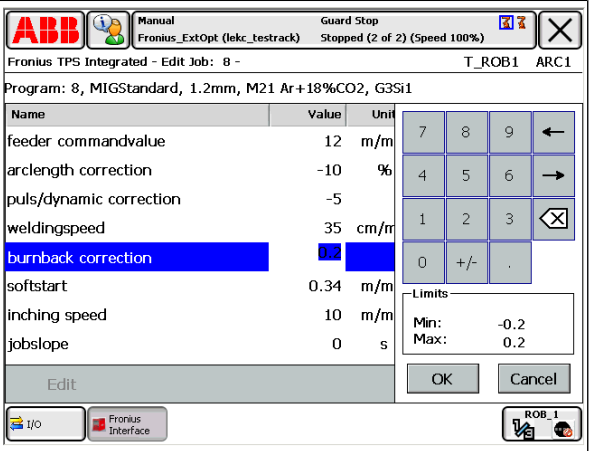
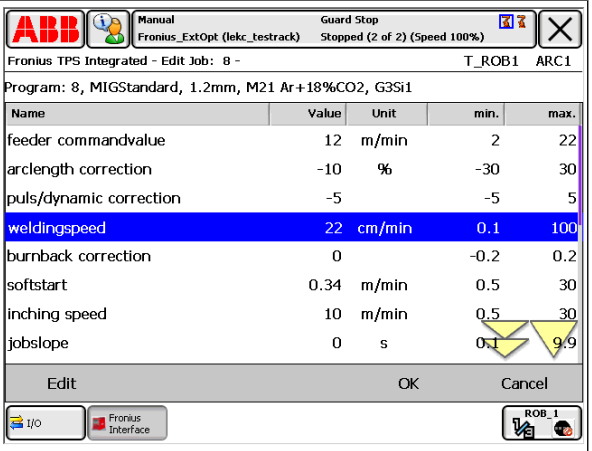
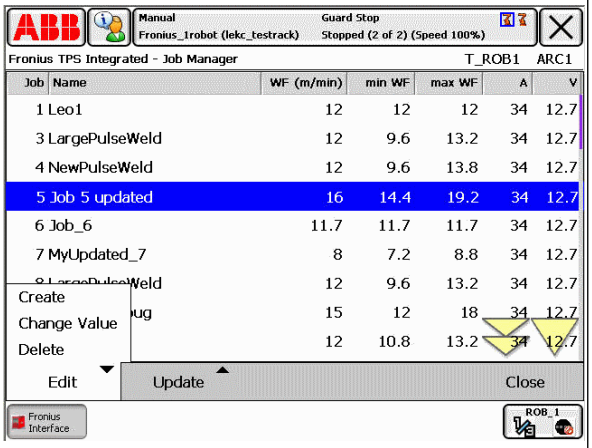
	Action	Info/illustration
3	Edit the value for the parameter with the numeric pad and tap **OK**.	 en1100000119
4	Edit all values you wanted to change, then tap **OK** to save the changes in the power source.	 en1100000120

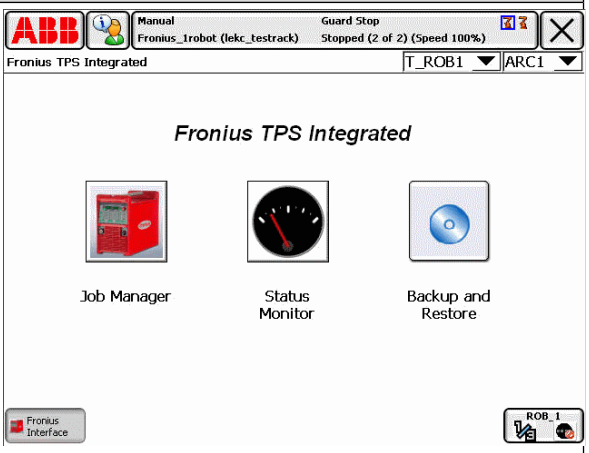
Deleting a job

	Action	Info/illustration
1	In the **Job Manager**, select the job number from the list of jobs.	 en1100000114
2	Tap **Edit** and select **Delete**.	

6.2 Monitor

6.2.1 The Monitor view

Opening the Monitor view

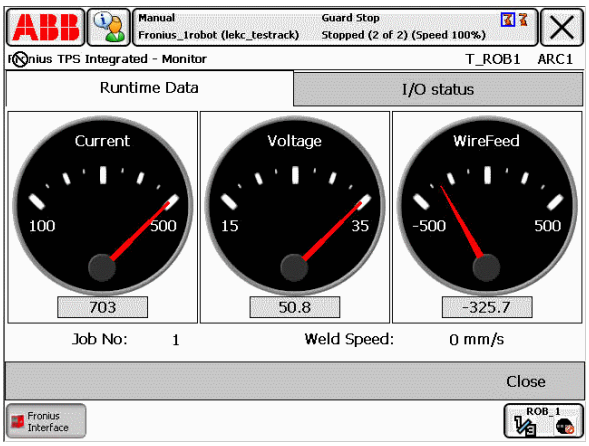
	Action	Info/illustration
1	Tap the **Status Monitor** button in the start window to open the **Monitor** view.	 en1100000107

Monitor tabs

The **Monitor** view has two tabs, **Runtime Data** and **I/O status**.

Runtime Data

The **Runtime Data** tab displays one voltage meter, one current meter and one wire feed meter. They show values that are measured and returned by the power source.



en1100000125

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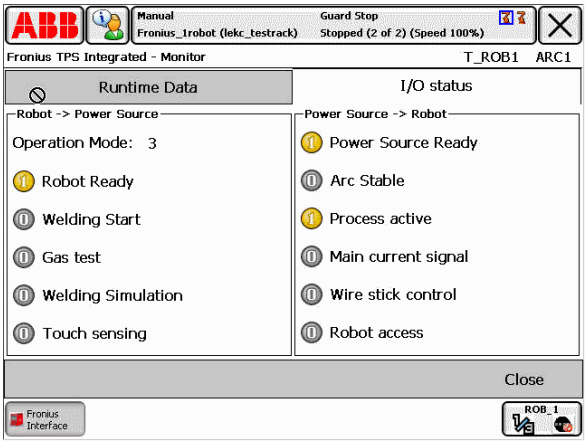
I/O status

The I/O status tab displays the status of the I/O signals between the robot controller and the power source.



en1100000126

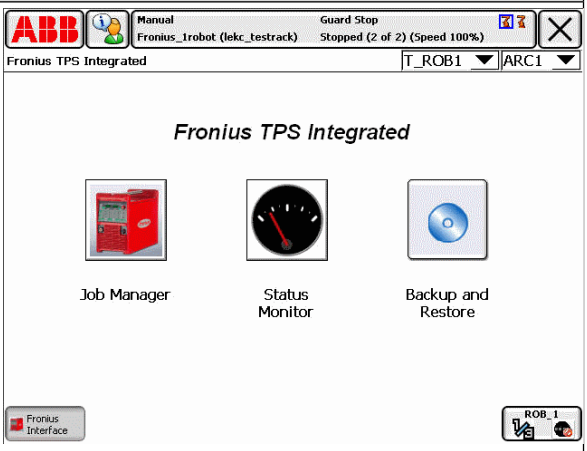
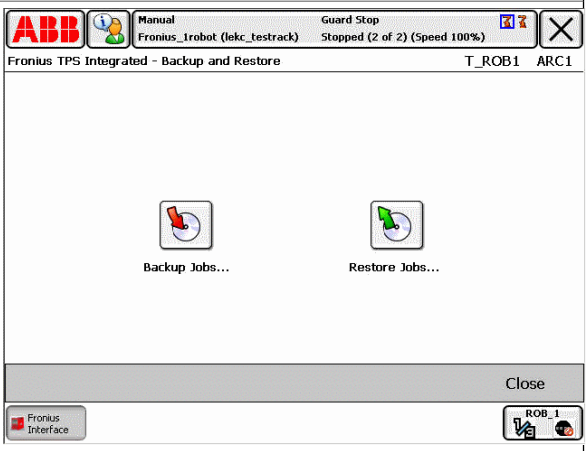
6.3 Backup and Restore

6.3.1 The backup and restore function

About backup and restore

The backup and restore function is used to back up the parameters of all the used jobs in a specified XML file and to restore all the jobs from a specified XML file.

Creating a backup of the current jobs

	Action	Info/illustration
1	Tap the **Backup and Restore** button in the start window to open the **Backup and Restore** view.	 en1100000107
2	Tap **Backup Jobs**.	 en1100000127

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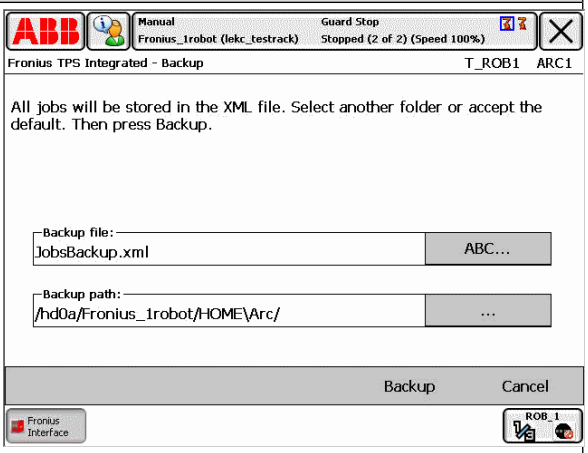
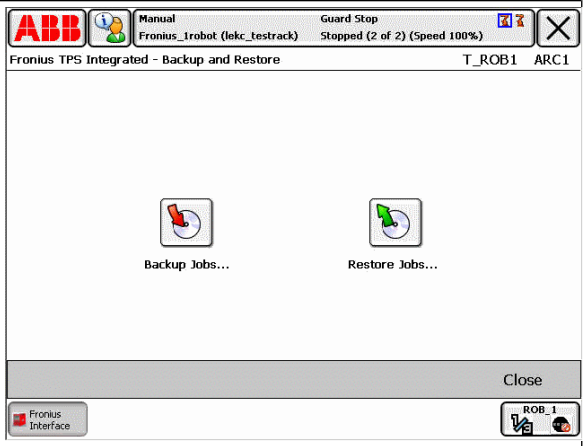
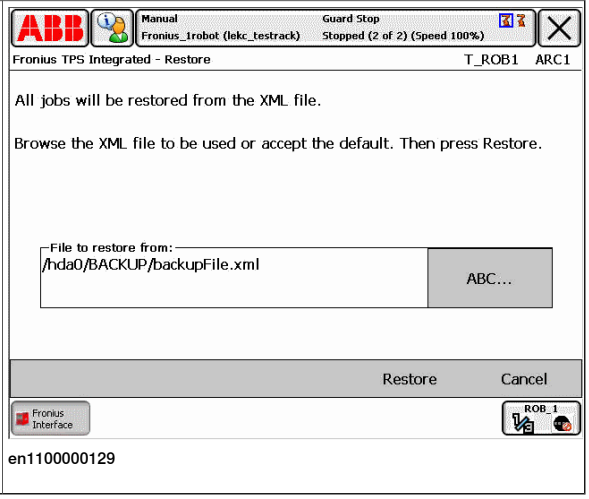
	Action	Info/illustration
3	A default file for saving the backup is suggested. To select another file, tap **ABC**. Tap **Backup** to start the backup process to the selected file.	 en1100000128

Restoring a backup of jobs

	Action	Info/illustration
1	In the **Backup and Restore** view, tap **Restore Memory Channels**.	 en1100000127
2	A default file to restore from is suggested. To select another file, tap **ABC**. Tap **Restore** to start the restoring process from the selected file.	 en1100000129

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7 Fronius error codes

Overview

Any weld errors that originates from the Fronius welder is presented as an event log message on the FlexPendant and in RobotStudio. The title is *110473 Weld Equipment Error*. The error message read from the Fronius Welder is presented in the format: ErrorCode ErrorText.

xx1500000450

Error codes

Error-Code	ErrorText
0	Power Source is OK
1	No Program
2	Over-temperature in secondary circuit of the machine
3	Over-temperature in secondary circuit of the machine
4	Over-temperature in secondary circuit of the machine
5	Over-temperature in primary circuit of the machine
6	Over-temperature in primary circuit of the machine
7	Over-temperature in primary circuit of the machine
8	Over-temperature in primary circuit of the machine
9	Over-temperature in primary circuit of the machine
10	Over-temperature in primary circuit of the machine
11	Temperature sensor fault
12	Temperature sensor fault
13	Temperature sensor fault

Continues on next page

Continued

Error-Code	ErrorText
14	Temperature sensor fault
15	Temperature sensor fault
16	Temperature sensor fault
17	DSP error
18	DSP error
19	DSP error
20	DSP error
21	DSP error
22	HOST error
23	HOST error
24	HOST error
25	HOST error
26	HOST error
27	HOST error
28	Cooling unit temp sensor bad
29	DSP error
30	Fault in wirefeeding system
31	HOST error
32	HOST error
33	Over-temperature in the control circuit
34	Temperature sensor fault
35	DSP error
36	DSP error
37	HOST error
38	Robot not ready
39	Flow watchdog
40	The licence key is faulty
49	Phase failure
50	Intermediate circuit-balance error
51	Intermediate circuit undervoltage
52	Intermediate circuit overvoltage
53	Ground (earth) fault
54	Wire stick control
55	Ignition time-out
56	Out of welding wire
57	Gas pressure error
58	Arc Break Fault

Continues on next page

Continued

Error-Code	ErrorText
59	Secondary overvoltage
60	SITRE1A has activated the safety cut-out
61	DSP detected several unwanted arcs in quick succession
62	TP08 overtemperature
63	Interface fault
64	Faulty cooling unit temperature sensor
65	Overtemperature in cooling system
66	JobMaster overtemperature
67	Jobmaster temperature sensor faulty
68	Secondary safety cut-out
69	Illegal mode change during welding
70	Digital gas sensor error
71	Limit Error
72	Configuration change
73	Host computer not found
74	Internal dummy for the Touchsensing display on the RCU
75	MMArc error
77	Motor overcurrent
78	Emergency stop
79	VRD error Limitation of open-circuit voltage
80	Wirefeeder error
100	HOST error
101	HOST error
102	HOST error
103	HOST error
104	HOST error
105	HOST error
106	HOST error
107	HOST error
108	HOST error
109	HOST error
110	HOST error
150	No power at welder

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Contact us

ABB AB
Discrete Automation and Motion
Robotics
S-721 68 VÄSTERÅS, Sweden
Telephone +46 (0) 21 344 400

ABB AS, Robotics
Discrete Automation and Motion
Nordlysvegen 7, N-4340 BRYNE, Norway
Box 265, N-4349 BRYNE, Norway
Telephone: +47 51489000

ABB Engineering (Shanghai) Ltd.
No. 4528 Kangxin Hingway
PuDong District
SHANGHAI 201319, China
Telephone: +86 21 6105 6666

www.abb.com/robotics

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