

Application manual

Programming Fronius power source

Power and productivity
for a better world™



Trace back information:
Workspace R16-1 version a2
Checked in 2016-02-26
Skribenta version 4.6.209

Application manual

Programming Fronius power source

RobotWare 6.01

Document ID: 3HAC050971-001

Revision: C

The information in this manual is subject to change without notice and should not be construed as a commitment by ABB. ABB assumes no responsibility for any errors that may appear in this manual.

Except as may be expressly stated anywhere in this manual, nothing herein shall be construed as any kind of guarantee or warranty by ABB for losses, damages to persons or property, fitness for a specific purpose or the like.

In no event shall ABB be liable for incidental or consequential damages arising from use of this manual and products described herein.

This manual and parts thereof must not be reproduced or copied without ABB's written permission.

Additional copies of this manual may be obtained from ABB.

The original language for this publication is English. Any other languages that are supplied have been translated from English.

© Copyright 2016 ABB. All rights reserved.

ABB AB
Robotics Products
Se-721 68 Västerås
Sweden

Table of contents

Overview of this manual	7
Product documentation, IRC5	9
Safety	11
1 Introduction to Fronius IRC5 interface	13
2 Installation	15
2.1 Hardware	15
2.2 Software	19
3 System parameters	21
3.1 DeviceNet	21
3.2 EtherNet/IP	26
4 Fronius Interface modes	31
4.1 Overview	31
4.2 Job Mode	33
4.3 Job Mode with Correction	34
4.4 Program Mode	36
4.5 TCP Speed Control	38
4.5.1 Functional description	38
4.5.2 Activating TCP Speed Control	39
4.5.3 TCP Speed Control mode	41
5 Fronius Interface application	49
5.1 Overview	49
5.2 Starting the interface	50
5.3 Selecting the arc welding system	51
6 Fronius Interface views	53
6.1 Job Manager	53
6.1.1 The Job Manager view	53
6.1.2 Handling jobs	55
6.2 Monitor	58
6.2.1 The Monitor view	58
6.3 Backup and Restore	60
6.3.1 The backup and restore function	60
7 Fronius error codes	63
Index	67

This page is intentionally left blank

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

Continues on next page

Revisions

Revision	Description
-	Released with RobotWare 6.0.
A	Released with RobotWare 6.01. <ul style="list-style-type: none">• Title is changed from <i>Programming Fronius TPS Integrated Power Source</i> to <i>Programming Fronius power source</i>.• Added chapters <i>Installation</i>, <i>System parameters</i>, <i>Fronius interface modes</i>, and <i>Fronius error codes</i> that were previously published as <i>Application manual - Fronius 4000/5000 IRC5 Interface</i>, 3HEA802920-001.• Added <i>TCP Speed Control</i>.
B	Added text, in section Fronius Weld Schedules on page 25 , about available jobs if Fronius RCU is connected.
C	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.

This page is intentionally left blank

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.

This page is intentionally left blank

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 DefaultI/O	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

Continues on next page

Continued

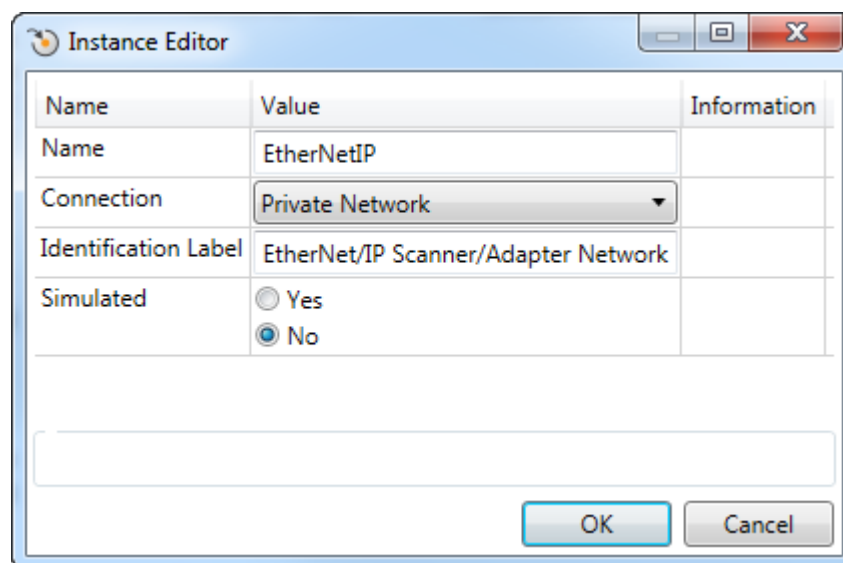
Pin 5. 0 Volts

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

© Copyright 2016 ABB. All rights reserved.

Industrial network

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



xx150000642

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

Continues on next page

2 Installation

2.1 Hardware

Continued

Name	Value	Information
Name	ioFronius2_EIP	
Connected to Industrial Network	EtherNet/IP	
State when System Startup	Activated	
Trust Level	DefaultTrustLevel	
Simulated	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Vendor Name	HMS Networks	
Product Name	Anybus-S EtherNet/IP	
Recovery Time (ms)	5000	
Identification Label		
EtherNet/IP Address	192.168.125.161	
Vendor ID	90	
Product Code	14	
Device Type	12	
Output Assembly	150	
Input Assembly	100	
Configuration Assembly	0	
Ownership	Exclusive	
Input Connection Type	Point-to-point	
Connection Priority	Low	
Output Size (bytes)	42	
Input Size (bytes)	42	
Request Packet Interval (ms)	20	
Quick Connect	Not Used	

OK Cancel

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

This page is intentionally left blank

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 <i>Fronius Equipment Properties</i> .
Use Equipment Standard IO	string	The name of the <i>Equipment Standard IO</i> to use.
Use Fronius Equipment IO	string	The name of the <i>Fronius Equipment IO</i> to use.
Mode	string	<p>The mode of the welder.</p> <p>The following modes are selectable:</p> <ul style="list-style-type: none"> • Program Mode • Job Mode • Job Mode with Correction • TCP Speed Control <p>Default value: Job Mode with Correction.</p>
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.

Continues on next page

3 System parameters

3.1 DeviceNet

Continued

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 <code>seamdata</code> will also change. Default value: <code>FALSE</code> .
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 <code>AUTO</code> mode, otherwise not allowed. Default value: <code>FALSE</code> .
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: <code>FALSE</code> .

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 <i>Arc Standard IO</i> .
StopProc	signal _{di}	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	signal _{do}	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	signal _{di}	Digital input signal for manual wire feed. A high signal means that the welding equipment has manual wire feed enabled.
WeldInhib	signal _{di}	Digital input signal for program execution without welding. A high signal means that welding is inhibited.
WeaveInhib	signal _{di}	Digital input signal for program execution without weaving. A high signal means that weaving is inhibited.
TrackInhib	signal _{di}	Digital input signal to inhibit tracking. (Not seen on FlexPendant). A high signal means that the tracking is inhibited.
GunOk	signal _{di}	Digital input signal for supervision of the torch. A high signal means that the torch is OK.
SupervGun	signal _{do}	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
AWEError	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 <i>Arc Equipment Analogue Inputs</i> .
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
PowerOutOfRange 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

3 System parameters

3.1 DeviceNet

Continued

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 <code>voltage</code> is available. Also referred to as <i>ArcLength</i> .
FeedReference AO (required)	signalao	Analog output signal for analog wire feed reference. If wire feed is defined, the component <code>wirefeed</code> in <code>welddata</code> is available. Also referred to as <i>Power</i> .
ControlPort AO (required)	signalao	Analog output to control the welder. Also referred to as <i>Dynamic</i> .
BurnBackCorrection AO (required)	signalao	Analog output for burn back correction. Also referred to as <i>BurnBackCorrection</i> .
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.
MotorCurrent-Meas 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.
WelderError-Codes 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 <i>Fronius Weld Schedule</i> , in the format: Robottaskname_arcsystem_mode_job, for example T_ROB1_1_2_1
Description	string	Description of job number, for example <i>Job 1</i>
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 System parameters

3.2 EtherNet/IP

3.2 EtherNet/IP

Fronius Arc Equipment Properties

Parameter	Data type	Description
Name	string	The name of the <i>Fronius Equipment Properties</i> .
Use Equipment Standard IO	string	The name of the <i>Equipment Standard IO</i> to use.
Use Fronius Equipment IO	string	The name of the <i>Fronius Equipment IO</i> to use.
Mode	string	<p>The mode of the welder. The following modes are selectable:</p> <p>The following modes are selectable:</p> <ul style="list-style-type: none">• Program Mode• Job Mode• Job Mode with Correction• TCP Speed Control <p>Default value: Job Mode with Correction.</p>
Ignition on	bool	Specifies if ignition data specified in <i>seamdata</i> 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 <i>seamdata</i> 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 <i>seamdata</i> will also change. Default value: FALSE.
Heat as time	bool	Specifies if the heat phase should use the <i>seamdata</i> parameters <i>heat_time</i> or <i>heat_distance</i> . TRUE means that <i>heat_time</i> is used and visible in the <i>seamdata</i> . FALSE means that <i>heat_distance</i> and <i>heat_speed</i> is used and visible in the <i>seamdata</i> . Default value: FALSE.
Cool time on	bool	Enables masking of <i>cool_time</i> component in <i>seamdata</i> . 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 <i>seamdata</i> 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 <i>Arc Standard IO</i> .
StopProc	signal di	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	signal do	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	signal di	Digital input signal for manual wire feed. A high signal means that the welding equipment has manual wire feed enabled.
WeldInhib	signal di	Digital input signal for program execution without welding. A high signal means that welding is inhibited.
WeaveInhib	signal di	Digital input signal for program execution without weaving. A high signal means that weaving is inhibited.
TrackInhib	signal di	Digital input signal to inhibit tracking. (Not seen on FlexPendant.) A high signal means that the tracking is inhibited.
GunOk	signal di	Digital input signal for supervision of the torch. A high signal means that the torch is OK.
SupervGun	signal do	Digital output signal for indication of torch errors. A high signal means that an error has occurred.
AWError	signal do	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 <i>Arc Equipment Analog Inputs</i> .
ArcEst DI (required)	signal di	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	signal di	Digital input for supervision of the Main Current. A high signal means that the Main current is OK

Continues on next page

3 System parameters

3.2 EtherNet/IP

Continued

Parameter	Data type	Description
WaterOk DI	signal _{di}	Digital input signal for supervision of the water. A high signal means that the water is OK.
GasOk DI	signal _{di}	Digital input signal for supervision of the protective gas. A high signal means that the protective gas is OK.
Internal Wirestick-Err (required)	signal _{di}	Digital input signal for supervision of the wire stick status. A high signal means that an error has occurred.
Internal Wirestick-ON (required)	signal _{do}	Digital output signal to indicate Wirestick errors.
WelderReady DI (required)	signal _{di}	Digital input signal for WelderReady.
WelderCommOk DI (required)	signal _{di}	Digital input signal for Welder Communication Ok.
Internal Welder-Ready DI	signal _{di}	Internal digital input signal that indicates if the welder is ready.
PowerOutOfRange DI	signal _{di}	Digital input for supervision of Power Out of Range. A high signal means that the power is out of range.
GasOn DO (required)	signal _{do}	Digital output signal for control of the gas flow. A high signal means that the gas flow is active.
WeldOn DO (required)	signal _{do}	Digital output signal for control of the weld voltage. A high signal means that the weld voltage control is active.
FeedOn DO (required)	signal _{do}	Digital output signal for activation of the wire feed. A high signal means wire feed forward.
FeedOnBwd DO (required)	signal _{do}	Digital output signal for backward activation of the wire feed. A high signal means wire feed backward.
RobotReady DO (required)	signal _{do}	Digital output signal indicating that the robot is ready.
WelderErrReset DO (required)	signal _{do}	Digital output signal to reset the welder.
Internal Welder-Ready DO	signal _{do}	Internal digital output signal that indicates if the welder is ready.
Touch Sense DO (required)	signal _{do}	Digital output for Touch Sense.
Update Weld Schedules DO (required)	signal _{do}	Digital output used for retrieving weld schedules from the welder and save them to file.
Supervision Welder DO	signal _{do}	Digital output signal that indicates welder supervision.
SupervArc DO	signal _{do}	Digital output signal for indication of welding arc errors. A high signal means that an error has occurred.
SupervWater DO	signal _{do}	Digital output signal for indication of cooling water errors. A high signal means that an error has occurred.
SupervGas DO	signal _{do}	Digital output signal for indication of protective gas errors. A high signal means that an error has occurred.
SupervWireStick DO	signal _{do}	Digital output signal for indication of wire feed errors. A high signal means that an error has occurred.
TcpSpeedCtrl DO	signal _{do}	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 <i>ArcLength</i> .
FeedReference AO (required)	signalao	Analog output signal for analog wire feed reference. If wire feed is defined, the component <i>wirefeed</i> in <i>welddata</i> is available. Also referred to as <i>Power</i> .
ControlPort AO (required)	signalao	Analog output to control the welder. Also referred to as <i>Dynamic</i> .
BurnBackCorrection AO (required)	signalao	Analog output for burn back correction. Also referred to as <i>BurnBackCorrection</i> .
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.
MotorCurrent-Meas 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.
WelderError-Codes 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 <i>Fronius Weld Schedule</i> , in the format: <i>Robottaskname_arcsystem_mode_job</i> , for example, <i>T_ROB1_1_2_1</i> .
Schedule Name	string	Name of the job, for example <i>Job 1</i>
Description	string	Description of job number, for example <i>Job 1</i>
Settings	float	Internal data
Settings2	float	Internal data
Wire Size	float	The size of the wire used in the job.

Continues on next page

3 System parameters

3.2 EtherNet/IP

Continued

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.

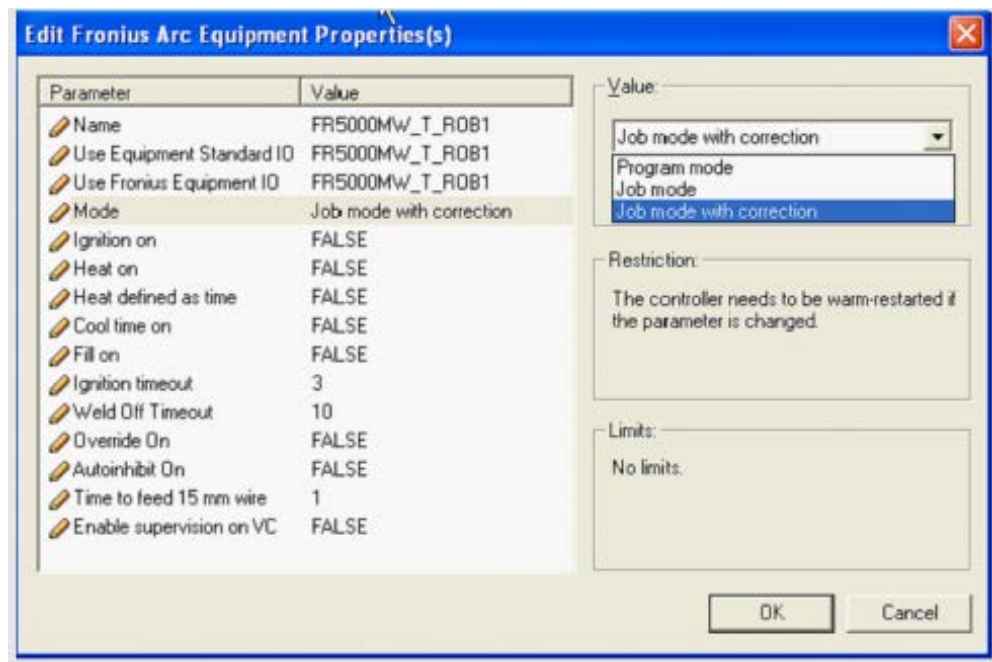
Continues on next page

4 Fronius Interface modes

4.1 Overview

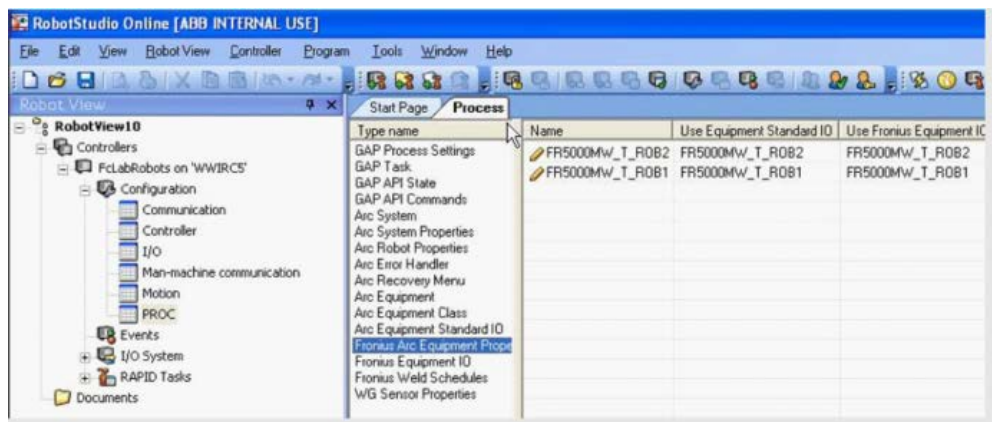
Continued

The configuration editor on the FlexPendant



xx1500000444

The configuration editor in RobotStudio






xx1500000445

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 <i>sched</i> is equivalent to a Fronius job. For example <i>sched 1</i> 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.



Manual
System3(USABBDTWL17182)
Guard Stop
Stopped (2 of 2) (Speed 100%)



Edit

Name: weld1

Tap a field to edit the value.

Name	Value	Data Type	1 to 4 of 4
weld1:	[10,[1]]	welddata	
weld_speed :=	10	num	
main_arc:	[1]	arcdata	
sched :=	1	num	

Refresh
OK
Cancel

T_ROB1 : MainModule





xx1500000447

4 Fronius Interface modes

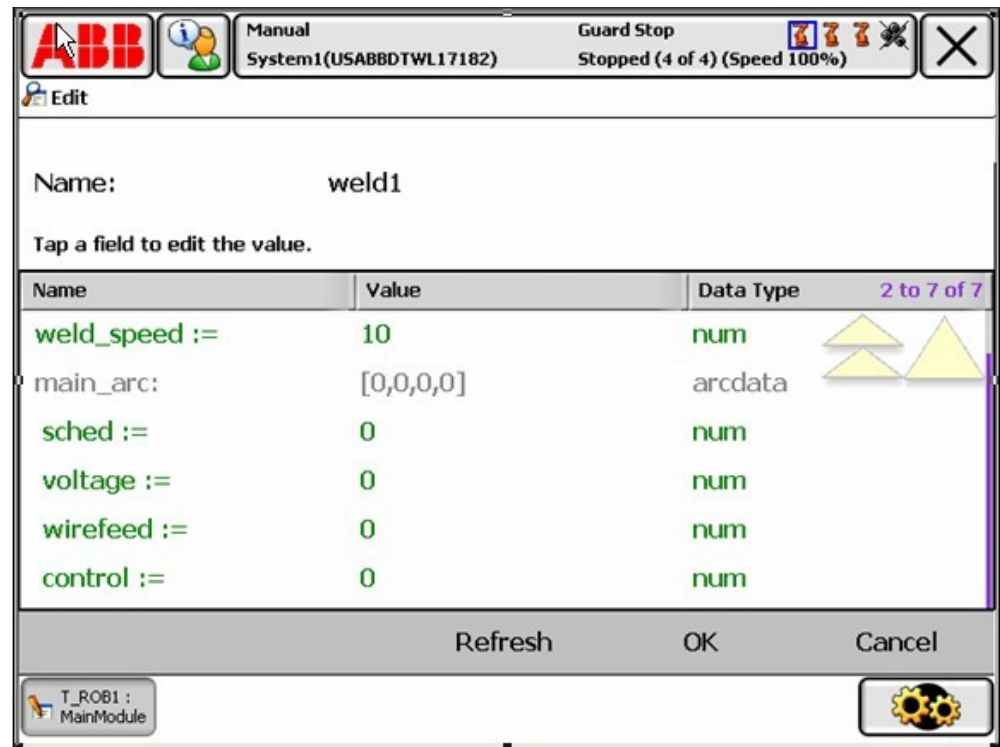
4.3 Job Mode with Correction

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 <i>sched</i> is equivalent to a Fronius job. For example <i>sched 1</i> 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	<p>Arc-length correction boundary for arc length upwards and downwards -30% to +30% of the value set for <i>AL.1</i> in the job for the power supply. Example <i>AL.1</i> in the Fronius Job is set to +10 and +30 (voltage) is set in your weld data. Your resultant value for <i>AL.1</i> is 13.</p> <p> Note</p> <p>Arc Length Control must be set in the power supply for the voltage setting in the weld data to have an effect.</p>
wirefeed	<p>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 <i>Pch</i>, and a wire feed value of -100 will give you the lowest <i>Pcl</i> 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.</p> <p> Note</p> <p><i>Pch</i> and/or <i>Pcl</i> must be set in the power supply for the wire feed setting in the weld data to have an effect.</p> <p> Note</p> <p>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.</p>
control	Arc-force dynamic correction (constant voltage or synergic) or pulse correction (pulsed arc). The range is -5 to +5.

Continues on next page



xx1500000448

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 Fronius Interface modes

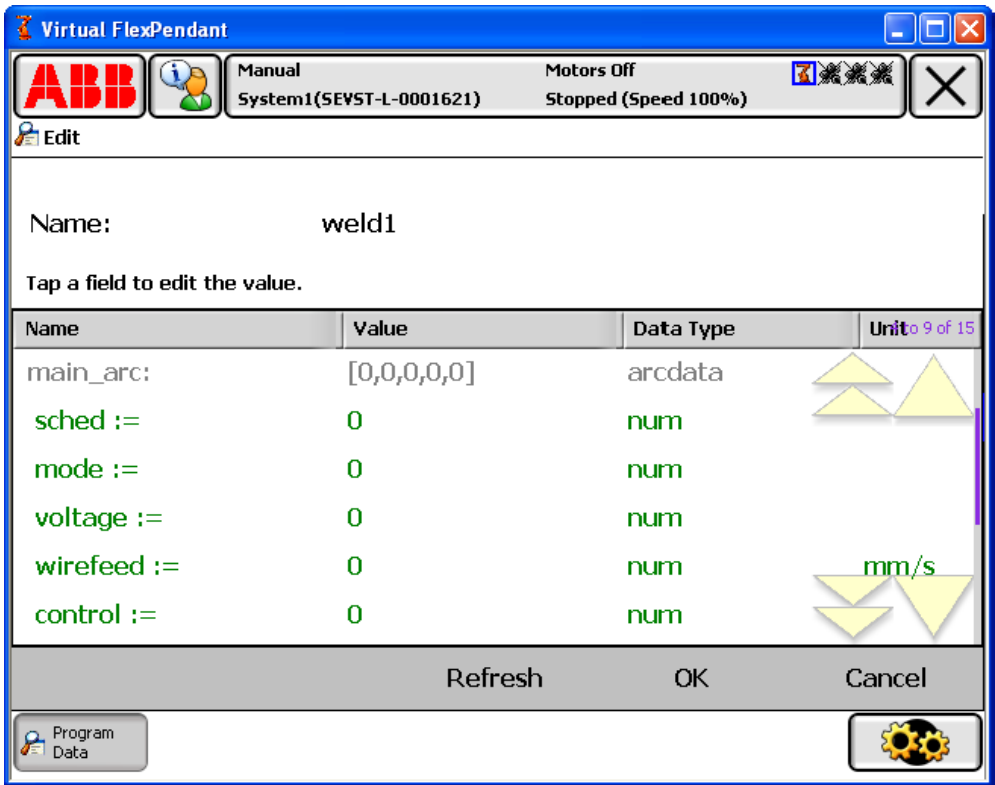
4.4 Program Mode

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 <i>sched</i> 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 <i>mode</i> 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	<p>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 <i>Pch</i>, and a wire feed value of 0 will give you the lowest <i>Pcl</i> value.</p> <p>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.</p> <p> Note</p> <p><i>Pch</i> and/or <i>Pcl</i> must be set in the power supply for the wire feed setting in the weld data to have an effect.</p> <p> Note</p> <p>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.</p>
control	Arc-force dynamic correction (constant voltage or synergic) or pulse correction (pulsed arc). The range is -5 to +5.

Continues on next page



xx1500000449

4 Fronius Interface modes

4.5.1 Functional description

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

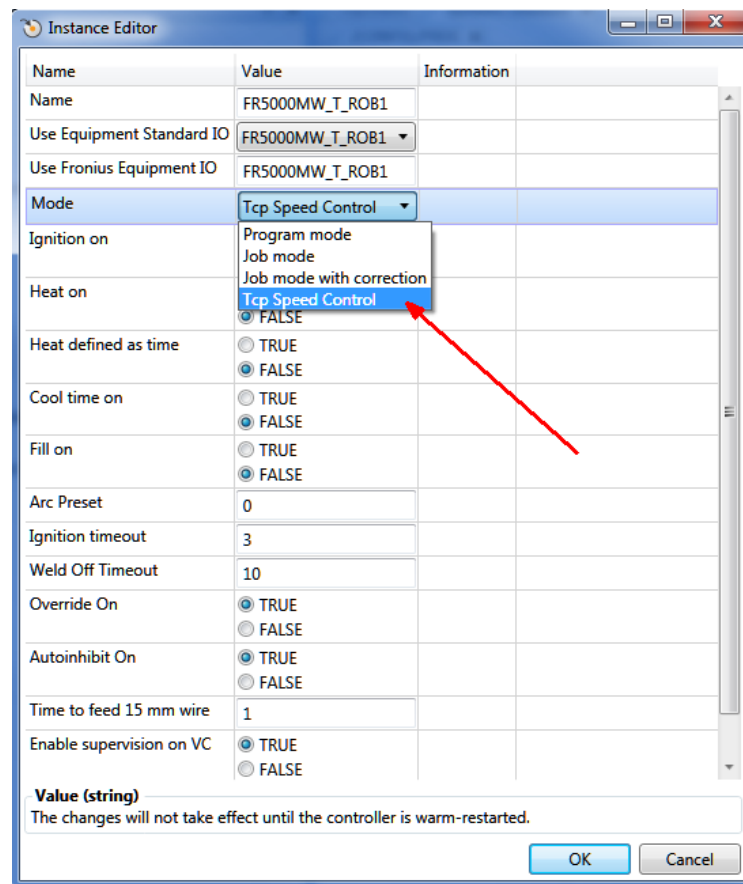
Activating TCP Speed Control

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.



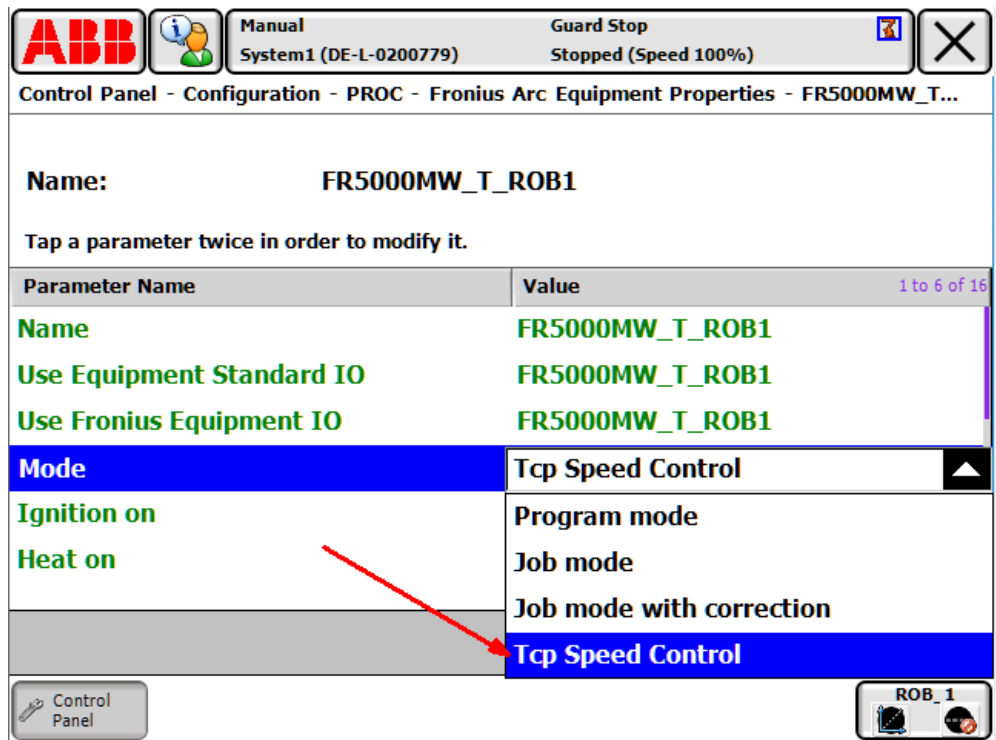
xx1500000477

Continues on next page

4 Fronius Interface modes

4.5.2 Activating TCP Speed Control

Continued



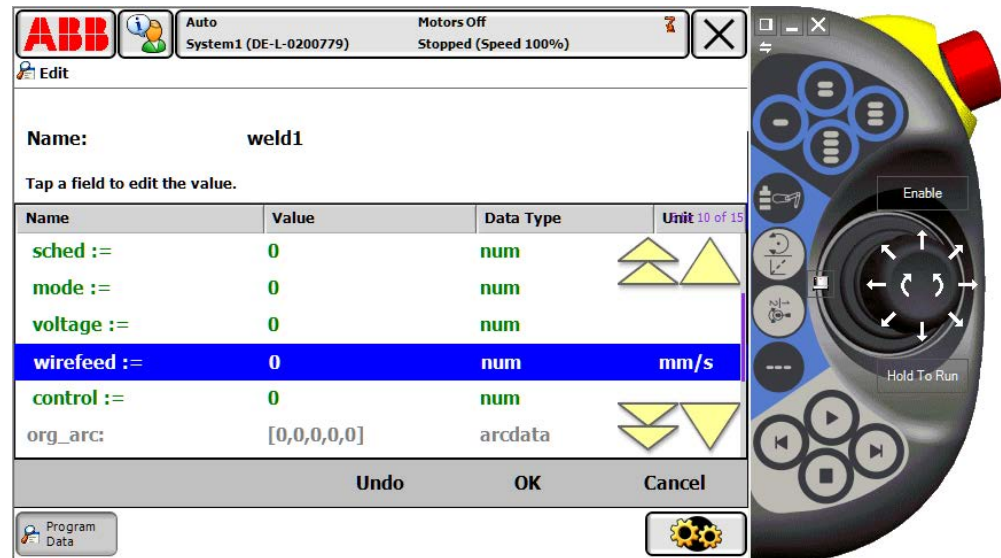
xx1500000478

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



xx1500000479

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 <i>sched</i> 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 <i>mode</i> 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 Fronius Interface modes

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 <i>schedule</i> 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 <i>mode</i> has a range of 0 to 7, but for GMAW with Fronius <i>TCP Speed Control</i> only use the modes listed below. <ul style="list-style-type: none">• 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

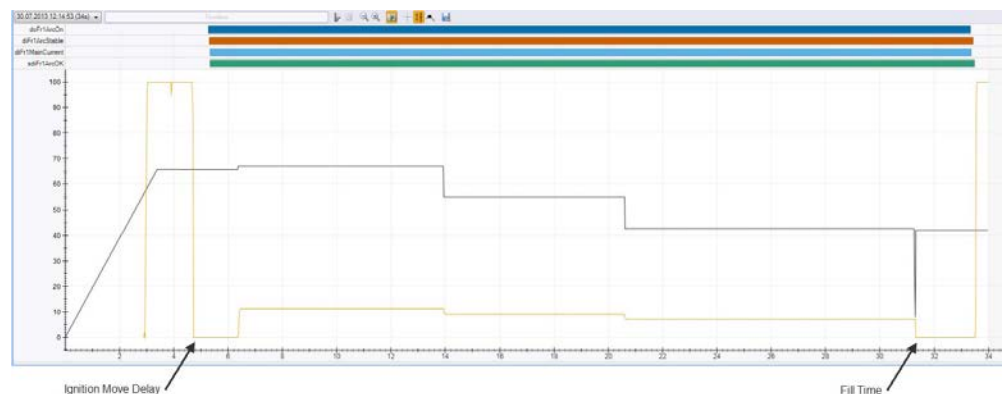
Parameters	Description
sched	The parameter <i>schedule</i> is equivalent to a Fronius program. The Fronius power supply has programs for many different types of materials, wire diameters, and transfer modes. The program (also known as a synergic line or a wave form) is stored in the power supply. The range is 1 to 127.
mode	The parameter <i>mode</i> has a range of 0 to 7, but for GMAW with Fronius <i>TCP Speed Control</i> only use the modes listed below. <ul style="list-style-type: none"> • 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



xx1500000480

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 Fronius Interface modes

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.

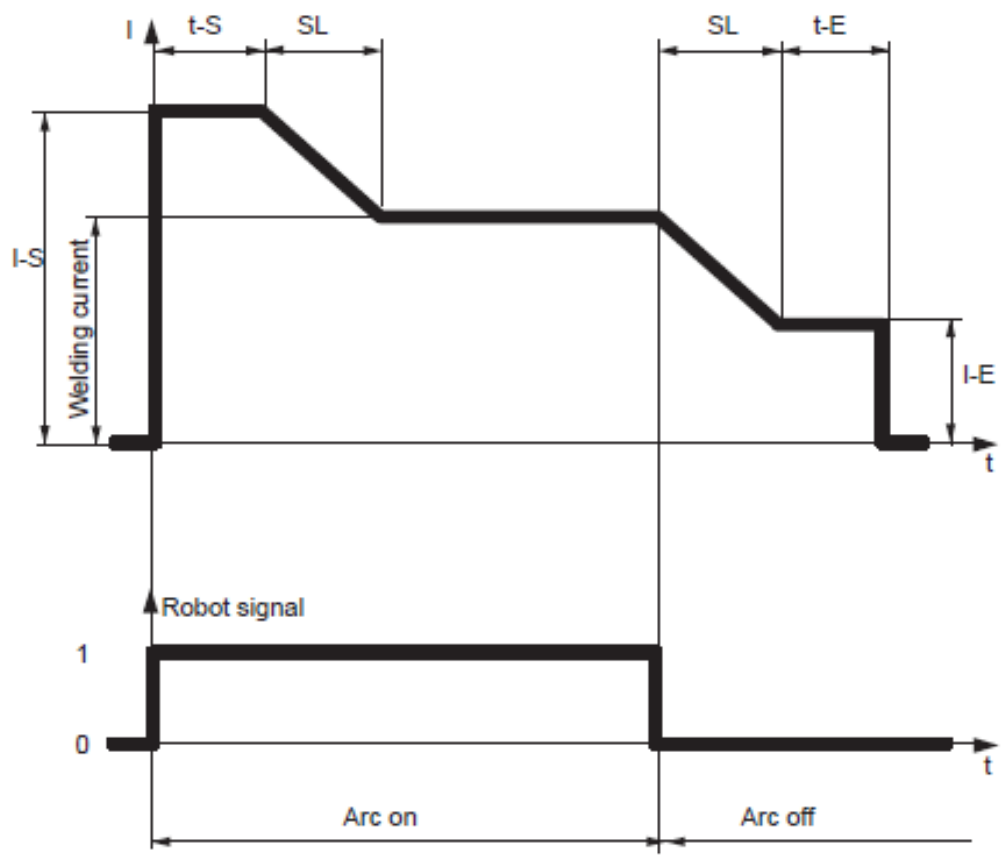


xx1500000481

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.

Continues on next page

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



xx1500000482

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 Fronius Interface modes

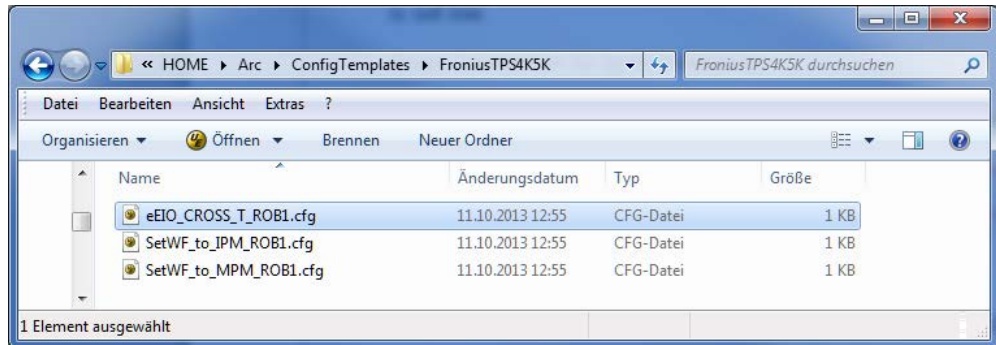
4.5.3 TCP Speed Control mode

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`)



xx1500000483

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.

$\text{Ignition timeout} = (t-S) + (\text{SlopeTime}) + 0.1 \text{ sec}$

Continues on next page



Note

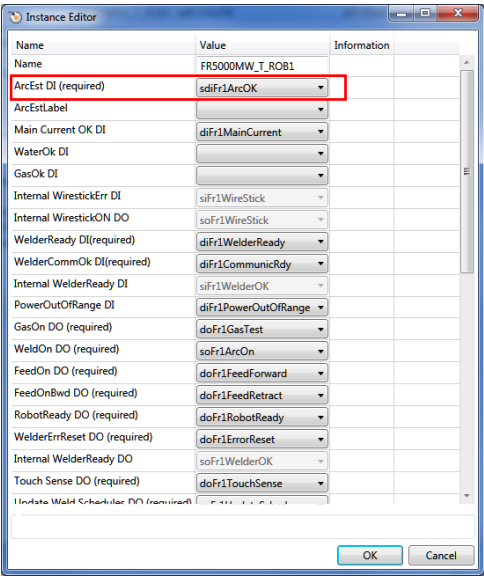
Make sure that the *Weld Off Timeout* parameter in *Fronius Arc Equipment Properties* is high enough to avoid any timeout errors during the fill phase.

$$\text{Weld Off timeout} = (t-E) + (\text{SlopeTime}) + 0.1 \text{ sec}$$



Note

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



xx1500000484

This page is intentionally left blank

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.

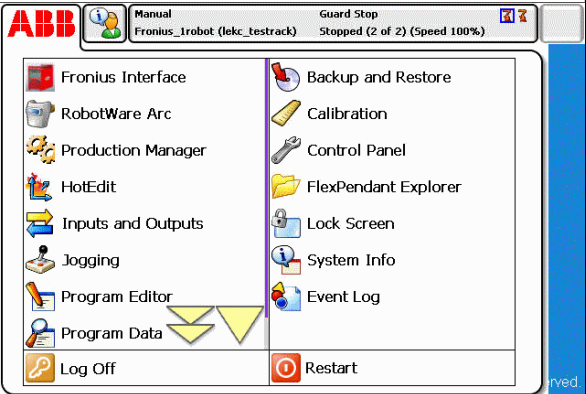
5 Fronius Interface application

5.2 Starting the interface

5.2 Starting the interface

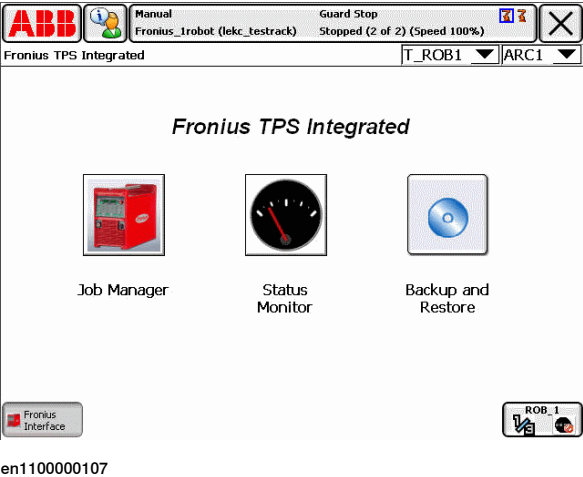
Starting the Fronius Interface application

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

	Action	Information
1	Tap the ABB menu.	
2	Tap Fronius Interface.	 <p>The screenshot shows the ABB menu interface. At the top, it displays 'ABB' and 'Manual Fronius_1robot (lekc_testrack)'. Below this, there's a status bar indicating 'Guard Stop Stopped (2 of 2) (Speed 100%)'. The main menu lists several options: Fronius Interface, RobotWare Arc, Production Manager, HotEdit, Inputs and Outputs, Jogging, Program Editor, Program Data, Log Off, Backup and Restore, Calibration, Control Panel, FlexPendant Explorer, Lock Screen, System Info, Event Log, and Restart. The 'Fronius Interface' option is highlighted with a red box. At the bottom right, there's a 'ROB_1' icon and a small 'en1100000106' label.</p>

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.



5.3 Selecting the arc welding system

General

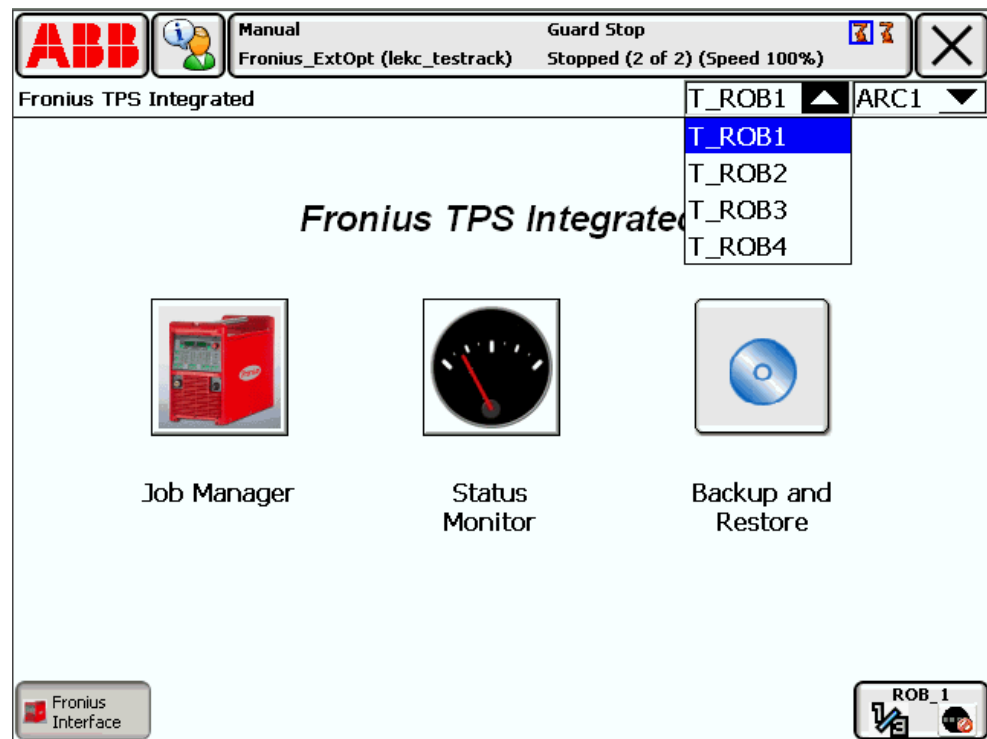
The selection of the arc welding system determines on which equipment the interface is operating on.

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

Continues on next page

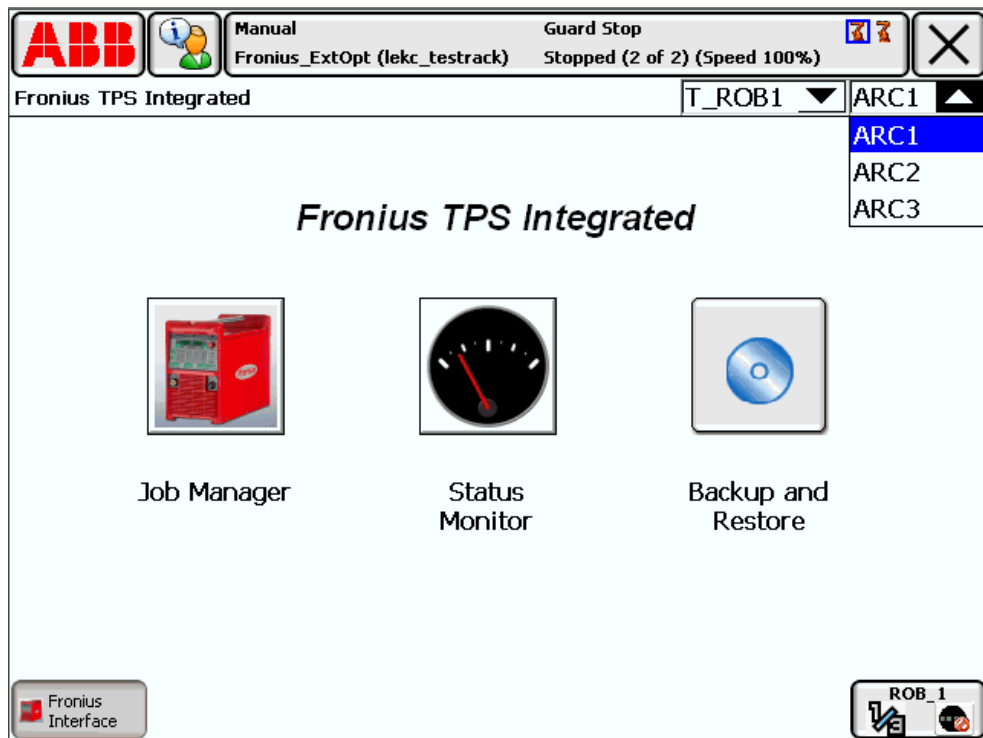
5 Fronius Interface application

5.3 Selecting the arc welding system

Continued

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.



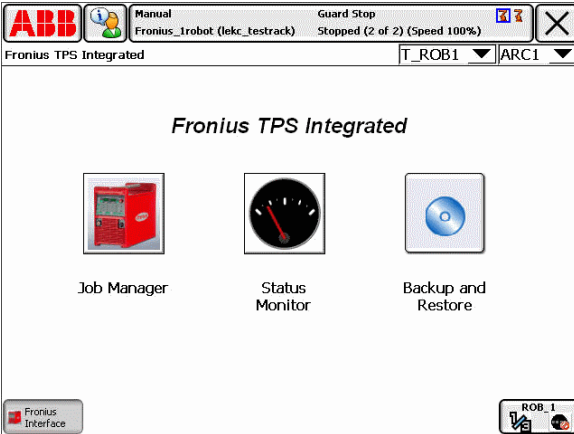
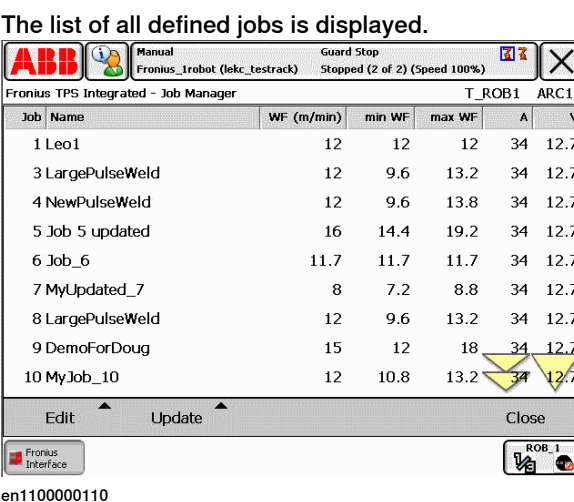
en1100000109

6 Fronius Interface views

6.1 Job Manager

6.1.1 The Job Manager view

Opening the Job Manager

Action	Info/illustration																																																																						
1	<div>Tap the Job Manager button in the main view to open the Job Manager.</div> <div><p>The list of all defined jobs is displayed.</p><table><thead><tr><th>Job</th><th>Name</th><th>WF (m/min)</th><th>min WF</th><th>max WF</th><th>A</th><th>V</th></tr></thead><tbody><tr><td>1</td><td>Leo1</td><td>12</td><td>12</td><td>12</td><td>34</td><td>12.7</td></tr><tr><td>3</td><td>LargePulseWeld</td><td>12</td><td>9.6</td><td>13.2</td><td>34</td><td>12.7</td></tr><tr><td>4</td><td>NewPulseWeld</td><td>12</td><td>9.6</td><td>13.8</td><td>34</td><td>12.7</td></tr><tr><td>5</td><td>Job 5 updated</td><td>16</td><td>14.4</td><td>19.2</td><td>34</td><td>12.7</td></tr><tr><td>6</td><td>Job_6</td><td>11.7</td><td>11.7</td><td>11.7</td><td>34</td><td>12.7</td></tr><tr><td>7</td><td>MyUpdated_7</td><td>8</td><td>7.2</td><td>8.8</td><td>34</td><td>12.7</td></tr><tr><td>8</td><td>LargePulseWeld</td><td>12</td><td>9.6</td><td>13.2</td><td>34</td><td>12.7</td></tr><tr><td>9</td><td>DemoForDoug</td><td>15</td><td>12</td><td>18</td><td>34</td><td>12.7</td></tr><tr><td>10</td><td>MyJob_10</td><td>12</td><td>10.8</td><td>13.2</td><td>34</td><td>12.7</td></tr></tbody></table></div>	Job	Name	WF (m/min)	min WF	max WF	A	V	1	Leo1	12	12	12	34	12.7	3	LargePulseWeld	12	9.6	13.2	34	12.7	4	NewPulseWeld	12	9.6	13.8	34	12.7	5	Job 5 updated	16	14.4	19.2	34	12.7	6	Job_6	11.7	11.7	11.7	34	12.7	7	MyUpdated_7	8	7.2	8.8	34	12.7	8	LargePulseWeld	12	9.6	13.2	34	12.7	9	DemoForDoug	15	12	18	34	12.7	10	MyJob_10	12	10.8	13.2	34	12.7
Job	Name	WF (m/min)	min WF	max WF	A	V																																																																	
1	Leo1	12	12	12	34	12.7																																																																	
3	LargePulseWeld	12	9.6	13.2	34	12.7																																																																	
4	NewPulseWeld	12	9.6	13.8	34	12.7																																																																	
5	Job 5 updated	16	14.4	19.2	34	12.7																																																																	
6	Job_6	11.7	11.7	11.7	34	12.7																																																																	
7	MyUpdated_7	8	7.2	8.8	34	12.7																																																																	
8	LargePulseWeld	12	9.6	13.2	34	12.7																																																																	
9	DemoForDoug	15	12	18	34	12.7																																																																	
10	MyJob_10	12	10.8	13.2	34	12.7																																																																	

Continues on next page

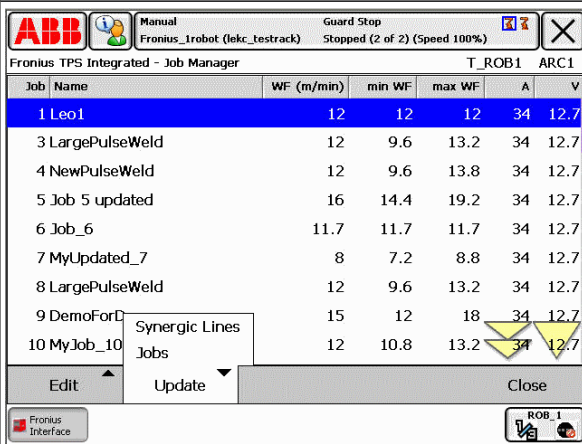
6 Fronius Interface views

6.1.1 The Job Manager view

Continued

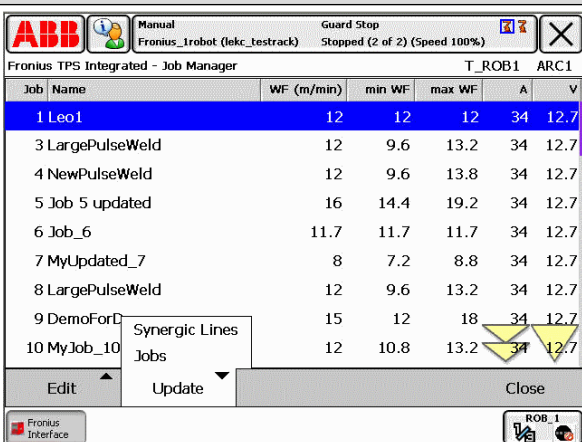
Update the synergic lines

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	<p>In the Job Manager, tap the Update menu and select Synergic Lines.</p>  <p>The update may take a few minutes.</p>

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	<p>In the Job Manager, tap the Update menu and select Jobs.</p>  <p>The update may take a few minutes. The time depends on how many jobs are defined in the power source.</p>

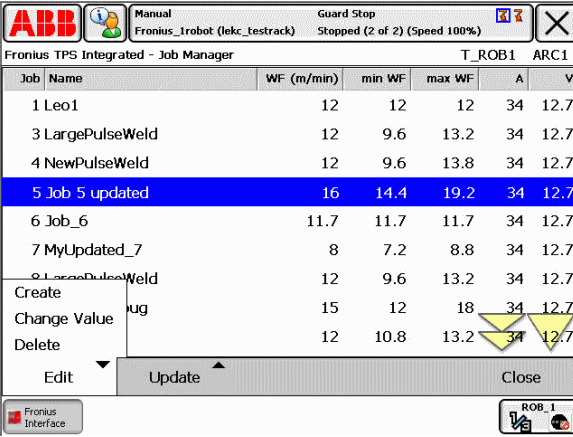
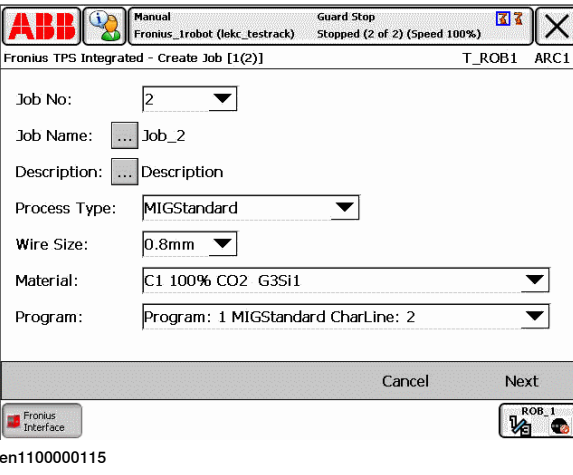
6.1.2 Handling jobs

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.

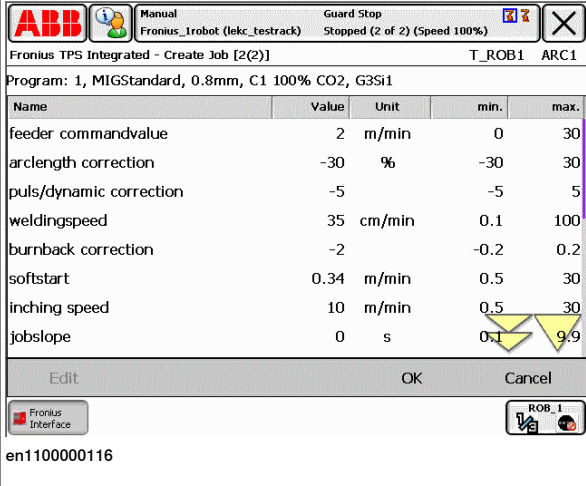
	Action	Info/illustration
1	In the Job Manager , tap the Edit menu and select Create .	 <p>The first view of a two step wizard to create a job is displayed.</p>
2	In the first view of the job creation wizard, do the following: <ul style="list-style-type: none"> • select a job number • edit the job name • 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 .	

Continues on next page

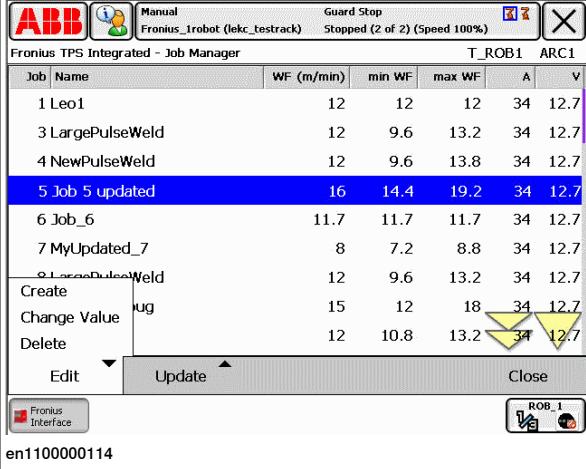
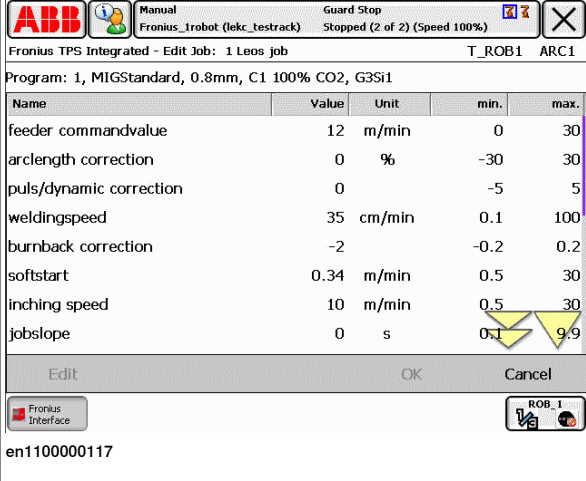
6 Fronius Interface views

6.1.2 Handling jobs

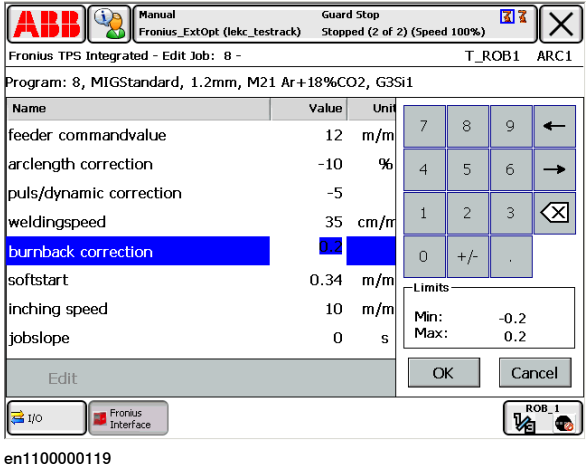
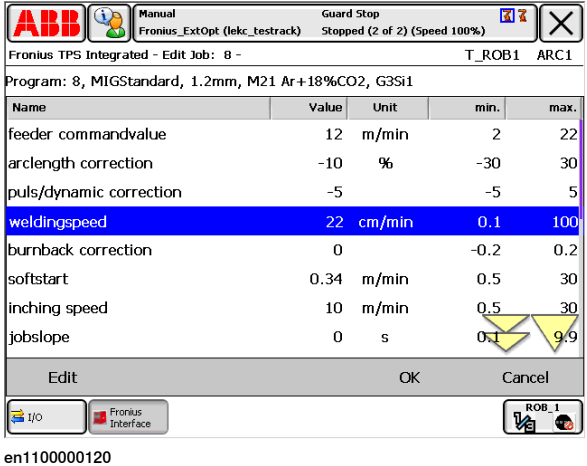
Continued

Action	Info/illustration
3	<p>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.</p> 

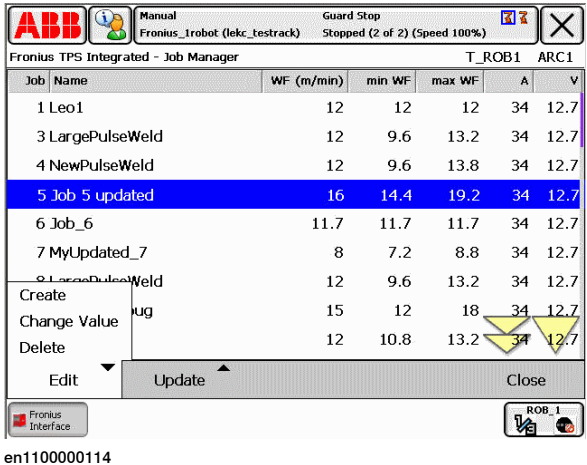
Editing a job

Action	Info/illustration
1	<p>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.</p> 
2	<p>Select the parameter you want to edit and tap Edit.</p> 

Continues on next page

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

Deleting a job

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

6 Fronius Interface views

6.2.1 The Monitor view

6.2 Monitor

6.2.1 The Monitor view

Opening the Monitor view

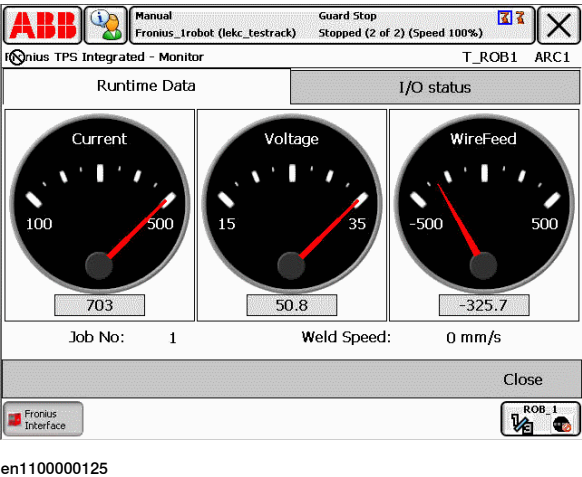
Action	Info/illustration
1 Tap the Status Monitor button in the start window to open the Monitor view.	

Monitor tabs

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

Runtime Data

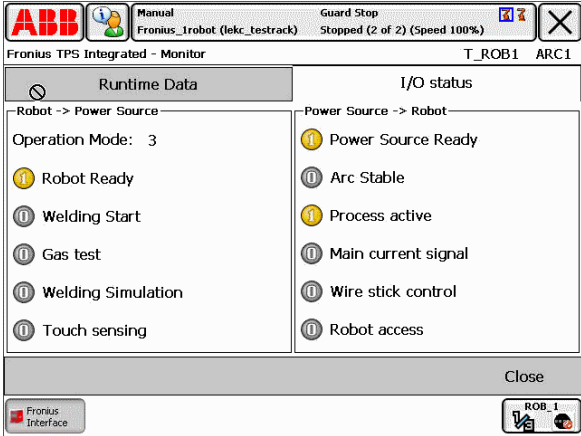
The **Runtime Data** tab displays one voltage meter, one current meter and one wire feed meter. They show values that are measured and returned by the power source.



Continues on next page

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 Fronius Interface views

6.3.1 The backup and restore function

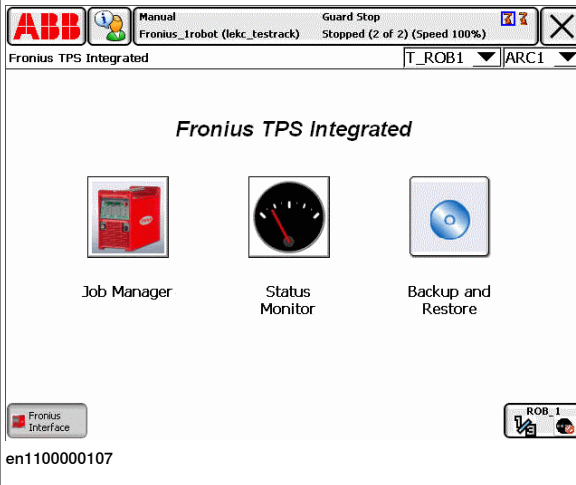
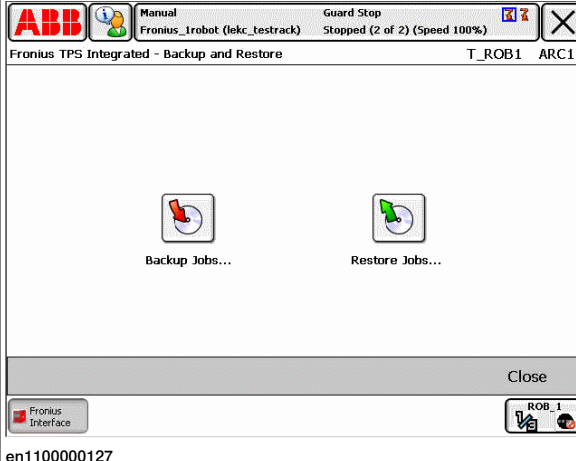
6.3 Backup and Restore

6.3.1 The backup and restore function

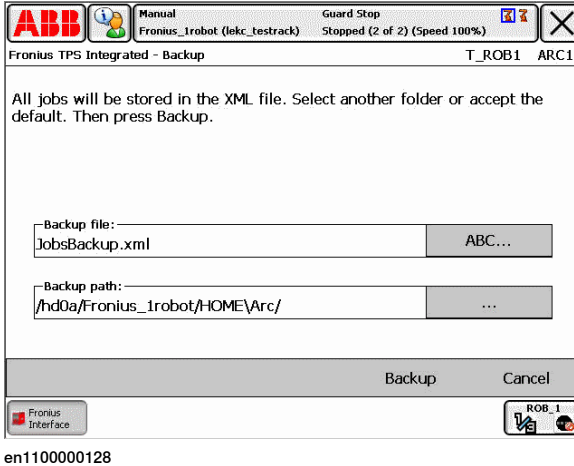
About backup and restore

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.

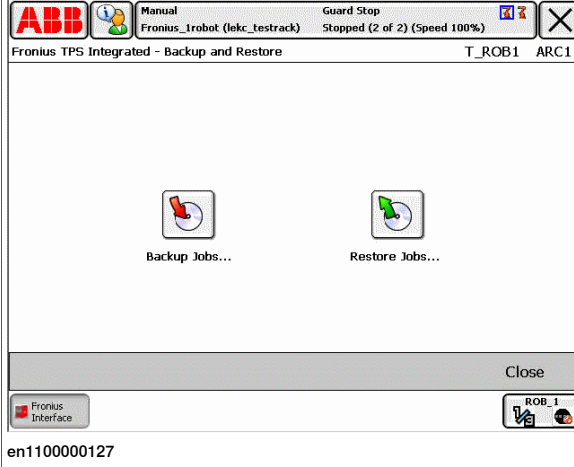
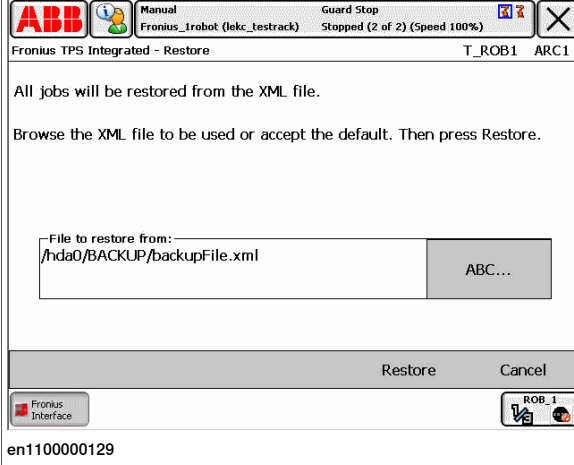
Creating a backup of the current jobs

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

Continues on next page

Action	Info/illustration
3	<p>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.</p> 

Restoring a backup of jobs

Action	Info/illustration
1	<p>In the Backup and Restore view, tap Restore Memory Channels.</p> 
2	<p>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.</p> 

This page is intentionally left blank

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**.

Event Log - Event Message

Event Message 110473

2006-10-05 16:37:37



Weld Equipment Error

Description

Task: T_ROB1

/ModuleR1S2/ProgStn2/ArcLEnd/79

Error: 30 Wirefeed error

(format: ErrorCode ErrorText)

Actions

Check the Power Source.

Next

Previous

OK

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

7 Fronius error codes

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

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

This page is intentionally left blank

Index

A

arc welding system, 51

B

backup, 60

Beckhoff, 15

C

creating job, 55

current meter, 58

D

deleting job, 57

DeviceNet

system parameters, 21

E

editing job, 56

error codes, 63

EtherNet/IP

system parameters, 26

G

gas information, 54

I

I/O status, 59

Installation Manager, 19

interface modes, 31

J

job

create, 55

delete, 57

edit, 56

job list, 54

Job Manager, 53

Job Mode, 33

Job Mode with Correction, 34

L

Limitations, 49

M

manuals referred to, 7

material information, 54

Monitor, 58

P

Power out of Range, 38

power sources supported, 49

prerequisites, 19

Program Mode, 36

R

references, 7

restore, 61

robot selection, 51

runtime data, 58

S

safety, 11

selecting arc welding system, 51

selecting robot, 51

signal status, 59

supported power sources, 49

synergic lines, 54

system parameters

DeviceNet, 21

EtherNet/IP, 26

T

TCP Speed Control, 38

U

update job list, 54

update synergic lines, 54

V

voltage meter, 58

W

wire dimension information, 54

wire feed meter, 58

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