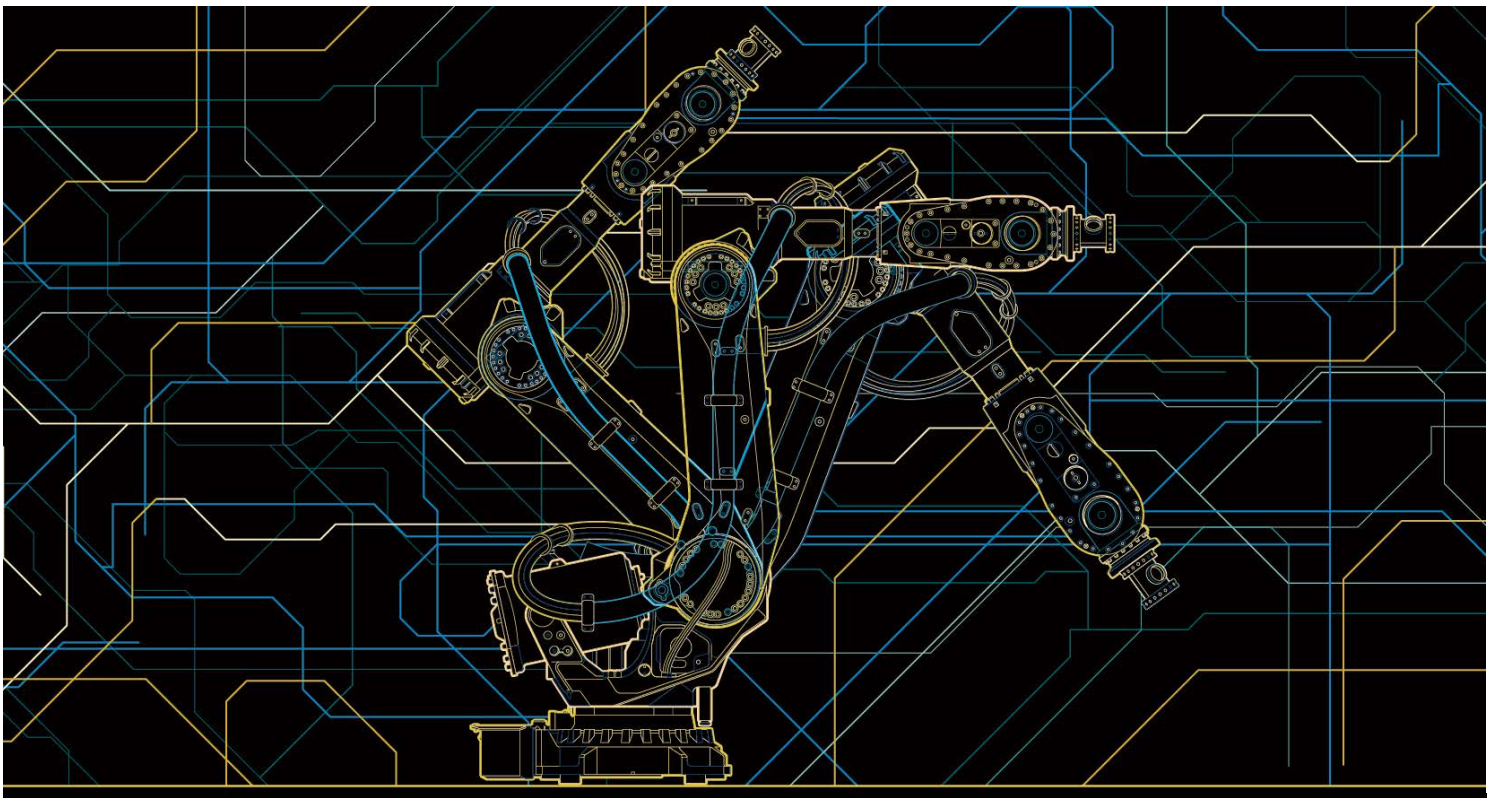

Application manual
SKS Interface with Feldbus 5

Power and productivity
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Application manual

SKS Interface with Feldbus 5

RobotWare 6.02

Document ID: 3HAC054884-001

Revision: A

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

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Table of contents

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Overview of this manual

About this manual

This manual contains information on how to:

- Create and edit schedules.
- Create user defined synergic lines.
- Read service information and execute service functions.
- Backup and restore SID files.

Usage

This manual is intended to be used for:

- Programming
- Maintenance

Who should read this manual?

This manual is intended for:

- Robot programmers
- Maintenance personnel

Basic knowledge

Readers of this manual must be:

- Familiar with industrial robots and the relevant terminology
- Familiar with RAPID programming language
- Familiar with system parameters and how to configure them.

Reference documents

References	Document ID
Technical reference manual - RAPID Instructions, Functions and Data types	*3HAC050917-001*
Technical reference manual - System parameters	*3HAC050948-001*
Application manual - Arc and Arc Sensor	*3HAC050988-001*
ESAB user manual	

Revisions

Revision	Comment
-	First revision.
A	Minor corrections.

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1 Safety

1.1 Safety

Safety of personnel

A robot is heavy and extremely powerful regardless of its speed. A pause or long stop in movement can be followed by a fast hazardous movement. Even if a pattern of movement is predicted, a change in operation can be triggered by an external signal resulting in an unexpected movement.

Therefore, it is important that all safety regulations are followed when entering safeguarded space.

Safety regulations

Before beginning work with the robot, make sure you are familiar with the safety regulations described in the manual *Operating manual - General safety information*.

1.2 Safety for arc welding

Safety instructions for arc welding

Safety instructions can be found in the manual *Introduction and Safety - Arc Welding Products* for all steps that involve risk of personal injury or material damage. In addition, they are included in the instructions for each step.

General warnings, where the intention is to avoid problems, are only included in the instructions.

WARNING

All personnel working with the welding robot system must have a full understanding of the applicable safety instructions.

1.3 Safety signals in the manual

Introduction to safety signals

This section specifies all dangers that can arise when doing the work described in the user manuals. Each danger consists of:

- A caption specifying the danger level (DANGER, WARNING, or CAUTION) and the type of danger.
- A brief description of what will happen if the operator/service personnel **do not** eliminate the danger.
- Instruction about how to eliminate danger to simplify doing the work.

Danger levels

The table below defines the captions specifying the danger levels used throughout this manual.

Symbol	Designation	Significance
 xx0200000022	DANGER	Warns that an accident *will* occur if the instructions are not followed, resulting in a serious or fatal injury and/or severe damage to the product. It applies to warnings that apply to danger with, for example, contact with high voltage electrical units, explosion or fire risk, risk of poisonous gases, risk of crushing, impact, fall from height, and so on.
 xx0100000002	WARNING	Warns that an accident *may* occur if the instructions are not followed that can lead to serious injury, possibly fatal, and/or great damage to the product. It applies to warnings that apply to danger with, for example, contact with high voltage electrical units, explosion or fire risk, risk of poisonous gases, risk of crushing, impact, fall from height, etc.
 xx0200000024	ELECTRICAL SHOCK	Warns for electrical hazards which could result in severe personal injury or death.
 xx0100000003	CAUTION	Warns that an accident may occur if the instructions are not followed that can result in injury and/or damage to the product. It also applies to warnings of risks that include burns, eye injury, skin injury, hearing damage, crushing or slipping, tripping, impact, fall from height, etc. Furthermore, it applies to warnings that include function requirements when fitting and removing equipment where there is a risk of damaging the product or causing a breakdown.
 xx0200000023	ELECTROSTATIC DISCHARGE (ESD)	Warns for electrostatic hazards which could result in severe damage to the product.

Continues on next page

1.3 Safety signals in the manual
Continued

Symbol	Designation	Significance
 xx0100000004	NOTE	Describes important facts and conditions.
 xx0100000098	TIP	Describes where to find additional information or how to do an operation in an easier way.

1.4 DANGER - Make sure that the main power has been switched off!

Description

Working with high voltage is potentially lethal. Persons subjected to high voltage may suffer cardiac arrest, burn injuries, or other severe injuries. To avoid these dangers, do not proceed working before eliminating the danger as detailed below.

1.5 WARNING - The unit is sensitive to ESD!

Description

ESD (electrostatic discharge) is the transfer of electrical static charge between two bodies at different potentials, either through direct contact or through an induced electrical field. When handling parts or their containers, personnel not grounded may potentially transfer high static charges. This discharge may destroy sensitive electronics.

Elimination

	Action	Note
1	Use a wrist strap	Wrist straps must be tested frequently to ensure that they are not damaged and are operating correctly.
2	Use an ESD protective floor mat.	The mat must be grounded through a current-limiting resistor.
3	Use a dissipative table mat.	The mat should provide a controlled discharge of static voltages and must be grounded.

Location of wrist strap button

The location of the wrist strap button is shown in the following illustration.

2 About the SKS Feldbus 5 IRC5 interface

Introduction

This guide describes the ABB Robotics IRC5 interface to the SKS power source models with Fieldbus 5 interface. The functionality described in this interface is part of the sub option SKS Synchroweld for RobotWare Arc.

Prerequisites

System prerequisites

- IRC5 controller
- RobotWare 6.01 or higher with RobotWare Arc
- Fieldbus Interface (DeviceNet, PROFIBUS, PROFINET)

Limitations

- Only the first Arc System is supported.
- If Multiple Arc Systems (per robot) are used, the second and third Arc System will be prepared for the StdIOWelder.
- Welddata tuning with the RobotWareArc GUI is not supported if the *Reference Speed* is set inside the power source.
- A delay of up to 1second occurs if you change a schedule within a weldseam using different weld speeds per schedule inside the welder. (Only if the *Reference Speed* is set inside the welder). Updating the already planed robot path can take a while.

Additional information

Additional information for commissioning and programming for the Q84 Controller, LSQ5 power source, and the Feldbus 5 interface can be found in the official SKS documentation.

Fieldbus 5 Manual

Operating Manual - Q84 Robot welding system

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3 SynchroWeld

About SynchroWeld

Synchroweld unites robot and welding machine to a procedural entity. This combination is made possible because thanks to Synchroweld the welding machine knows the actual welding speed, that is, the TCP speed of the robot and its external axes. The speed information is directly processed in the weld controller. Synchroweld opens up new welding process options.

Advantages of SyncroWeld

Optimum welding results with constant weld penetration and identical appearance at all points of the weld seam (even at the torch reorientation points).

Constant energy input per length – the energy provided in time remains constant during welding.

Process optimization – visualization of the actual TCP speed during welding supports easy optimization of the process.

Work made easier and time saved – even with complicated weld seam geometries only one welding program and one welding speed setting is required.

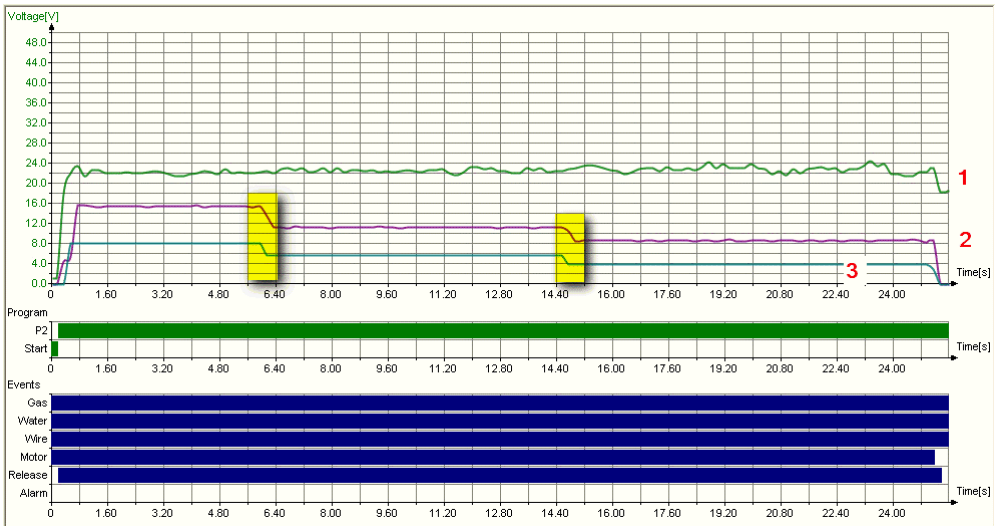
Continues on next page

3.1 Welding with SynchroWeld

Welding with SynchroWeld

The welding parameters are automatically adapted to the actual TCP speed of the robot or the complete system, consisting of robot and external axes. If the robot slows down at the reorientation points or on sharp curves, the welding parameters are synchronized at the same time. Result: A constant energy input per unit length is introduced in the work piece. The result is homogeneous, constant penetration and identical appearance at all points of the weld seam.

Example 1



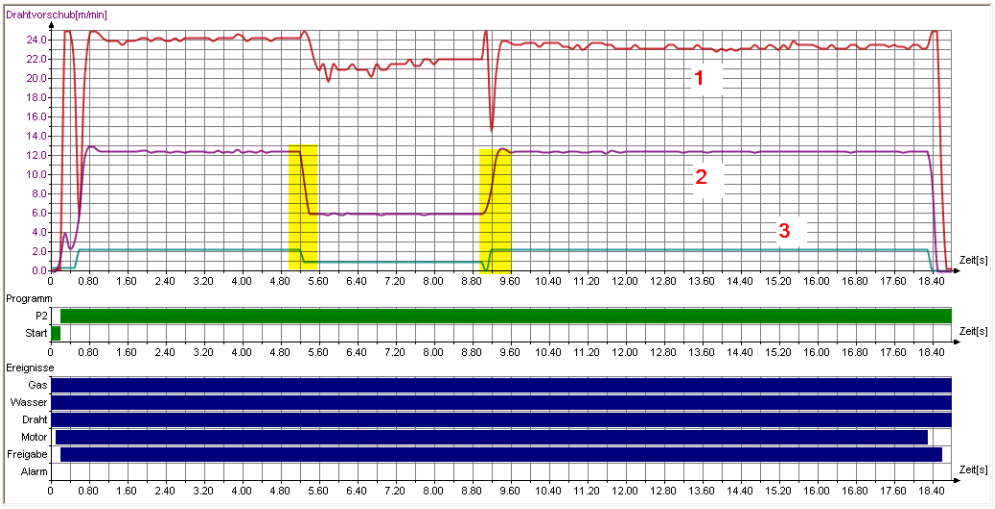
xx1500000953

1	Voltage
2	Wirefeed Speed
3	WeldSpeed

The picture above shows the behaviour of the wirefeed speed (2) in relation to the TCP Speed (3). If the robot reduces the TCP speed the wirefeed speed will automatically react on the speed change (marked yellow) without changes of the welding parameters inside the power source. Only Schedule P2 (green line) was active during welding.

Continues on next page

Example 2



xx1500000954

1	Current
2	Wirefeed Speed
3	WeldSpeed

The picture above shows the behaviour of the wirefeed speed (2) in relation to the TCP Speed (3). If the robot reduces the TCP speed the wirefeed speed will automatically react on the speed change (marked yellow), also if the TCP increases the wirefeed speed will automatically react without changes of the welding parameters inside the power source. Only Schedule P2 (green line) was active during welding.

3.2 Speed reference set inside the robot

Speed reference set inside the robot

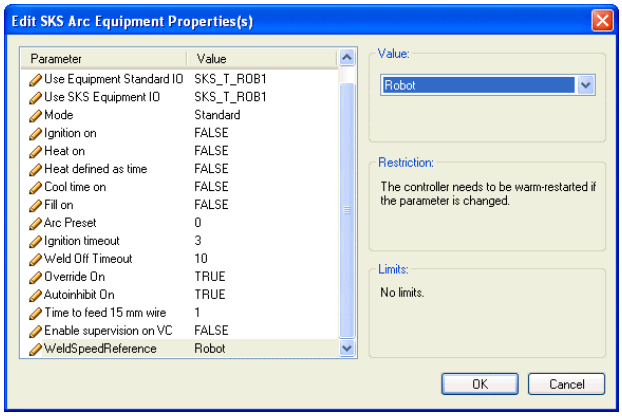
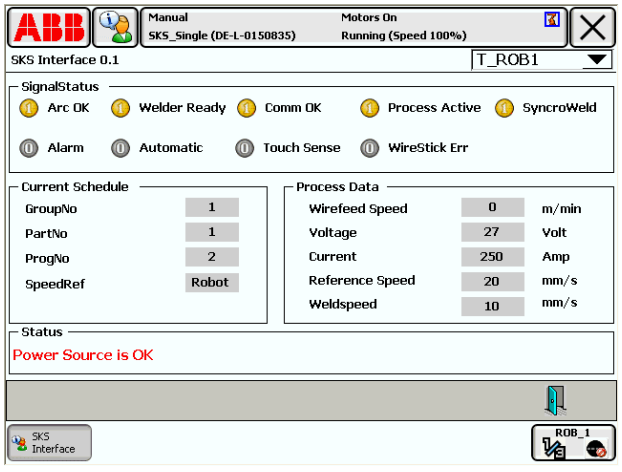
The speed reference (weldspeed) can either be set inside the power source (Q84 controller) or the robot. In the pre-defined mode, after installing the option, the speed reference is set inside the welddata as in any other ABB welding application.

Activation and Deactivation of the SyncroWeld functionality must be done in the Q84 controller. The SKS Interface Application has a signal that shows whether it is active or not.

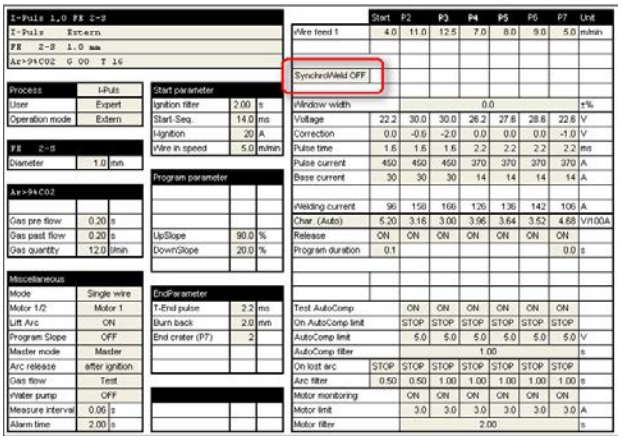
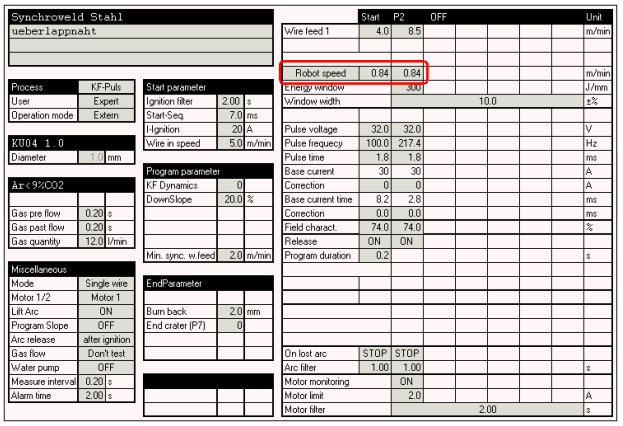
If SyncroWeld is turned off on the Q84 controller the equipment can be used as any other welding machine.

Note

The welding speed unit inside the Q84 Controller is m/min and the weldspeed unit used with welddata is mm/s .The weldspeed used in welddata must be stored inside the Q84 controller as this is the reference for the corrections done to the welding process to keep the energy input constant.

	Action	Info/illustration
1	SKS Equipment Properties in RobotStudio Possible selections: • **Robot** • **PowerSource**	 xx1500000955
2	SpeedRef set to *Robot* and SyncroWeld active	 xx1500000956

Continues on next page

	Action	Info/illustration
3	SyncroWeld is turned off. To active the function press **SyncroWeld OFF**.	 xx1500000957
4	SyncroWeld active. If Syncroweld is turned on the weldspeed must be added to the schedule you use. This is necessary as the powersource has to know the welding speed to adapt the wirefeed speed.	 xx1500000958

3.3 Speed reference set inside the power source

Speed reference set inside the power source

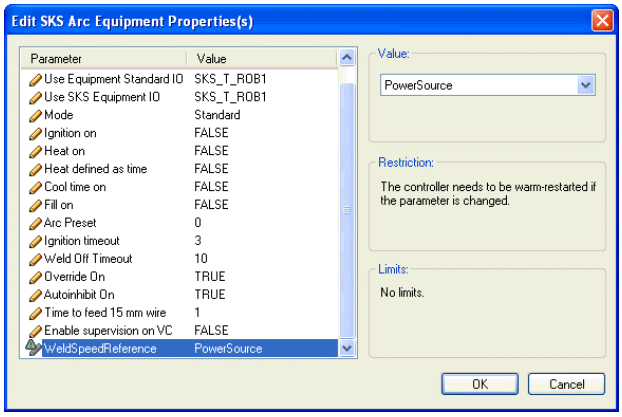
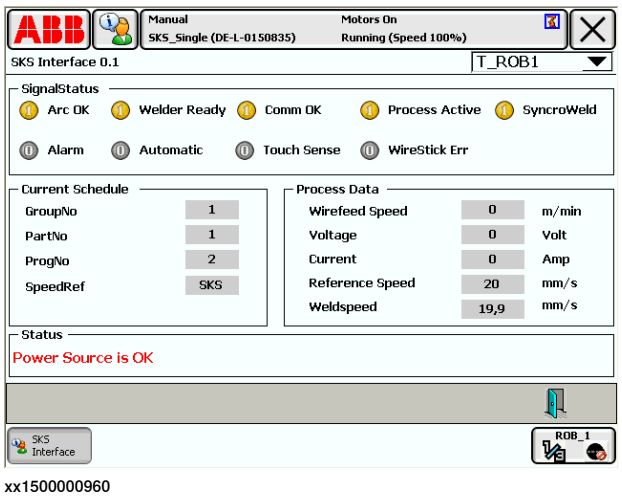
If you want to set the speed reference inside the power source you have to change the speed *Reference Speed mode* in the process configuration database (proc.cfg) from *Robot* to *Powersource*. The current mode is also shown on the SKS Interface Application.

Activation and deactivation of the SyncroWeld functionality must be done in the Q84 controller. The SKS Interface Application has a signal that shows whether it is active or not.

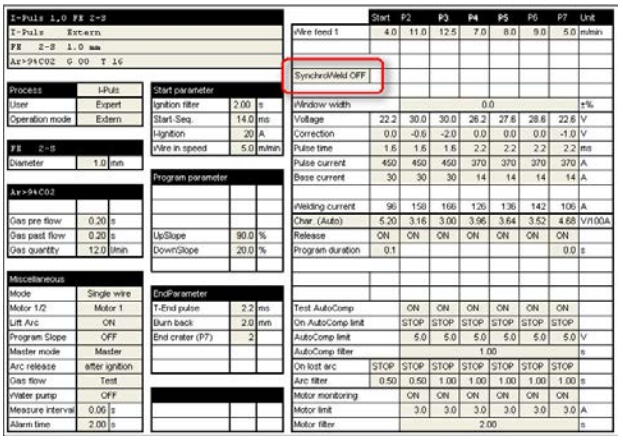
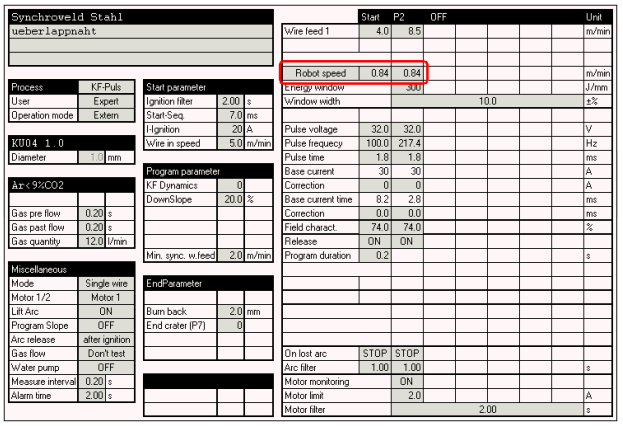
If SyncroWeld is turned off on the Q84 controller the equipment can be used as any other welding machine.

Note

The welding speed unit inside the Q84 Controller is m/min and the weldspeed unit used with welddata is mm/s. The weldspeed stored in the start program (Start) will be used for the complete weld (until the next `ArcLStart` instruction). The Speed Reference can not be changed within a seam.

	Action	Info/illustration
1	SKS Equipment Properties in RobotStudio Possible selections: • **Robot** • **PowerSource**	 xx1500000959
2	SpeedRef set to power source and SyncroWeld active	 xx1500000960

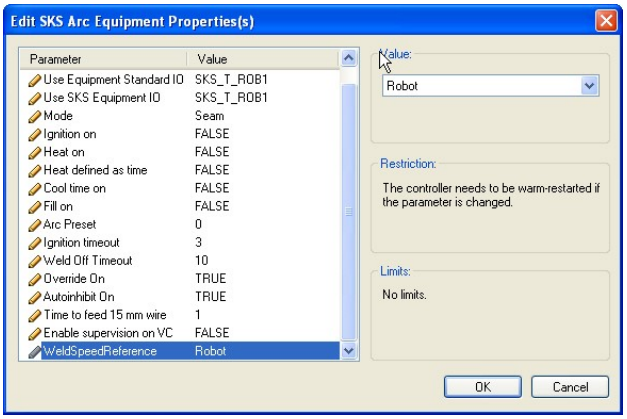
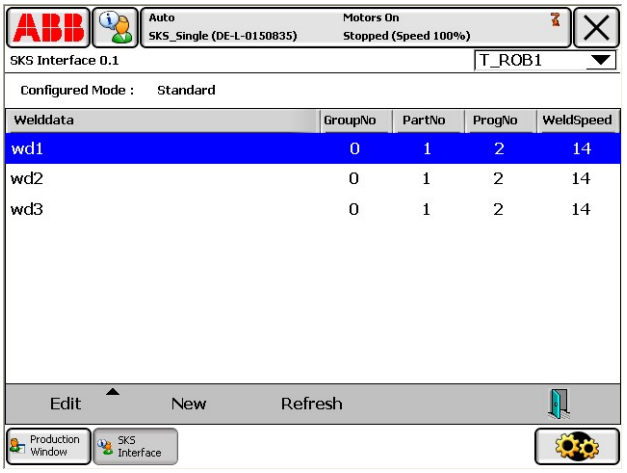
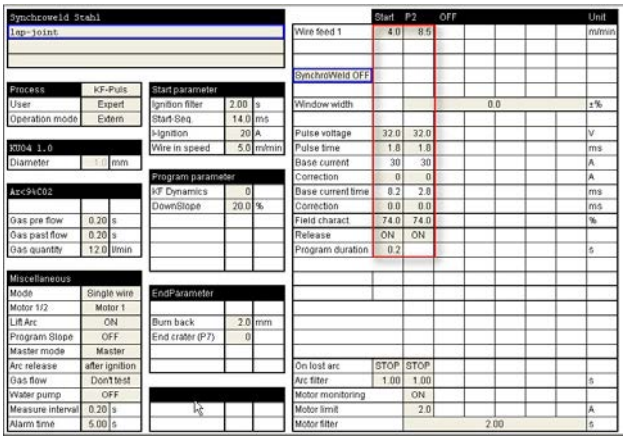
Continues on next page

	Action	Info/illustration
3	Syncroweld is turned off. To active the function press **SyncroWeld OFF**.	 xx1500000961
4	SyncroWeld active. Add the weldspeed in the Start program (here 0.84m/min). This speed is used for your complete weld. (Until next `ArcLStart`)	 xx1500000962

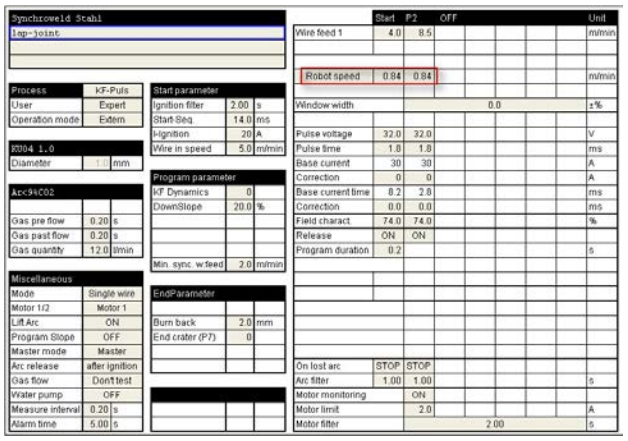
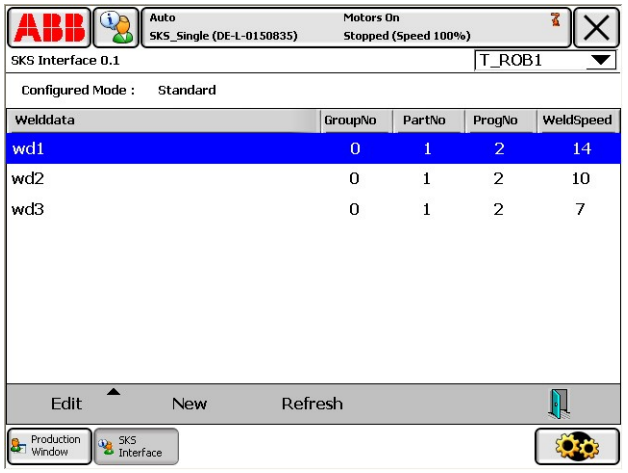
3.4 Testing the functionality

Testing the SyncroWeld functionality

To test the SynroWeld functionality a simple test can be done with a lap joint.

	Action	Info/illustration
1	Check that the Speed Reference is configured as *Robot*.	 xx1500000963
2	Program a simple weld seam with 3 segments using different welddata for every segment.	 xx1500000965
3	Use the same speed and Group/Part/Program number in all welddata. We later on change the speed to test the SyncroWeld functionality by simulating a TCP Speed reduction.	 xx1500000966

Continues on next page

	Action	Info/illustration
4	Define the welddata in the Q84 Controller that gives you a good weld. (Do some test welds) These parameters can be used as start.	 xx1500000968
5	Once you have defined the welddata, activate SyncroWeld in the Q84 controller and add your weldspeed from the tests in the schedule you have used for welding. 0.84 m/min is used for this test (14 mm/s).	 xx1500000969
6	Change the weldspeed for segment 2 and 3 to get different values in the welddata (for example, 10 mm/s in segment 2 and 7 mm/s in segment 3)	 xx1500000970

Continues on next page

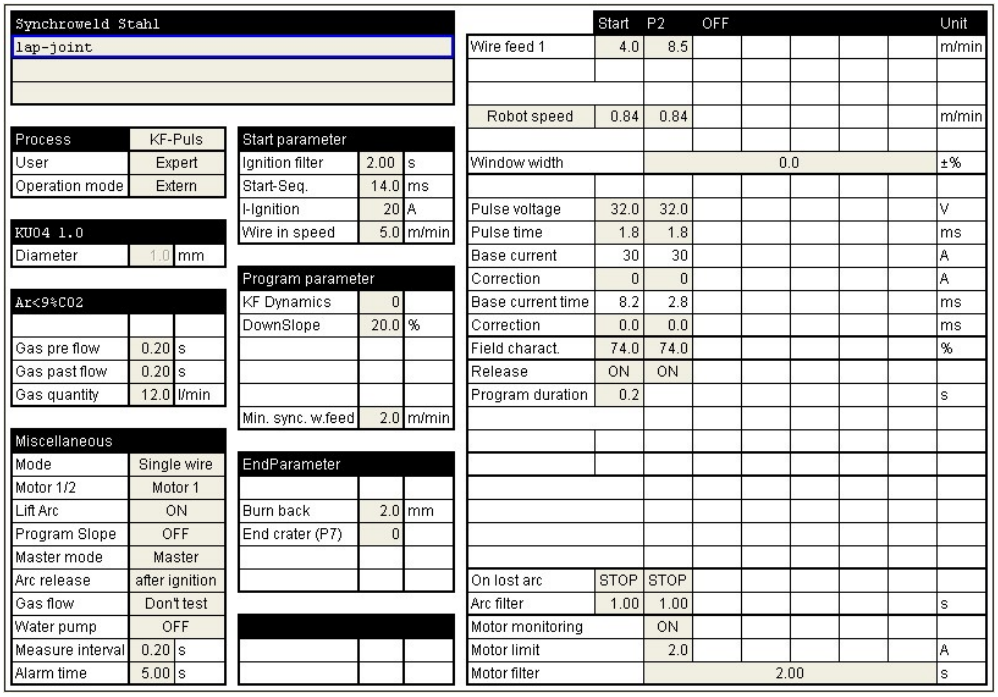
3.4 Testing the functionality

Continued

Example setup

The following parameters have been used in a lab environment to test the functionality with good results:

Wiresize	1mm
WireType	SG3
Gas	8% CO2 / 92% Argon



Synchroweld Stahl

lap-joint

Process	KF-Puls
User	Expert
Operation mode	Extern

KU04 1.0		
Diameter	1.0	mm

Ar<9%CO2		
Gas pre flow	0.20	s
Gas past flow	0.20	s
Gas quantity	12.0	l/min

Miscellaneous	
Mode	Single wire
Motor 1/2	Motor 1
Lift Arc	ON
Program Slope	OFF
Master mode	Master
Arc release	after ignition
Gas flow	Don't test
Water pump	OFF
Measure interval	0.20 s
Alarm time	5.00 s

Start parameter		
Ignition filter	2.00	s
Start-Seq.	14.0	ms
I-Ignition	20	A
Wire in speed	5.0	m/min

Program parameter		
KF Dynamics	0	
DownSlope	20.0	%
Min. sync. w.feed	2.0	m/min

EndParameter		
Burn back	2.0	mm
End crater (P7)	0	

	Start	P2	OFF					Unit
Wire feed 1	4.0	8.5						m/min
Robot speed	0.84	0.84						m/min
Window width		0.0						±%
Pulse voltage	32.0	32.0						V
Pulse time	1.8	1.8						ms
Base current	30	30						A
Correction	0	0						A
Base current time	8.2	2.8						ms
Correction	0.0	0.0						ms
Field charact.	74.0	74.0						%
Release	ON	ON						
Program duration	0.2							s
On lost arc	STOP	STOP						
Arc filter	1.00	1.00						s
Motor monitoring		ON						
Motor limit		2.0						A
Motor filter		2.00						s

xx1500000971

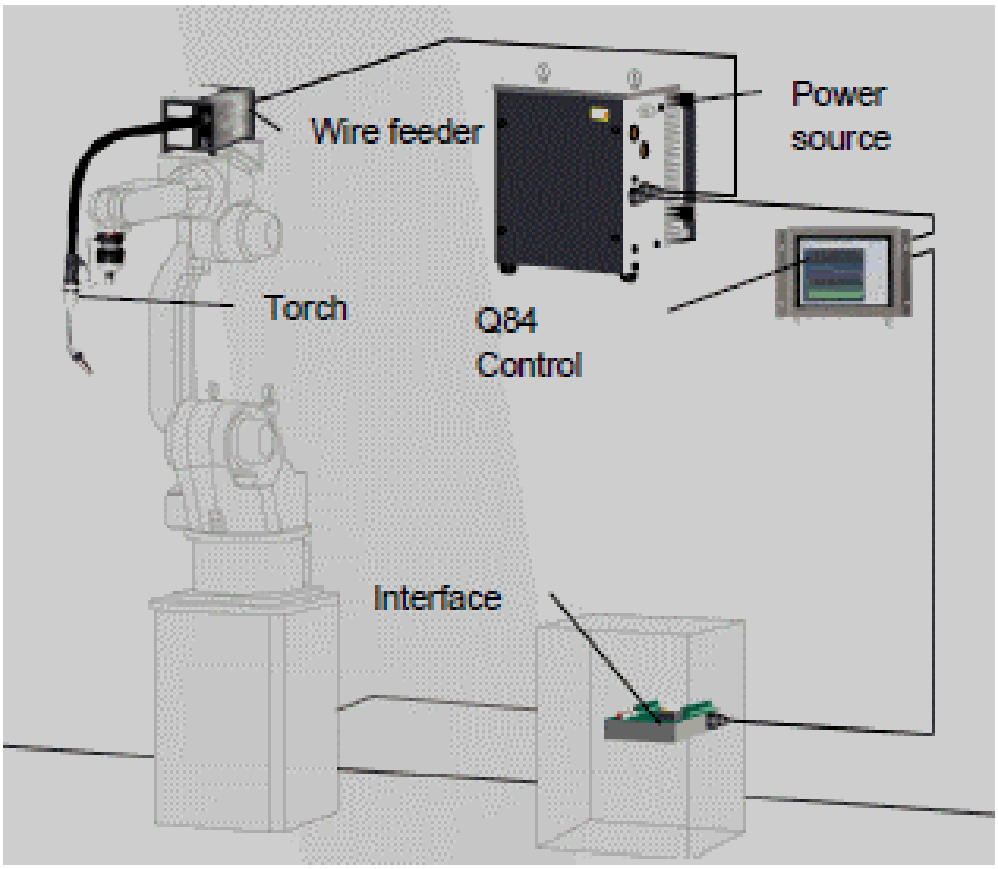
4 Installation and setup

4.1 Hardware

Components of the Q84 robot welding system

The overall Q84 system comprises the following individual components:

- Wire feeder
- Power source
- Torch
- Q84 Control
- Interface



xx1500000972

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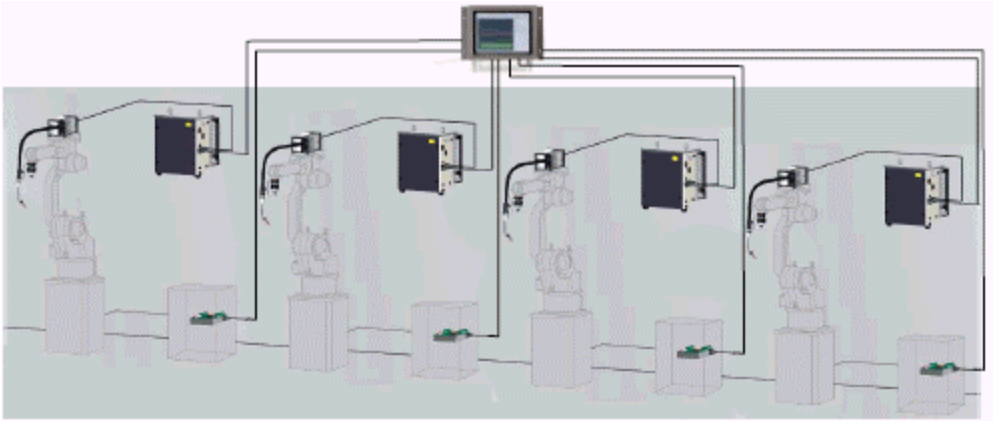
The Q84 can control up to 4 welding units depending on the number of Q81 welding control cards fitted.



xx1500000973

Q84 Process Controller

xx1500000974

Q84 Process Controller

The Q84 process controller serves as a data memory and information system, and is also used for entering the welding parameters. The touch screen is mounted on the front. The slots for the Q81 welding cards are located at the rear. Each has two sockets for connecting the SPW field bus. Also located here is an RJ45 LAN interface for connecting a PC or network.

Technical Data LSQ5

The LSQ 5 with 480 A (40% duty cycle), 420 A (60% duty cycle), 325 A (100% duty cycle) is a universal power source and is suitable for the following processes.

Technical data	LSQ 5
Adjustment range: Welding current / Welding voltage	• GTAW: 10 A / 10.4 V – 510 A / 30.4 V • GMAW: 15 A / 14.8 V – 480 A / 38 V
Duty cycle at 40°C Ambient temperature	• 40% duty cycle: 480 A • 60% duty cycle: 420 A • 100% duty cycle: 325 A

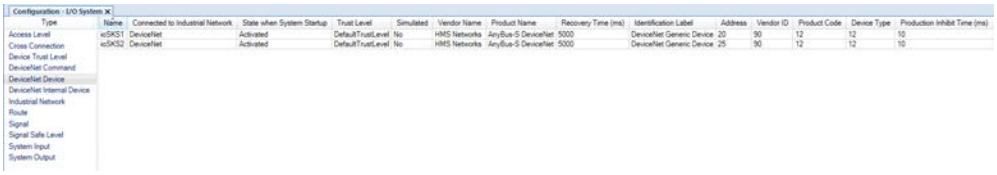
Continues on next page

Technical data	LSQ 5
Duty cycle at 20°C Ambient temperature	• 40% duty cycle: 500 A • 60% duty cycle: 440 A • 100% duty cycle: 340 A
Duty cycle	10 min (60%: 6 min ON, 4 min OFF)
No load voltage	70 Volt
Mains voltage (tolerances)	3x400 V (-10%, +10%) 3x480 V (-10%, +10%)
Frequency	50/60 Hz
Mains fuse (slow-acting fuse)	35 A
Mains cable	4x4 mm²
Max. connected power	25.8 kVA
Recommended generator power	32 kVA
Ambient temperature	Ambient temperature <45°C
Workpiece cable	70 mm²
Dimensions L / W / H [mm]	450x400x540
Weight	49 kg

DeviceNet setup

Devicenet Addressing

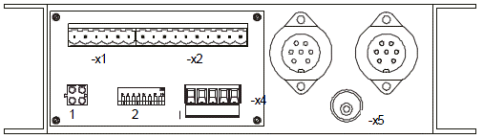
The default addressing when the SKS Fieldbus 5 interface is selected is 20. If there is more than one SKS power supply the device net address will increment by 5 for each unit (see example below). Be sure the Device Net cables are terminated correctly with resistors.



xx1500000975

Information	Info/Illustration
Feldbus 5 DeviceNet Interface	 xx1500000976

Continues on next page

Information	Info/Illustration
Connectors on DeviceNet Interface	 xx1500000977
X1 - Digital Inputs X2 - Digital Outputs (Relays) X4 - Fieldbus connector X5 - Optional Power supply (24V) 1 - Fieldbus Status LED 2 - MAC ID & Baud rate switch	 xx1500000978

Note

Each device in a devicenet network has its own unique Mac ID (0 – 63). The Mac ID and Baud rate can be adjusted with the DIP switches. The Baud rate is specified with the switches 1 and 2, switches 3 to 8 are used for the Mac ID.

S1	S2	Baudrate
OFF	OFF	125k
OFF	ON	250k
ON	OFF	500k
ON	ON	reserved

S3	S4	S5	S6	S7	S8	MAD ID
OFF	OFF	OFF	OFF	OFF	OFF	0
OFF	OFF	OFF	OFF	OFF	ON	1
OFF	OFF	OFF	OFF	ON	OFF	2
OFF	OFF	OFF	OFF	ON	ON	3
...	...	...	...	...	...	...
ON	ON	ON	ON	OFF	OFF	60
ON	ON	ON	ON	OFF	ON	61
ON	ON	ON	ON	ON	OFF	62
ON	ON	ON	ON	ON	ON	63

xx1500000979

Set the Baud Rate to 500 kbps

Feldbus Status LED

Module Status — Not used

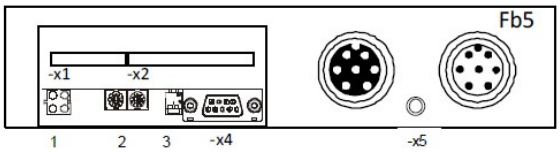
Network Status — Not used

LED	Status	Description
Network Status	Off	Supply voltage missing , not online
	Green	
	Green flashing	
	Red/green alternating	

Continues on next page

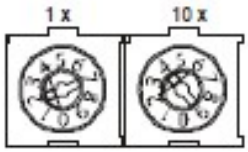
LED	Status	Description
Modul Status (MS)	Off	Supply voltage missing
	Green	Normal operation
	Green flashing	Baud rate detection running
	Red	Major error
	Red flashing	Minor error
	Red/green alternating	Device self test running

Profibus setup

	Action	Info/illustration
1	Feldbus 5 interface with Profibus connector	 xx1500000981
2	Profibus connection on robot controller (Profibus DP M/S) The hardware of the PROFIBUS DP field bus consists of a master/slave unit, DSQC 687. The signals are connected to the board front (two 9-pole D-sub). Occupies one PCI slot.	 xx1500000982
3	X1: Digital Inputs X2: Digital Outputs (Relays) X4: Fieldbus connection X5: external Power supply 24V (optional) 1: Fieldbus Status LED 2: Adress switch 3: Termination switch	 xx1500000983

Continues on next page

4.1 Hardware
Continued

	Action	Info/illustration
4	The Profibus station address can be adjusted within its Range from 1 to 99.	 xx1500000984
5	Each segment in a Profibus Network needs a correct termination. If the modul is the first or the last device in the network the termination switch must be in position *On* otherwise it should be *Off*	 xx1500000985

Fieldbus Status LED

Fieldbus Offline
Fieldbus Online

Fieldbus Diagnose
Not used

LED	Status	Description
Fieldbus Online	Green Off	Bus online, Data exchange possible Bus not online (or no Voltage)
Fieldbus Offline	Red Off	Bus offline Bus not offline (or no Voltage)
Fieldbus Diagnose	Off Red flashing 1Hz Red flashing 2Hz Red flashing 4Hz Red flashing 8Hz	No diagnostics possible (or no voltage) Error in Configuration file Error in Parameter file Errors during initialization of the Profibus communication ASIC Watchdog timeout (internal error)

Profibus DP m/s CFG Tool

The tool (DP Configurator from Softing) consists of software for a standard PC. The tool creates a bus configuration, which is used in the robot controller.

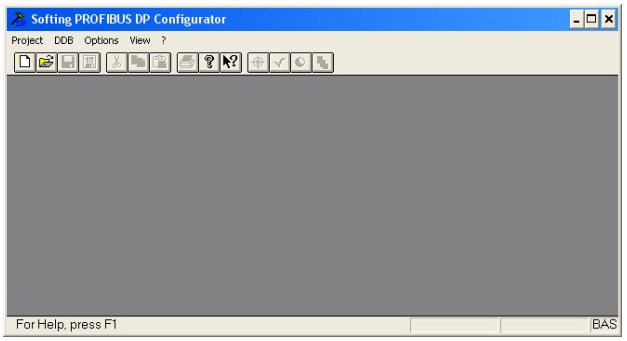
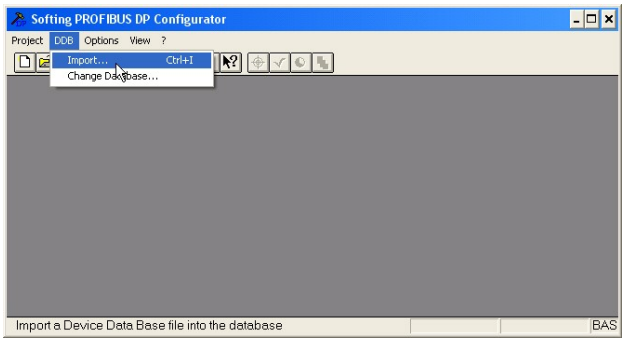
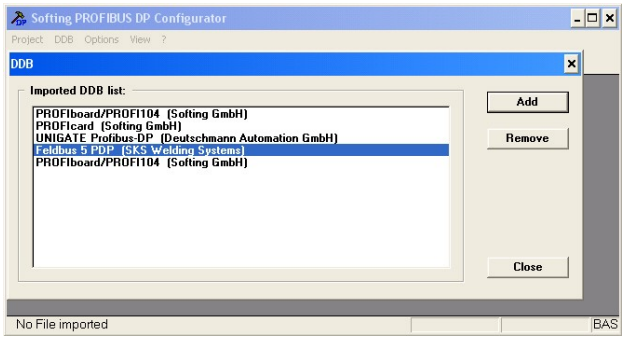
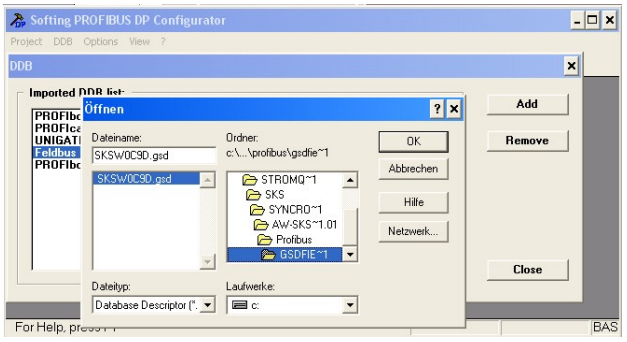
Note

This tool is NOT needed for configuration and use of other channels than the DSQC 687 master channel.

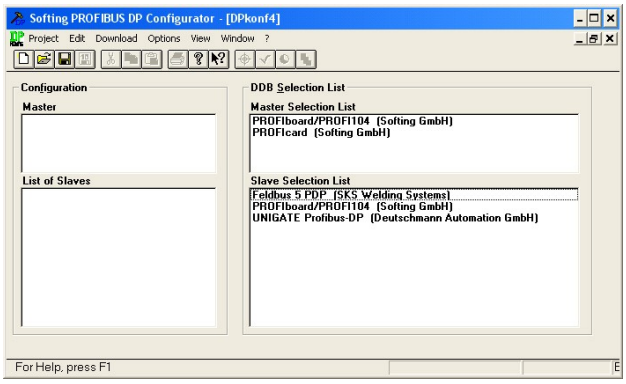
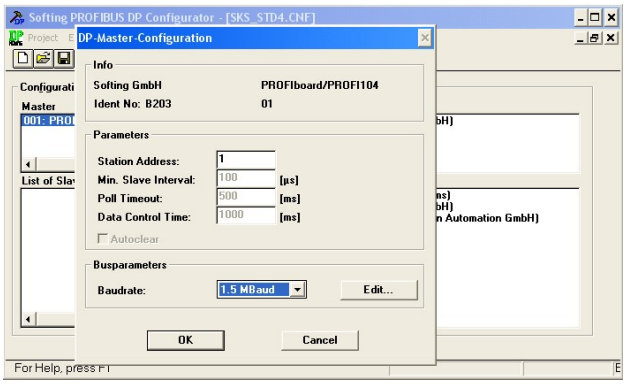
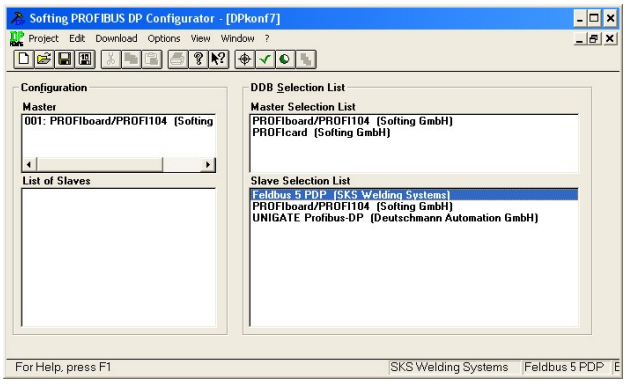
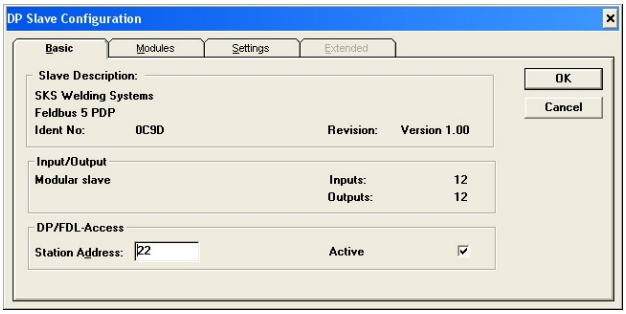
The GSD file needed to create the bus configuration can be found in the additional optiondisc in the following folder:

Continues on next page

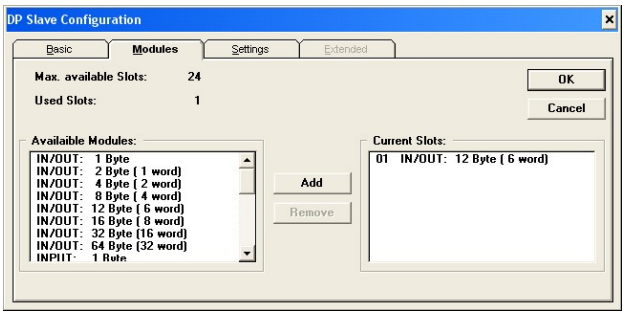
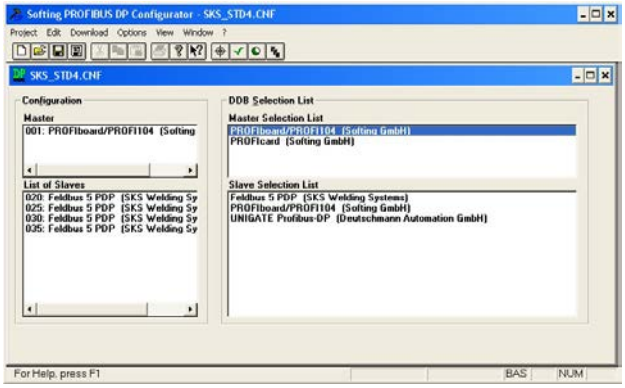
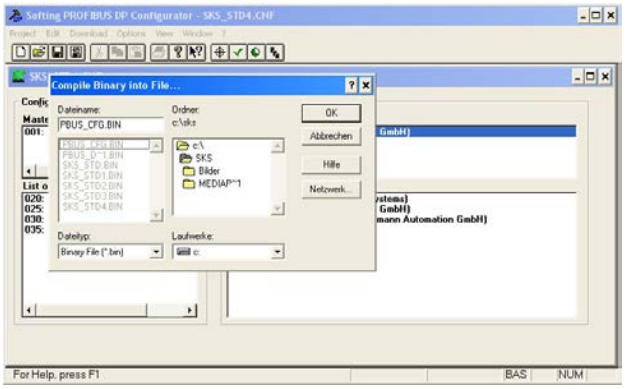
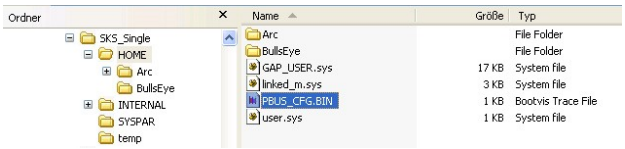
AW-SKS-SYNC-WELD.01\Profibus\GSD Fieldbus 5

	Action	Info/illustration
1	Start the DP Configurator Software and import the GSD File.	 xx1500000987
2	Select **DDB** and then **Import**.	 xx1500000988
3	If the Fieldbus 5 PDP cfg is not already in the selection then import it from the Mediapool by clicking **Add**.	 xx1500000989
4	Browse to the Mediapool and select the SKSW0C9D.gsd file.	 xx1500000990

Continues on next page

	Action	Info/illustration
5	Now you can start with a new project by clicking **Project**.	 xx1500000991
6	Configure first the DP Master by selecting the PROFIboard/PROFI104 entry.	 xx1500000992
7	Click **OK** and the master will be added.	 xx1500000993
8	Configure the slave by selecting the Fieldbus 5 PDP entry in the list of slaves. Add your **Station Address** in the **Basic** tab.	 xx1500000994

Continues on next page

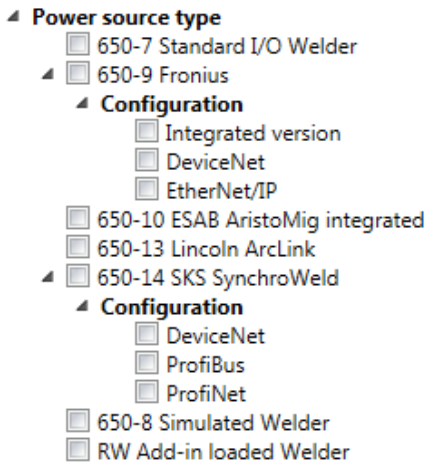
	Action	Info/illustration
9	Select the **Modules** tab and configure the IN/OUT size of the module. Select: IN/OUT 12 byte (6 word)	 xx1500000995
10	Add more modules if you have more then one Fieldbus 5 interface and configure them.	 xx1500000996
11	Select **Download** to create the BIN file for the robot controller. Save the file as `PBUS_CFG.BIN`	 xx1500000997
12	Copy the file into your system's HOME folder and restart the controller.	 xx1500000998

4.2 Software

Software requirements

System prerequisites

- IRC5 controller
- RobotWare 6.01 or higher with the following options
- 633-4 RobotWare Arc



xx1500000999

5 System parameters

5.1 SKS Equipment Class

Overview

The *SKS Equipment Class* and settings are activated in RobotStudio, in Installation Manager.

1 This option has advanced support for the SKS Power Source that includes:
   - Job Mode
   - Seam Mode
   - Manual Mode
2 Display of error codes originating from Group Output signal from the power source on the FlexPendant.
3 Graphical User interface
4 SyncroWeld functionality

SKS Equipment Properties

The following *SKS Equipment Properties* can be defined in RobotWare Arc.

Parameter	Data type	Note/Illustration
Name	String	The name of the SKS Equipment Properties
Use Equipment Standard IO	String	The name of the Equipment Standard IO to use
Use SKS Equipment IO	String	The mode of the welder. The following modes are selectable: • Standard • Seam • Manual • Default value: Standard (Preset Group and Part)
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 Disabled in this release as the SKS Welder always executes a start program (Start) during ignition. The entry remains for future use.
Head 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 Disabled in this release as the SKS Welder always executes a start program (Start) during ignition. The entry remains for future use.

Continues on next page

Parameter	Data type	Note/Illustration
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 semadata. FALSE means that heat_distance and heat_speed is used and visible in the seamdata. Default value: FALSE Disabled in this release as the SKS Welder always executes a start program (Start) during ignition. The entry remains for future use.
Cool time on	Bool	Enables masking of cool_time component in seamdata. Default value: FALSE Disabled in this release as the SKS Welder always executes a Fill program if activated in the power source. The entry remains for future use.
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 Disabled in this release as the SKS Welder always executes a Fill program if activated in the power source. The entry remains for future use.
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 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 wire (15mm).
Enable supervision on VC	Bool	Enables signal supervision in the VC Default value: FALSE
WeldSpeedReference	String	Specifies if the weldspeed defined in welddata is used or if the weldspeed is defined in the power source Default value: Robot

Arc Equipment Standard IO

The following Arc Equipment Standard IO signals can be defined in RW Arc

Parameter	Data type	Note/illustration
Name	String	The name of the Arc Standard IO.

Continues on next page

Parameter	Data type	Note/illustration
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.

SKS Equipment IO

The following SKS Equipment IOs can be defined in RW Arc.

Parameter	Datatype	Note/Illustration
Name	String	The name of the SKS Equipment EIO
ArcEst (required)	Signaldi	Digital input signal for supervision of the welding arc. A high signal means that the welding arc is ignited
WaterOk DI	Signaldi	Digital input signal for supervision of the water. A high signal means that the water is OK
GasOk	Signaldi	Digital input signal for supervision of the protective gas. A high signal means that the protective gas is OK
Internal WirestickErr	Signaldi	Digital input signal for supervision of the wire stick status. A high signal means that an error has occurred
Internal WirestickON	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
WelderRdyDI	Signaldi	Internal digital input signal that indicates if the welder is ready
ProcessActiveDI (required)	Signaldi	Digital Input signal that the process is active
WireStickDI (required)	Signaldi	Digital input signal for supervision of the wire stick status
TouchSenseDI (required)	Signaldi	Digital Signal that indicates Wire contact with the part (can be used to search the part)

Continues on next page

Parameter	Datatype	Note/Illustration
AlarmDI (required)	Signaldi	Digital Signal that indicates an error with the welder
SyncroWeldDI (required)	Signaldi	Digital Signal that indicates that SyncroWeld is activated in the Q84
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 wirefeed forward
FeedOnBwd DO (required)	Signaldo	Digital output signal for backward activation of the wirefeed A high signal means wirefeed backward
WelderRdyDO (required)	Signaldo	Internal digital output signal that indicates if the welder is ready
SupervWelder 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. high signal means that an error has occurred
SupWireStick DO	Signaldo	Digital output signal for indication of wire feed errors. A high signal means that an error has occurred
LastSeam DO (required)	Signaldo	Digital output signal for indication of the Last Seam in the part (Not yet implemented)
TCPSpeedRef (required)	Signalao	Analog output for the current TCP Speed (Value in m/s). Only used inside the Equipment Class
TCPSpeedSKS (required)	Signalao	Analog output for the current TCP Speed (Value in m/min)
VoltageMeas (required)	Signalai	Analog input signal for voltage measurement
CurrentMeas (required)	Signalai	Analog input signal for current measurement
SynWireFeed (required)	Signalai	Analog input signal for synergic wirefeed
WeldSpeedRef (required)	Signalai	Analog input for the weld reference speed
GroupPort (required)	Signalgo	Group output signal for sending the group number to the welder
PartPort (required)	Signalgo	Group output signal for sending the part number to the welder
ProgramPort (required)	Signalgo	Group output signal for sending the program number to the welder
SeamPort (required)	Signalgo	Group output signal for sending the seam number to the welder. (Only used in Seam Mode)

Continues on next page

Parameter	Datatype	Note/Illustration
WelderErrCodes (required)	Signalgo	Group input signal for the error codes from the welder

SKS User Button IO

The following SKS User Button IO can be defined in RW Arc. This is used to configure the of the buttons used within the SKS Interface View *User Functions*.

Parameter	Data type	Note/illustration
Name	String	The name of the SKS Equipment Inputs
Button_Name	String	The button *Label* shown in the TP Application
Enabled	Bool	Flag to enable the button functionality Default value: FALSE
Allow in Auto	Bool	Flag to enable the button functionality in Auto mode Default value: FALSE
DigitalOutput	SignalDo	Digital Output Signal that is set if the button is pressed
Mode	String	Behavior of the button when pressed. The following modes can be selected: • Set • Reset • Press-Release • Toggle • Pulse
Description	String	A text description can be added

SKS User IO

The following SKS User IO can be defined in RW Arc. This is used to configure the behavior of the digital inputs used within the SKS Interface View *User Functions*.

Parameter	Datatype	Note/Illustration
Name	String	The name of the SKS User Inputs
Signal_Name	String	Name of signal as text that is shown in the TP application
Enabled	Bool	Flag to enable the signal supervision **Default: FALSE**
DigitalInput	Signaldi	Digital Input Signal that should be monitored
Description	String	A text description can be added

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6 SKS Interface modes

General

The Q84 Controller provides a robot with suitable welding parameters on demand. Individual parameter combinations are put together to form welding programs, which are then stored in the Q84 controller, where they can be selected at any time. Welding programs constitute individual welding seams.

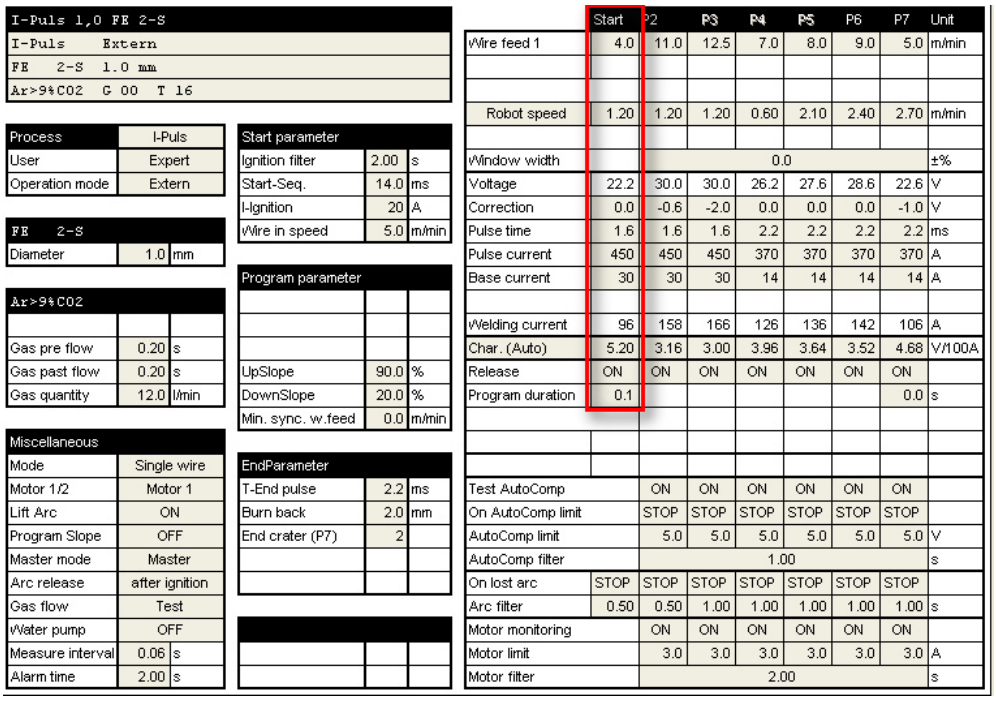
For reasons of clarity, 8 welding programs are combined to form one part number. Up to 124 parts numbers can be defined for different work pieces. 31 part numbers each form one group, and 4 groups can be managed by the Q84. Hence the total number of stored parameter sets is 744.

The Q84 can manage 4 groups (Group 0 to 3)

4 groups each with	Total
31 Part numbers	124 Part numbers
31 Start programs	124 Start programs
31 End programs	134 End programs
6 x 31 Welding programs	744 Welding programs

A start program is always carried out at the beginning of a weld in order to optimize the ignition process. In doing so, the gas pre-flow time is included in the cycle time of the system. The wire feed speed is normally slower than with normal welding.

The start program is automatically executed at "welding on" signal. After ignition, the start program lasts for the set duration (in this case 0.1 seconds), then switches to a selected welding program



xx1500001000

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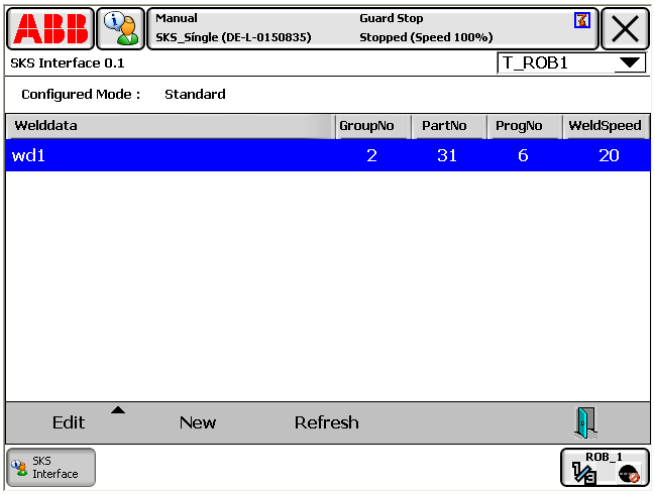
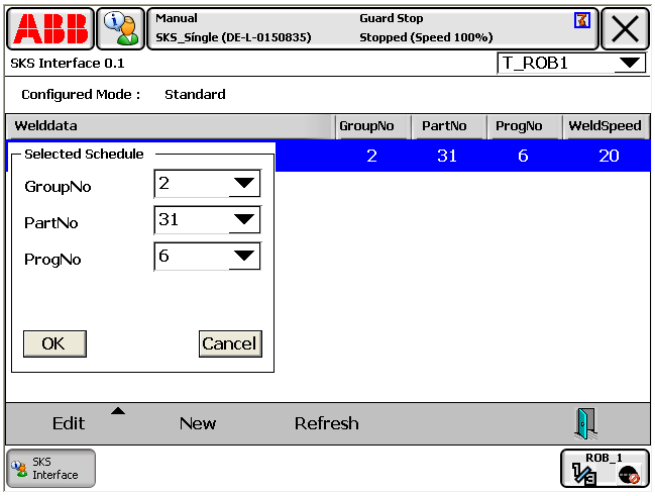
Standard Mode

The *Standard mode* is the pre-defined selection after booting the SKS option into the robot controller. Using the Standard Mode the Group / Part number is automatically set before ignition of the arc. Once the arc is ignited it is no longer possible to change the Group / Part selection. Only the Program numbers (schedules) can be changed during welding.

To define the Group / Part and Program number in the welddata of the robot controller the SKS user interface has to be used. The mode port component of the active welddata holds a masked value for the selected Group / Part number. This value is *unmasked* in the equipment class and the group outputs are set to the correct value.

To set / change the Group, Part and Program number the SKS Interface must be used. Click **Edit** the set/change the selected welddata	 xx1500001001
The Schedule numbers can be selected with the drop down menus	 xx1500001002

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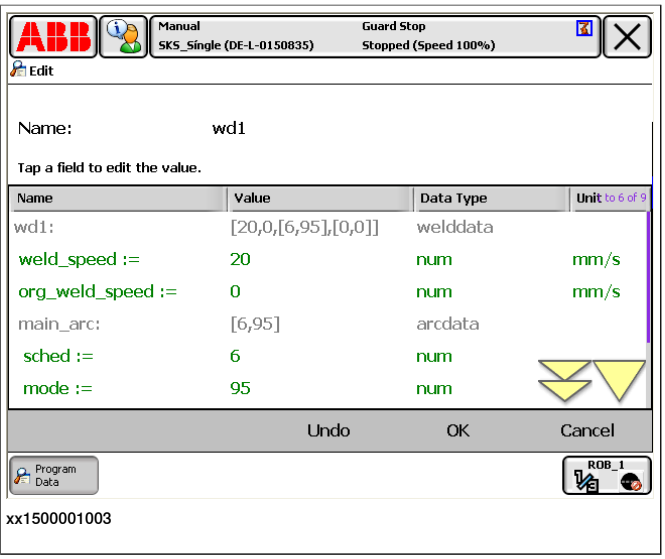
Values of *wd1* in the Program Data view.

Mode: =95 correspondents to

- GroupNo = 2
- PartNo = 31

Changing the data with the rapid data editor is critical as it can result in a wrong program selection inside the Q84



xx1500001003

Note

Changing the mode port value (without using the FlexPendant Application) can result in a wrong selection of the welding parameters inside the Q84 controller. This can damage your welding equipment or part.

Make sure the Q84 is set to *Group/File* mode (Q84 system settings).

The weld program can be created as any other weld program using ABB's standard Arc instructions either online or with RobotStudio.

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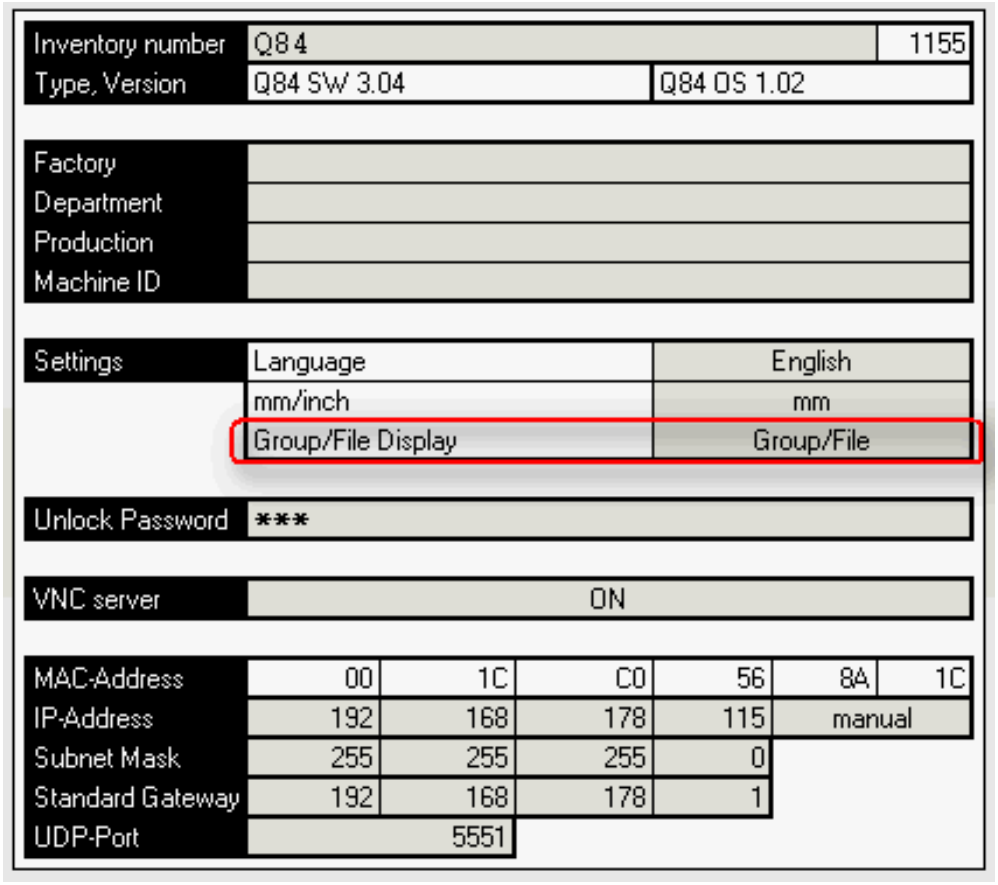
Continued

Q84 system settings



xx1500001004

In Standard Mode the Q84 system settings must be set to *Group/File*.

Program example

```
TASK PERS welddata wd1:=[20,10,[6,95,0,0,0,0,0,0,0],[0,0,0,0,0,0,0,0,0]];

PROC Part_1_Pth_1()
    MoveJ p11,v1000,z10,PKI_500\WObj:=wobj0;
    ArcLStart p12,v1000,sm1,wd1,fine,PKI_500\WObj:=Stn1;
    ArcL p13,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p14,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p15,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p18,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p19,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p20,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p21,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p22,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p23,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p24,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcLEnd p26,v100,sm1,wd1,fine,PKI_500\WObj:=Stn1;
    MoveJ p11,v1000,z10,PKI_500\WObj:=Stn1;
ENDPROC
```

xx1500001005

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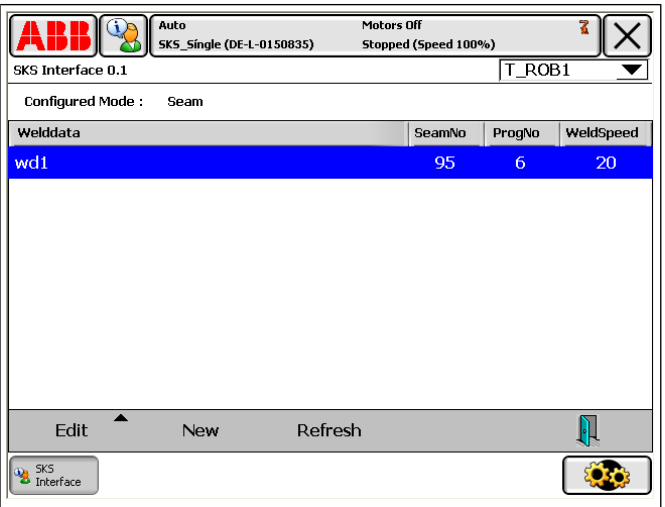
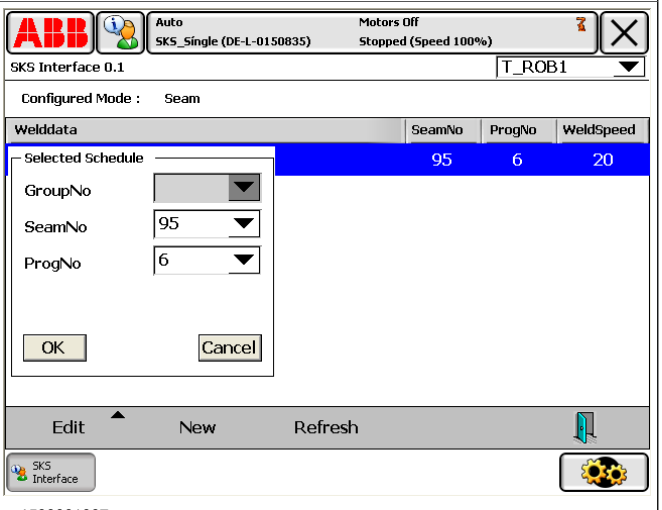
Seam Mode

The *Seam mode* is activated in the SKS_Equipment_Properties. In Seam Mode the Group/Part port will be connected to one port. Instead of having two separate group outputs for group / Part number just the seam number is set. The value is stored in the weld data component `mode`.

In Seam Mode the group output is automatically set before the ignition of the arc. Once the arc is ignited it is not longer possible to change the Seam selection. Only the Program numbers (schedules) can be changed during welding.

To define the Seam number and Program number in the welddata the FlexPendant Application can be used. In Seam mode it is also possible to change the weldata using the RAPID editor as the value stored in the mode component is not masked.

To set / change the Seam number and Program number the TP Application can be used.	 xx1500001006
The Schedule numbers can be selected with the drop down menus	 xx1500001007

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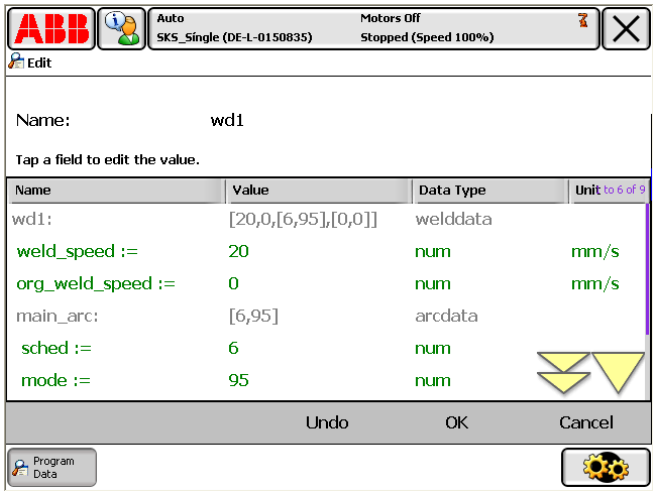
Values of *wd1* in the Program Data view. • Mode:=95 • Correspondents to Seam No. 95	

The weld program can be created as any other weld program using ABB's standard Arc instructions either online or with RobotStudio.

Note

In Seam Mode the modeport value can be changed also using the RAPID program editor.

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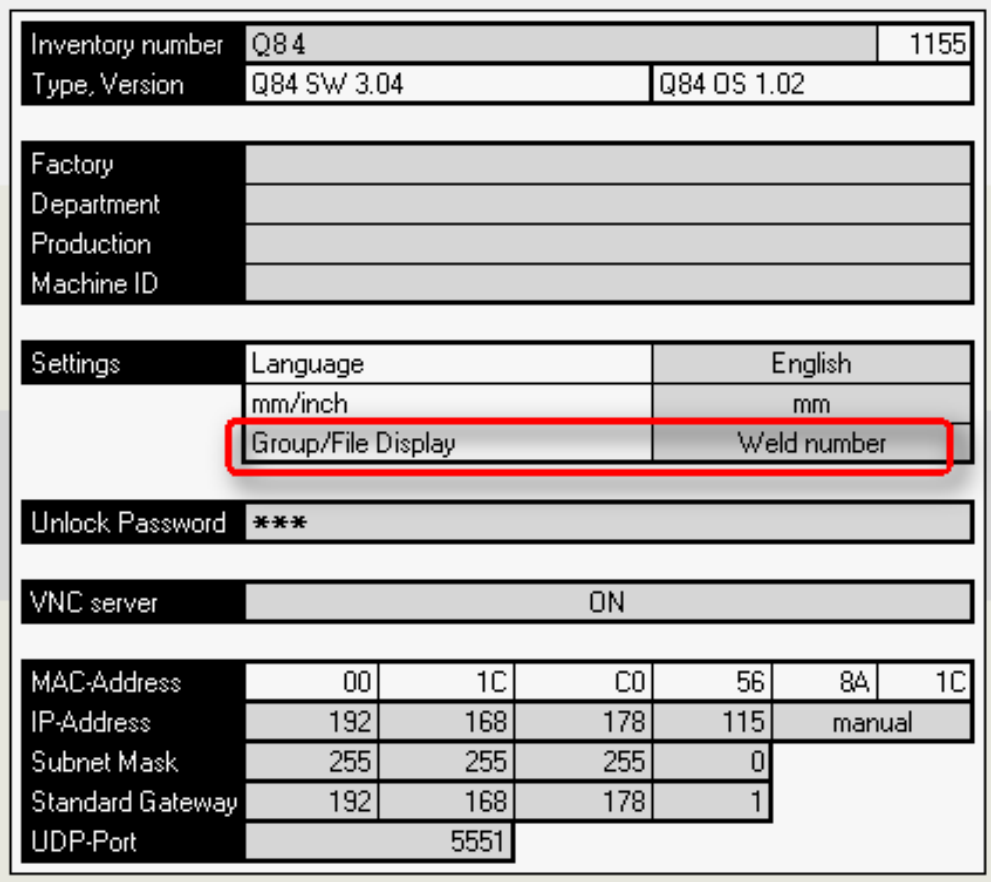
Q84 system settings



xx1500001009

In Seam Mode the Q84 system settings must be set to *Weld number*.

Program example

```
TASK PERS welddata wd1:=[15,0,[2,35,0,0,0,0,0,0,0],[0,0,0,0,0,0,0,0,0]];

PROC Part_1_Pth_1()
    MoveJ p11,v1000,z10,PKI_500\WObj:=Stn1;
    ArcLStart p12,v1000,sm1,wd1,fine,PKI_500\WObj:=Stn1;
    ArcL p13,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p14,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p15,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p18,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p19,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p20,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p21,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p22,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p23,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p24,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcLEnd p26,v100,sm1,wd1,fine,PKI_500\WObj:=Stn1;
    MoveJ p11,v1000,z10,PKI_500\WObj:=Stn1;
ENDPROC
```

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Continued

Manual Mode

The Manual mode is activated in the SKS_Equipment_Properties. In Manual Mode the Group/Part port must be set manually either using the RAPID instruction `Set_Group_Part` (if the Q84 is set to Standard mode) or `Set_SeamNo` (if the Q84 is set to Seam mode). Also the group outputs can be optionally set using the `SetGo` instruction. The welddata component `schedule` can be changed using the RAPID data editor. It is also possible to change the data using the SKS FlexPendant Application.

The Manual mode can be used if you have already an older SKS welding machine and want to upgrade the system with the SyncroWeld functionality using your existing weld programs. See example below were the Group and Part number is set with the `Set_Group_Part` instruction.

Example with `Set_Group_Part` instruction (Q84 in OpMode *Group/File*)

```
TASK PERS welddata wd1:=[15,0,[2,0,0,0,0,0,0,0,0,0],[0,0,0,0,0,0,0,0,0,0]];

PROC Part_1_Pth_1()
    !GroupNo is set to "0" and PartNo is set to "2"
    !ProgramNo is set in wd1
    Set_Group_Part 0, 2;
    !
    MoveJ p11,v1000,z10,PKI_500\WObj:=Stn1;
    ArcLStart p12,v1000,sm1,wd1,fine,PKI_500\WObj:=Stn1;
    ArcL p13,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p14,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p15,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p18,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p19,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p20,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p21,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p22,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p23,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p24,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcLEnd p26,v100,sm1,wd1,fine,PKI_500\WObj:=Stn1;
    MoveJ p11,v1000,z10,PKI_500\WObj:=Stn1;
ENDPROC
```

xx1500001011

Example with `Set_SeamNo` instruction (Q84 in OpMode *Weldnumber*)

```
PROC Part_1_Pth_1()
    !SeamNo is set to 5 , ProgramNo is set in welddata
    Set_SeamNo 5;

    MoveJ p1,v1000,z10,PKI_500\WObj:=wobj0;
    ArcLStart p2,v1000,sm1,wd1,fine,PKI_500\WObj:=Stn1;
    ArcL p5,v100,sm1,wd1,z1,PKI_500\WObj:=Stn1;
    ArcL p6,v100,sm1,wd2,z1,PKI_500\WObj:=Stn1;
    ArcLEnd p3,v100,sm1,wd3,fine,PKI_500:=Stn1;
    MoveL p4,v1000,z10,PKI_500\WObj:=wobj0;
ENDPROC
```

xx1500001012

7 SKS FlexPendant Application

7.1 Introduction

Overview

The SKS graphical user interface on the FlexPendant is called SKS Interface.

The SKS Interface shows valuable process information, such as:

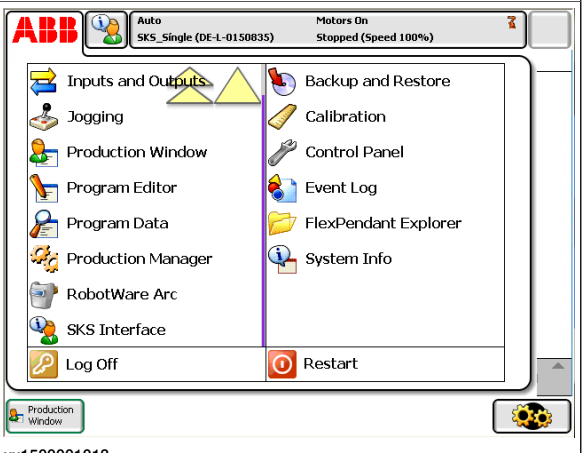
- Real-time voltage and current.
- Real-time wire feed speed.
- Real-time welding speed
- Reference Speed
- Active Schedule (Group/Part/Program)
- Active Signal status
- Power source status
- Average Energy

The SKS Interface also includes a welddata editor that allows the user to change the following data

- Group port value
- Part port value
- Schedule port value (Program Number)

Finally the relay contacts and digital inputs of the Feldbus 5 interface can be controlled from here if configured.

Starting the SKS interface

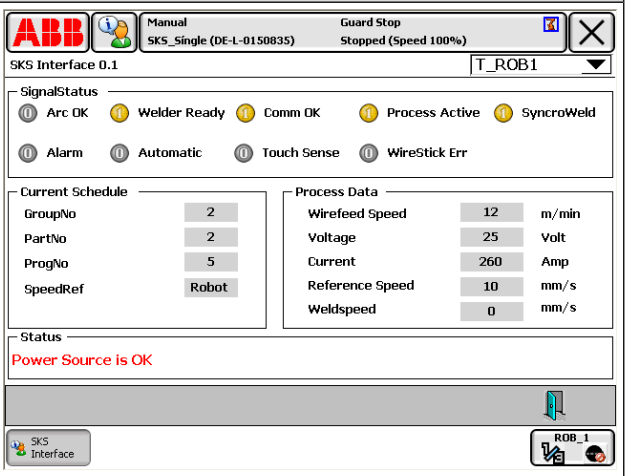
	Action	Info/illustration
1	Press the **ABB menu**.	The name of the SKS User Inputs
2	Press **SKS Interface**. The application starts.	 xx1500001013

Continues on next page

	Action	Info/illustration
3	Once the application has been loaded, a desktop is displayed with a number of icons. The power source functions can be accessed from here. • Click on the shutdown button (top right corner) to close the SKS Interface	 xx1500001014

7.2 Status Window

Start the SKS Interface Status Window

	Action	Info/illustration
1	Press the Status button in the start window to open the Status window	 xx1500001015
2	Click the “Door” icon to exit the status window. Click on the shutdown button (top right corner) to close the SKS Interface	

Info in the Status Window

The Status window shows the following information:

Function	Info/Illustration
Signal Status	Current Signal Status for : • ArcOK • Welder Ready • Communication OK • Process Activ • SyncroWeld On • Alarm • Automatic • Touch Sense • Wirestick Error
Current Schedule	Current Signal Status for the selected Weld-data within the Q84 : • Active group port • Active part port • Active program number • Speed Reference
Process Data	Real-time Data from the SKS welder • Wirefeed speed • Voltage • Current • Reference Speed • Weldspeed

Continues on next page

7.2 Status Window
Continued

Function	Info/Illustration
Status	Status Message from the SKS Welder

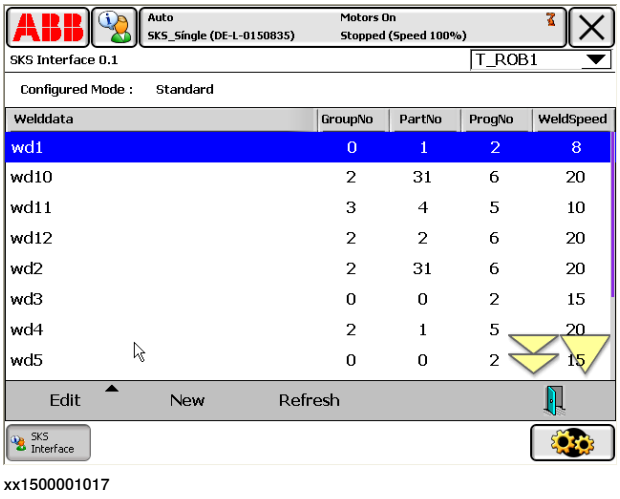
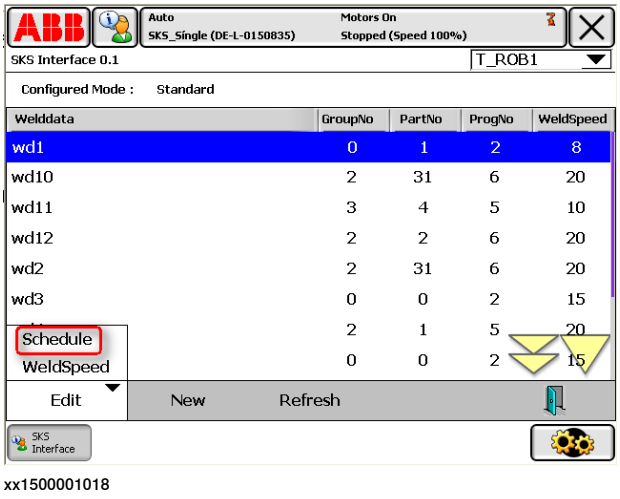
7.3 Schedule Editor

Schedule editor search

The Schedule Editor searches for all welddata in the system and presents it on the FlexPendant.

> **Note**
>
> Welddata must be defined on module level, if defined on routine level the editor cannot find the data.

Set/Change Schedule data

	Action	Info/illustration
1	Select the weldata you want to change	 xx1500001017
2	Press **Edit** and select **Schedule**.	 xx1500001018

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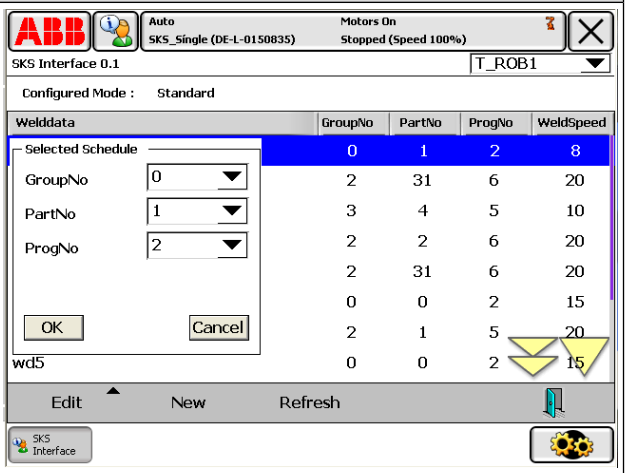
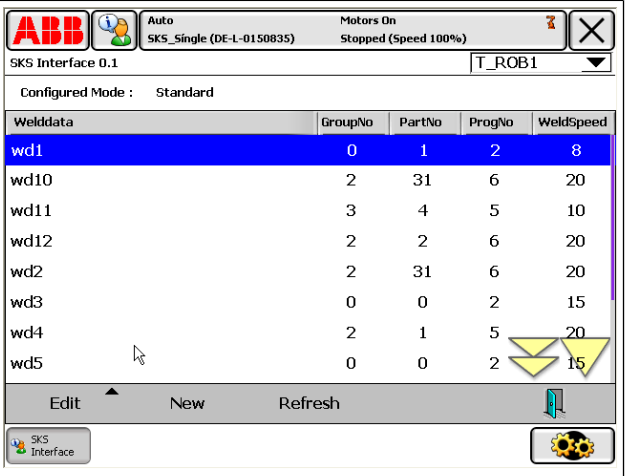
7.3 Schedule Editor
Continued

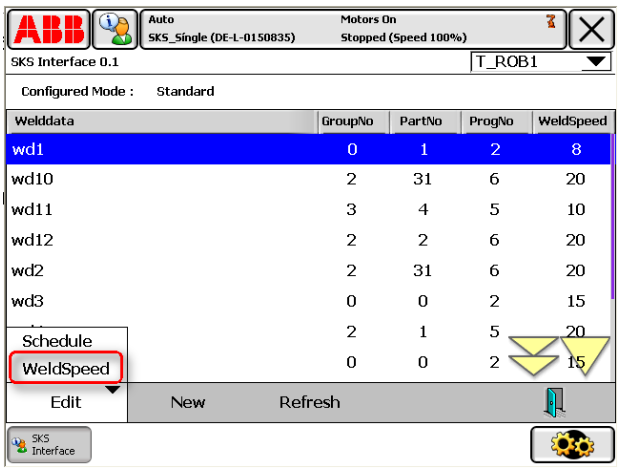
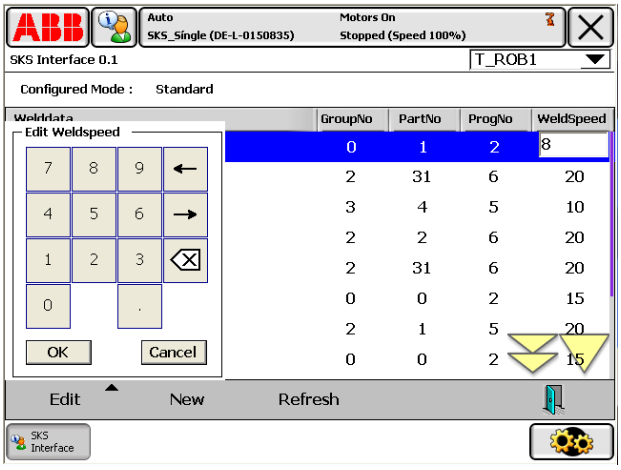
	Action	Info/illustration
3	The Schedule numbers can be selected with the drop-down menus Press **OK** to activate the changes or **Cancel** to cancel the operation.	 xx1500001016

Set/Change Weldspeed

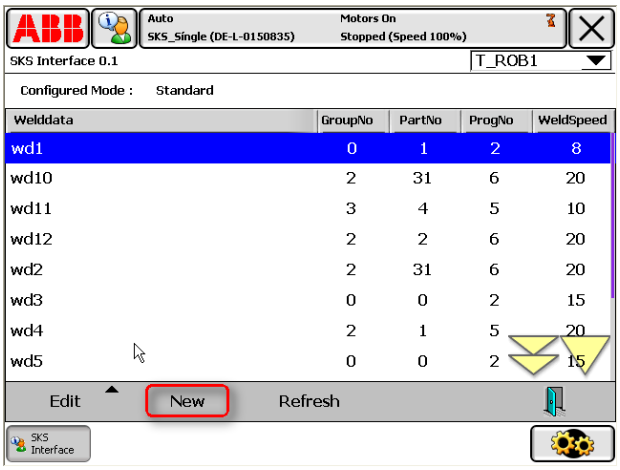
The weldspeed can either be changed with the SKS Interface Application or with the RAPID data editor.

	Action	Info/illustration
1	Select the weldata you want to change	 xx1500001019

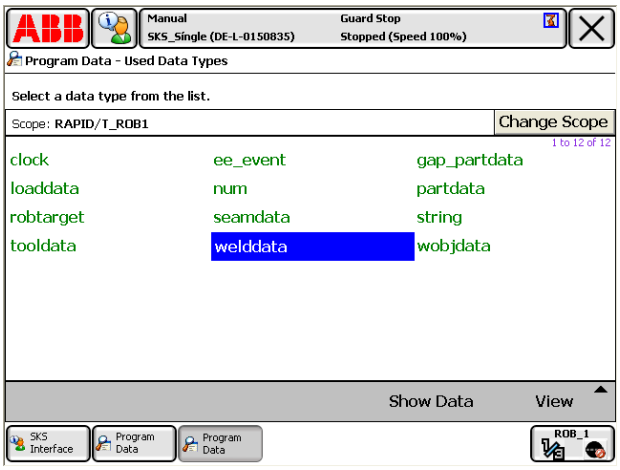
Continues on next page

	Action	Info/illustration
2	Press **Edit** and select **WeldSpeed**.	 xx1500001020
3	The weldspeed can be changed using the NumPad Editor Press **OK** to activate the changes or **Cancel** to cancel the operation.	 xx1500001021

Create new Welddata

	Action	Info/Illustration
1	Press **New** to create new welddata This is a shortcut the the RAPID Program Data window.	 xx1500001022

Continues on next page

	Action	Info/Illustration
2	Select **welddata** to create new data	 xx1500001023

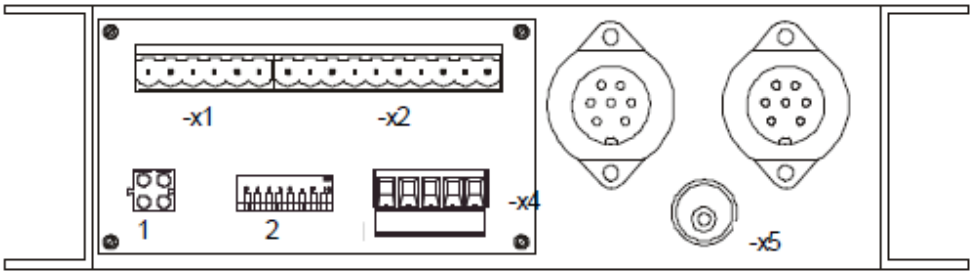
7.4 User functions

General

The SKS Interface provides a view which allows the user to control the five relay outputs on the Fieldbus 5 interface. The behavior of the buttons is fully configurable also the digital inputs can be configured and monitored. The configuration is done in the process configuration database (proc.cfg)

The relay outputs can for example be used to connect and control a torch cleaner or any other equipment.

Relay connections on Feldbus 5 Interface



xx1500001024

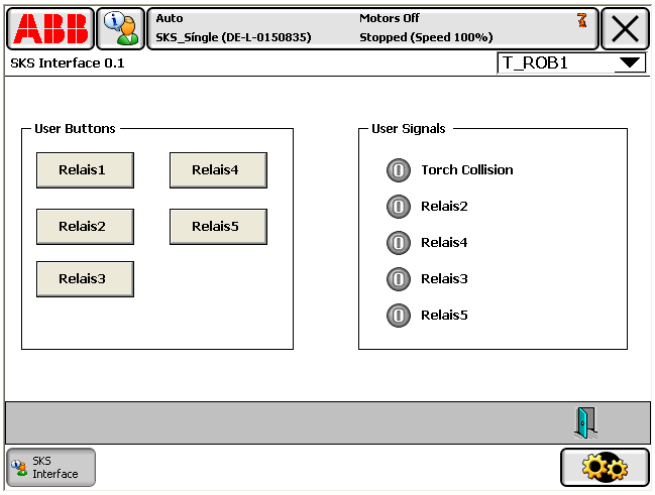
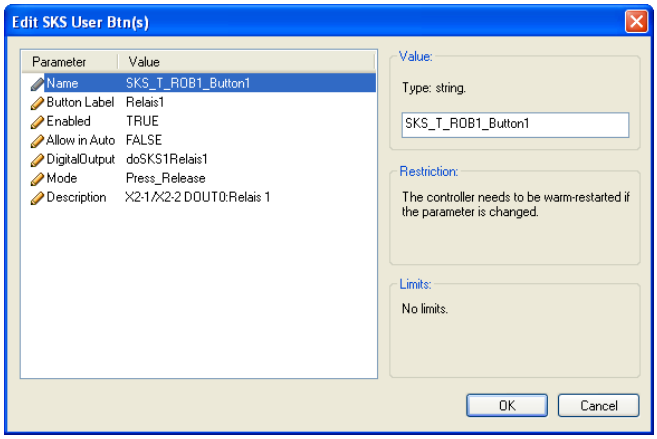
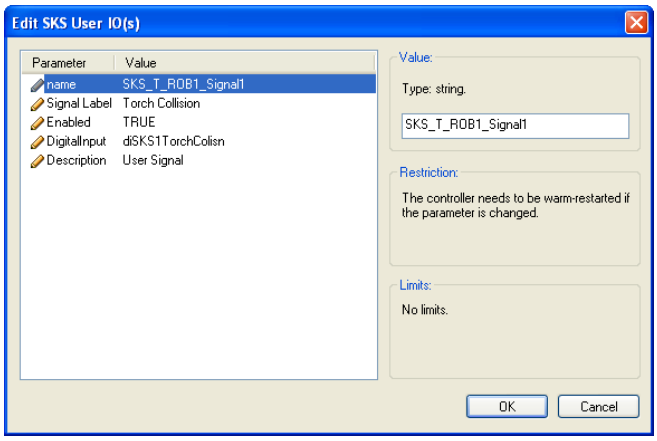
Contactor on Feldbus 5	Info/illustration
X2-1/X2-2 DOUT0	Relay 1
X2-3/X2-4 DOUT1	Relay 2
X2-5/X2-6 DOUT2	Relay 3
X2-7/X2-8 DOUT3	Relay 4
X2-9/X2-10 DOUT4	Relay 5

Digital Input on Feldbus 5	Info/illustration
X1-2: DIN0	Digital Input 1
X1-3: DIN1	Digital Input 2
X1-4: DIN2	Digital Input 3
X1-5: DIN3	Digital Input 4
X1-6: DIN4	Digital Input 5

Continues on next page

7.4 User functions

Continued

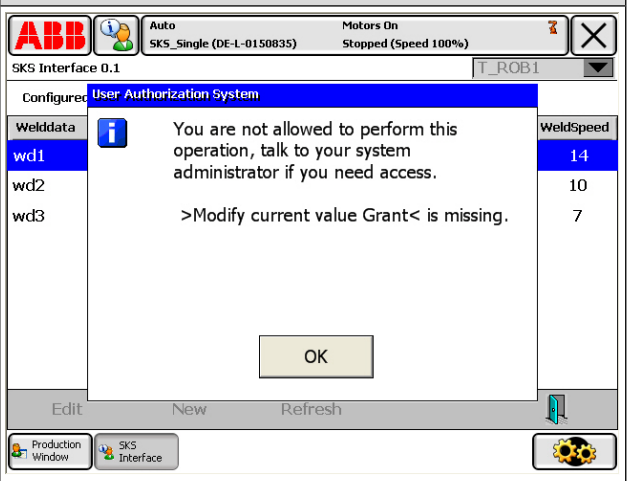
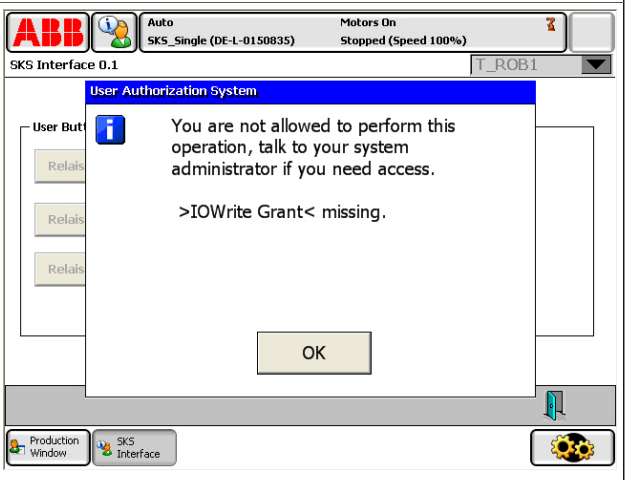
	Action	Info/illustration
1	The **User Functions View** can be launched from the SKS Desktop	 xx1500001025
2	Button configuration in RobotStudio	 xx1500001026
3	Signal configuration in RobotStudio	 xx1500001027

7.5 UAS grants

UAS grants

The SKS User Interface requires some UAS grants to operate properly. The User needs the following grants in order to use the full functionality:

- *Application Grant* to get access to the ABB menu
- *IOWrite Grant* to change the EIO Value from the *User Functions* tab
- *Modify Current Value* to change the welddata

Description	Info/illustration
Message shown at the FlexPendant with missing *Modify Current Value* grant The operator gets a message and the *Edit* and *New* functionality will be disabled. It is just possible to view the current schedules.	 xx1500001028
Message shown at the FlexPendant with missing *IO Write Grant*	 xx1400002597

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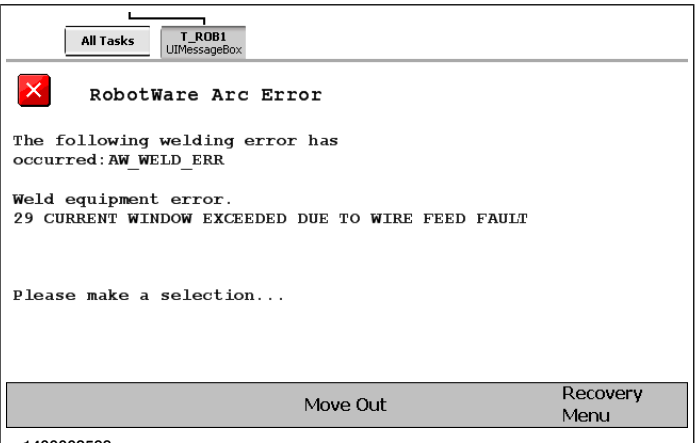
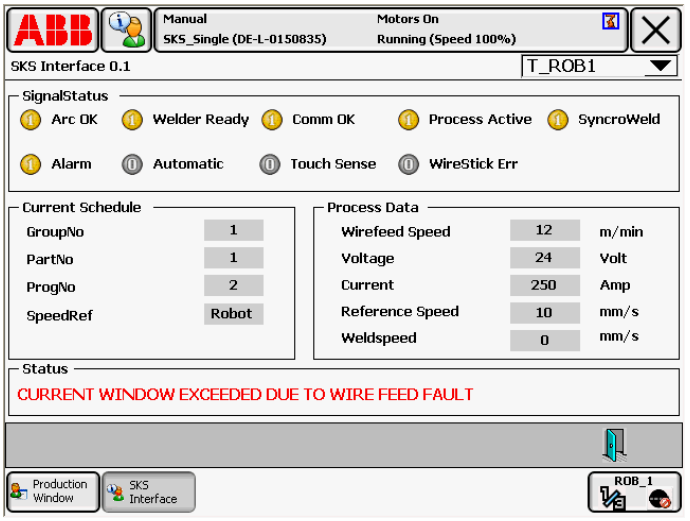
8 SKS error codes

Codes are presented on the SKS inteface Application

All SKS error Codes are presented on the SKS Interface Application and via the RobotWare Arc Error handler. The Error number and its corresponding error message are shown.

Error message as shown in RobotWare Arc	 xx1400002598
Error message as shown in SKS Interface	 xx1400002596

Alarm code list

The alarm codes are divided into groups according to their association:

ALARM groups	Info/illustration
ALARM 00	System configuration
ALARM 10	Gas, water, wire, cable
ALARM 20	Power source
ALARM 30	Welding process
ALARM 40	Messages for documentation
ALARM 50	Synchronization PC <=> Q8

Continues on next page

Continued

ALARM groups	Info/illustration
ALARM 60	
ALARM 70	Control system
ALARM 80	Wire feeders
ALARM 90	Interface

Alarm No.	Description	Possible cause	Resolution
1	POWER SOURCE NOT CONNECTED Controller cannot detect any power source	SPW cable between power source and control Q350/351/500/501/1000 power unit: Board LTRDCx missing from the power source Ribbon cable TRDC3/LTRDCx Q420/421 power unit: Cable BuBuCON/Q420H	Inspect, rectify or replace if necessary
2	WIRE FEEDER NOT CONNECTED The control system is unable to find a wire feeder.	SPW cable between power source and control Connection in wire feeder Motor card not fitted in wire feeder Wire feeder coding (master/slave) incorrectly selected Cable connection (Master/Slave) incorrectly selected	Inspect, rectify or replace if necessary
3	CABLE or CABLING not OK. Controller has detected faulty wiring.	SPW cable mechanically damaged Connection plug mechanically damaged SPW cable at the interface incorrectly positioned	Inspect, rectify or replace necessary
4	Entry in alarm buffer of power source	Contact SKS for more information	
7	THE CONTROLLER IS NOT SUITABLE Controller and other units do not match.	The controller has been changed incorrect data records	Inspect, rectify or replace necessary
8	INTERFACE MISSING Controller cannot detect ant interface.	No interface connected Switch board cable misplaced There is no SPW cable to the switchboard Especially with MASTER/SLAVE systems: MASTER not switched on MASTER/SLAVE mixed-up Second switchboard cable missing Synchronizing cable missing Direction of synchronizing cable wrong	Inspect, rectify or replace necessary

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Continued

Alarm No.	Description	Possible cause	Resolution
9	Change in the enivronment Controller has detected a new or modified unit	A unit was replaced without switching off the machine. Wiring was modified without switching off the machine. An SPW cable was damaged. Especially with MASTER/SLAVE Systems: MASTER was switched off MASTER/SLAVE wiring was modified	Inspect, rectify or replace if necessary
10	GAS SHORTAGE The GAS sensor indicates a lack of shield gas.	Gas bottle empty Gas supply interrupted Gas valve defective Especially with twin wire units: Gas connected to wrong wire feeder	Inspect, rectify or replace if necessary
11	LACK OF WATER WATER sensor indicates a problem with cooling water.	Lack of cooling water Water circuit clogged Water circuit interrupted Water pump defective Unit has an air-cooled torch Especially with twin wire units: Water connected to wrong wire feeder	Inspect, rectify or replace if necessary
12	WIRE DIAMETER UNSUITABLE The selected wire diameter cannot be processed	Output of power source is too low Configuration parameters for this wire diameter missing	Inspect, rectify or replace if necessary
20	POWER SOURCE NOT READY The power source indicates a problem.	Incorrect mains voltage One phase of mains voltage not present The mains voltage has been briefly interrupted Power unit defective Especially with twin wire units: Double cable missing Doubler cable mechanically damaged	Inspect, rectify or replace if necessary
21	TEMPERATURE OF POWER SOURCE OR WIRE FEEDER TOO HIGH The temperature probe in the power source or wire feeder unit indicates that the temperature is too high.	Air circulation obstructed An unsuitable location has been chosen Power source needs cleaning Too high a load has been selected Permissible duty cycle exceeded The temperature probe in the power source or wire feeder unit is defective. Fans tripped or obstructed	Inspect, rectify or replace if necessary

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Continued

Alarm No.	Description	Possible cause	Resolution
22	POWER SOURCE UPDATE REQUIRED The selected welding process cannot be carried out with this power source.	Power source not suitable Welding process incorrectly selected	Change power source Upgrade power source Do not use this welding process
23	SPECIAL EQUIPMENT "KF-PULSE" MISSING You want to use the "KF-PULSE" welding process. You need a power source with special equipment to do this.	Welding process is incorrectly selected Power source not suitable	Update the LTRDC 4 board in the power source
24	GMAW SYSTEM MISSING Controller requires a GMAW power source to carry out the selected welding process.	Welding process incorrectly selected A GTAW power source is not suitable	Inspect, rectify or replace if necessary
25	GTAW or AC SYSTEM MISSING Controller requires a GTAW power source to carry out the selected welding process.	Welding process incorrectly selected A GMAW power source is not suitable	Inspect, rectify or replace if necessary
26	CURRENT SETPOINT TOO HIGH The welding data record contains a too high entry for welding current of a GTAW power source.	Set point value too high The GTAW power source is not suitable	Inspect, rectify or replace if necessary
27	SLAVE CONTROLLER NOT READY The welding data set requires a slave controller. This is missing.	Controller missing Synchronising cable missing Data transmission from the slave controller has been deactivated with "P3"	Switch system off and on again.
28	CURRENT WINDOW EXCEEDED Welding current was out of the pre adjusted current window for longer than permitted in the arc "Arc Filter" setting.	Wrong torch distance Air gap on work piece Shunt path on torch / cable assembly / wire feed	Find and rectify mechanical fault

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Continued

Alarm No.	Description	Possible cause	Resolution
29	CURRENT WINDOW EXCEEDED DUE TO WIRE FEED FAULT Welding current was out of the pre-adjusted current window for longer than permitted in the "Arc Filter" setting, because welding wire could not be fed as needed.	see ALARM 31	
30	IGNITION TIME EXCEEDED The arc could not be ignited within the time set in "Start Filter"	Ground cable is not connected or defective Torch cable is not connected or defective Torch cable not connected Torch cable defective No welding wire Roller drive not closed Washing residue on component Arc strike attempted on slag layer of the previous weld Especially with bulk wire spool units: Bulk wire spool has ground contact Auxiliary drive of bulk wire spool is defective	Inspect, rectify or replace if necessary
31	WIRE FEED PROBLEM Welding wire cannot be fed correctly. The upper limit of motor current as set in "Motor-Limit" is exceeded for longer than permitted in "Motor-Filter".	Liner blocked Wire coil brake set too strong Wire coil sticks (wrong coiling) Wire has jumped out of guide Especially with the bulk wire spool units: Auxiliary drive of bulk wire spool is defective Large spool takes too long to accelerate Hose to wire feeder blocked Hose to wire feeder not laid correctly Distance from wire feeder too large	Inspect, rectify or replace if necessary

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Continued

Alarm No.	Description	Possible cause	Resolution
32	ARC FAILURE The arc has extinguished for no apparent reason. The welding current has been less than 10 A for longer than the time specified in "Arc_filter".	Wire spool empty The robot has strayed from its path No component has been inserted A hole has appeared in the work piece Especially with twin wire units: One of the two wire spools is empty One wire cannot be transported properly One wire stuck in torch	Inspect, rectify or replace if necessary
33	ARC FAILURE DUE TO WIRE FAULT The arc extinguished due to a wire fault. The welding current has been less than 10 A for longer than the time specified in "Arc_filter". It had previously been established that there was a wire fault (see ALARM 31).	Wire spool empty Wire jams or sticks to the coil The earlier ALARM 32 has been ignored Especially with twin wire units: One of the two wire spools is empty One wire cannot be transported properly One wire stuck in torch	Inspect, rectify or replace if necessary
34	AUTOCOMP LIMIT EXCEEDED The automatic correction procedure for welding voltage (Autocomp) has exceeded the value which is set in "Autocomp-Limit" for a time longer than set in "Autocomp-Filter".	Torch distance too great Torch touches work piece Shunt path on wire in transport system The robot has strayed from its path No component has been inserted A hole has appeared in the work piece Especially with twin wire units: One of the two wire spools is empty One wire cannot be transported properly One wire stuck in torch Especially with bulk wire spool units: Bulk wire spool has a shunt path Insulation of wire feeding is defective	Inspect, rectify or replace if necessary **Note** The test voltage displayed at the control should always be above 15 Volts!

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Continued

Alarm No.	Description	Possible cause	Resolution
35	AUTOCOMP LIMIT EXCEEDED DUE TO WIRE FEED FAULT The automatic correction procedure for welding voltage (Autocomp) has exceeded the value which is set in "Autocomp-Filter". A wire feed malfunction had been previously detected.	ALARM 31 has been ignored Torch too close to component The robot has jammed the cable assembly Wrong contact nozzle in torch Especially with twin wire units: One of the two wire spools is empty One wire cannot be transported properly One wire stuck in torch Especially with bulk wire spool units: Bulk wire spool clamps Insulation is defective	Inspect, rectify or replace if necessary
36	AUTOCOMP LIMIT EXCEEDED DURING ARC FAILURE The automatic correction procedure for welding voltage (Autocomp) has exceeded the value which is set in "Autocomp-Filter" for a time longer than set in "Autocomp-Filter". At the same time, an arcbreak was detected.	see ALARM 32 and see ALARM 34 As both events can occur simultaneously, an unambiguous assessment is not possible.	Inspect, rectify or replace if necessary
37	AUTOCOMP LIMIT EXCEEDED -DURING ARC FAILURE -AFTER WIRE FEED PROBLEM The automatic correction procedure for welding voltage (Autocomp) has exceeded the value which is set in "Autocomp-limit" for a time longer than set in "Autocomp-Filter". Previously, a wire feed fault had been detected, which followed an arc failure.	see ALARM 33 and see ALARM 34 The alarm is triggered by the wire feed malfunction. A clear fault attribution is not possible.	Inspect, rectify or replace if necessary

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Continued

Alarm No.	Description	Possible cause	Resolution
38	WIRE STUCK AT THE END OF WELDING After end of welding the control detected an insufficient test voltage.	Shunt path on wire in transport system Torch touches a part of the clamping device Wire is in contact with work piece Steel wool has spilled out of a catalyst Especially with twin wire units: One wire cannot be transported properly Torch insulation defective Especially with the bulk wire spool units: Bulk wire spool has a shunt path Insulation of wire feeding is defective	Inspect, rectify or replace if necessary  **Note** The test voltage displayed at the control should always be above 15 Volts!
39	WIRE FEED PROBLEM (DOUBLE WIRE) Welding wires not feeding properly. The difference between motor currents is higher than 1 Amp for a time longer than set in "Motor-Filter".	(see also ALARM 31) One-sided wire feed malfunction One wire stuck in contact nozzle	Inspect, rectify or replace if necessary
40	START OF WELD ON NEW COMPONENT	The interface provides an input called "work piece counter". When this input is set by the robot before welding starts, Q8-control records "ALARM 40" for subsequent evaluation on the PC. Evaluations are simplified if the robot always sets this signal only at the first weld of a work piece.	
41	SETPOINTS HAVE BEEN CHANGED MANUALLY	The Q8 controller can be preprogrammed so that manual changes to welding parameter setpoints are recorded as "ALARM 41". In this way, the PC can be used later to evaluate when and how which data were modified.	
42	ROBOT SELECTS WRONG PROGRAM	If the robot selects a program that does not exist in the Q8 controller, "ALARM 42" is recorded. The controller refuses to execute the program and continues to weld with the previously selected program.	Inspect, rectify or replace if necessary  **Note** If the robot selects a wrong program prior to the start of welding, "ALARM 93" is output and the start of welding is rejected.

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Alarm No.	Description	Possible cause	Resolution
43	ROBOTS SELECTS WRONG FILE/GROUP	If the robot selects a program that does not exist in the Q8 controller, "ALARM 42" is recorded. The controller refuses to execute the file or group and does not start.	Inspect, rectify or replace if necessary **Note** The Q84 controller additionally discriminates between the faulty selection of a FILE (ALARM 94) or GROUP (ALARM 95)
44	USER HAS PERFORMED A "BACKUP"	Q84 controller has a memory area for backup data (BACKUP/RESTORE). When a data backup is performed "ALARM 44" is recorded for subsequent evaluation on the PC.	
45	USER HAS PERFORMED A "RESTORE"	Q84 controller has a memory area for backup data (BACKUP/RESTORE). When setpoint values from a previous backup are restored, "ALARM 45" is recorded for later	
46	UNKNOWN ERROR An error message is generated which is not yet in this list		An update is required.
50	BASE DATA NOT YET LOADED Controller has detected missing or defective data records.	A new controller is missing data Data have been corrupted (e.g. lightning strike) Buffer battery failed	Load data from PC Check battery voltage: turn off control -wait at least 1 min - measure Ubatt > 2.65V
51	DATA CREATED WITH OUT OF DATE SOFTWARE Controller has detected incomplete data records.	Data have been generated with outdated software Data have been corrupted (e.g. lightning strike)	Request a software update Reload the data
52	WRONG LANGUAGE FILE Controller has detected that the loaded language file does not match the software.	New language file not yet loaded following an update. Data have corrupted (e.g. lightning strike)	Reload the language file
53	WRONG WELDING PROCESS (1) Controller has detected that the selected material does not match the welding process.	Wrong material selection Data have been corrupted (e.g. lightning strike)	Select suitable material

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Alarm No.	Description	Possible cause	Resolution
54	WRONG WELDING PROCESS (2) The controller cannot execute this welding process.	Wrong controller connected (Q6xx instead of Q8xx) Data have been corrupted (e.g. lightning strike)	Change controller
59	TRAP-ERROR The controller has established that the operational sequence is incorrect.	GTAW high-voltage ignition in the vicinity Data have been corrupted (e.g. lightning strike)	Switch off the system Wait 5s Replace the controller if the message appears again immediately
70	HEIGHT SENSING CONTROL MISSING The control system does not support height sensing.		Use the correct controller
71	GMAW PROCESS CONTROL MISSING The control system does not support the GMAW process.		Use the correct controller
72	GSTAW PROCESS CONTROL MISSING The control system does not support the GTAW process.		Use the correct controller
73	GTAW-AC PROCESS CONTROL MISSING The control system does not support the GTAW-AC welding process.		Use the correct controller
80	UNSUITABLE WIRE FEEDER The wire feeder is not suitable for this welding system.		Use the correct controller
81	WIRE FEEDER WITHOUT TACHO The wire feeder is not suitable for this welding system.		Use the correct controller
82	OBSOLETE WIRE FEEDER The wire feeder does not have all the required characteristics.		Load new software (Motor4/5) Replace motor card (all others)
83	GMAW WIRE FEEDER MISSING The wire feeder is not suitable for GMAW welding systems.		Set coding switch correctly (Motor4/5) Use the correct wire feeder Replace motor board

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Alarm No.	Description	Possible cause	Resolution
84	GTAW WIRE FEEDER MISSING The wire feeder is not suitable for GTAW welding systems.		Set coding switch correctly (Motor5) Use the correct wire feeder Replace motor board
85	SECOND WIRE FEEDER MISSING The control system is unable to find the necessary second wire feeder.	The "MASTER" wire feeder is not suitable for double-wire welding processes.	See: ALARM 02
86	DOUBLE-WIRE WIRE FEEDER 1 MISSING		Set coding switch correctly (Motor4/5) Use the correct wire feeder Replace motor board
87	UNSUITABLE WIRE FEEDER 2 The "SLAVE" wire feeder is not suitable for this welding system.		Use the correct wire feeder
88	DOUBLE-WIRE WIRE FEEDER 2 MISSING The "SLAVE" wire feeder is not suitable for double-wire welding systems.		Set coding switch correctly (Motor4/5) Use the correct wire feeder Replace motor board
90	LSP INTERFACE REQUIRED The data set requires an LSP interface. A PGM interface has been connected instead.		Set up interface correctly (UNI5) Use correct interface
91	PGM INTERFACE REQUIRED The data set requires a PGM interface. An LSP interface has been connected instead.		Set up interface correctly (UNI5) Use correct interface
92	ANGLE TRANSMITTER INTERFACE REQUIRED The data set requires an angle transmitter interface. A PGM/LSP interface has been connected instead.		Set up interface correctly (UNI5) Use correct interface
93	INVALID PROGRAM SELECTED Robot/PLC selects a non-existent welding program.		Load missing programs from the PC or add it to the Q84 Avoid selecting this group

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Alarm No.	Description	Possible cause	Resolution
94	INVALID FILE NUMBER SELECTED Robot/PLC selects a non-existent part number.		Load missing part number from PC or add to Q84 Avoid selecting this group
95	INVALID GROUP SELECTED Robot/PLC selects a non-existent group.		Load missing group from the PC Avoid selecting this group
99	START SIGNAL PRESENT The robot or PLC keeps holding the start signal even after the welding process was automatically terminated.		Reset start signal

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