

Application manual SKS Interface with Feldbus 5



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Application manual SKS Interface with Feldbus 5

RobotWare 6.02

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Table of contents

	Overview of this manual	7
1	Safety	9
	 1.1 Safety 1.2 Safety for arc welding 1.3 Safety signals in the manual 1.4 DANGER - Make sure that the main power has been switched off! 1.5 WARNING - The unit is sensitive to ESD! 	9 10 11 13 14
2	About the SKS Feldbus 5 IRC5 interface	15
3	SynchroWeld	17
	 3.1 Welding with SynchroWeld	18 20 22 24
4	Installation and setup	27
	4.1 Hardware4.2 Software	27 36
5	System parameters	37
	5.1 SKS Equipment Class	37
6	SKS Interface modes	43
7	SKS FlexPendant Application	51
	 7.1 Introduction	51 53 55 59 61
8	SKS error codes	63
Inc	lex	75

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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

Revi- sion	Comment
-	First revision.
Α	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 <i>Operating manual - General safety information</i> .

1.2 Safety for arc welding

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.



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 <i>will</i> 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.
xx010000002	WARNING	Warns that an accident <i>may</i> occur if the instructions are not followed that can lead to serious injury, pos- sibly 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.
xx010000003	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, im- pact, 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.
xx020000023	ELECTROSTATIC DISCHARGE (ESD)	Warns for electrostatic hazards which could result in severe damage to the product.

1.3 Safety signals in the manual *Continued*

Symbol	Designation	Significance
xx010000004	NOTE	Describes important facts and conditions.
xx010000098	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-limit- ing 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.

^{1.5} WARNING - The unit is sensitive to ESD!

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.		
Droroquisitos			
Fielequisites	S Svetem prorequisites		
	IBC5 controller		
	BobotWare 6.01 or higher with BobotWare 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 <i>Reference Speed</i> is set inside the power source.		
	• A delay of up to 1 second occurs if you change a schedule within a weldseam using different weld speeds per schedule inside the welder. (Only if the <i>Reference Speed</i> is set inside the welder). Updating the already planed robot path can take a while.		
Additional informa	tion		
	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.		
	Cherating Manual - 084 Robot welding system		
	Operating Manual - 204 Nobol 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.

17

3.1 Welding with SynchroWeld

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.

3 SynchroWeld

3.1 Welding with SynchroWeld Continued

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

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.



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	Edit SKS Arc Equipment Properties(s) Parameter Value Use Equipment Standard ID SKS_T_R0B1 Use SKS Equipment ID SKS_T_R0B1 Mode Standard Ignition on FALSE Heat on FALSE Colume on FALSE Actor Preset 0 Joint mimeout 3 Weld Off Timeout 10 Override On TRUE Autorihibit On TRUE Autorihibit On TRUE WeldSpeedReference Robot OK Cancel	
2	SpeedRef set to <i>Robot</i> and SyncroWeld active	Manual Motors On SKS Interface 0.1 T_ROB1 SignalStatus Image: Common Circle Arc DK Welder Ready Comm DK Process Active SyncroWeld Alarm Automatic Touch Sense WireStick Err Current Schedule 1 Process Data GroupNo 1 Process Data Voltage 27 Volt SpeedRef Robot Reference Speed 0 Status Power Source is OK Image: Status Image: Status Power Source is OK Image: Status Image: Status Image: Status Status Power Source is OK Image: Status Image: Status Status Image: Status Image: Status Image: Status Power Source is OK Image: Status Image: Status Image: Status Status Image: Status Image: Status Image: Status Image: Status Power Source is OK Image: Status Image: Status Image: Status Image: Status Status Image: Status Image: Status Image: Status Image: Status Image: Sta	

3.2 Speed reference set inside the robot *Continued*

	Action	Info/illustration
3	SyncroWeld is turned off. To active the function press SyncroWeld OFF.	Synchrodived CPF Stat P2 P3 P4 P5 P60 P2 P3 1 - Pals Structure Nere feed 1 4.0 11.0 12.5 7.0 8.0 9.0 5.0 mA P2 2.9 1.0 ma Active read 1 10 12.5 7.0 8.0 9.0 5.0 mA P2 2.9 1.0 ma Active read 1 0.0 1 0.0 Active read 1 0.0 Active read 1 0.0 - 1 0.0 - 1 0.0 - 1 0.0 - 1 0.0 - 1 0.0 - 1 0.0 - 1 0.0 - 1 0.0 - 1 0.0 - 1 0.0 - 1 0.0 - 1 0.0 - 1 0.0 1 1 1 1 1 1 1 1
		Oss past flow 0.20 s UsSue 90.0 % Release ON
4	SyncroWeld active. If Syncroweld is turned on the weldspeed must be ad- ded to the schedule you use. This is necessary as the powersource has to know the welding speed to adapt the wirefeed speed.	Synchroweld Stahl uber Lapraht Staf parameter Laprahon like <

3.3 Speed reference set inside the power source

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.



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	Edit SKS Arc Equipment Properties(s) Parameter Value Use Equipment Standard IO SKS_T_R0B1 Use SKS Equipment ID SKS_T_R0B1 Mode Standard Ignition on FALSE Heat on FALSE Cool time on FALSE Fill on FALSE Arc Preset 0 Jignition timeout 3 Weld Off Timeout 10 Override On TRUE Time to feed 15 mm wire 1 Enable supervision on VC FALSE WeldSpeedReference PowerSource OK Cancel
2	SpeedRef set to power source and SyncroWeld active	Manual Manual Motors On SKS Interface 0.1 T_ROB1 SignalStatus Image: Common Circle Arc DK Welder Ready Comm DK Process Active SyncroWeld Alarm Automatic Touch Sense WireStick Err Current Schedule 1 Process Data Mirefeed Speed 0 m/min PartNo 1 1 Valtage 0 volt SpeedRef SKS Current 0 Amp Reference Speed 19,9 mm/s Status Power Source is OK Image: Common Status Image: Common Status Status Notors On 1 Image: Common Status Image: Common Status Power Source is OK Image: Common Status Image: Common Status Image: Common Status X1500000960 X1500000960 Image: Common Status Image: Common Status Image: Common Status

Continues on next page

3.3 Speed reference set inside the power source *Continued*

	Action	Info/illustration						
3	Syncroweld is turned off. To active the function press	I-Fuls 1.0 FE 2-5 I-Fuls Entern FE 3-2 1.0 mm Ar-91C02 6.00 T 16	ed 1 4.0	P2 0 11.0	P3 P4 12.5 7.0	8.0	P6 P7	5.0 m/min
	SyncroWeld OFF.	Docksis Liyus Experimental Date State preference species State preference species<	wwidth 22.2 a 22.2 consol 0.1 me 11. urrent 45.0 gournent 90.0 gournent 90.0 doComp 5.00.0 doComp 0.0 doComp 6.0 mp linit mp linit mp cellume 0.50	2 30.0 2 -0.6 5 1.6 450 0 300 5 158 3 316 ON STOP S 5.0 STOP S 5.0 STOP S 0 -0.6 STOP S 0 -0.6	() ((((() ((((((((() (((() (((()) (()) (()) () () ((() () (()) ()) () () () () () () () () () () () ()) ()) ()) () () () () () () () () () () () ()) () () () () () () () ()) () ()) () () () () () () () () () () () () () () () ()) () () () () () () () () () () () () () () () () ()) ()) (0 27.8 0.0 2.2 370 1.2 2.2 370 1.4 1.364 0N 510P 5.0 00 510P 5.0 00 510P	28.6 2 0.0 - 2.2 1 370 3 14 142 1 3.52 4 ON ON STOP STO 5.0 1 STOP STO 1.00 1 CM 01	2.6 V 1.0 V 2.2 ms 170 A 14 A 06 A 56 V/100A N 0.0 s 0.0 s 0.0 s 0.0 s 0.0 s
4	SyncroWeld active.	Nessure Intervie 0.06 s Alarm Inter 2.00 s xxx1500000961 Synchrowz14 Stahl uebez lappnaht Wre leed	ater Start 11 4.0	2.0 8.5	3.0 3.0 2	00	3.0	Unit
	Add the weldspeed in the Start program (here 0.84m/min).	Process KF-Puis Start parameter Errory wr User Expert Ignition filter 2.00 s Window wr Operation mode Extern Start Seq. 7.0 ms	speed 0.84 indow width	0.84	1	0.0		m/mir J/mm ±%
	This speed is used for your complete weld. (Until next ArcLStart)	Accelerate Acceler	tage 220 guecy 1000 s 184 eret 300 n 000 eret time 822 n 000 eret time 822 n 000 0N 0N 0N 0N 0N 0N 00 0N 00 0N 00 0N 00 0N 00 0N 00 0N 00 00	32.0 217.4 1.8 30 0 2.8 0.0 74.0 0N 0N STOP 1.00 0N 0N 2.0	2			V Hz A A ms % s c A A A s

3.4 Testing the functionality

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 <i>Robot</i> .	Edit SKS Arc Equipment Properties(s) Parameter Value Use SKS Equipment Standard ID SKS_T_R0B1 Use SKS Equipment 0 SKS_T_R0B1 Mode Seam Ignition on FALSE Heat offind as time FALSE Cool time on FALSE Part Preset 0 Jointion timeout 3 Weld Off Timeout 10 Override On TRUE Autorinitib Ch TRUE Time to feed 15 mm wire 1 Enable supervision on VC FALSE Weld SpeedReference Robot CK Cancel
2	Program a simple weld seam with 3 segments using different welddata for every segment.	Auto Motors Un X SKS Stsped (Speed 100%) X SKS Interface D.1 T_ROB1 T Configured Mode : Standard Velddata Welddata GroupNo PartNo ProgNo Welddata 0 1 2 14 wd2 0 1 2 14 wd3 0 1 2 14 Wodorn Sts Interface Interface Interface Xx1500000965 Xx1500000965 Interface Interface
3	Use the same speed and Group/Part/Program number in all welddata. We later on change the speed to test the SyncroW- eld functionality by simulat- ing a TCP Speed reduction.	Start Start <th< th=""></th<>

3.4 Testing the functionality *Continued*

	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.	Synchroweid Stobit Imp-toint Process K#-Puls User User Egent User User Egent User 000 Egent User 0000 Egent User 00000 Egent User 000000 Egent User 0000000000 Egent User 000000000000000000000000000000000000	Ethel P2 OFF Unit Wire feed 1 4.0 8.5 mininini Rooot speed 0.84 0.84 mininini Rooot speed 0.84 0.84 mininini Window width 0.0 #% mininini Puise width 0.0 #% % Puise width 0.0 #% % Puise width 0.0 #% % Puise width 0.0 A % Correction 0.0 0 A Dearce current lime 0.2 2.8 ms Correction 0.0 0 A Program duration 0.2 \$ \$ Program duration 0.2 \$ \$ On lost arc STOP \$ \$ Motor minint 2.0 A \$
5	Once you have defined the welddata, activate SyncroW- eld 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).	Auto SKS Interface 0.1 Configured Mode : Standard Welddata wd1 wd2 wd3 Edit New Production SKS Interface xx1500000969	Motors 0n Image: Constraint of the second secon
6	Change the weldspeed for segment 2 and 3 to get differ- ent values in the welddata (for example, 10 mm/s in segment 2 and 7 mm/s in segment 3)	xx150000970	

3 SynchroWeld

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 S	tahl						Start	P2	OFF				Unit
lap-joint						Wire feed 1	4.0	8.5					m/min
											8		
						Robot speed	0.84	0.84					m/min
Process	KF-F	Puls	Start parameter										
User	Exp	ert	Ignition filter	2.00	S	Window width				0	.0		±%
Operation mode	Exte	ern	Start-Seq.	14.0	ms								
			I-Ignition	20	A	Pulse voltage	32.0	32.0					V
KU04 1.0			Wire in speed	5.0	m/min	Pulse time	1.8	1.8					ms
Diameter	1.0	mm				Base current	30	30					A
		26	Program parame	ter		Correction	0	0					A
Ar<9%C02			KF Dynamics	0		Base current time	8.2	2.8					ms
			DownSlope	20.0	%	Correction	0.0	0.0					ms
Gas pre flow	0.20	s				Field charact.	74.0	74.0					%
Gas past flow	0.20	s		1 30	36	Release	ON	ON			s		
Gas quantity	12.0	l/min				Program duration	0.2						S
	00		Min. sync. w.feed	2.0	m/min								
Miscellaneous													
Mode	Single	e wire	EndParameter										
Motor 1/2	Moto	or 1											
Lift Arc	0	N	Burn back	2.0	mm								
Program Slope	OF	F	End crater (P7)	0									
Master mode	Mas	ster											
Arc release	after ig	nition				On lost arc	STOP	STOP					
Gas flow	Dont	test		× ×	273 - A	Arc filter	1.00	1.00					S
Water pump	OF	F				Motor monitoring		ON					
Measure interval	0.20	s			- 24	Motor limit		2.0			8		A
Alarm time	5.00	s				Motor filter				2.	00		S

xx1500000971

4.1 Hardware

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

4.1 Hardware *Continued*

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

4.1 Hardware Continued

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 mm ²
Max. connected power	25.8 kVA
Recommended generator power	32 kVA
Ambient temperature	Ambient temperature <45°C
Workpiece cable	70 mm ²
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



4.1 Hardware Continued

Information	Info/Illustration
Connectors on DeviceNet Interface	xx150000977
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	x1



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	82
						02

xx1500000979

Set the Baud Rate to 500 kbps

Feldbus Status LED





Not used

Not used

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

4 Installation and setup

4.1 Hardware Continued

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	FELDBUS 5 FELDBUS 5
2	Profibus connection on robot controller (Profibus DP M/S) The hardware of the PROFIBUS DP field bus consists of a mas- ter/slave unit, DSQC 687. The signals are connected to the board front (two 9-pole D- sub). Occupies one PCI slot.	<image/> <image/>
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 	Fb5 -x1 -x2 -x1 -x2 1 2 3 -x4 xx1500000983

4 Installation and setup

4.1 Hardware

Continued

	Action	Info/illustration
4	The Profibus station address can be adjusted within its Range from 1 to 99.	xx150000984
5	Each segment in a Profibus Network needs a correct termin- ation. If the modul is the first or the last device in the network the termination switch must be in position <i>On</i> otherwise it should be <i>Off</i>	Enabled NO Disabled
		xx150000985

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 communica- tion 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

4.1 Hardware Continued

	Action	Info/illustration
1	Start the DP Configurator Software and import the GSD File.	Softing PROFIBUS DP Configurator Project DD6 Options View ? Image: Im
2	Select DDB and then Import.	Softing PROFIBUS DP Configurator
3	If the Fieldbus 5 PDP cfg is not already in the selection then import it from the Me- diapool by clicking Add.	Softing PROFIBUS DP Configurator Project DD8 Options View 7 DDB Imported DD8 list: PROFILect Group (PROFILId4 (Softing GmbH)) PROFILect (Softing GmbH) Close No File imported xx1500000989
4	Browse to the Mediapool and select the SKSW0C9D.gsd file.	Softing PROFIBUS DP Configurator Project DDS Options View ? DDB Imported DDR list- PROFILE Diffinen PROFILE Diffinen PROFILE Diffinen PROFILE Diffinen PROFILE Diffinen PROFILE Dateiname: Chronibus \gardie=1 Diffinen PROFILE Dateiname: Chronibus \gardie=1 SKSW00500.grd Datebase Descriptor (*,) Close Datebase Descriptor (*

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

4.1 Hardware

Continued

	Action	Info/illustration
5	Now you can start with a new project by clicking Pro- ject.	Softing PROFIBUS DP Configurator - [DPkonf4] - × Project Edit Download Options View Window ? - × Configuration DDB Selection List - × Master DDB Selection List FROFIDear/PROFIDe4 (Softing GmbH) Fibility Slave Selection List Feldbus SPDP [SKS Welding Systems] Flortboard/PROFIDe4 (Softing GmbH) FROFIDear/PROFIDe4 (Softing GmbH) UNIGATE Profibus-DP (Deutschmann Automation GmbH) UNIGATE Profibus-DP (Deutschmann Automation GmbH) For Help, press F1 E xx1500000991 E
6	Configure first the DP Mas- ter by selecting the PROFI- board/PROFI104 entry.	Softing PROFIBUS DP Configurator - [SKS_STD4_CHF]
7	Click OK and the master will be added.	Softing PROFIBUS DP.Configurator -: [DPkonf7] Image: Configurator -: [DPkonf7] Project Edit Download Options View Window ? Configuration Image: Configurator -: [DPkonf7] Master DDB Selection List Master PROFIbaord/PROFI104 [Soling Ist of Slaves Selection List FROFIbaord/PROFI104 [Soling Slave Selection List FROFIbaord/PROFI104 [Soling Slave Selection List FROFIbaord/PROFI104 [Soling Slave Selection List FROFIbaord/PROFID4 [Soling GmbH] Slave Selection List Factores Configurator Forthelp. (Soling GmbH) UNIGATE Profibue-DP [Deutschmann Automation GmbH] UNIGATE Profibue-SDP [Deutschmann Automation GmbH] For Help. press F1 [SKS Welding Systems Feldbus SPDP] E xx1500000993 State Selection List
8	Configure the slave by se- lecting the Fieldbus 5 PDP entry in the list of slaves. Add your Station Address in the Basic tab.	DP Slave Configuration X Basic Modules Settings Slave Description: OK SKS Welding Systems Cancel Feldbus 5 POP Ident No: 0C9D Input/Output Inputs: 12 DP/FDL-Access Station Address: 12 Station Address: 12 Version 1.00

Continues on next page

4.1 Hardware Continued

	Action	Info/illustration	
9	Select the Modules tab and configure the IN/OUT size of the module. Select: IN/OUT 12 byte (6 word)	DP Slave Configuration X Basic Modules Settings Max. available Slots: 24 UK Used Slots: 1 Cancel Available Modules: 1 Cancel IN/OUT: 1 Byte 1 IN/OUT: 2 Byte (1 word) Add IN/OUT: 1 Byte (2 word) Add IN/OUT: 1 Byte (3 word) Add INPIT: 1 Byte (3 word) X X1500000995 Xx1500000995	
10	Add more modules if you have more then one Field- bus 5 interface and config- ure them.	Softing PROFINUS DP Configurator - SKS_STD4.CHF Protect Drest StS-STD4.CHF StS-STD4.CHF StS-STD4.CHF DDB Selection List Matter DDF Selection List Pf0FIboard/PR0FII04 (Softing Coll Fride/Room Coll Coll State Selection List DDB Selection List Pf0FIboard/PR0FII04 (Softing Coll Fride/Room Coll State Selection List Pf0FIboard/PR0FII04 (Softing Coll Fride/Room Coll State Selection List Pf0FIboard/PR0FII04 (Softing Coll Fride/Room Coll State Selection List Pf0FIboard/PR0FII04 (Softing Coll Fride/Room SPOP) (SKS Working Systems) DDS Selection List Pf0FIboard/PR0FII04 (Softing GmbH) Stare Selection List Pf0FIboard/PR0FII04 (Softing GmbH) DDS Selection List Pf0FIboard/PR0FII04 (Softing GmbH) DDS Selection List Pf0FIboard/PR0FII04 (Softing GmbH) DDS Selection Softing Statement Pf0FIboard/PR0FII04 (Softing GmbH) USE Foldbard SPOP (SES Working Systement) Pf0FIboard/PR0FID4 (Softing GmbH) USE Foldbard SPOP (SES Working Systement) Pf0FIboard/PR0FID4 (Softing GmbH) VIGATE Fordbard SPOP (SES Working Systement) Pf0FIboard/PR0FID4 (Softing GmbH) VIGATE Fordbard SPOP (SES Working Systement) VIGATE Fordbard SPOP (SES Working Systement)<	
11	Select Download to create the BIN file for the robot controller. Save the file as PBUS_CFG.BIN	Softing PRO/ BUIS KIP Configurator -SKS_S1D4.CN/	
12	Copy the file into your sys- tem's HOME folder and re- start the controller.	Ordner X Name ▲ Größe Typ Ordner SKS_Single Arc File Folder Image: Single Arc Bullstye File Folder Image: Single Image: Single Image: Single File Folder Image: Single Image: Single Image: Single Image: Single	

4.2 Software

4.2 Software

Software requirements

System prerequisites

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

Power source type

	650-7	Standard	I/O	Welder
4	650-9	Fronius		

4 650-9 Fronius
Configuration
Integrated version
DeviceNet
EtherNet/IP
650-10 ESAB AristoMig integrated
650-13 Lincoln ArcLink
🔺 📃 650-14 SKS SynchroWeld
Configuration
DeviceNet
ProfiBus
ProfiNet
650-8 Simulated Welder
RW Add-in loaded Welder

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 Equip- ment 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.

5 System parameters

5.1 SKS Equipment Class *Continued*

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 re- mains 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 re- mains 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 supervi- sion on VC	Bool	Enables signal supervision in the VC Default value: FALSE
WeldSpeedRefer- ence	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.

5.1 SKS Equipment Class Continued

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 inter- rupted 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 FlexPend- ant) 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 ig- nited
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 oc- curred
Internal WirestickON	Signaldo	Digital output signal to indicate Wirestick errors
WelderReady DI (required)	Signaldi	Digital input signal for WelderReady
WelderCommOk DI (re- quired)	Signaldi	Digital input signal for Welder Communication Ok
WelderRdyDl	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

5 System parameters

5.1 SKS Equipment Class *Continued*

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 ac- tivated 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 oc- curred
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

5.1 SKS Equipment Class Continued

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.

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

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

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

I-Puls 1,0 F	E 2-S						Start	P2	PS	P4	PS	P6	P7	Unit
I-Puls Ex	tern					Wire feed 1	4.0	11.0	12.5	7.0	8.0	9.0	5.0	m/min
FE 2-S 1.	0 mm													
Ar>9%C02 G	00 T	16												
						Robot speed	1.20	1.20	1.20	0.60	2.10	2.40	2.70	m/min
Process	I-P	uls	Start parameter											
User	Exp	pert	Ignition filter	2.00	s	Window width				0.	.0			±%
Operation mode	Ext	ern	Start-Seq.	14.0	ms	Voltage	22.2	30.0	30.0	26.2	27.6	28.6	22.6	V
			I-Ignition	20	А	Correction	0.0	-0.6	-2.0	0.0	0.0	0.0	-1.0	V
FE 2-S			Wire in speed	5.0	m/min	Pulse time	1.6	1.6	1.6	2.2	2.2	2.2	2.2	ms
Diameter	1.0	mm				Pulse current	450	450	450	370	370	370	370	A
			Program parameter			Base current	30	30	30	14	14	14	14	A
Ar≻9%C02														
						Welding current	96	158	166	126	136	142	106	A
Gas pre flow	0.20	s				Char. (Auto)	5.20	3.16	3.00	3.96	3.64	3.52	4.68	V/100A
Gas past flow	0.20	s	UpSlope	90.0	%	Release	ON	ON	ON	ON	ON	ON	ON	
Gas quantity	12.0	l/min	DownSlope	20.0	%	Program duration	0.1						0.0	s
			Min. sync. w.feed	0.0	m/min									
Miscellaneous													3 3	
Mode	Single	e wire	EndParameter											
Motor 1/2	Mot	or 1	T-End pulse	2.2	ms	Test AutoComp		ON	ON	ON	ON	ON	ON	
Lift Arc	0	N	Burn back	2.0	mm	On AutoComp limit		STOP	STOP	STOP	STOP	STOP	STOP	
Program Slope	0	FF	End crater (P7)	2		AutoComp limit		5.0	5.0	5.0	5.0	5.0	5.0	V
Master mode	Mas	ster			AutoComp filter 1.00			00			s			
Arc release	after i	gnition				On lost arc	STOP	STOP	STOP	STOP	STOP	STOP	STOP	
Gas flow	Te	st				Arc filter	0.50	0.50	1.00	1.00	1.00	1.00	1.00	s
vVater pump	O	FF				Motor monitoring		ON	ON	ON	ON	ON	ON	
Measure interval	0.06	s				Motor limit		3.0	3.0	3.0	3.0	3.0	3.0	А
Alarm time	2.00	s				Motor filter				2.0	00			s

xx1500001000

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.



Values of <i>wd1</i> in the Program Data view.	Hanual SK5_Single	Guard (DE-L-0150835) Stoppe	Stop ed (Speed 100%)	
 Mode: =95 correspondents to GroupNo = 2 PartNo = 31 	Name: w	vd1		
Changing the data with the	Name	Value	Data Type	Unit to 6 of 9
rapid data editor is critical as	wd1:	[20,0,[6,95],[0,0]]	welddata	
gram selection inside the Q84	weld_speed :=	20	num	mm/s
	org_weld_speed :=	0	num	mm/s
	main_arc:	[6,95]	arcdata	
	sched :=	6	num	
	mode :=	95	num	\swarrow
		Undo	ОК	Cancel
	Program Data			
	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.

Q84 system settings

Inventory number	Q84					1155
Type, Version	Q84 SW 3.0	D4		Q84 OS 1.		
Factory						
Department						
Production						
Machine ID						
Settings	Language				English	
	mm/inch				mm	
(Group/File	Display		G	roup/File	
Unlock Password	***					
VNC server			ON			
MAC-Address	00	10	CO	56	84	1C
IP-Address	192	168	178	115	manu	Jal
Subnet Mask	255	255	255	0		
Standard Gateway	192	168	178	1		
UDP-Port		5551			•	

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\W0bj:=wobj0;
ArcLStart p12,v1000,sml,wd1,fine,PKI_500\W0bj:=Stn1;
ArcL p13,v100,sml,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p14,v100,sml,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p15,v100,sml,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p18,v100,sml,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p19,v100,sml,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p20,v100,sml,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p21,v100,sml,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p22,v100,sml,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p23,v100,sml,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p24,v100,sml,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p26,v100,sml,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p26,v100,sml,wd1,fine,PKI_500\W0bj:=Stn1;
ArcLP20\W0bj:=Stn1;
ArcLP20\W0bj:=Stn1;
ArcLP20\W0bj:=Stn1;
ArcLP30\W0bj:=Stn1;
ArcLP
```

xx1500001005

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.	ABB Auto SKS Interface 0.1 Configured Mode : Seam	Motors Off DE-L-0150835) Stopped (Speed 100%)	
	Welddata	SeamNo ProgN	o WeldSpeed
	wd1 Edit New	95 6 Refresh	20
	xx1500001006		
The Schedule numbers can be selected with the drop	Auto SKS Interface 0.1	Motors Off DE-L-0150835) Stopped (Speed 100%)	
The Schedule numbers can be selected with the drop down menus	ABB Auto SKS Interface 0.1 Configured Mode : Seam	Motors Off DE-L-0150835) Stopped (Speed 100%) T_F	
The Schedule numbers can be selected with the drop down menus	Auto SKS Interface 0.1 Configured Mode : Seam Welddata	Motors Off DE-L-0150835) Stopped (Speed 100%) T_F SeamNo ProgN	ROB1 V
The Schedule numbers can be selected with the drop down menus	ABB Auto SKS Interface 0.1 Configured Mode : Seam Welddata Selected Schedule	Motors Off DE-L-0150835) Stopped (Speed 100%) T_F SeamNo ProgN 95 6	ROB1 V WeldSpeed 20
The Schedule numbers can be selected with the drop down menus	Auto SKS Interface 0.1 Configured Mode : Seam Welddata Selected Schedule GroupNo	Motors Off DE-L-0150835) Stopped (Speed 100%) T_F SeamNo ProgN 95 6	ROB1 V WeldSpeed 20
The Schedule numbers can be selected with the drop down menus	Auto SKS Interface 0.1 Configured Mode : Seam Welddata Selected Schedule GroupNo SeamNo 95	Motors Off DE-L-0150835) Stopped (Speed 100%) T_F SeamNo ProgN 95 6	ROB1 V WeldSpeed 20
The Schedule numbers can be selected with the drop down menus	Auto SKS Interface 0.1 Configured Mode : Seam Welddata	Motors Off DE-L-0150835) Stopped (Speed 100%) T_F SeamNo ProgN 95 6 ▼	ROB1 WeldSpeed 20
The Schedule numbers can be selected with the drop down menus	Auto SKS Interface 0.1 Configured Mode : Seam Welddata	Motors Off DE-L-0150835) Stopped (Speed 100%) T_F SeamNo ProgN 95 6 Cel	Image: Constraint of the second se
The Schedule numbers can be selected with the drop down menus	Auto SKS_Single (SKS Interface 0.1 Scame Configured Mode : Seam Welddata Selected Schedule GroupNo 95 ProgNo 6 OK Car Edit New	Motors Off DE-L-0150835) Stopped (Speed 100%) T_F SeamNo ProgN 95 6 Cel Refresh	ROB1
The Schedule numbers can be selected with the drop down menus	Auto SKS Interface 0.1 Configured Mode : Seam Welddata Selected Schedule GroupNo SeamNo 95 ProgNo 6 OK Can Edit New	Motors Off DE-L-0150835) Stopped (Speed 100%) T_F SeamNo ProgN 95 6 Cel Refresh	ROB1 V ROB1 V 20 20



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.

Q84 system settings

Inventory number	Q84					1155
Type, Version	Q84 SW 3.	04		Q84 OS 1.	.02	
Factory						
Department						
Production						
Machine ID						
Settings	Language				English	
	mm/inch mm			mm		
	Group/File	Display		We	eld number	
Unlock Password	***					
VNC server			ON			
MAC-Address	00	10	CO	56	84	1C
IP-Address	192	168	178	115	manu	al
Subnet Mask	255	255	255	0		
Standard Gateway	192	168	178	1		
UDP-Port		5551				

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],[0,0,0,0,0,0,0,0,0]];
```

```
PROC Part 1 Pth 1()
```

```
MoveJ p11,v1000,z10,PKI_500\W0bj:=Stn1;
ArcLStart p12,v1000,sm1,wd1,fine,PKI_500\W0bj:=Stn1;
ArcL p13,v100,sm1,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p14,v100,sm1,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p15,v100,sm1,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p18,v100,sm1,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p19,v100,sm1,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p20,v100,sm1,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p21,v100,sm1,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p22,v100,sm1,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p23,v100,sm1,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p24,v100,sm1,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p24,v100,sm1,wd1,z1,PKI_500\W0bj:=Stn1;
ArcL p26,v100,sm1,wd1,fine,PKI_500\W0bj:=Stn1;
ArcLP20\W0bj:=Stn1;
ArcLP20\W0bj:=Stn1;
ArcLP20\W0bj:=Stn1;
ArcLP20\W0bj:=Stn1;
ArcLP30\W0bj:=Stn1;
ArcLP3
```

xx1500001010

6 SKS Interface modes

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]]; PROC Part 1 Pth 1() !GroupNo is set to "O" and PartNo is set to "2" !ProgramNo is set in wd1 Set_Group_Part 0, 2; MoveJ p11,v1000,z10,PKI 500\W0bj:=Stn1; ArcLStart p12,v1000,sm1,wd1,fine,PKI_500\W0bj:=Stn1; ArcL p13,v100,sm1,wd1,z1,PKI 500\W0bj:=Stn1; ArcL p14,v100,sm1,wd1,z1,PKI 500\W0bj:=Stn1; ArcL p15,v100,sm1,wd1,z1,PKI 500\W0bj:=Stn1; ArcL p18,v100,sm1,wd1,z1,PKI 500\W0bj:=Stn1; ArcL p19,v100,sm1,wd1,z1,PKI 500\W0bj:=Stn1; ArcL p20,v100,sm1,wd1,z1,PKI 500\W0bj:=Stn1; ArcL p21,v100,sm1,wd1,z1,PKI 500\W0bj:=Stn1; ArcL p22,v100,sm1,wd1,z1,PKI 500\W0bj:=Stn1; ArcL p23,v100,sm1,wd1,z1,PKI 500\W0bj:=Stn1; ArcL p24,v100,sm1,wd1,z1,PKI_500\W0bj:=Stn1; ArcLEnd p26,v100,sm1,wd1,fine,PKI 500\W0bj:=Stn1; MoveJ p11,v1000,z10,PKI 500\W0bj:=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\W0bj:=wobj0;
    ArcLStart p2,v1000,sm1,wd1,fine,PKI_500\W0bj:=Stn1;
    ArcL p5,v100,sm1,wd1,z1,PKI_500\W0bj:=Stn1;
    ArcL p6,v100,sm1,wd2,z1,PKI_500\W0bj:=Stn1;
    ArcLEnd p3,v100,sm1,wd3,fine,PKI_500:=Stn1;
    MoveL p4,v1000,z10,PKI_500\W0bj:=wobj0;
- ENDPROC
```

xx1500001012

7.1 Introduction

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.	Auto Motors Dn Stopped (Speed 100%) Stopped (Speed 100%) Inputs and Outputs Image: Stopped (Speed 100%) Image: Stopped (Speed 100%) Image: Stopped (Speed 100%) Image: Stopped				

7 SKS FlexPendant Application

7.1 Introduction *Continued*

	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 Inter- face	Auto Motors On X SKS Interface 0.1 Stopped (Speed 100%) X SKS Interface 0.1 Image: Comparison of the systems Image: Comparison of the systems Schedules Status User RobotWare Schedules Status User RobotWare Image: Production Image: Comparison of the systems Image: Comparison of the systems xx1500001014 Image: Comparison of the systems Image: Comparison of the systems

7.2 Status Window

7.2 Status Window

	Action	Info/illustration
1	Press the Status button in the start window to open the Status window	Manual Guard Stop SKS Interface 0.1 T_ROB1 SignalStatus Image: Common Commo
2	Click the "Door" icon to exit the status window. Click on the shutdown but- ton (top right corner) to close the SKS Interface	

Start the SKS Interface Status Window

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

7 SKS FlexPendant Application

7.2 Status Window *Continued*

Function	Info/Illustration
Status	Status Message from the SKS Welder

7.3 Schedule Editor

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	Auto SK5_Síngle (DE-L-0150835)	Motors (Stopped)n (Speed 100%	b)	
	to change	SKS Interface 0.1			T_ROB	31 🔽
		Configured Mode : Standard				
		Welddata	GroupNo	PartNo	ProgNo	WeldSpeed
		wd1	0	1	2	8
		wd10	2	31	6	20
		wd11	3	4	5	10
		wd12	2	2	6	20
		wd2	2	31	6	20
		wd3	0	0	2	15
		wd4	2	1	5	20
		wd5 k	0	0	2 🦯	7 15
		Edit New Ref	resh			Į
		SKS Interface				
		xx1500001017				
2	Press Edit and select		Motors (On /Encod 1000		
2	Press Edit and select Schedule.	Auto SK5_Single (DE-L-0150835)	Motors (Stopped	Dn (Speed 100%	a) T ROB	
2	Press Edit and select Schedule.	Auto SK5_Single (DE-L-0150035) SKS Interface 0.1 Configured Mode : Standard	Motors (Stopped	Dn (Speed 100%	。) T_ROB	
2	Press Edit and select Schedule.	Auto SK5_Single (DE-L-0150835) SK5 Interface 0.1 Configured Mode : Standard Welddata	Motors (Stopped	On (Speed 100% PartNo	o) T_ROB	WeldSpeed
2	Press Edit and select Schedule.	Auto SK5_Single (DE-L-0150835) SK5 Interface 0.1 Configured Mode : Standard Welddata Wcl1	Motors (Stopped	Dn (Speed 100% PartNo 1	 T_ROB ProgNo 2 	X 31 V WeldSpeed 8
2	Press Edit and select Schedule.	Auto SK5_Single (DE-L-0150835) SK5 Interface 0.1 Configured Mode : Standard Welddata Wd1 Wd10	Motors (Stopped	Dn (Speed 100% PartNo 1 31	o) T_ROB ProgNo 2 6	₹ × 31 ▼ WeldSpeed 8 20
2	Press Edit and select Schedule.	Auto SK5_Single (DE-L-0150835) SK5 Interface 0.1 Configured Mode : Standard Welddata Wd1 Wd10 Wd11	Motors (Stopped	Dn (Speed 100%) PartNo 1 31 4	6) T_ROB ProgNo 2 6 5	₹ × × × × × × × × × × × × × × × × × × ×
2	Press Edit and select Schedule.	Auto SK5_Single (DE-L-0150835) SK5 Interface 0.1 Configured Mode : Standard Welddata Wd1 Wd10 Wd11 Wd12	Motors (Stopped	Dn (Speed 100%) PartNo 1 31 4 2	 T_ROE ProgNo 2 6 5 6 	₹ ★ 31 ▼ WeldSpeed 8 20 10 20
2	Press Edit and select Schedule.	Auto SK5_Single (DE-L-0150835) SK5 Interface 0.1 Configured Mode : Standard Welddata Wd10 wd11 wd12 wd2	Motors (Stopped)n (Speed 100%) PartNo 1 31 4 2 31	6) T_ROB ProgNo 2 6 5 6 6 6	₹ 31 ▼ WeldSpeed 8 20 10 20 20 20
2	Press Edit and select Schedule.	Auto SK5_Single (DE-L-0150035) SK5 Interface 0.1 Configured Mode : Standard Welddata Wd10 Wd10 Wd11 Wd12 Wd2 Wd2 Wd3	Motors (Stopped	3) (Speed 100%) PartNo 1 31 4 2 31 0	•) T_ROE ProgNo 2 6 5 6 6 6 2	WeldSpeed 8 20 10 20 20 15
2	Press Edit and select Schedule.	Auto SK5_Single (DE-L-0150035) SK5 Interface 0.1 Configured Mode : Standard Welddata Wd1 Wd10 Wd11 Wd12 Wd2 Wd3 Schedule	Motors stopped stopped 0 2 3 2 2 2 0 2 0 2)n (Speed 100%) PartNo 1 31 4 2 31 0 1	•) T_ROE Prog\vo 2 6 5 6 6 2 2 5 5 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	WeldSpeed 8 20 10 20 20 15 20
2	Press Edit and select Schedule.	Auto SK5_Single (DE-L-0150835) SK5 Interface 0.1 Configured Mode : Standard Welddata Wd1 wd10 wd11 wd12 wd2 wd2 wd3 Schedule WeldSpeed	Motors Stopped Stopped 2 3 2 2 0 2 0 2 0	PartNo PartNo 1 31 4 2 31 0 1 0 1 0	ProgNo 2 6 5 6 2 2 3 4 5 6 2 2	Image: Constraint of the second sec
2	Press Edit and select Schedule.	Auto SK5_Single (DE-L-0150835) SK5 Interface 0.1 Configured Mode : Standard Welddata Wd1 Wd10 Wd11 Wd12 Wd2 Wd2 Wd3 Schedule WeldSpeed Edit New Ref	Motors Stopped Stopped 2 3 2 2 0 2 0 2 0 2 0	n (Speed 100%) 1 31 4 2 31 0 1 0	•) T_ROB ProgNo 2 6 5 6 6 2 5 2 2 5 2 2	₹ 31 ▼ WeldSpeed 8 20 10 20 15 20 15 20 15 20 15 20 15 20
2	Press Edit and select Schedule.	Auto SK5_Single (DE-L-0150835) SK5 Interface 0.1 Configured Mode : Standard Welddata Wd1 Wd10 Wd11 Wd12 Wd2 Wd2 Wd2 Wd3 Schedule WeldSpeed Edit New Ref	Motors stopped stopped 2 3 2 2 0 2 0 2 0 2 0	n (Speed 100%) PartNo 1 31 4 2 31 0 1 0 1 0	ProgNo 2 6 5 6 6 2 5 2 2	WeldSpeed 8 20 10 20 15 20 15 20 15 20 15 20 15 20 15

7 SKS FlexPendant Application

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	ABB SKS Interface 0.1	150835)	Motors (Stopped)n (Speed 100%	») T_ROE	
		Welddata		GroupNo	PartNo	ProgNo	WeldSpeed
	changes or Cancel to cancel	Selected Schedule		0	1	2	8
	the operation.	GroupNo 0 💌		2	31	6	20
		PartNo 1 💌		з	4	5	10
		ProgNo 2 🔻		2	2	6	20
		,		2	31	6	20
				0	0	2	15
		OK		2	1	5	20
		wd5		0	0	2	<u></u>
		Edit New	Refr	esh			I
		SK5 Interface					
		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	Auto SKS_Single (DE-L-0150835)	Motors (Stopped	In (Speed 100%	o)	<pre>X</pre>
	to change	SKS Interface 0.1			T_ROB	1 💌
		Configured Mode : Standard				
		Welddata	GroupNo	PartNo	ProgNo	WeldSpeed
		wd1	0	1	2	8
		wd10	2	31	6	20
		wd11	3	4	5	10
		wd12	2	2	6	20
		wd2	2	31	6	20
		wd3	0	0	2	15
		wd4	2	1	5	20
		wd5 🧟	0	0	2 🤿	15
		Edit New Refr	esh			I
		SKS Interface				
		xx1500001019				

7.3 Schedule Editor Continued

	Action	Info/illustration		
2	Press Edit and select Weld- Speed.	Auto SK5_Single (DE-L-0150835) SK5 Interface 0.1	Motors On Stopped (Speed 100	™) X
		Configured Mode : Standard		
		Welddata	GroupNo PartNo	ProgNo WeldSpeed
		wd1	0 1	2 8
		wd10	2 31	6 20
		wd11	3 4	5 10
		wd12	2 2	6 20
		wd2	2 31	6 20
		wd3	0 0	2 15
		Schedule	2 1	$\frac{5}{20}$
		WeldSpeed	0 0	2 18
		Edit New Refi	esh	I
		SKS Interface		
		xx1500001020		
3	The weldspeed can be		Motors On	
	changed using the NumPad	SKS_single (DE-L-0150835) SKS Interface 0.1	Scopped (Speed 100	
	Editor	Configured Mode : Standard		
	Press OK to activate the	Weldata	GroupNo PartNo	ProgNo WeldSpeed
	changes or Cancel to cancel		0 1	2 8
		/ 8 9 🗲	2 31	6 20
		4 5 6 →	3 4	5 10
			2 2	6 20
		1 2 3 🔀	2 31	6 20
				0 20
		0.	0 0	2 15
			0 0 2 1	$\begin{array}{c} 0 \\ 2 \\ 5 \\ \hline 20 \\ 20 \\ \hline 20 \\ 20 \\ 20 \\ 20 \\ 20 \\ 20 \\ 20 \\ 20 \\$
		0 . OK Cancel	0 0 2 1 0 0	$\begin{array}{c} 0 \\ 2 \\ 5 \\ 2 \\ 2 \\ \end{array} \begin{array}{c} 20 \\ 15 \\ 15 \\ \end{array}$
		OK Cancel Edit New Refr	0 0 2 1 0 0	$ \begin{array}{c} 0 \\ 2 \\ 15 \\ 5 \\ 2 \\ 15 \\ 15 \\ 15 \\ 15 \\ 15 \\ 15 \\ 15 \\ 15$
		OK Cancel Edit New Refr	0 0 2 1 0 0	0 20 2 15 5 20 2 15 15

Create new Welddata

	Action	Info/Illustration				
1	Press New to create new	Auto SK5_Single (DE-L-0150835)	Motors (Stopped)n (Speed 100%	ia)	<pre>X</pre>
		SKS Interface 0.1			T_ROE	31 🔽
	I his is a shortcut the the	Configured Mode : Standard				
	dow	N- Welddata	GroupNo	PartNo	ProgNo	WeldSpeed
	dow.	wd1	0	1	2	8
		wd10	2	31	6	20
		wd11	3	4	5	10
		wd12	2	2	6	20
		wd2	2	31	6	20
		wd3	0	0	2	15
		wd4	2	1	5 🥿	20
		wd5 🦻	0	0	2	<u>→ 15</u>
		Edit New Refr	esh			I
		SKS Interface				
		xx1500001022				

7 SKS FlexPendant Application

7.3 Schedule Editor *Continued*

	Action	Info/Illustrati	on		
2	Select welddata to create new data	ect welddata to create data Guard Stop Program Data - Used Data Types			
		Scope: RAPID/T_R081			Change Scope
		clock	ee_event	gap_partd	1 to 12 of 12 ata
		loaddata	num	partdata	
		robtarget	seamdata	string	
		tooldata	welddata	wobjdata	
		SK5 Interface Program xx1500001023	m Program Data	Show Data	View

7.4 User functions

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

7 SKS FlexPendant Application

7.4 User functions *Continued*

	Action	Info/illustration	
1	The User Functions View can be launched from the SKS Desktop	Auto SK5_Single (DE-L-0150835) SK5 Interface 0.1 User Buttons Relais1 Relais4 Relais2 Relais5 Relais3 SK5 Interface xx1500001025	Motors Off Stopped (Speed 100%) T_ROB1
2	Button configuration in RobotStudio	Edit SKS User Btn(s) Parameter Value Name SKS_T_R0B1_Button1 Ø Button Label Relais1 Ø Enabled TRUE Ø Aldwin Auto FALSE Ø DigitalOutput doSKS1Relais1 Ø Mode Press_Release Ø Description X217/K2-2 DOUT0:Relais 1	Value: Type: string. SKS_T_ROB1_Button1 Restriction: The controller needs to be warm-restarted if the parameter is changed. Limits: No limits. OK Cancel
3	Signal configuration in RobotStudio	Edit SKS User ID(s) Parameter Value Image: SKS_T_ROB1_signal1 Image: Signal Label Torch Collision Image: Display the signal label Torch Collision Image: Display the signal Display the signal Image: Display the signal User Signal Image: Display the signal Signal <	Value: Type: string. SKS_T_ROB1_Signal1 Restriction: The controller needs to be warm-restarted if the parameter is changed. Limits: No limits. OK Cancel

7.5 UAS grants

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 FlexPend- ant with missing <i>Modify Current</i> <i>Value</i> grant The operator gets a message and the <i>Edit</i> and <i>New</i> functional- ity will be disabled. It is just possible to view the current schedules.	Auto Motors On SKS_Single (DE-L-0150835) Motors On Stopped (Speed 100%) X SKS Interface 0.1 T_ROB1 Configured User Authorization System Welddata Welddata You are not allowed to perform this operation, talk to your system administrator if you need access. WeldSpeed Wd2 >Modify current value Grant< is missing.
	OK Edit New Refresh Window SKS xx1500001028
Message shown at the FlexPend- ant with missing <i>IO Write Grant</i>	Auto Motors On SKS Interface 0.1 T_ROB1 User Authorization System operation, talk to your system administrator if you need access. >IOWrite Grant< missing.

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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	All Tasks T_ROB1 UIIMessageBox			
	RobotWare Arc Error			
	The following welding error has occurred:AW_WELD_ERR			
	Weld equipment error. 29 CURRENT WINDOW EXCEEDED DUE TO WIRE FEED FAULT			
	Please make a selection			
	Move Out Recovery Menu			
	xx1400002598			
Error message as shown	ABB Manual Motors On SK5_Single (DE-L-0150835) Running (Speed 100%)			
	SKS Interface 0.1			
	SignalStatus			
	1 Arc OK (1) Welder Ready (1) Comm OK (1) Process Active (1) SyncroWeld			
	Alarm Automatic Touch Sense WireStick Err			
	Current Schedule Process Data			
	GroupNo 1 Wirefeed Speed 12 m/min			
	PartNo 1 Voltage 24 Volt			
	ProgNo 2 Current 250 Amp			
	SpeedRef Robot Reference Speed In mm/s			
	Status			
	CURRENT WINDOW EXCEEDED DUE TO WIRE FEED FAULT			
	Production 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

ALARM gr	oups	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 de- tect 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 feed- er Wire feeder coding (master/slave) incorrectly selected Cable connection (Master/Slave) incorrectly selected	Inspect, rectify or re- place if necessary
3	CABLE or CABLING not OK. Controller has detec- ted faulty wiring.	SPW cable mechanically dam- aged Connection plug mechanically damaged SPW cable at the interface incor- rectly positioned	Inspect, rectify or re- place 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 re- place necessary
8	INTERFACE MISSING Controller cannot de- tect 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 miss- ing Synchronizing cable missing Direction of synchronizing cable wrong	Inspect, rectify or replace necessary

Continues on next page

8 SKS error codes

Alarm No.	Description	Possible cause	Resolution
9	Change in the enivron- ment Controller has detec- ted 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 indic- ates 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 indic- ates 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 UN- SUITABLE The selected wire dia- meter cannot be pro- cessed	Output of power source is too low Configuration parameters for this wire diameter missing	Inspect, rectify or re- place if necessary
20	POWER SOURCE NOT READY The power source in- dicates 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 dam- aged	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 selec- ted 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

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 selec- ted	Change power source Upgrade power source Do not use this weld- ing process
23	SPECIAL EQUIP- MENT "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 selec- ted welding process.	Welding process incorrectly selec- ted A GTAW power source is not suitable	Inspect, rectify or re- place if necessary
25	GTAW or AC SYSTEM MISSING Controller requires a GTAW power source to carry out the selec- ted welding process.	Welding process incorrectly selec- ted A GMAW power source is not suitable	Inspect, rectify or re- place if necessary
26	CURRENT SETPOINT TOO HIGH The welding data re- cord 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 re- place if necessary
27	SLAVE CONTROL- LER NOT READY The welding data set requires a slave con- troller. This is miss- ing.	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 adjus- ted 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 as- sembly / wire feed	Find and rectify mechanical fault

Alarm No.	Description	Possible cause	Resolution
29	CURRENT WINDOW EXCEEDED DUE TO WIRE FEED FAULT Welding current was out of the pre-adjus- ted current window for longer than permitted in the "Arc Filter" set- ting, because welding wire could not be fed as needed.	see ALARM 31	
30	IGNITION TIME EX- CEEDED 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 con- tact Auxiliary drive of bulk wire spool is defective	Inspect, rectify or replace if necessary
31	WIRE FEED PROB- LEM Welding wire cannot be fed correctly. The upper limit of motor current as set in "Mo- tor-Limit" is exceeded for longer than permit- ted 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 ac- celerate Hose to wire feeder blocked Hose to wire feeder not laid cor- rectly Distance from wire feeder too large	Inspect, rectify or replace if necessary

Alarm No.	Description	Possible cause	Resolution
32	ARC FAILURE The arc has extin- guished for no appar- ent 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 estab- lished 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 correc- tion procedure for welding voltage (Autocomp) has ex- ceeded the value which is set in "Auto- comp-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 de- fective	Inspect, rectify or replace if necessary Note The test voltage displayed at the control should always be above 15 Volts!

Alarm No.	Description	Possible cause	Resolution
35	AUTOCOMP LIMIT EXCEEDED DUE TO WIRE FEED FAULT The automatic correc- tion procedure for welding voltage (Autocomp) has ex- ceeded the value which is set in "Auto- comp-Filter". A wire feed malfunc- tion had been previ- ously 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 correc- tion procedure for welding voltage (Autocomp) has ex- ceeded the value which is set in "Auto- comp-Filter" for a time longer than set in "Autocomp-Filter". At the same time, an arc- break was detected.	see ALARM 32 and see ALARM 34 As both events can occur simul- taneously, an unambiguous as- sessment is not possible.	Inspect, rectify or replace if necessary
37	AUTOCOMP LIMIT EXCEEDED -DURING ARC FAIL- URE -AFTER WIRE FEED PROBLEM The automatic correc- tion procedure for welding voltage (Autocomp) has ex- ceeded the value which is set in "Auto- comp-limit" for a time longer than set in "Autocomp-Filter". Previously, a wire feed fault had been detected, which fol- lowed 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

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 de- fective	Inspect, rectify or replace if necessary Note The test voltage displayed at the control should always be above 15 Volts!
39	WIRE FEED PROB- LEM (DOUBLE WIRE) Welding wires not feeding properly. The difference between motor cur- rents is higher than 1 Amp for a time longer than set in "Motor-Fil- ter".	(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 sub- sequent 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 pre- programmed 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 control- ler, "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 weld- ing is rejected.

Continues on next page

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 control- ler, "ALARM 42" is recorded. The controller refuses to execute the file or group and does not start.	Inspect, rectify or replace if necessary Note New Note The Q84 controller additionally discrimin- ates between the faulty selection of a FILE (ALARM 94) or GROUP (ALARM 95)
44	USER HAS PER- FORMED A "BACKUP"	Q84 controller has a memory area for backup data (BACKUP/RESTORE). When a data backup is performed "ALARM 44" is recorded for sub- sequent evaluation on the PC.	
45	USER HAS PER- FORMED A "RE- STORE"	Q84 controller has a memory area for backup data (BACKUP/RESTORE). When setpoint values from a pre- vious 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 detec- ted missing or defect- ive 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 detec- ted 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 detec- ted that the loaded language file does not match the software.	New language file not yet loaded following an update. Data have corrupted (e.g. light- ning strike)	Reload the language file
53	WRONG WELDING PROCESS (1) Controller has detec- ted that the selected material does not match the welding process.	Wrong material selection Data have been corrupted (e.g. lightning strike)	Select suitable material

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 es- tablished that the op- erational 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 ap- pears again immedi- ately
70	HEIGHT SENSING CONTROL MISSING The control system does not support height sensing.		Use the correct con- troller
71	GMAW PROCESS CONTROL MISSING The control system does not support the GMAW process.		Use the correct con- troller
72	GSTAW PROCESS CONTROL MISSING The control system does not support the GTAW process.		Use the correct con- troller
73	GTAW-AC PROCESS CONTROL MISSING The control system does not support the GTAW-AC welding process.		Use the correct con- troller
80	UNSUITABLE WIRE FEEDER The wire feeder is not suitable for this weld- ing system.		Use the correct con- troller
81	WIRE FEEDER WITHOUT TACHO The wire feeder is not suitable for this weld- ing system.		Use the correct con- troller
82	OBSOLETE WIRE FEEDER The wire feeder does not have all the re- quired characteristics.		Load new software (Motor4/5) Replace motor card (all others)
83	GMAW WIRE FEED- ER 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
Continued

Alarm No.	Description	Possible cause	Resolution
84	GTAW WIRE FEEDER MISSING		Set coding switch correctly (Motor5)
	The wire feeder is not suitable for GTAW		Use the correct wire feeder
	weiding systems.		Replace motor board
85	SECOND WIRE FEEDER MISSING The control system is unable to find the ne- cessary 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 sys- tem.		Use the correct wire feeder
88	DOUBLE-WIRE WIRE FEEDER 2 MISSING The "SLAVE" wire feeder is not suitable for double-wire weld- ing systems.		Set coding switch correctly (Motor4/5) Use the correct wire feeder Replace motor board
90	LSP INTERFACE RE- QUIRED The data set requires an LSP interface. A PGM interface has been connected in- stead.		Set up interface cor- rectly (UNI5) Use correct interface
91	PGM INTERFACE REQUIRED The data set requires a PGM interface. An LSP interface has been connected in- stead.		Set up interface cor- rectly (UNI5) Use correct interface
92	ANGLE TRANSMIT- TER INTERFACE RE- QUIRED The data set requires an angle transmitter interface. A PGM/LSP interface has been connected instead.		Set up interface cor- rectly (UNI5) Use correct interface
93	INVALID PROGRAM SELECTED Robot/PLC selects a non-existent welding program.		Load missing pro- grams from the PC or add it to the Q84 Avoid selecting this group

Continued

Alarm No.	Description	Possible cause	Resolution
94	INVALID FILE NUM- BER SELECTED		Load missing part number from PC or
	Robot/PLC selects a non-existent part number.		add to Q84 Avoid selecting this group
95	INVALID GROUP SE- LECTED 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 ter- minated.		Reset start signal

Index

D

danger levels, 11

E ESD

damage elimination, 14 sensitive equipment, 14 wrist strap connection point, 14

S

safety, 9 ESD, 14 signals, 11 signals in manual, 11 symbols, 11 wrist strap, 14 safety signals in manual, 11 signals safety, 11 symbols safety, 11

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