Product Manual

Control Cabinet M2001

504 868-102
2003-10

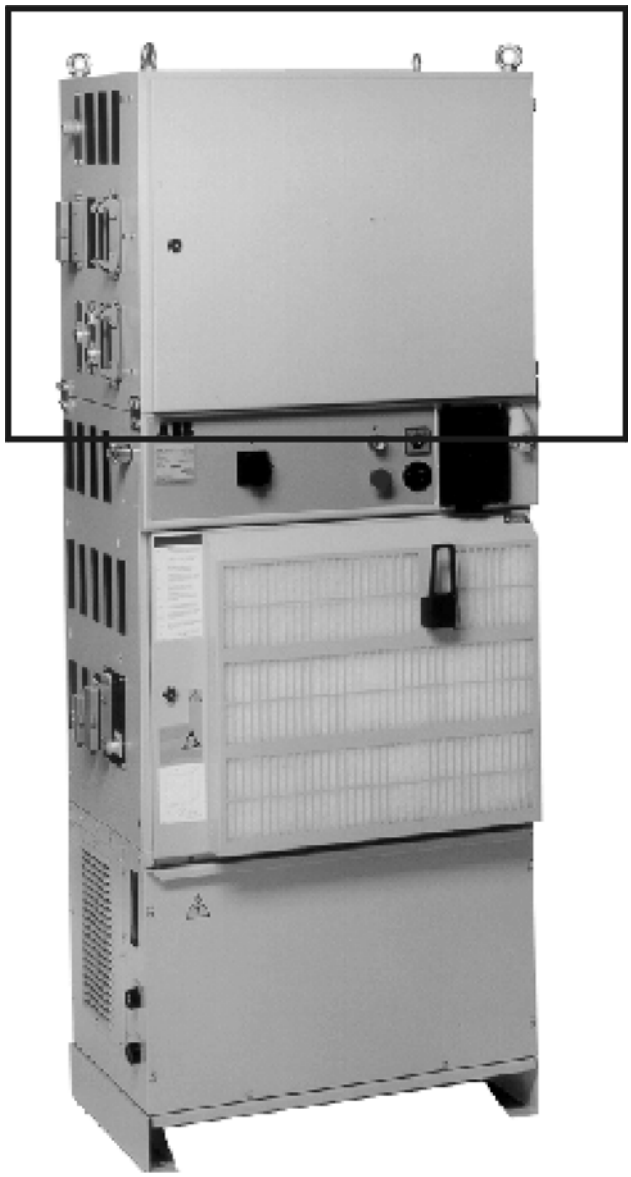

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ABB Automation Technology Products AB

Arc Welding & Application Equipment

S-695 82 Laxå

Sverige

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1 General

1.1 Types of robot

The top cabinet for equipment from the standard product range is adapted for connection to the control system S4Cplus.

Please refer to the Product and User Guide for
a description of the control system

The product range has been produced for robot types:

- IRB 140/1400/2400 in AW design.

However, some products can, without further modification, be connected in combination with other robot types.

2 Description of the top cabinet

2.1 Structure

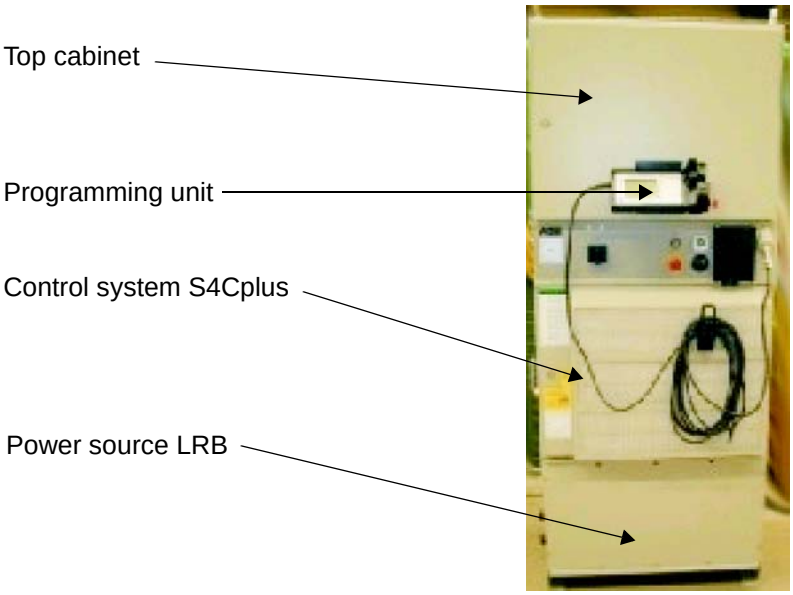
The Control Cabinet consists of the following units:

1 Control system S4Cplus

2 The top cabinet, which is available in two heights 620 mm/ 820 mm, with interfaces for:

- positioner
- process equipment
- Operator communications and safety equipment

3 Welding power source ARCITEC LRB (if applicable)



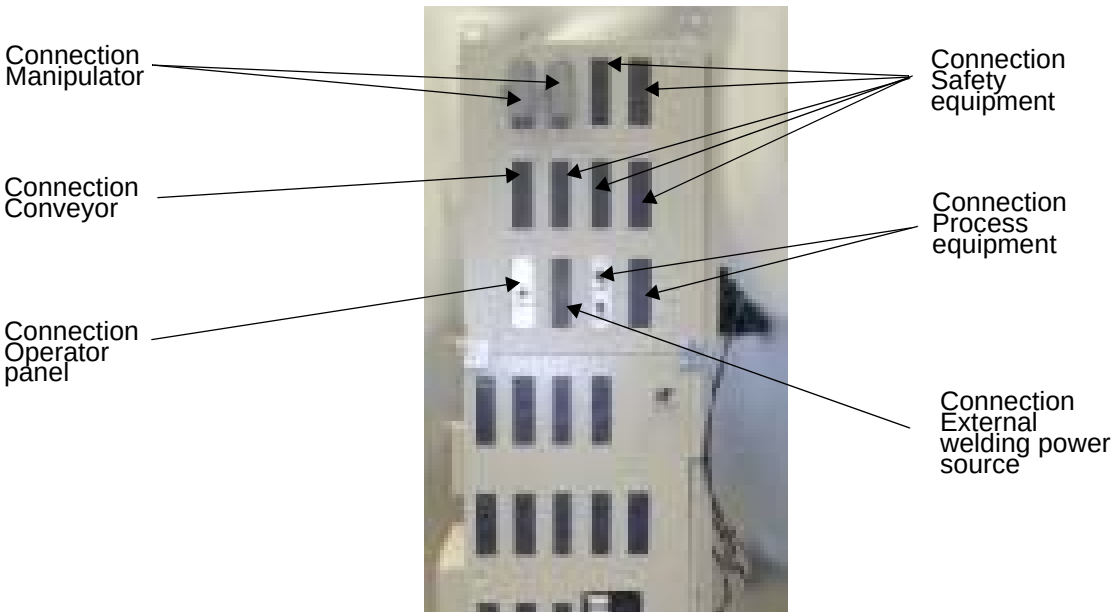
Cabinet_S4Cplus-8

Figure 1 Control Cabinet

2.2 Connections

2.2.1 External connections

The figure below shows the external connections on the left of the top cabinet.



Cabinet_S4Cplus-7

Figure 2 Connections

The interface modules in the top cabinet are connected to the control system via a signal interface that distributes the requisite system signals and feeds.

Connections to the different units are made using jackable terminals to facilitate service and repair work.

2.2.2 Inside the top cabinet with component interface modules.

The figure below shows the inside of the top cabinet.

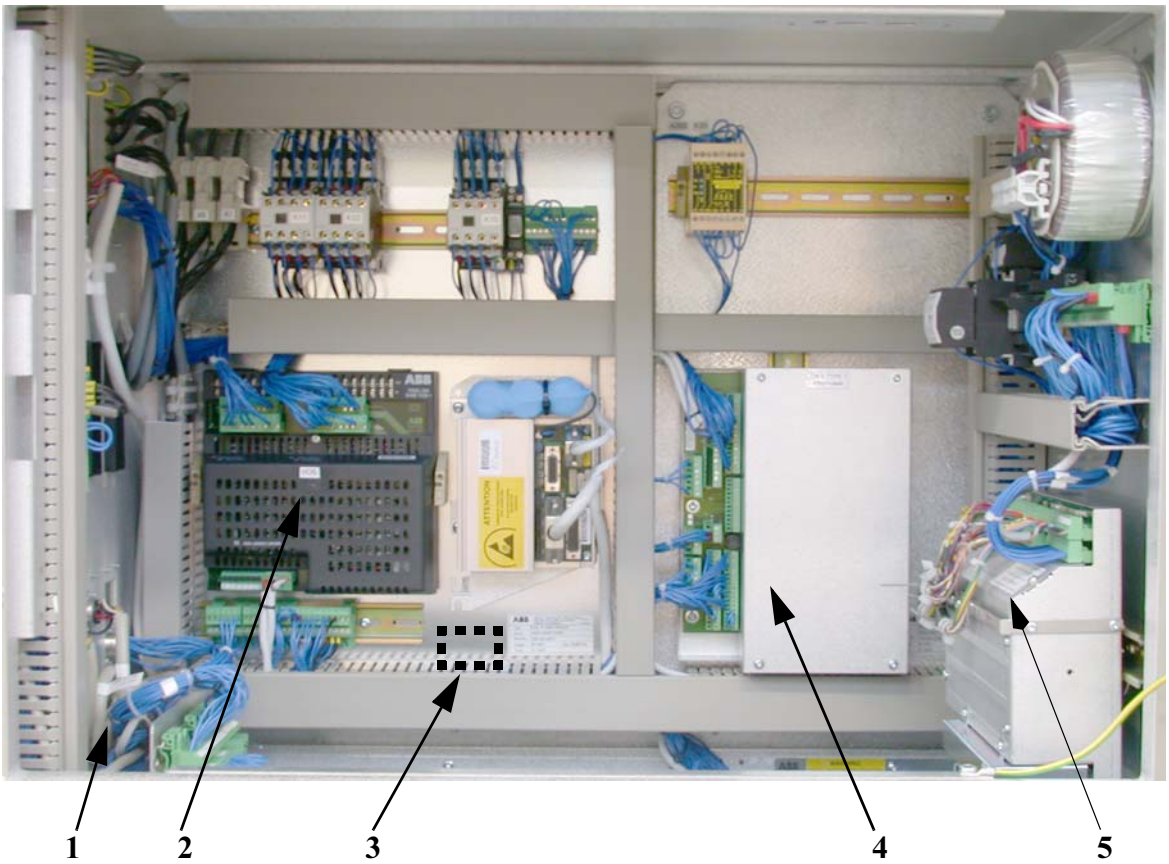


Figure 3 Top cabinet, inside

1	Customer connections	**4**	OpCom interface
2	Positioner interface	**5**	Process interface
3	Option, Extended emergency stop		

2.2.3 Extra customer space in the top cabinet

Extra customer space is only available in the high top cabinet (820 mm)

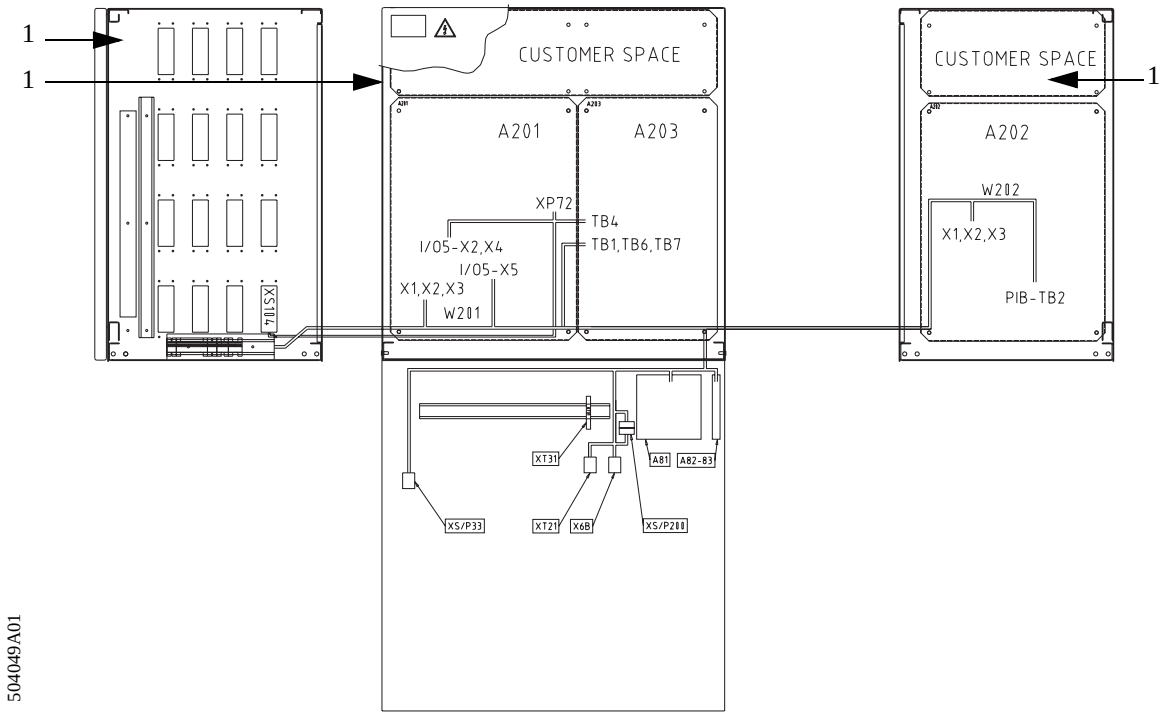


Figure 4 Extra customer space in the top cabinet 820 mm

2.3 Customer connections

As standard the following signals and feeds are available on jackable terminals to allow the addition of customer specific equipment:

Terminal A204-X1	24V I/O (DC) max 2A
Terminal A204-X2	Contactor/relay control via "MOTORS ON"
	Two channel function control
Terminal A204-X3	Two channel connection for emergency stop device
Terminal A204-X4	CAN-bus connection

If the "Extended emergency stop" option is included the following signals are also available:

Terminal A204-X5	Two channel contactor/relay control via "EMSTOP"
	Two channel function control of contactor/relay control as above

See Figure 3 for customer connections.

2.4 Option - Extended emergency stop

Some installations require more emergency stop signals from the control system than are available in the standard design. This applies, for example, when emergency stop functions are required to be integrated in fixture control or distributed to external equipment. This option offers a possibility of connecting an optional number of redundant relays as required. See Figure 3

2.5 Option - Pivot frame

A pivot frame is available as an accessory to top cabinet 620/820.

The pivot frame is fitted to the left-hand end of the top cabinet door opening. On the inside of the pivot frame space is provided for the installation of further equipment and components.

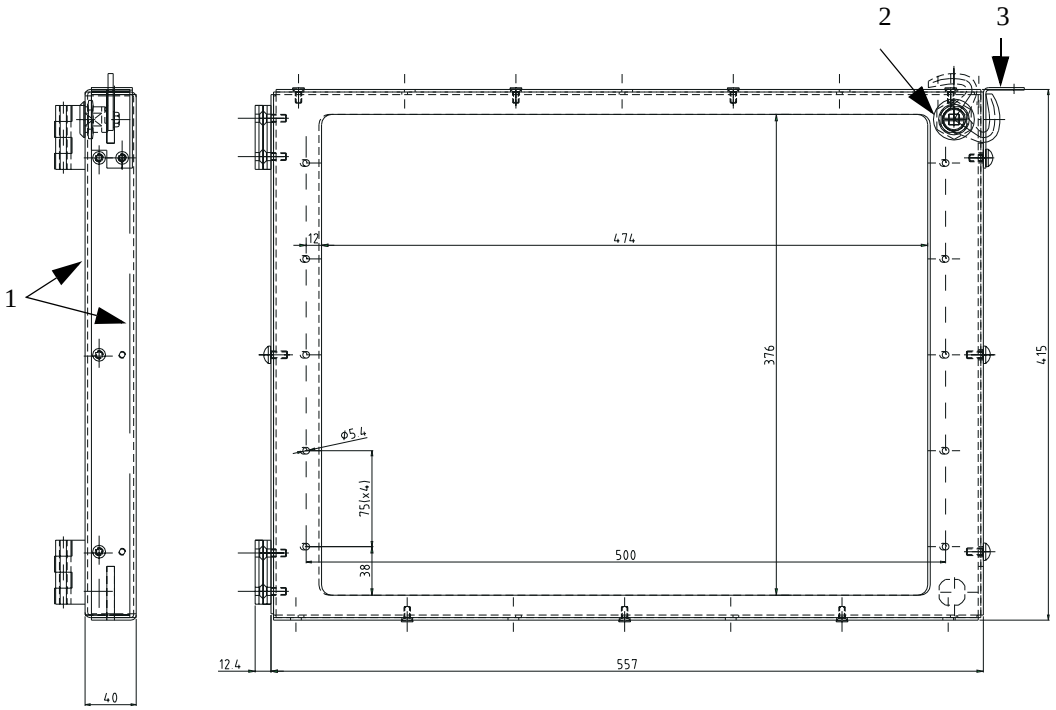


Figure 5 Pivot frame (option)

1 Frame section	**3** Transport locking device
2 Lock	

2.6 Safety/Directives and Standards

The electrical equipment is designed to comply with applicable demands, for further information, see "***Introduction and safety",*** chapter "Declaration", under tab 1.

2.6.1 Safety categories

Equipment for safety has been designed so that safety functions are maintained in the event of individual faults, such as a sticking relay, in the supervision system. Faults are detected at the latest with the next call to the safety function.

This corresponds with category 4 in accordance with EN 954-1, Safety of machinery, Control safety, Safety related parts of control systems. Part 1: General principles for design.

For other parts of the control system please refer to

- the Product Manual for IRB 140/1400/2400.

2.7 Reservdelsförteckning*Spare Parts List*

Reservdelar beställs genom ABB Automation Technology Products AB. Vid beställning var vänlig uppge typ och tillverkningsnummer samt benämningar och beställningsnummer enligt reservdelsförteckningen.

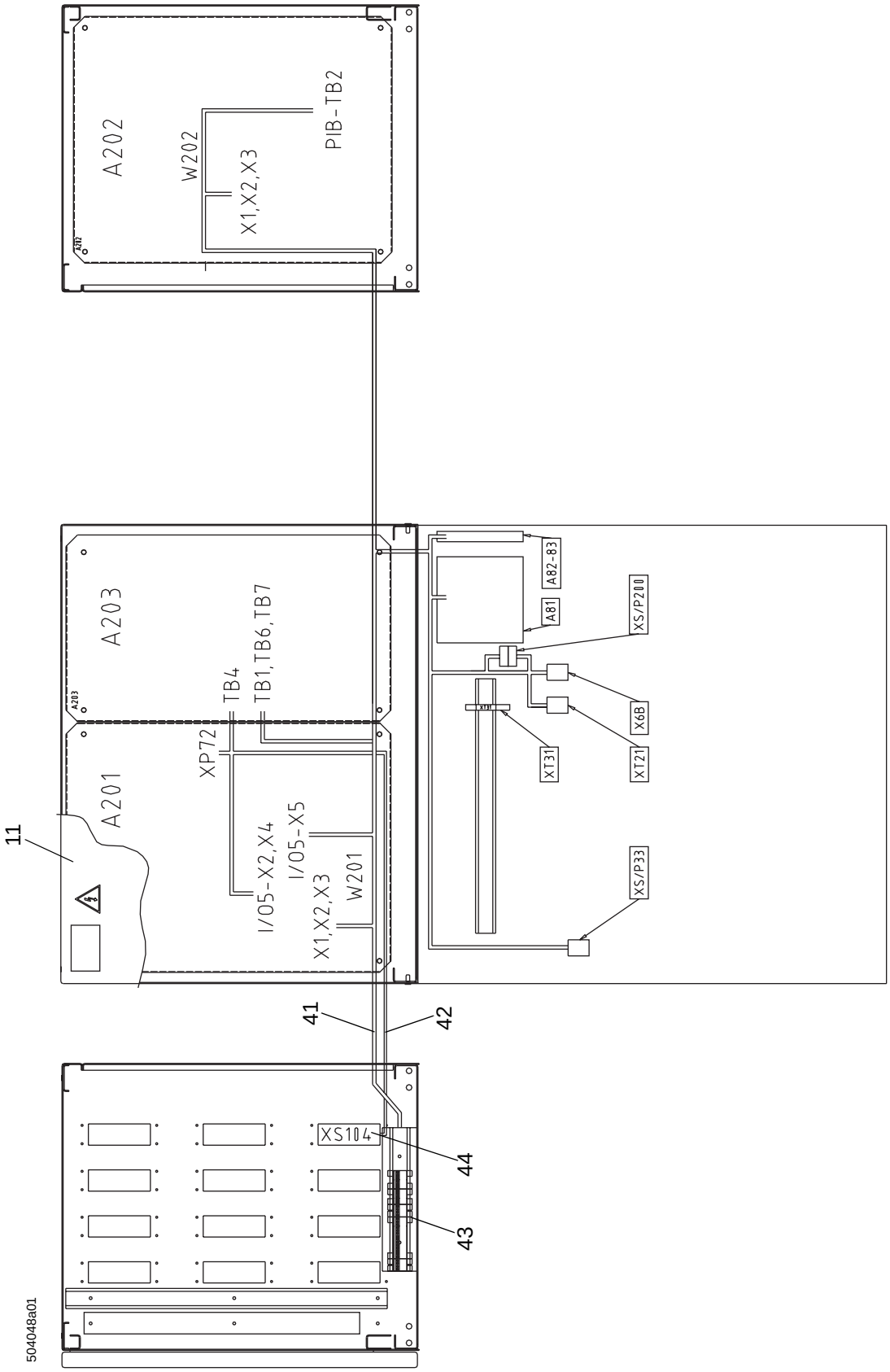
Rätt till ändring av specifikationer utan avisering förbehålles.

Spare parts are to be ordered from ABB Automation Technology Products AB. Kindly indicate type of unit, serial number, denominations and ordering number according to the spare parts list.

Rights to reserved to alter specifications without notice.

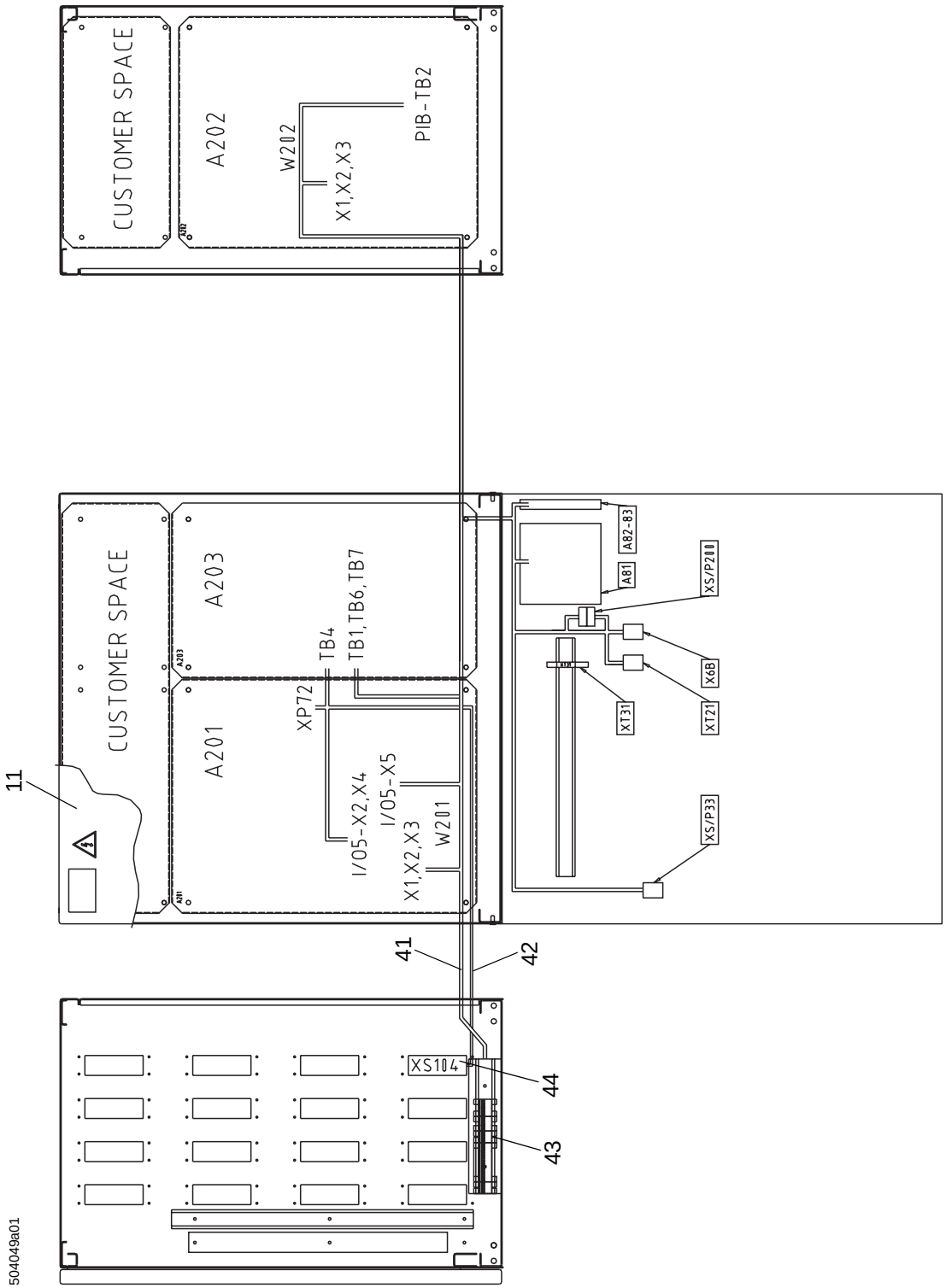
Description of the top cabinet

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		504 048-880	**Controller IF**	**Controller InterFace**	**M2001 620 mm**
11		502 146-001	Skåp	Cabinet	620 mm
41		502 282-880	Huvudkabelstam	Cable harness	M2001
42		502 285-880	Kabelstam, Op-panel	Cable harness, Op-panel	
43		502 796-880	Canbus	Canbus	
44		503 172-880	Byglingsdon	Clamping unit	


A202
W202
X1,X2,X3
PIB-TB2
A203
TB4
TB1,TB6,TB7
XP72
A201
I/O5-X2,X4
I/O5-X5
X1,X2,X3
W201
A82-83
A81
XS/P200
X6B
XT31
XT21
XS/P33
11
41
42
XS104
44
43
504048a01

Description of the top cabinet

Positions-nummer *Position number*	**Antal** *Quantity*	**Beställningsnummer** *Ordering number*	**Benämning**	***Denomination***	**Anmärkningar** *Remarks*
		504 049-880	**Controller IF**	**Controller InterFace**	**M2001 820 mm**
11		502 145-001	Skåp	Cabinet	820 mm
41		502 282-880	Huvudkabelstam	Cable harness	M2001
42		502 285-880	Kabelstam, Op-panel	Cable harness, Op-panel	
43		502 796-880	Canbus	Canbus	
44		503 172-880	Byglingsdon	Clamping unit	


CUSTOMER SPACE
A202
W202
X1,X2,X3
PIB-TB2
CUSTOMER SPACE
A203
A201
TB4
TB1,TB6,TB7
XP72
I/O5-X2,X4
I/O5-X5
X1,X2,X3
W201
A82-83
A81
XS/P200
X6B
XT31
XT21
XS/P33
11
41
42
XS104
44
43
504049a01

3 Manipulator interface

There is a modular based interface fitted to the left of the cabinet's rear panel for the positioner. This may be equipped differently from case to case, depending on the type of manipulator.

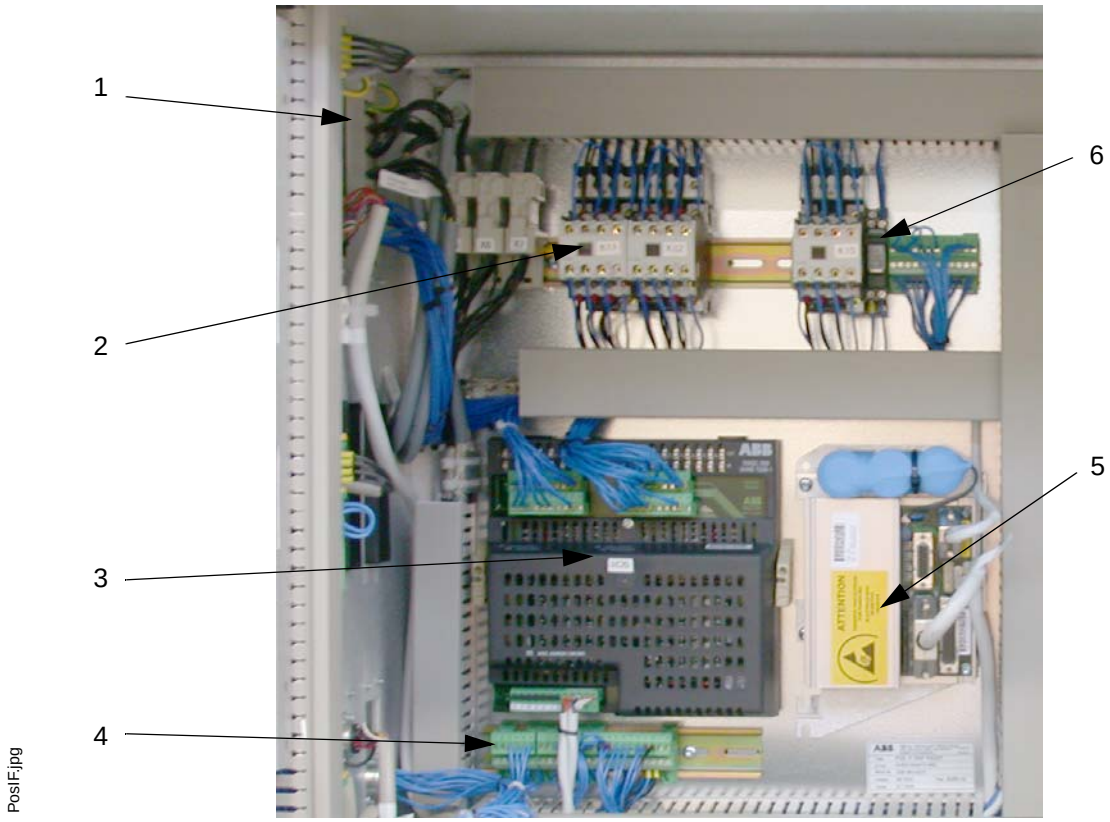


Figure 6 Top cabinet, inside

1 Distribution contactor drive unit connection

2 Motor contactors with interface relay and auxiliary contact blocks for the manipulator axis

3 Dig. I/O card

4 Terminal block for internal wiring

5 Serial measurement board

6 Auxiliary relay for brake activation

The interface is fitted with internal wiring for connection to the robot control system. See Figure 6.

3.1 Connections

Cables to external equipment are connected to the outputs on the left-hand side of the top cabinet.

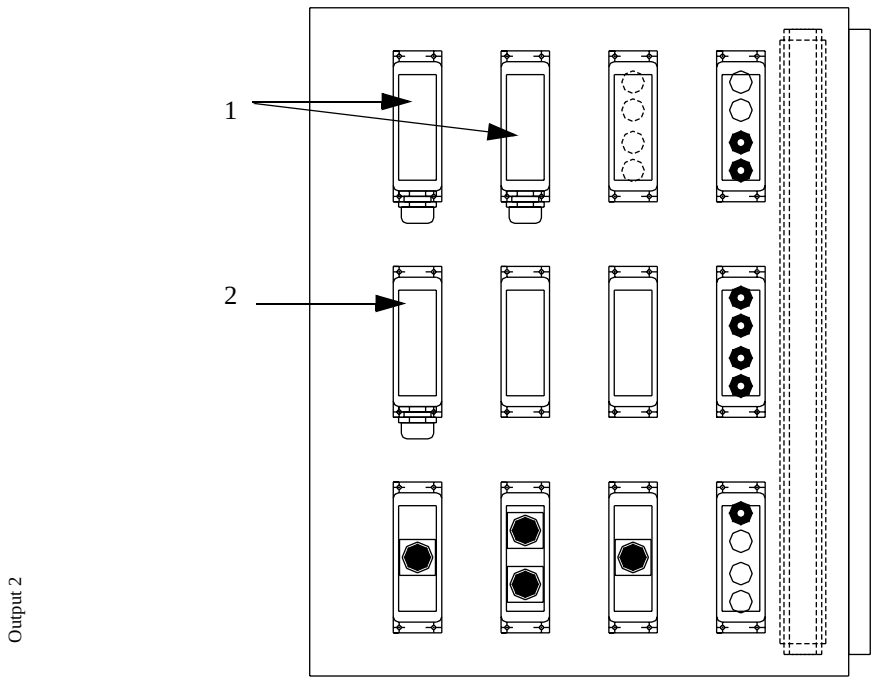


Figure 7 Terminations - positioner

1 Positioner

2 Travel track motor/resolver

3.2 Drive system

3.2.1 Axis computer

Control cabinet S4Cplus is equipped wit an axis computer for the robot (axis computer 1) and an axis computer card for the manipulator IRBP (axis computer 2).

Connection to the drive unit and serial measurement board is made via a connector card. Each axis computer has its own connector card. See Figure 8.

Axis computer 1 6 axes for the robot (+ 1 external axis)

Axis computer 2 Up to 6 axes for the manipulator

Each axis computer has two drive systems (DS1 and DS2) and two measurement systems (MS1 and MS2)

Axis computer 1

Drive system 1 (DS1) Drive unit for the robot

Drive system 2 (DS2) Rectifier or Rectifier + a drive unit for the positioner/ conveyor

Axis computer 2

Drive system 1 (DS1) Drive unit for manipulator and/or conveyor

Drive system 2 (DS2) Rectifier or Rectifier + a drive unit for the positioner.

(Only used when the multi-axes IRBP positioner is included in the system, moved over from drive system 2 on axis computer 1)

Figure 8 Connector card top cabinet

In order to control positioner IRBP the control cabinet must be ordered with ABB Robotics' option 397 "Prepared for external axes".

Option 397 contains the following components:

- Transformer T4
- Rectifier DC4 including a U type drive unit
- Axis computer 2
- Connector card 2

3.3 Drive unit

The control cabinet for IRB140/1400 and 2400 can be equipped with max three drive units for the positioner and/or robot carrier.

The control cabinet for IRB4400 and 6400 can be equipped with max one drive unit for the positioner and/or robot carrier.

On delivery the control cabinet is equipped with drive units for the robot and positioner axes included in the system.

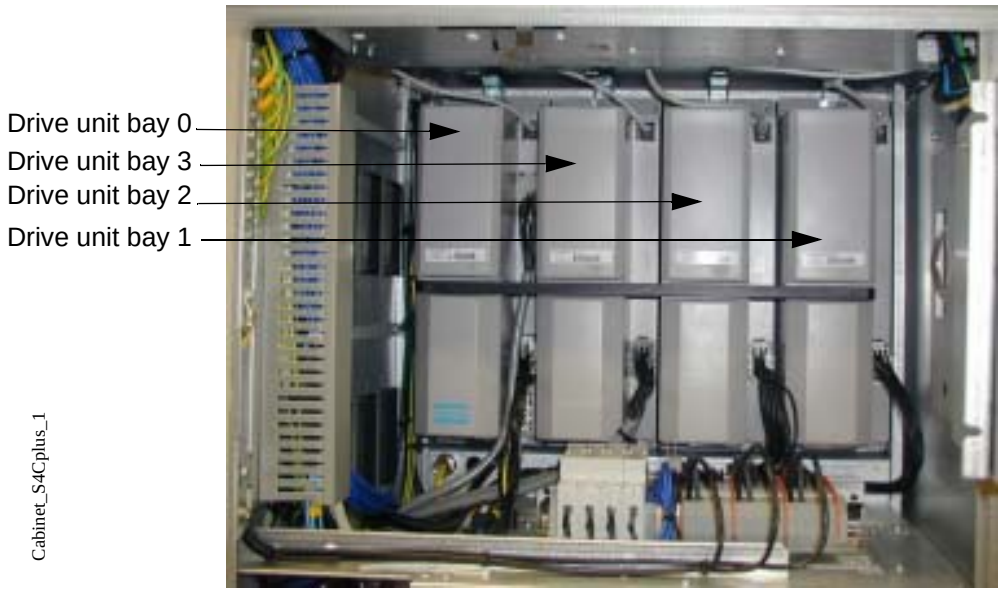


Figure 9 Drive unit positions in the top cabinet

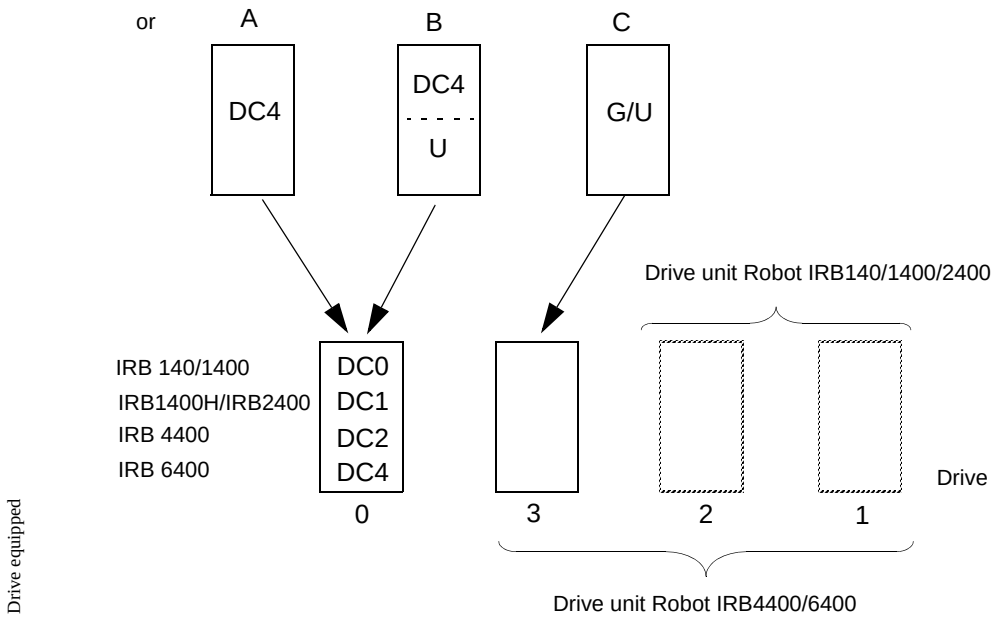


Figure 10 Drive unit

Drive unit set-up for robots IRB 140/1400/2400

The following drive unit set-ups are available for robots IRB140/1400/2400 with manipulator IRBP: See Figure 9.

Position 0	Position 3	Position 2	Position 1
B	Empty	Robot	Robot
B	C	Robot	Robot

Drive unit set-up for robots IRB 4400/6400

The following drive unit set-up is available for robots IRB 4400/6400 with manipulator IRBP: See Figure 9.

Position 0	Position 3	Position 2	Position 1
B	Robot	Robot	Robot

3.4 Measurement system

Each axis computer has two measurement systems. A measurement system can handle up to 7 axes.

Serial measurement boards are connected to the measurement system. These include six nodes for connection of the resolvers.

3.4.1 Axis computer 1

Measurement system 1 (MS1)	Serial measurement board for the robot
Measurement system 2 (MS2)	Spare

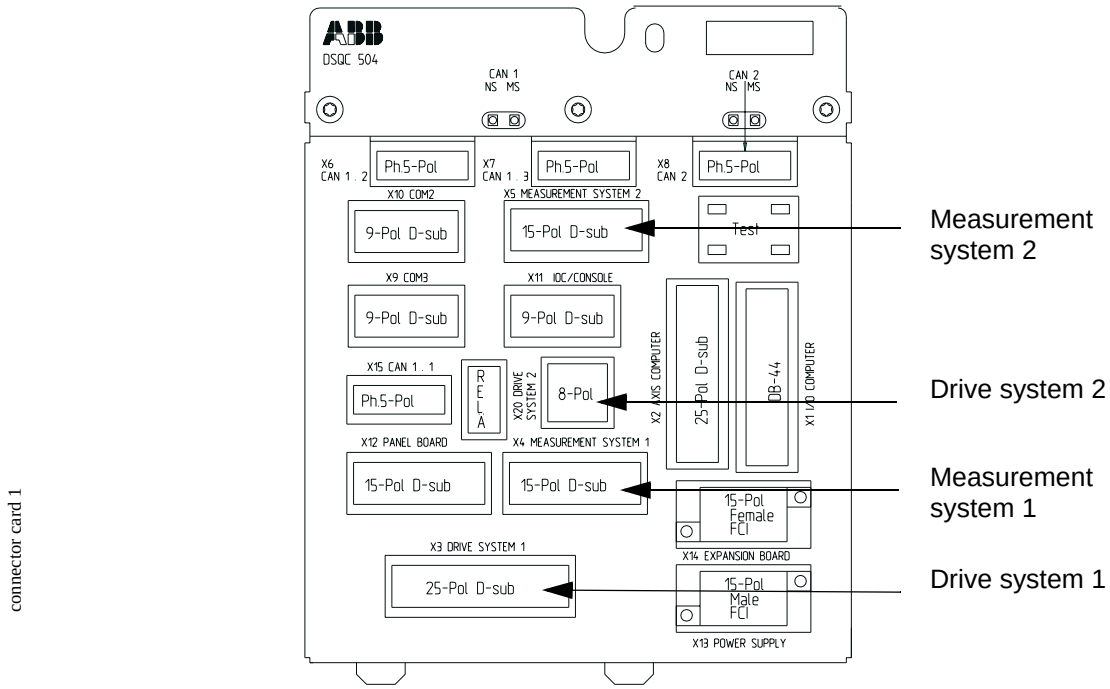


Figure 11 Axis computer 1

3.4.2 Axis computer 2

Measurement system 1 (MS1) Spare

Measurement system 2 (MS2) Serial measurement board for manipulator/conveyor

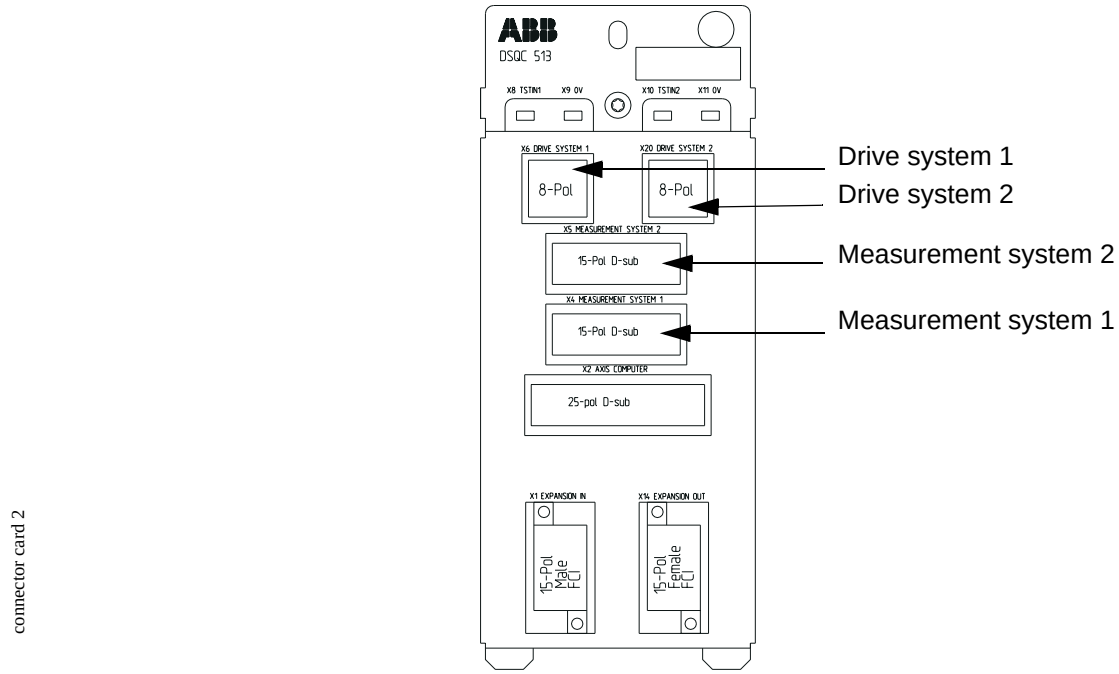
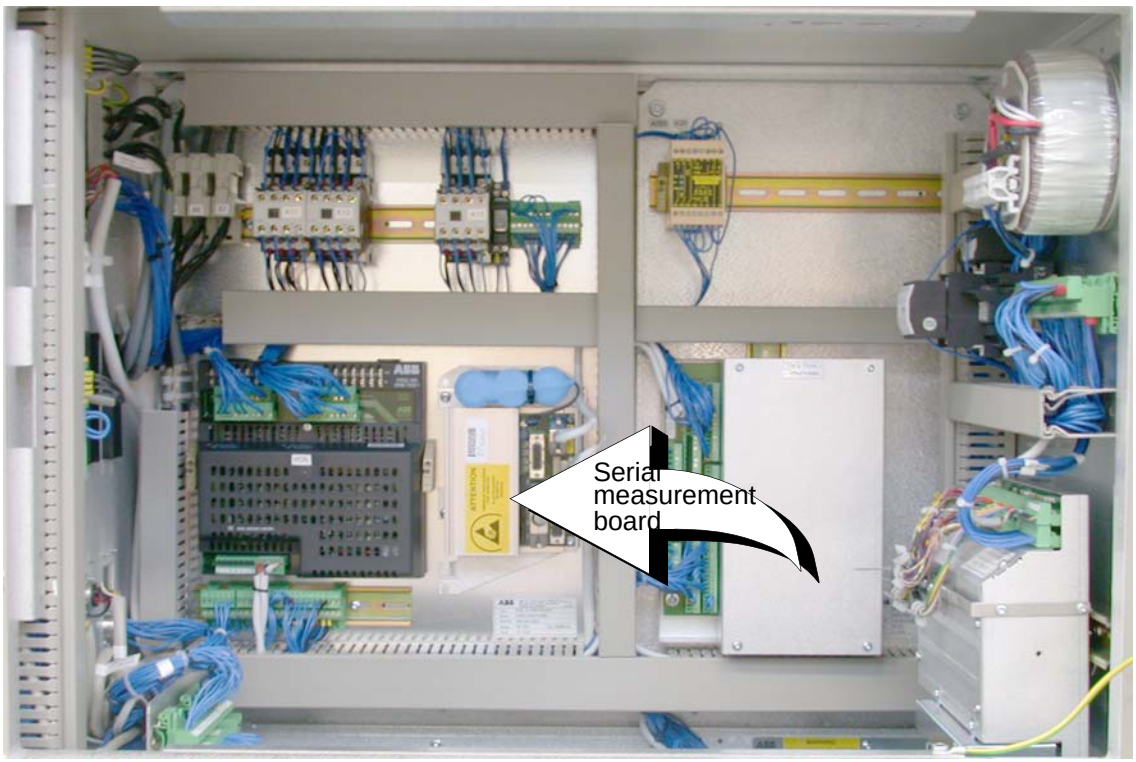


Figure 12 Axis computer 2

3.4.3 Resolver connection

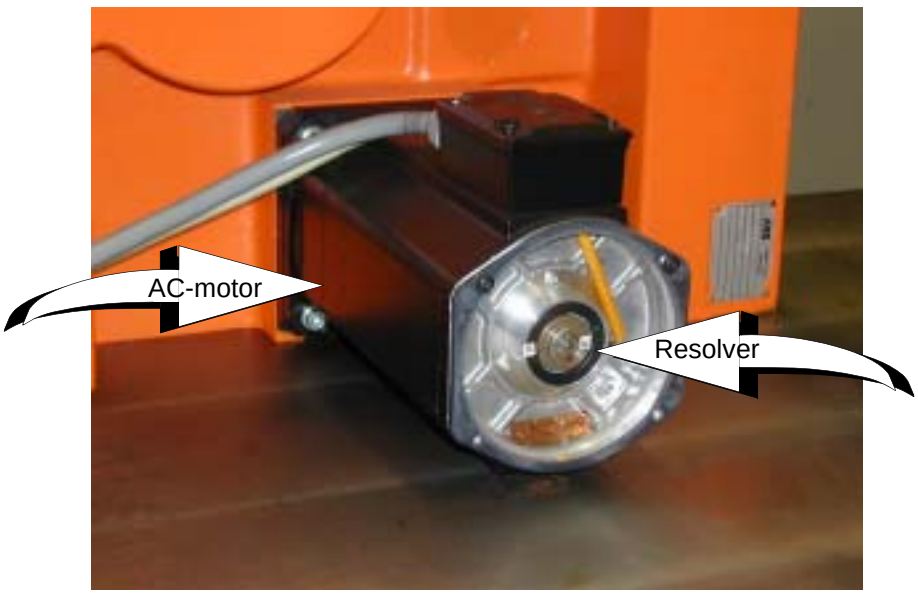
The robot's/manipulator's axes are equipped with a resolver integrated with respective motors to give exact positioning. See Figure 14

The resolvers are connected to the measurement channel for respective axis on the serial measurement boards.



skåpinsida.jpg

Figure 13 Top cabinet - serial measurement card



Skåp_S4Cplus_6

Figure 14 Motor with resolver

3.5 Axis selector

Up to 6 axis for the robot carrier and/or the manipulator can be connected to the robot system.

The motor for these products can be connected to the robot system according to the following options:

1 Direct drive between the motors and the drive units.
Robot carrier, station switching unit and some IRBP positioners (for example, FlexArc Compact).

2 Motors connected via the motor contactors to the drive units.
Normal connection of the work stations for the IRBP positioner.

The drive unit can be used according to the following options:

1 Common drive unit. Two or more motors share a drive unit.

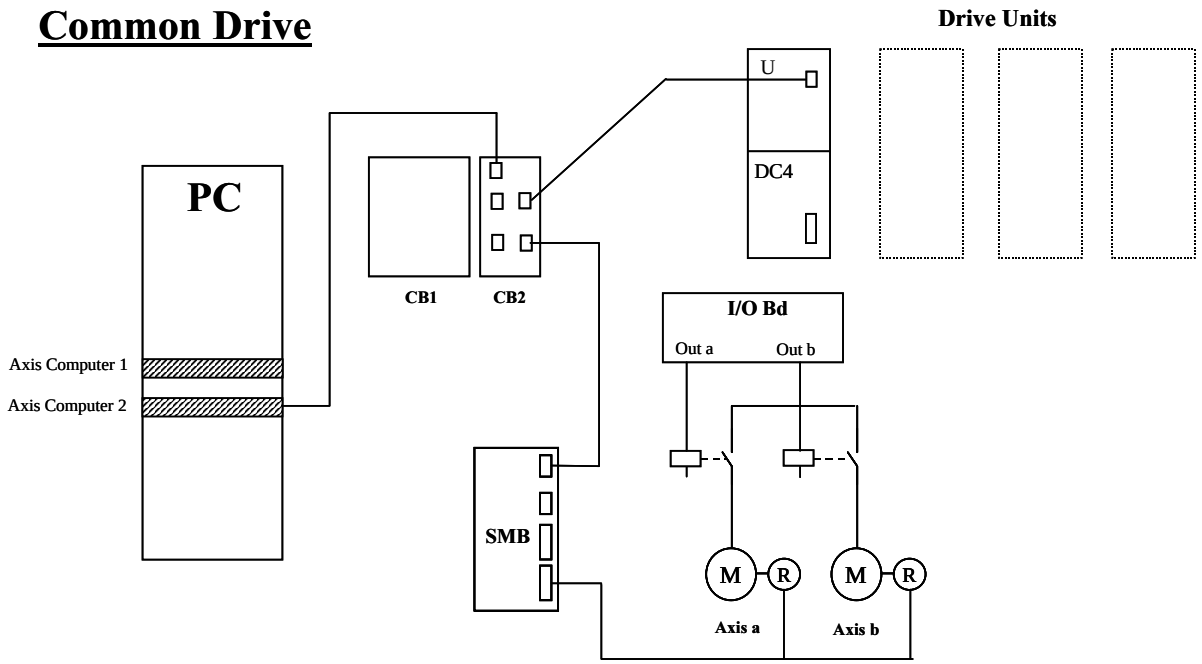


Figure 15 Common drive unit

2 Individual drive unit, i.e. one drive unit per motor (axis).

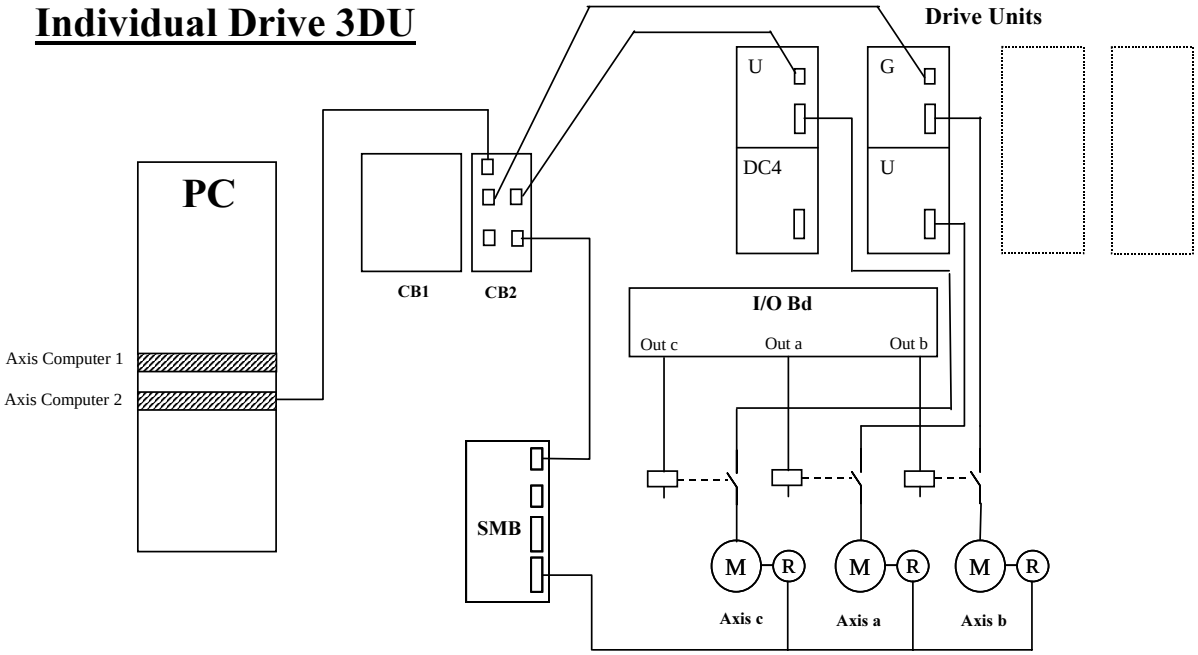


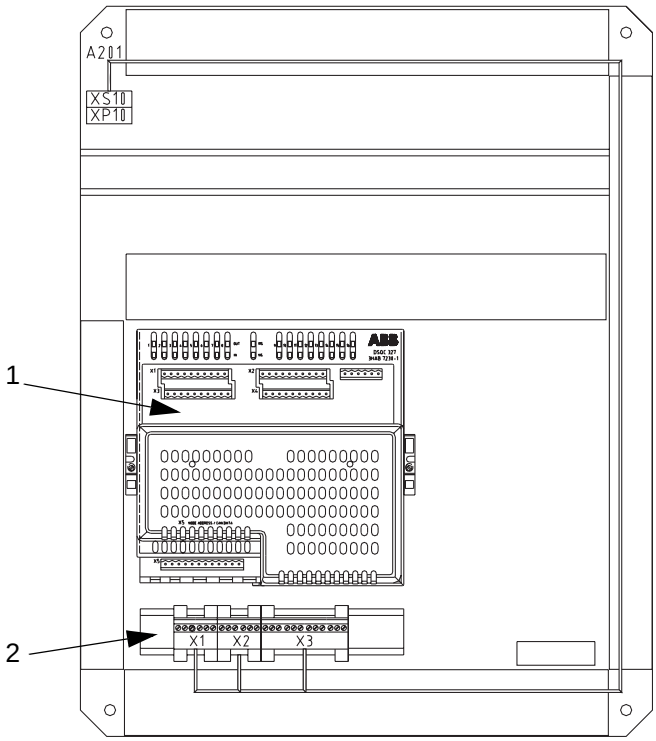
Figure 16 Individual drive unit

When direct connection is used, the connected axis follows the robot's status with activation/deactivation.

The motor connectors included in the axis selector are activated/deactivated by signals from a digital I/O-card.

3.6 Positioner interface Type S (Fixed table) Single/double Station

Between the control system and the included positioner there is a modular based interface fitted on the left of the top cabinet's rear panel .



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1 Digital I/O card

2 Signal connection

This equipment is intended for installations with welding tables and therefore contains no drive or measurement systems to control the motor axes.

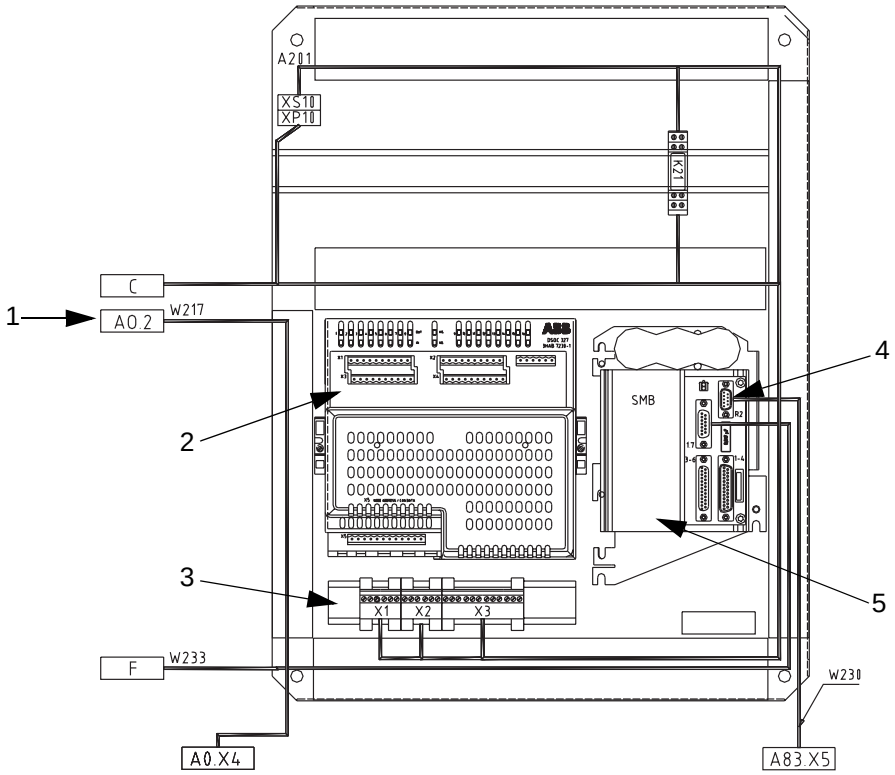
Station indication (applies for FlexArc Compact C and S)

In order for the correct production program to be initiated the station changer unit is equipped with limit switches, where applicable, that indicate which station is in the working mode for the robot.

The switches are cross-connected and actuate individual digital inputs in the control system. Respective inputs are set "high" when the station changer unit is at an end position.

3.7 Interface for conveyor type S (option)

Between the control system and the included manipulator there is a modular based interface fitted to the left of the cabinet's rear panel.



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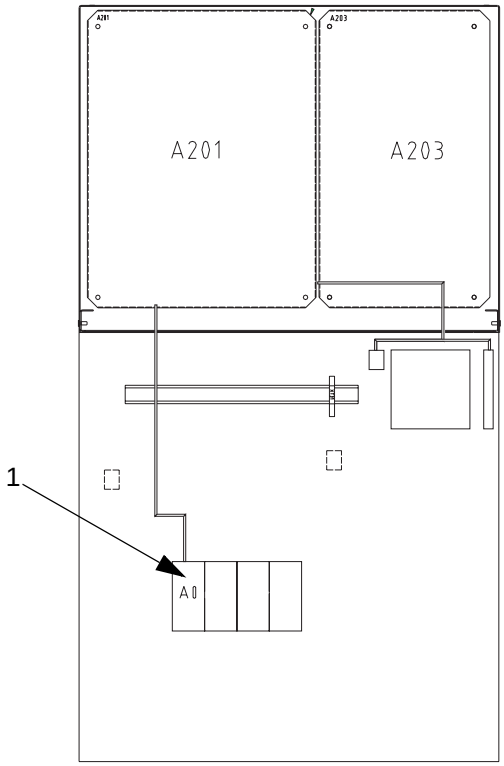
1 Connection A0.2 Motor Positioner (fitted to output XS103) on the cabinet wall's output side

2 Digital I/O card

3 Signal connection

4 Communication cable (MS2) connection

5 Serial measurement board



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1 Rectifier with the drive unit, DC 4/U

Drive system

For this positioner the drive system consists of:

- Axis computer 2/connector card (DS2)
- Communications cable (DS2)
- Rectifier DC 4
- Drive unit U (included in the rectifier module)
- Motor connection cable

A thermal contact for temperature monitoring is fitted to the manipulator's motor to provide protection against overheating. This signal is connected to the control system's PTC-loop.

Measurement system

For this positioner the measurement system consists of:

- Axis computer 2/connector card
- Communication cable (MS2)
- Serial measurement board
- Resolver connection cable

Axis selector

The manipulator's axle is permanently connected to the drive unit and consequently follows the operating status of the robot with activation/deactivation.

Connecting the manipulator

The motor and resolver signals are gathered in a common output XS103 on the control cabinet and the manipulator is connected to this output.

3.8 Reservdelsförteckning/*Spare Parts List*

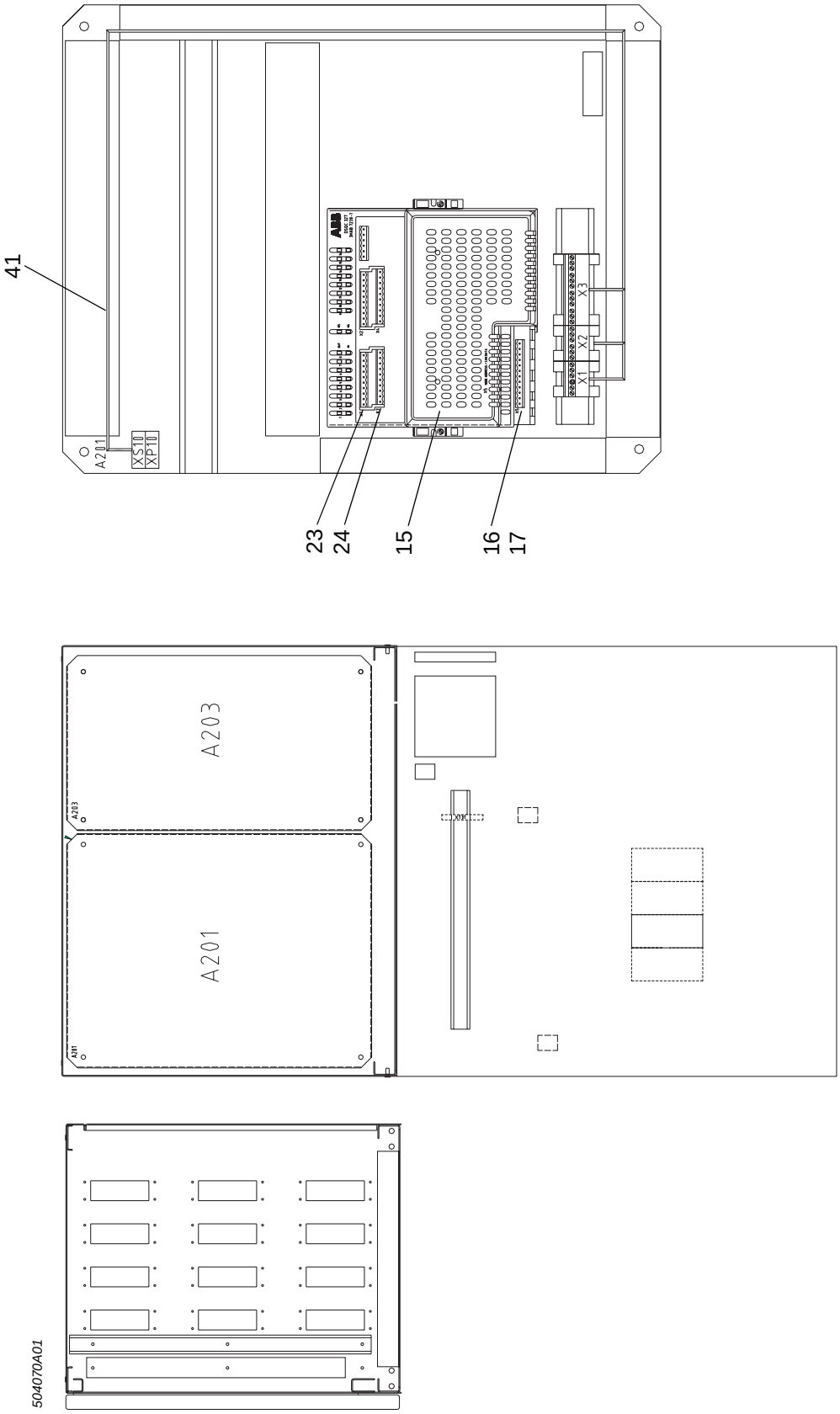
Reservdelar beställs genom ABB Automation Technology Products AB. Vid beställning var vänlig uppge typ och tillverkningsnummer samt benämningar och beställningsnummer enligt reservdelsförteckningen.

Rätt till ändring av specifikationer utan avisering förbehålles.

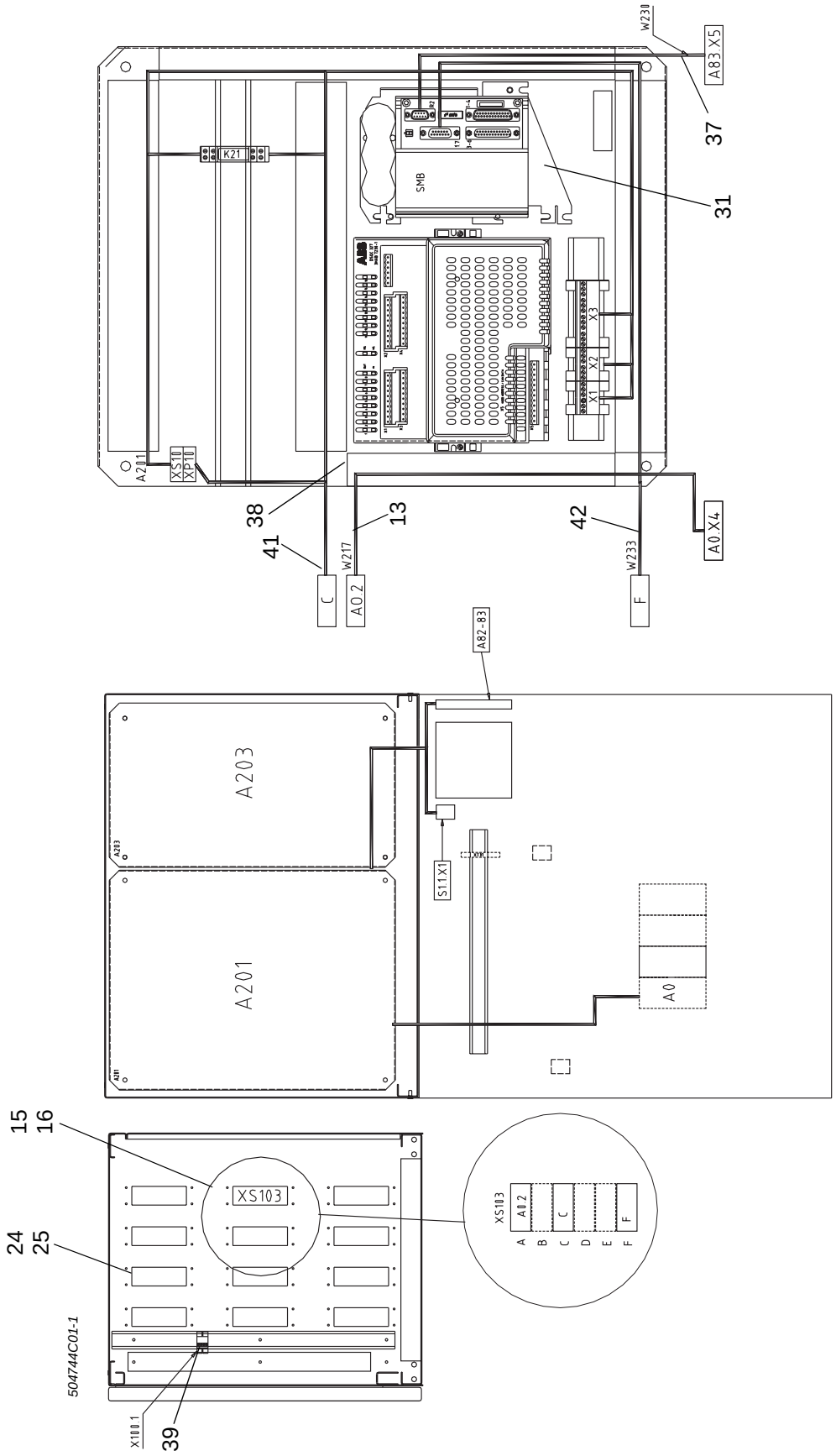
Spare parts are to be ordered from ABB Automation Technology Products AB. Kindly indicate type of unit, serial number, denominations and ordering number according to the spare parts list.

Rights to reserved to alter specifications without notice.

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		504 070-880	**Lägeställargränssnitt, Stationary och FlexArc compact S/C**	**Postioner InterFace, Staionary and FlexArc Compact S/C**	**M2001**
11		502 152-880	Plåt, kompl.	Plate, compl.	
15		501 112-001	Digitalt I/O-kort	Digital I/O-board	
16		489 947-244	Anslutningsdon, Combi-Con	Connector, CombiCon	7-pol
17		500 958-001	Insticksbrygga	Address Key	7-pol
23		489 947-601	Anslutningsdon, Combi-Con	Connector, CombiCon	24 V
24		489 947-603	Anslutningsdon, Combi-Con	CombiCon	24 V
41		504 165-880	Kabelstam S	Cable harness S	FlexArc Comp.

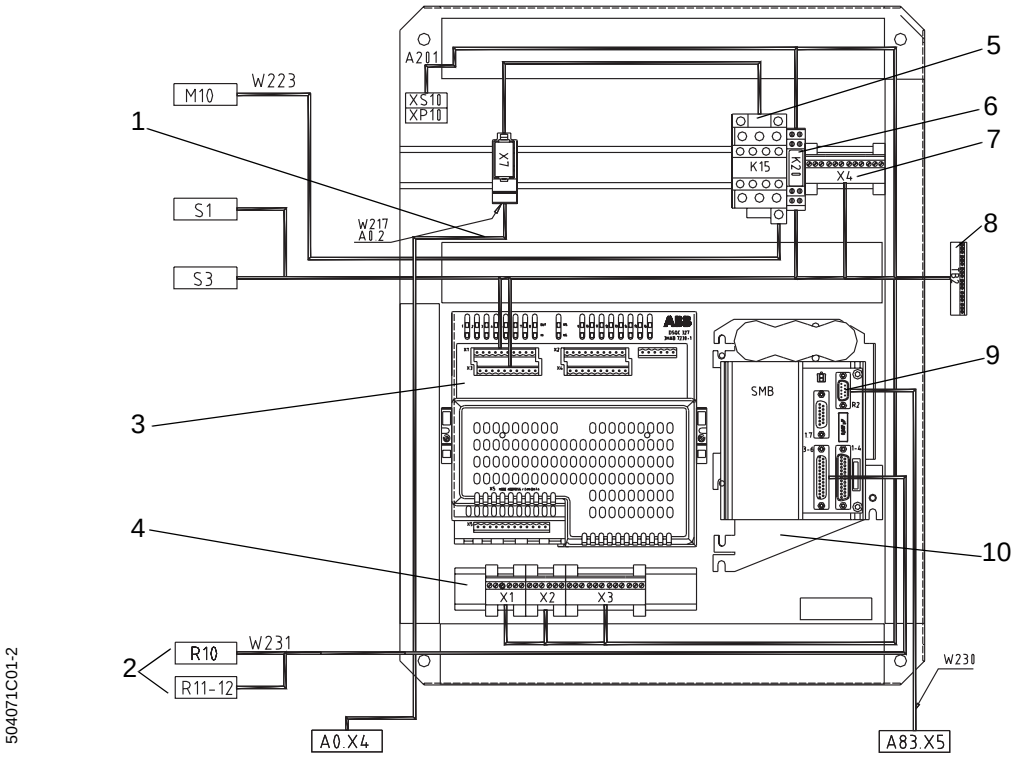

41
A201
XS10
XP10
X1
X2
X3
23
24
15
16
17
A203
A201
504070A01

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
			OPTION	**OPTION**	
		504 744-880	**Åkbana RTT, S/FlexArc Compact L/T**	**Travel track RTT, S/Flex-Arc Compact L/T**	**M2001**
13		502 341-881	Kabel	Cable	W217
15		193 715-110	Sockel	Housing	64-pol
16		193 715-607	Ram	Frame	A-F
24		193 715-152	Kåpa	Hood	
25		193 715-151	Delad kåpa, max 4 kablar	Shared hood, max 4 cables	
31		505 966-880	Seriemätkort, kompl.	Serial measurement board, compl,	SMB
31.1		505 966-001	Seriemätkort	Serial measurement board	
31.5		505 966-003	Batterienhet	Battery unit	
37		502 511-880	Kabel	Cable	W230
38		500 157-001	Skärmklämma	Screen clamp	6-16 mm
39		489 947-443	Anslutningsdon,Combi-Con	Connector, CombiCon	4-pol
41		504 159-880	Kabelstam, option	Cable harness, option	
42		502 508-880	Kabel	Cable	W233


W230
A83 X5
37
31
K21
SMB
X3
X2
X1
A201
XS10
XP10
38
41
13
42
C
A0 2
W217
W233
F
A0 X4
A82-83
A203
A201
S11X1
A0
15
16
24
25
XS103
A0 2
C
F
A
B
C
D
E
F
504744C01-1
X100 1
39

3.9 Positioner interface type IRBP C/C Index

Between the control system and the included positioner there is a modular based interface fitted on the left of the top cabinet's rear panel .



1 Connection X7, Motor - Positioner

2 Resolver connection

3 Digital I/O card

4 Signal connection

5 Motor connector K15

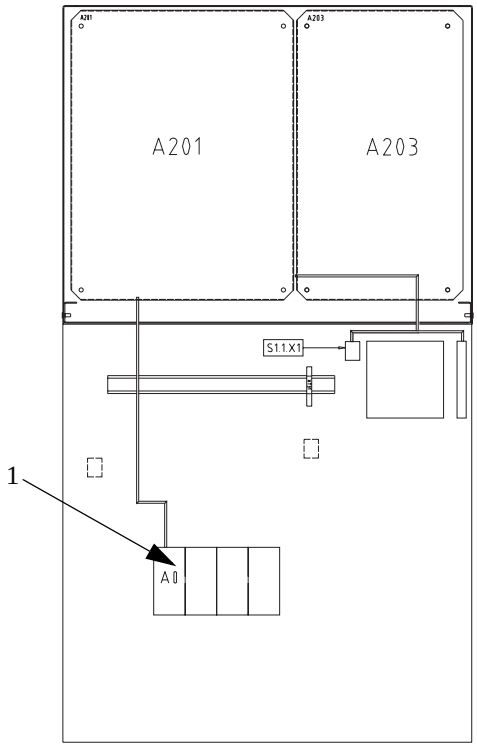
6 Brake relay

7 Adapter X4

8 Safety signals, connection TB2

9 Communication cable (MS2) connection

10 Serial measurement board



504071a01-3

1 Rectifier with the drive unit, DC 4/U

Drive system

For this positioner the drive system consists of:

- Axis computer 2/connector card (DS2)
- Communications cable (DS2)
- Rectifier DC4
- Drive unit U (included in the rectifier module)
- Cables for connecting the motor

A thermal contact for temperature monitoring is fitted to the manipulator's motor to provide protection against overheating. This signal is connected to the control system's PTC-loop.

Measurement system

For this positioner the measurement system consists of:

- Axis computer 2/connector card
- Communication cable (MS2)
- Serial measurement board
- Resolver connection cable

Axis selector

A contactor that connects the drive unit voltage to the motor is used to activate the manipulator's axle.

The contactor is operated using a 24V DC amplifier block, which is controlled by a digital output from the control system. The control voltage for the contact coil is 230V AC.

Activation signals

Activation/deactivation of the manipulator's axle can be performed from the control program or by using the function button under the Jogging menu on the programming unit.

The contactor for the axis in question is operated via a digital output on activation. An acknowledgement signal is obtained and a brake release relay with a digital output is then activated.

When deactivating, the motor is stopped before the contactor cuts the drive unit voltage.

Station indication

In order for the correct production program to be initiated the station changer unit is equipped with limit switches, that indicate which station is in the working mode for the robot. The switches actuate individual digital inputs in the control system. Respective inputs are set "high" when the station changer unit is at an end position.

Connecting the manipulator

The motor and resolver signals are gathered in a common output XS101 on the control cabinet and the manipulator is connected to this output.

Safety

Due to reasons of safety the station changer cannot be set in the operating mode "MAN FS". This interlock is integrated into the interface for operator communication and safety equipment.

Note! If, for some reason, this interface is omitted it is incumbent on the user to ensure this interlock is maintained.

Contactors and auxiliary contact blocks are of an approved redundant type in order to guarantee assured monitoring of the active motor axis. The operation of the contactors is monitored by the personal safety equipment.

3.10 Reservdelsförteckning/*Spare Parts List*

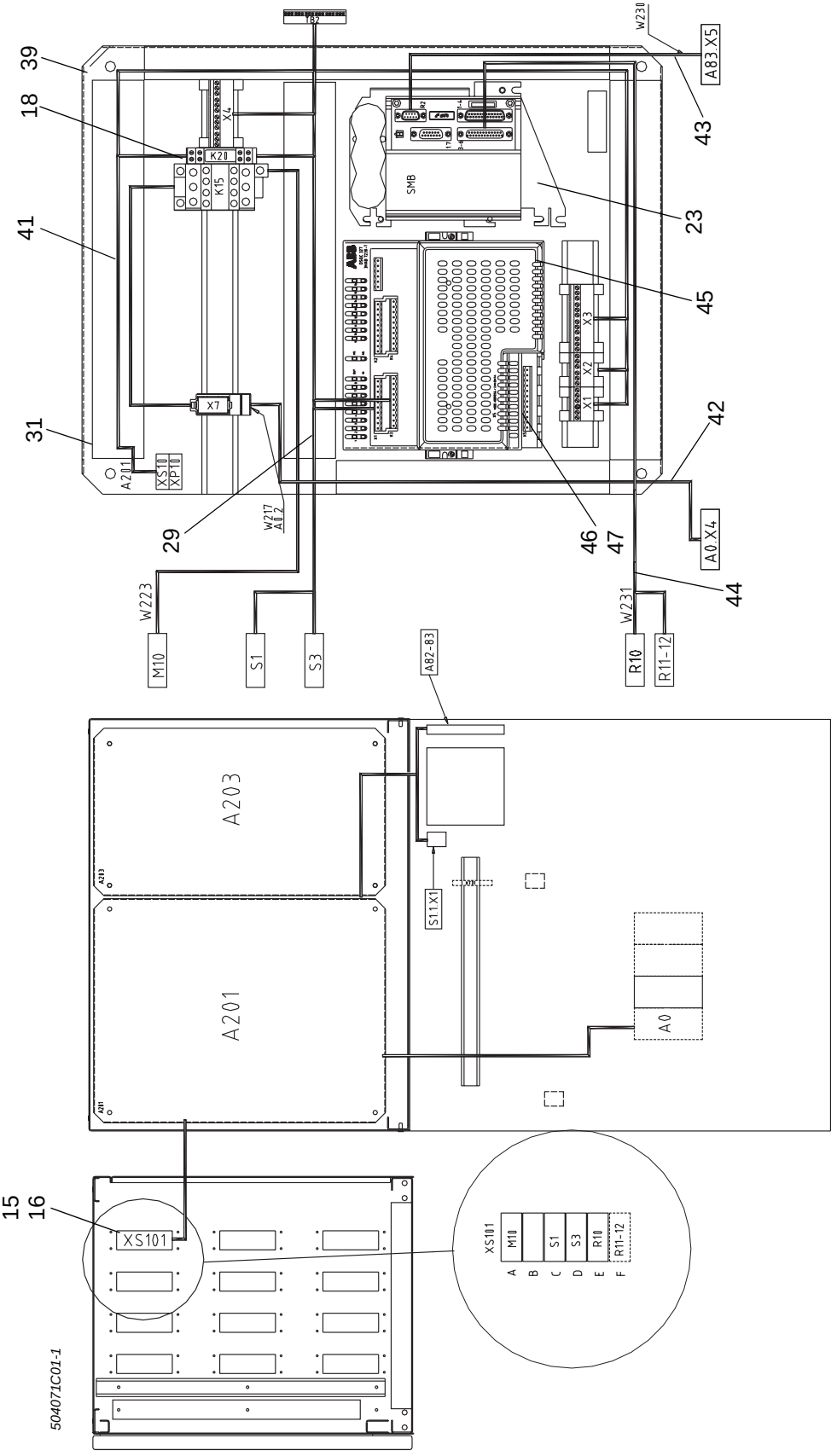
Reservdelar beställs genom ABB Automation Technology Products AB. Vid beställning var vänlig uppge typ och tillverkningsnummer samt benämningar och beställningsnummer enligt reservdelsförteckningen.

Rätt till ändring av specifikationer utan avisering förbehålles.

Spare parts are to be ordered from ABB Automation Technology Products AB. Kindly indicate type of unit, serial number, denominations and ordering number according to the spare parts list.

Rights to reserved to alter specifications without notice.

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		504 071-880	**Lägeställargränssnitt, IRBP C/C Index**	**Positioner Interface, IRBP C/C Index**	**M2001**
15		193 715-110	Sockel	Housing	64-pol
16		193 715-607	Ram	Frame	6-mod A-F
18		500 861-881	Säkerh. relä kompl.	Safety relay compl.	
23		505 966-880	Seriemätkort, kompl.	Serial measurement board, compl.	SMB
23.1		505 966-001	Seriemätkort	Serial measurement board	
23.5		505 966-003	Batterienhet	Battery unit	
29		500 157-001	Skärmklämma	Clamp	6-16 mm
31		502 152-880	Plåt, kompl.	Plate, compl.	
39		505 370-880	Kontaktor-modul, stn.växel	Contactor kit, interchange	
41		504 153-880	Kabelstam	Cable harness	IRBP C
42		502 341-881	Kabel	Cable	W 217
43		502 511-880	Kabel	Cable	W 230
44		502 517-880	Kabel	Cable	W 231
45		501 112-001	Digitalt I/O-kort	Digital I/O board	
46		489 947-244	Anslutningsdon, Combi-Con	Connector, CombiCon	7-pol
47		500 958-001	Insticksbrygga	Address key	7-pol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18
41
31
29
W217
A82
W223
M10
S1
S3
X7
A201
XS10
XP10
K20
K15
X4
SMB
X3
X2
X1
W230
A83:X5
43
23
45
42
A0:X4
46
47
44
W231
R10
R11-12
A82-83
A203
A201
S11:X1
A0
15
16
XS101
XS101
M10
S1
S3
R10
R11-12
A
B
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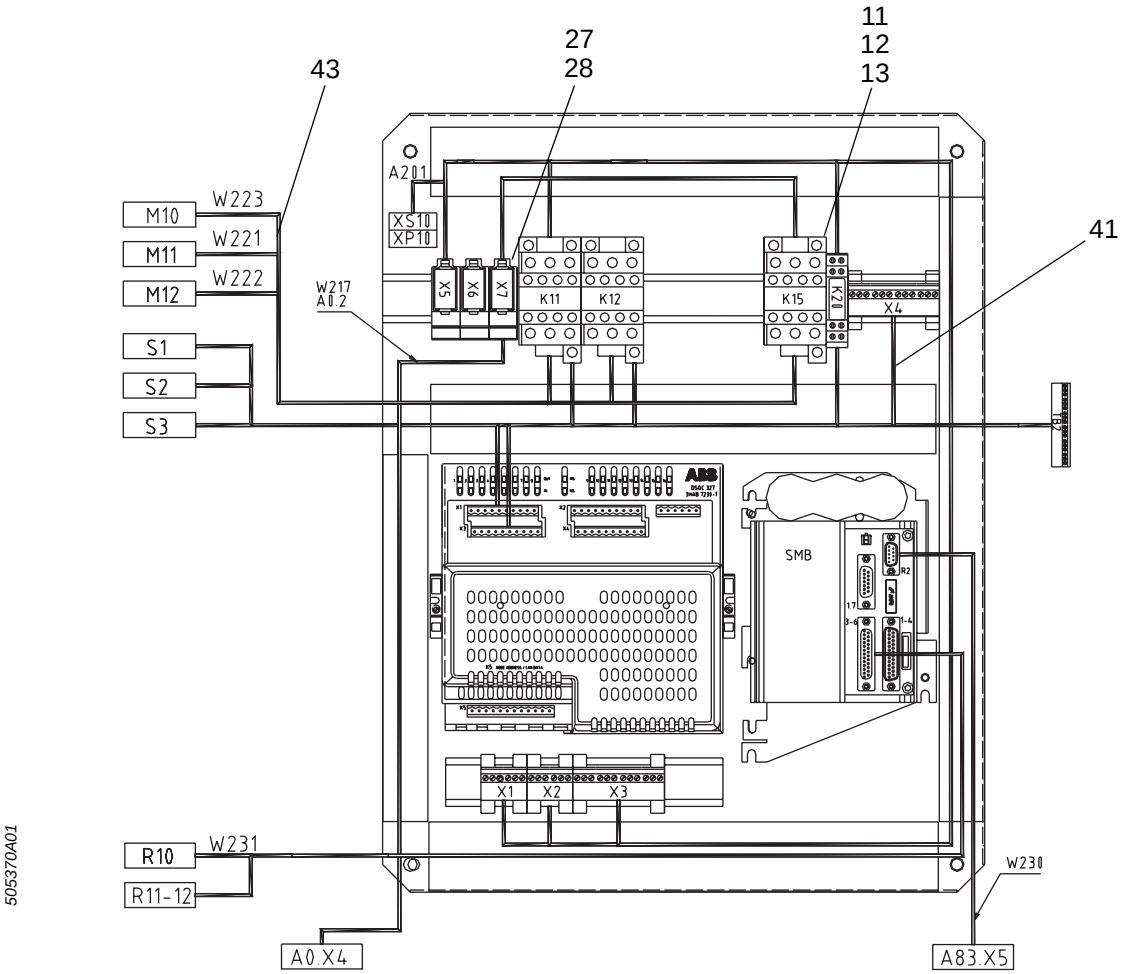
504071C01-1

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		505 370-880	**Kontaktormodul, stationsväxel**	**Contactor kit, inter-change**	
11		193 751-055	Kontaktor	Contactor	
12		193 861-002	Förstärkarblock	Amplifier block	
13		193 751-105	Hjälpkontaktblock	Auxiliary contact block	
27		193 715-707	Modulhållare	Module holder	12p
28		193 715-708	Modulhållare	Module holder	12p
41		505 367-880	Kabelstam	Cable harness	
43		502 505-880	Kabel	Cable	W221-223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28
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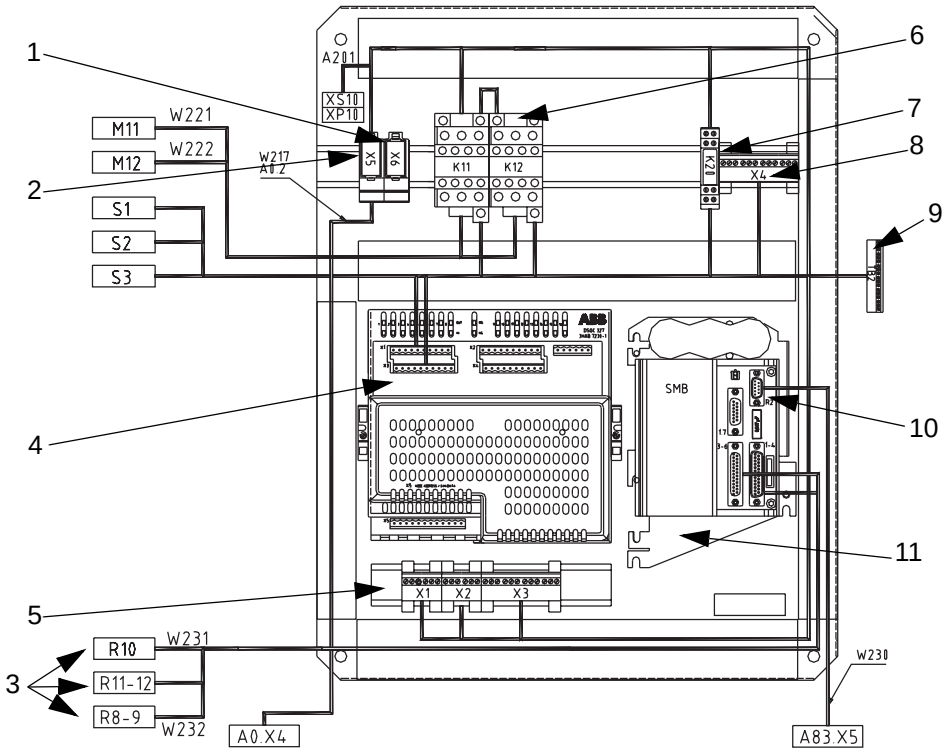
12
13
41
A201
XS10
XP10
M10
M11
M12
W223
W221
W222
W217
A0.2
S1
S2
S3
X5
X6
X7
K11
K12
K15
K22
X4
SMB
X1
X2
X3
R10
R11-12
W231
W230
A0.X4
A83.X5
505370A01

3.11 Positioner interface type IRBP L/T

Between the control system and the included positioner there is a modular based interface fitted to the left of the top cabinet's rear panel.



504072D01-2

1 Connection X6 (not used)

2 Connection X5 Motor Manipulator

3 Resolver connections

4 Digital I/O card

5 Signal connection

6 Motor contactors

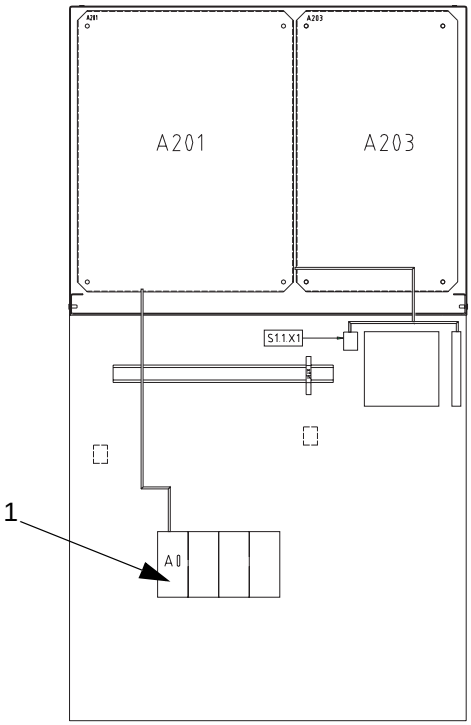
7 Brake relay

8 Adapter X4

9 Connection TB2 safety signals

10 Communication cable (MS2) connection

11 Serial measurement board



504072a01-3

1 Rectifier with drive unit DC 4/U

Drive system

For this positioner the drive system consists of:

- Axis computer 2/connector card (DS2)
- Communications cable (DS2)
- Rectifier DC4
- Drive unit U (included in the rectifier module)
- Cables and connectors for connecting the motors

A thermal contact for temperature monitoring is fitted to the manipulator's motors to provide protection against overheating. These signals are connected to the control system's PTC-loop.

Measurement system

For these positioners the measurement system consists of:

- Axis computer 2/connector card
- Communication cable (MS2)
- Serial measurement board
- Cables for connecting resolvers

Axis selector

A contactor that connects the drive unit voltage to the motor is used to activate respective manipulators' axes. The contactor is operated using a 24V DC amplifier block, which is controlled by a digital output from the control system. The control voltage for the contact coil is 230V AC.

Activating/deactivating

Activation/deactivation of the manipulator's axle can be performed from the control program or by using the function button under the Jogging menu on the programming unit.

The contactor for the axis in question is operated via a digital output on activation. An acknowledgement signal is obtained and a brake release relay with a digital output is then activated.

When deactivating, the motor is stopped before the contactor cuts the drive unit voltage.

Connecting the manipulator

The motor and resolver signals for respective manipulators are gathered in a common output on the control cabinet and the manipulator is connected to this output. The manipulator for station 1 is connected to output XS101 and the manipulator for station 2 is connected to output XS102.

Safety

Contactors and auxiliary contact blocks are of an approved redundant type in order to guarantee assured monitoring of the active motor axis. The function of the contactors is supervised by the safety equipment.

Options

IRBP 5000L
As an option there is a possibility to receive the axis selector with the cabling, dimensioned for the large "motor currents" that are demanded, in order to run this type of positioner.

3.12 Reservdelsförteckning/*Spare Parts List*

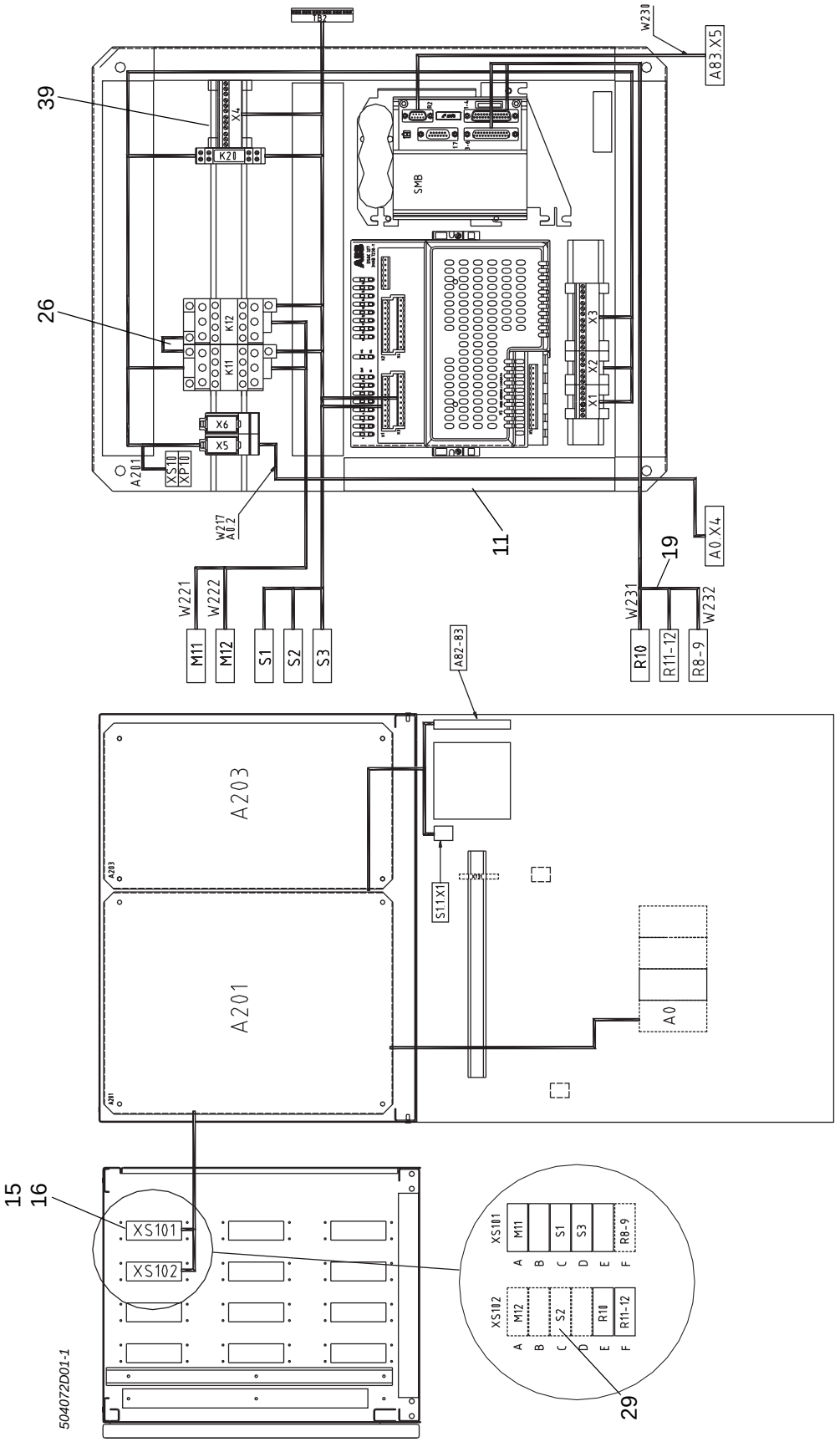
Reservdelar beställs genom ABB Automation Technology Products AB. Vid beställning var vänlig uppge typ och tillverkningsnummer samt benämningar och beställningsnummer enligt reservdelsförteckningen.

Rätt till ändring av specifikationer utan avisering förbehålles.

Spare parts are to be ordered from ABB Automation Technology Products AB. Kindly indicate type of unit, serial number, denominations and ordering number according to the spare parts list.

Rights to reserved to alter specifications without notice.

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		504 072-880	**Lägeställargränssnitt, IRBP L/T**	**Positioner InterFace, IRBP L/T**	**M2001**
11		504 080-880	Gem. detaljer. 2 aktiveringsenheter	Common parts, 2 activation unit	
15		193 715-110	Sockel	Housing	64-pol
16		193 715-607	Ram	Frame	6-mod A-F
19		502 514-880	Kabel	Cable	W 232
26		502 780-002	Trefas kontaktorbygel	Three phase contactor jumper	
29		504 739-880	Byglingsdon	Jumper	If only 1 positioner
39		505 371-880	Anslutningsdon, CombiCon	Connector, CombiCon	12-pol.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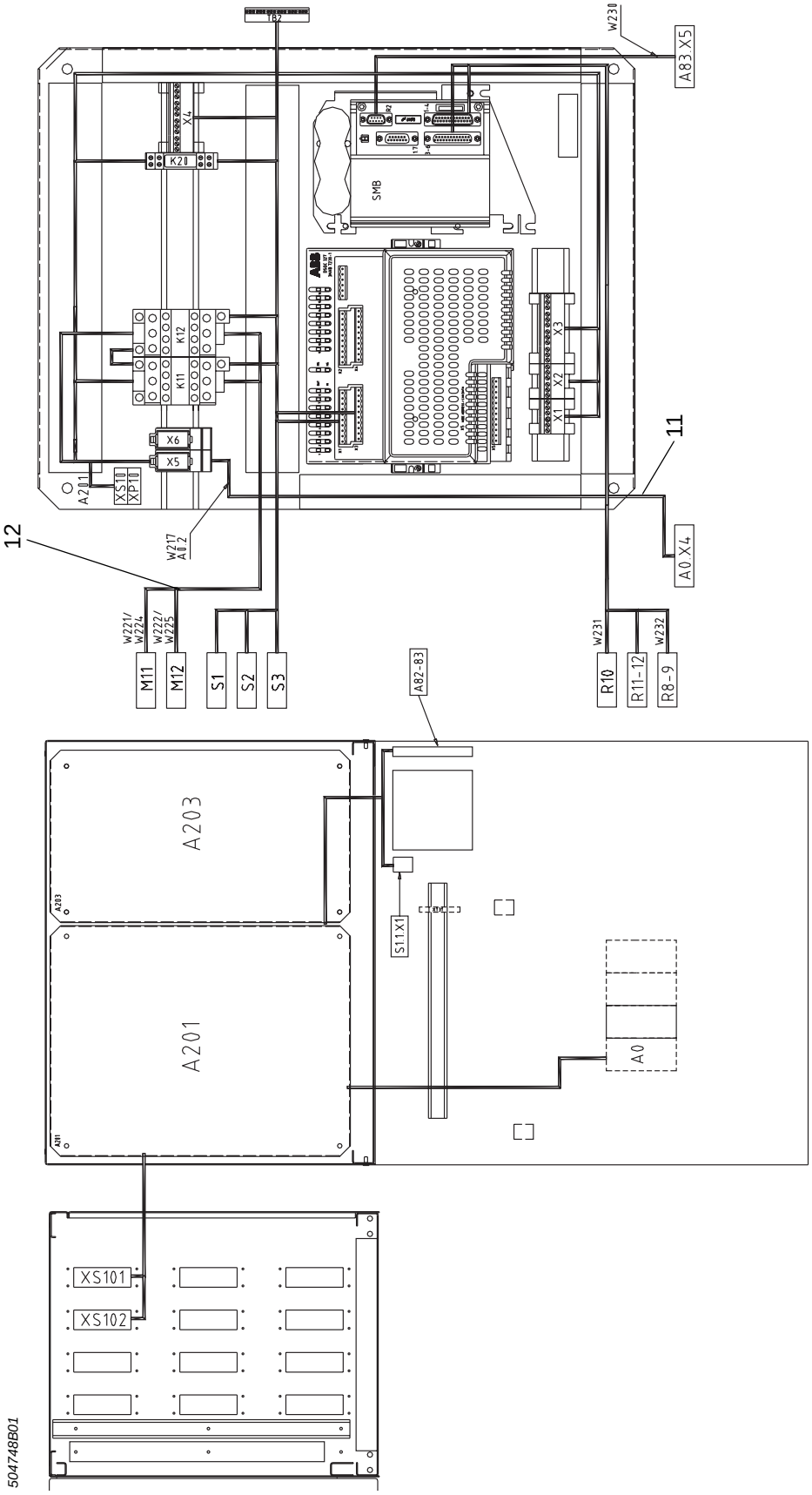
26
11
19
15
16
29
W230
A83 X5
A0 X4
W217
A12
W221
W222
W231
W232
M11
M12
S1
S2
S3
R10
R11-12
R8-9
A82-83
S11X1
A203
A201
A0
XS101
XS102
504072D01-1

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
			OPTION	**OPTION**	
		504 748-880	**Pos IF, IRBP 5000 L**	**Positioner InterFace, IRBP 5000 L**	**M2001**
11		502 341-890	Kabel	Cable	W217
12		502 505-881	Kabel	Cable t	W224-225


W230
A83 X5
X4
K20
SMB
K12
K11
X6
X5
X3
X2
X1
A201
XS10
XP10
11
12
W217
A0 X4
W221/
W224
W222/
W225
W231
W232
M11
M12
S1
S2
S3
R10
R11-12
R8-9
A82-83
A203
A201
S11X1
A0
XS101
XS102
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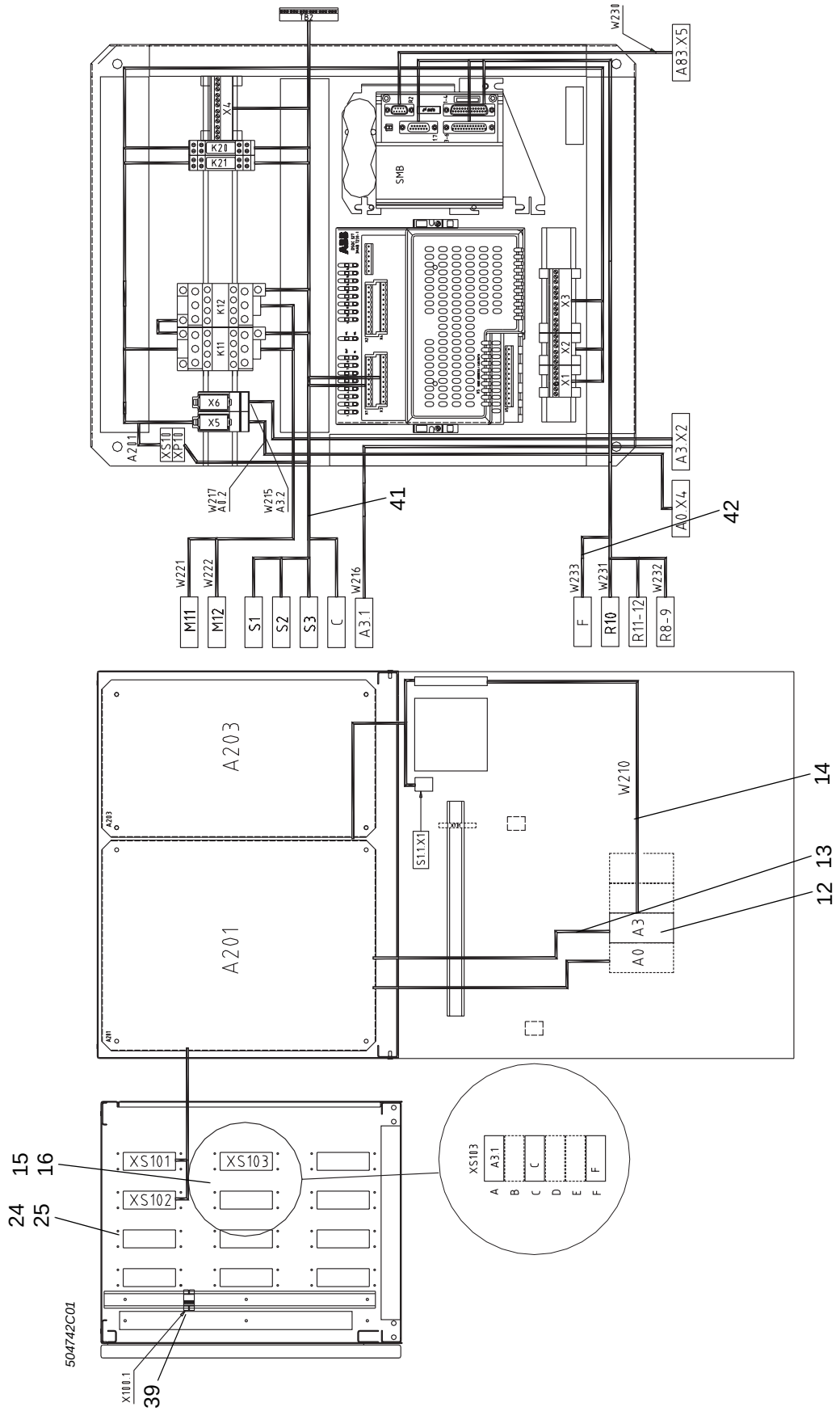
Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
			OPTION	**OPTION**	
		504 742-880	**Åkbana RTT 1400/2400 + L/T**	**Travel track RTT 1400/ 2400 + L/T**	**M2001**
12		501 111-011	Drivdon	Drive unit	2-axes G/U
13		502 338-880	Kabel	Cable	W215-216
14		502 344-001	Kabel DS (drive system)	Cable DS (drive system)	
15		193 715-110	Sockel	Housing	64-pol
16		193 715-607	Ram	Frame	6-mod A-F
24		193 715-152	Kåpa	Hood	
25		193 715-151	Delad kåpa	Shared hood	
39		489 947-443	Anslutningsdon, Combi-Con	Connector, CombiCon	4-pol
41		504 159-880	Kabelstam	Cable harness	
42		502 508-880	Kabel	Cable	W233


IB2
W230
A83 X5
X4
K20
K21
SMB
K12
K11
X6
X5
XS10
XP10
A201
X3
X2
X1
A3 X2
A0 X4
W217
A12
W215
A32
41
42
W221
W222
W216
W233
W231
W232
M11
M12
S1
S2
S3
C
A31
F
R10
R11-12
R8-9
A203
A201
W210
14
S11X1
13
12
A3
A0
15
16
XS101
XS103
XS102
24
25
XS103
A31
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A
B
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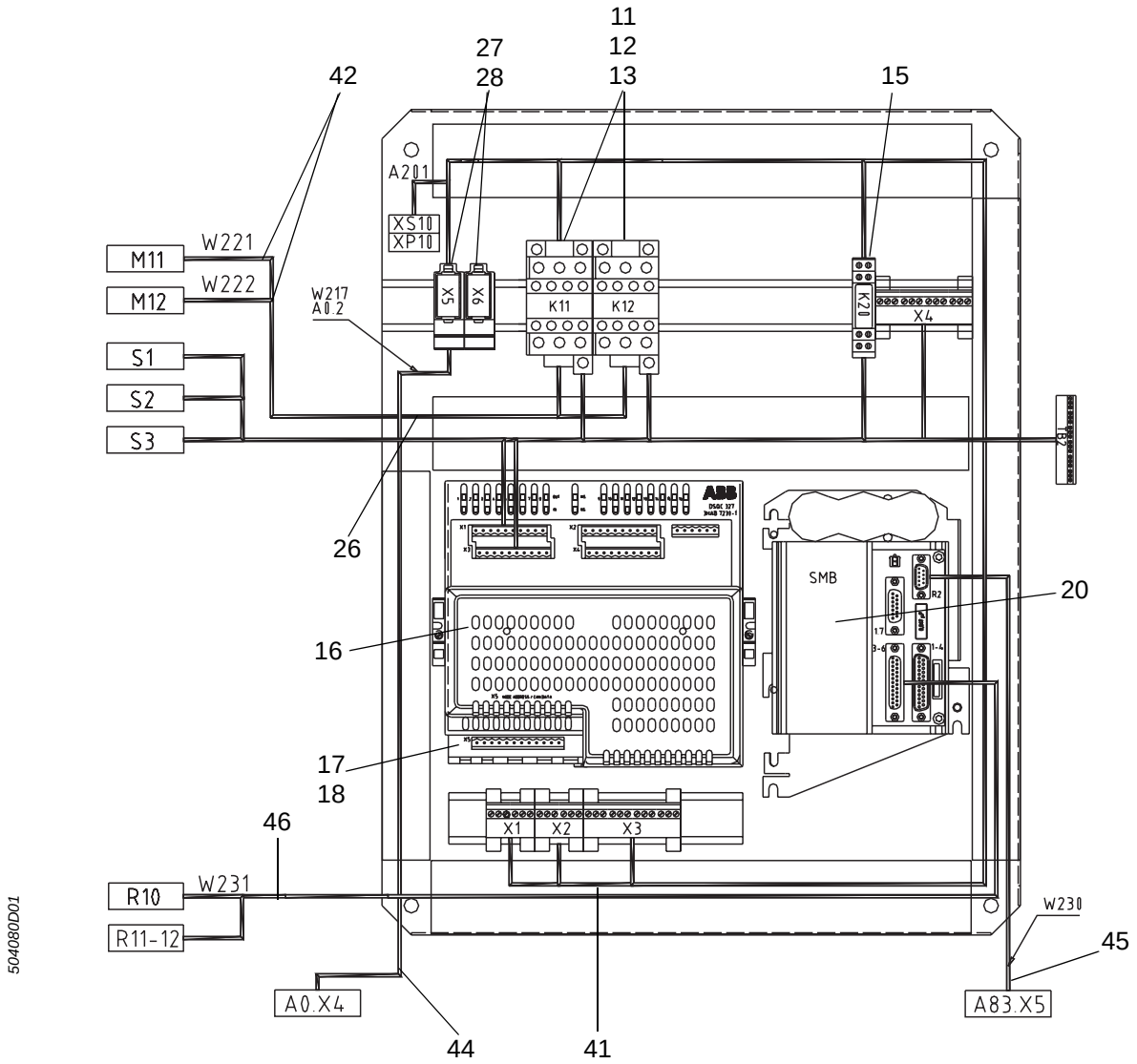
E
F
504742C01
X100.1
39

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		504 080-880	**Gem. detaljer, 2 aktiver-ingsenheter**	**Common parts, 2 activa-tion unit**	**M2001**
11		193 751-055	Kontaktor	Contactor	
12		193 861-002	Förstärkarblock	Amplifier block	
13		193 751-105	Hjälpkontaktblock	Auxilliary contact block	
15		500 861-881	Säkerh. relä kompl. 2 växl	Safety relay compl. 2 change over contact	
16		501 112-001	Digitalt I/O-kort	Digital I/O board	
17		489 947-244	Anslutningsdon, Combi-Con	Connector, CombiCon	7-pol
18		500 958-001	Insticksbrygga	Address key	7-pol
20		505 966-880	Seriemätkort, kompl.	Serial measurement board, compl.	SMB
20.1		505 966-001	Seriemätkort	Serial measurement board	
20.5		505 966-003	Batterienhet	Battery unit	
26		500 157-001	Skärmklämma	Clamp	6-16 mm
27		193 715-707	Modulhållare	Module bracket	
28		193 715-708	Modulhållare	Module bracket	
31		502 152-880	Plåt kompl.	Plate compl.	
41		504 150-880	Kabelstam, 2 akt.enhet	Cable harness, 2 act.unit	
42		502 505-880	Kabel	Cable	W221-223
44		502 341-881	Kabel	Cable	W217
45		502 511-880	Kabel	Cable	W230
46		502 517-880	Kabel	Cable	W231


11
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42
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A201
XS10
XP10
M11
M12
W221
W222
W217
A0.2
X5
X6
K11
K12
K27
X4
S1
S2
S3
X81
26
SMB
20
16
17
18
X1
X2
X3
46
R10
R11-12
W231
W230
45
A0.X4
A83.X5
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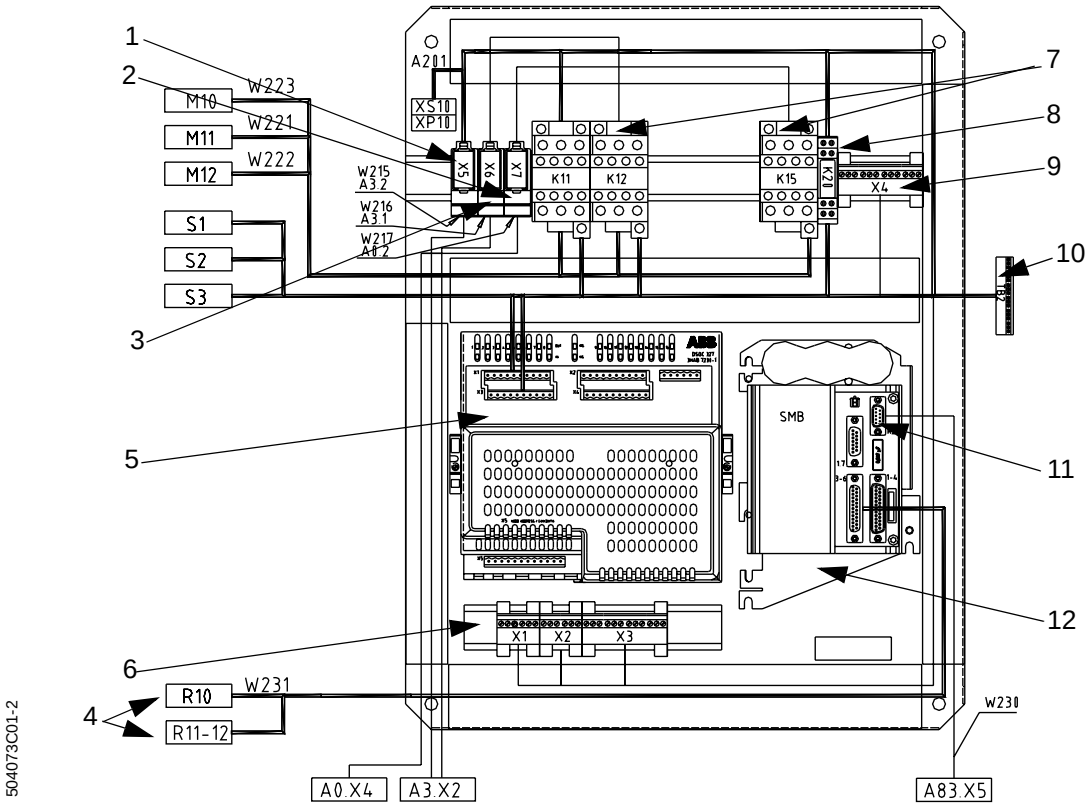
504080D01

3.13 Positioner interface types IRBP R/K/E/F

Between the control system and the included positioner there is a modular based interface fitted to the left of the top cabinet's rear panel.



1 Connection X5 Motor Positioner

2 Connection X7 Motor Positioner

3 Connection X6 Motor Positioner

4 Resolver connection

5 Digital I/O card

6 Signal connection

7 Motor contactors

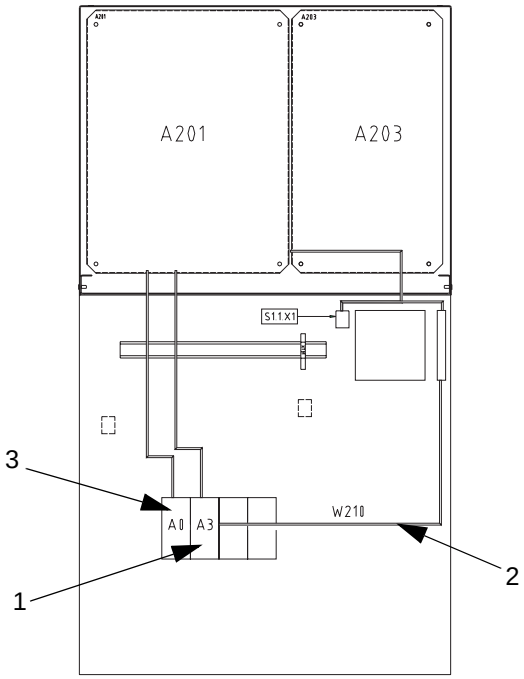
8 Brake relay

9 Connection X4

10 Connection TB2 safety signals

11 Communication cable (MS2) connection

12 Serial measurement board



504073a01-3

1 Drive unit G/U

2 Communication cable (DS2) connection

3 Rectifier with drive unit DC 4/U

Drive system

For this positioner the drive system consists of:

- Axis computer 2/connector card (DS2)
- Communications cable (DS2)
- Rectifier DC4
- Drive unit U (included in the rectifier module)
- Drive unit G/U
- Cables and connectors for connecting the motors

A thermal contact for temperature monitoring is fitted to the positioners' motors to provide protection against overheating. These signals are connected to the control system's PTC-loop.

Measurement system

For this positioner the measurement system consists of:

- Axis computer 2/connector card
- Communication cable (MS2)
- Serial measurement board
- Resolver connection cables

Axis selector

A connector is used to activate one of the positioners' work stations, this is connected to the drive unit voltage to the motor in question.

The contactor is operated using a 24V DC amplifier block, which is controlled by a digital output from the control system. The control voltage for the contact coil is 230V AC.

As standard only one axis can be active at any one time.

Activating/deactivating

Activating/deactivating of the positioner's work stations can be performed from:

- the control program or
- by using the function key from the jogging menu on the programming unit.

The contactor for the axis in question is operated via a digital output on activation. An acknowledgement signal is obtained and a brake release relay with a digital output is then activated.

When deactivating, the motor is stopped before the contactor cuts the drive unit voltage.

Station indication

In order for the correct production program to be initiated the station changer unit is equipped with limit switches, that indicate which station is in the working mode for the robot. The switches set individual digital inputs in the control system. Respective inputs are set "high" when the station changer unit is at an end position.

Connecting the positioner

Motor and resolver signals for the positioner are separated into two outputs on the control cabinet, and the positioner is connected to these.

- The motors are connected to the output XS101 and
- the resolvers are connected to the output XS102.

Safety

Due to reasons of safety the station changer cannot be set in the operating mode "MAN FS". This interlock is integrated into the interface for operator communication and safety equipment.

Note! If, for some reason, this interface is omitted it is incumbent on the user to ensure this interlock is maintained.

Contactors and auxiliary contact blocks are of an approved redundant type in order to guarantee assured monitoring of the active motor axis. The operation of the contactors is monitored by the safety equipment.

3.14 Reservdelsförteckning/*Spare Parts List*

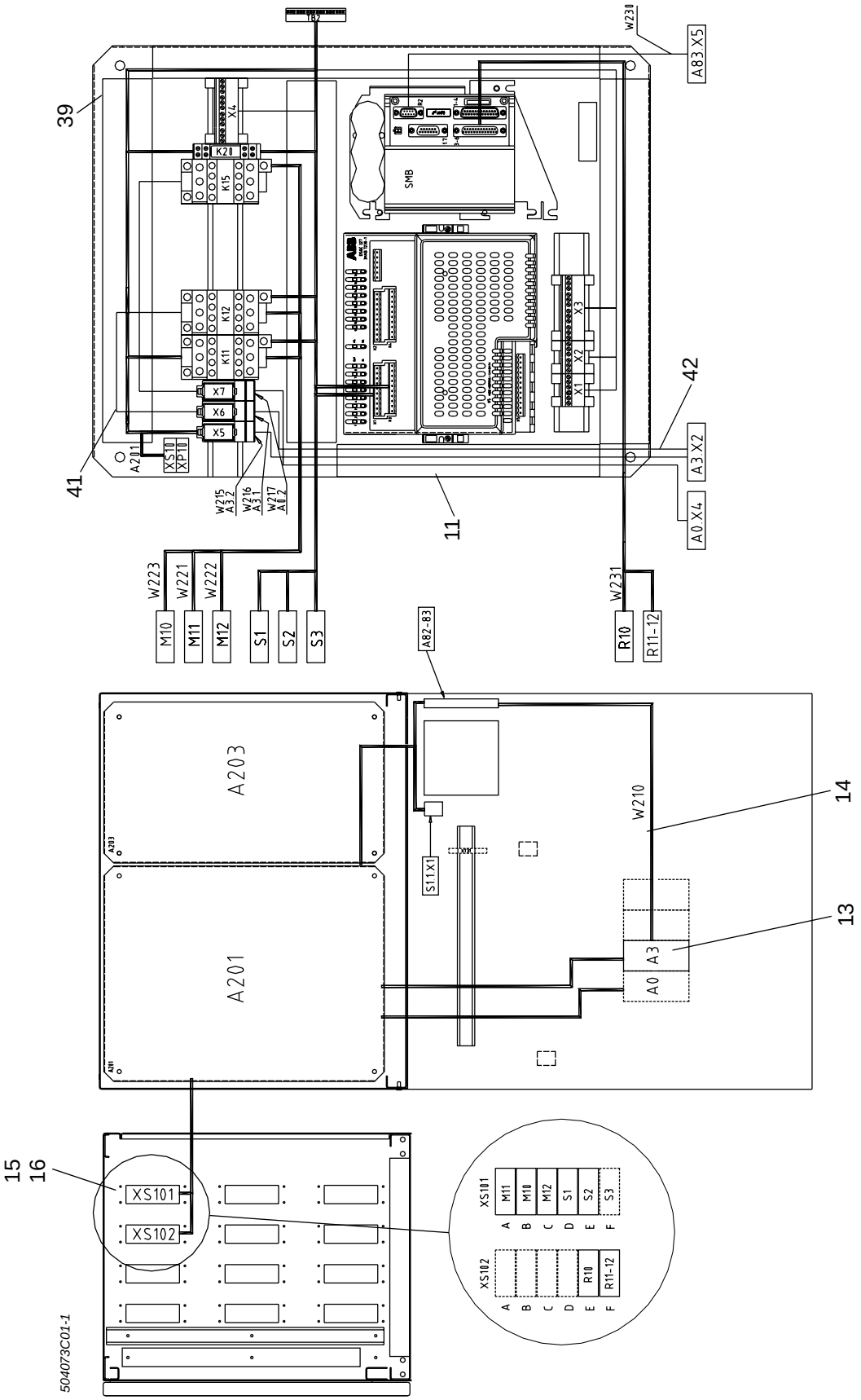
Reservdelar beställs genom ABB Automation Technology Products AB. Vid beställning var vänlig uppge typ och tillverkningsnummer samt benämningar och beställningsnummer enligt reservdelsförteckningen.

Rätt till ändring av specifikationer utan avisering förbehålles.

Spare parts are to be ordered from ABB Automation Technology Products AB. Kindly indicate type of unit, serial number, denominations and ordering number according to the spare parts list.

Rights to reserved to alter specifications without notice.

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		504 073-880	**Lägeställargränssnitt, IRBP R/K/E/F**	**Positioner InterFace, IRBP R/K/E/F**	**M2001**
11		504 080-880	Gem. detaljer, 2 aktiveringsenheter	Common details, 2 activation unit	
13		501 111-011	Drivdon	Drive unit	2-axes
14		502 344-001	Kabel DS (Drivsystem)	Kabel DS (Drive system)	
15		193 715-110	Sockel	Housing	64-pol
16		193 715-607	Ram	Frame	6-mod A-F
39		505 370-880	Kontaktormodul, stationsväxel	Contactor kit, interchange	
41		504 162-880	Kabelstam	Cable harness	
42		502 338-880	Kabel	Cable	W215-216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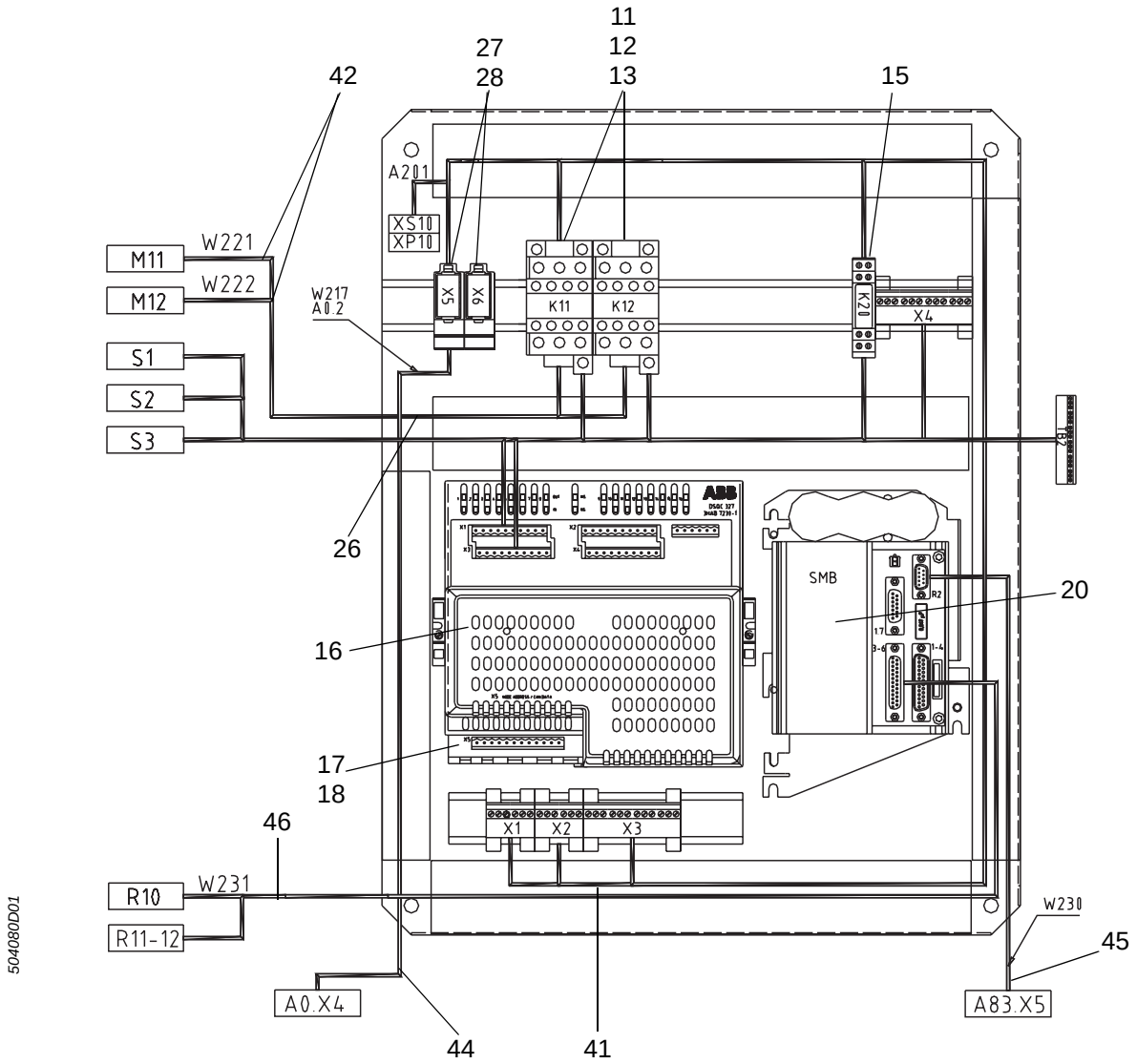
A83 X5
A3 X2
A0 X4
W230
W231
W223
W221
W222
W215
W216
W217
W210
M10
M11
M12
S1
S2
S3
R10
R11-12
A82-83
S11 X1
A203
A201
XS101
XS102
504073C01-1

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		504 080-880	**Gem. detaljer, 2 aktiver-ingsenheter**	**Common parts, 2 activa-tion unit**	**M2001**
11		193 751-055	Kontaktor	Contactor	
12		193 861-002	Förstärkarblock	Amplifier block	
13		193 751-105	Hjälpkontaktblock	Auxilliary contact block	
15		500 861-881	Säkerh. relä kompl. 2 växl	Safety relay compl. 2 change over contact	
16		501 112-001	Digitalt I/O-kort	Digital I/O board	
17		489 947-244	Anslutningsdon, Combi-Con	Connector, CombiCon	7-pol
18		500 958-001	Insticksbrygga	Address key	7-pol
20		505 966-880	Seriemätkort, kompl.	Serial measurement board, compl.	SMB
20.1		505 966-001	Seriemätkort	Serial measurement board	
20.5		505 966-003	Batterienhet	Battery unit	
26		500 157-001	Skärmklämma	Clamp	6-16 mm
27		193 715-707	Modulhållare	Module bracket	
28		193 715-708	Modulhållare	Module bracket	
31		502 152-880	Plåt kompl.	Plate compl.	
41		504 150-880	Kabelstam, 2 akt.enhet	Cable harness, 2 act.unit	
42		502 505-880	Kabel	Cable	W221-223
44		502 341-881	Kabel	Cable	W217
45		502 511-880	Kabel	Cable	W230
46		502 517-880	Kabel	Cable	W231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S1
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SMB
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X1
X2
X3
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R11-12
W231
W230
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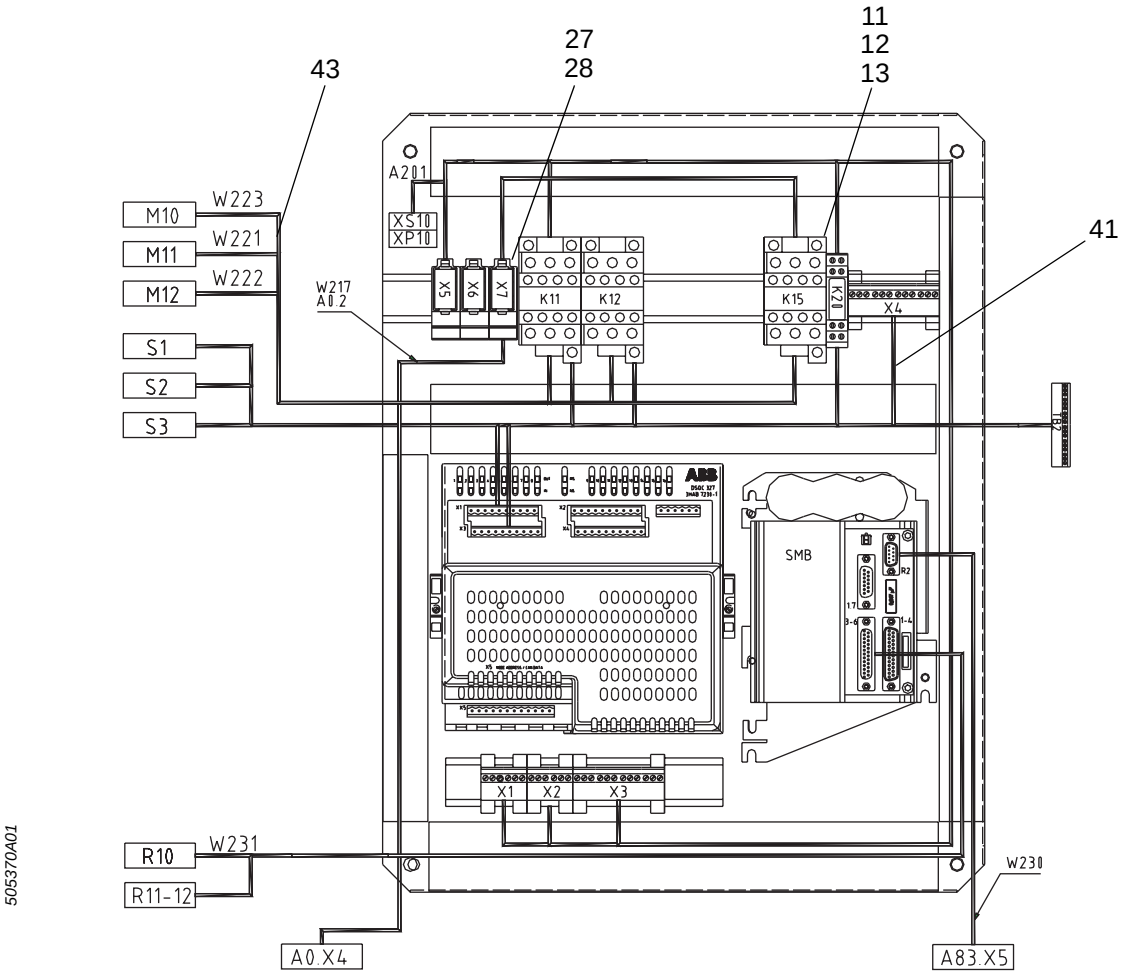
A0.X4
A83.X5
44
41
504080D01

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		505 370-880	**Kontaktormodul, stationsväxel**	**Contactor kit, inter-change**	
11		193 751-055	Kontaktor	Contactor	
12		193 861-002	Förstärkarblock	Amplifier block	
13		193 751-105	Hjälpkontaktblock	Auxiliary contact block	
27		193 715-707	Modulhållare	Module holder	12p
28		193 715-708	Modulhållare	Module holder	12p
41		505 367-880	Kabelstam	Cable harness	
43		502 505-880	Kabel	Cable	W221-223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XP10
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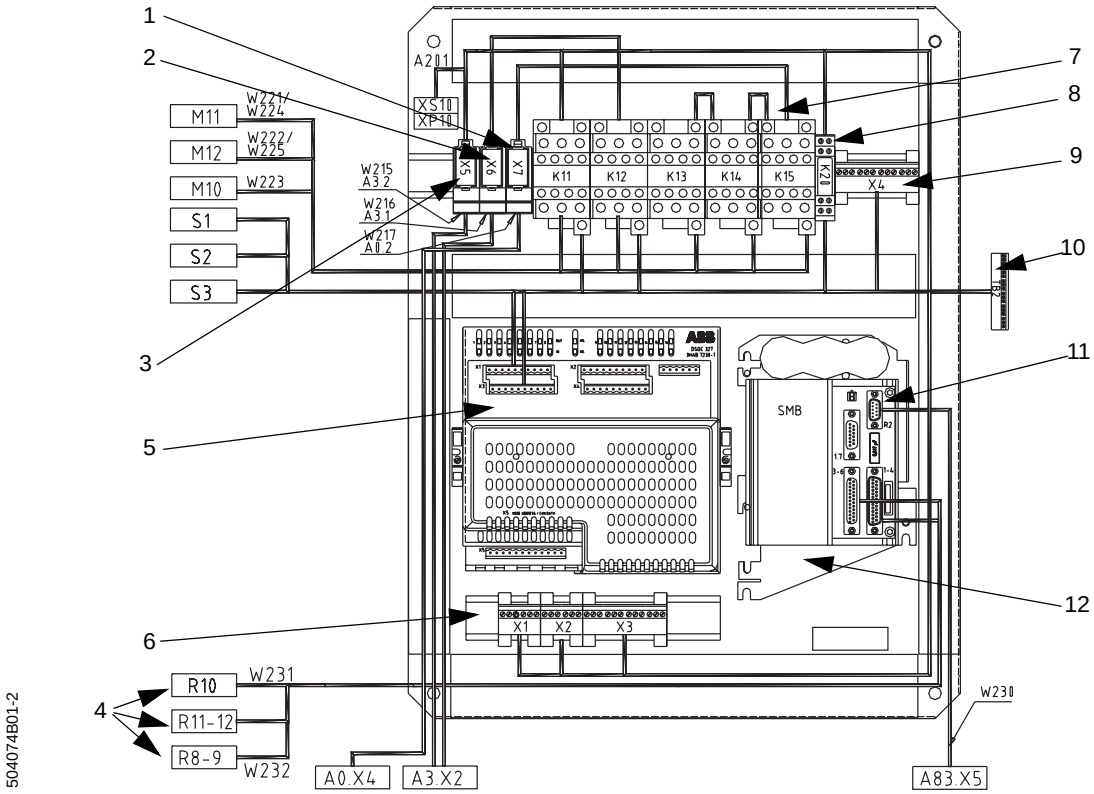
A0.2
S1
S2
S3
X5
X6
X7
K11
K12
K15
K21
X4
SMB
X1
X2
X3
R10
R11-12
W231
W230
A0.X4
A83.X5
505370A01

3.15 Positioner interface types IRBP B/D

Between the control system and the included positioner there is a modular based interface fitted to the left of the top cabinet's rear panel.



1 Connection X7 Motor Positioner

2 Connection X6 Motor Positioner

3 Connection X5 Motor Positioner

4 Resolver connection

5 Digital I/O card

6 Signal connection

7 Motor contactors

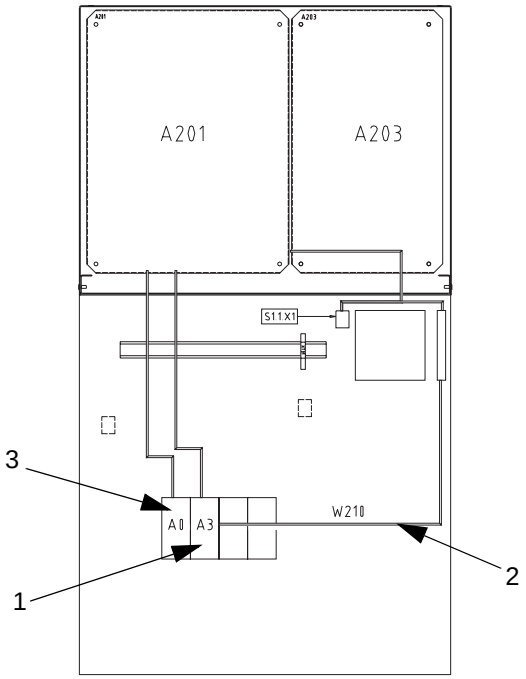
8 Brake relay

9 Connection X4

10 Connection TB2 safety signals

11 Communication cable (MS2) connection

12 Serial measurement board



504073a01-3

1 Drive unit G/U

2 Communication cable (DS2) connection

3 Rectifier with drive unit DC 4/U

Drive system

For this positioner the drive system consists of:

- Axis computer 2/connector card (DS2)
- Communications cable (DS2)
- Rectifier DC4
- Drive unit U (included in the rectifier module)
- Drive unit G/U
- Cables and connectors for connecting the motors

A thermal contact for temperature monitoring is fitted to the positioners' motors to provide protection against overheating. These signals are connected to the control system's PTC-loop.

Measurement system

For this positioner the measurement system consists of:

- Axis computer 2/connector card
- Communication cable (MS2)
- Serial measurement board
- Resolver connection cables

Axis selector

Contactors are used to activate one of the positioners' work stations, these are connected to the drive unit voltage to the motors in question.

The contactors are operated using a 24V DC amplifier block, which is controlled by a digital output from the control system. The control voltage for the contact coils is 230V AC.

As standard only one axis can be active at any one time.

Activating/deactivating

Activating/deactivating of the positioner's work stations can be performed from:

- the control program or
- by using the function key from the jogging menu on the programming unit.

The contactors for the mechanical unit in question are operated via a digital output on activation. An acknowledgement signal is obtained and a brake release relay with a digital output is then activated.

When deactivating, the motor is stopped before the contactor cuts the drive unit voltage.

Station indication

In order for the correct production program to be initiated the station changer unit is equipped with limit switches, that indicate which station is in the working mode for the robot. The switches set individual digital inputs in the control system. Respective inputs are set "high" when the station changer unit is at an end position.

Connecting the positioner

Motor and resolver signals for the positioner are separated into two outputs on the control cabinet, and the positioner is connected to these.

- The motors are connected to the output XS101 and
- the resolvers are connected to the output XS102.

Safety

Due to reasons of safety the station changer cannot be set in the operating mode "MAN FS". This interlock is integrated into the interface for operator communication and safety equipment.

Note! If, for some reason, this interface is omitted it is incumbent on the user to ensure this interlock is maintained.

Contactors and auxiliary contact blocks are of an approved redundant type in order to guarantee assured monitoring of the active motor axis. The operation of the contactors is monitored by the safety equipment.

3.16 Reservdelsförteckning/*Spare Parts List*

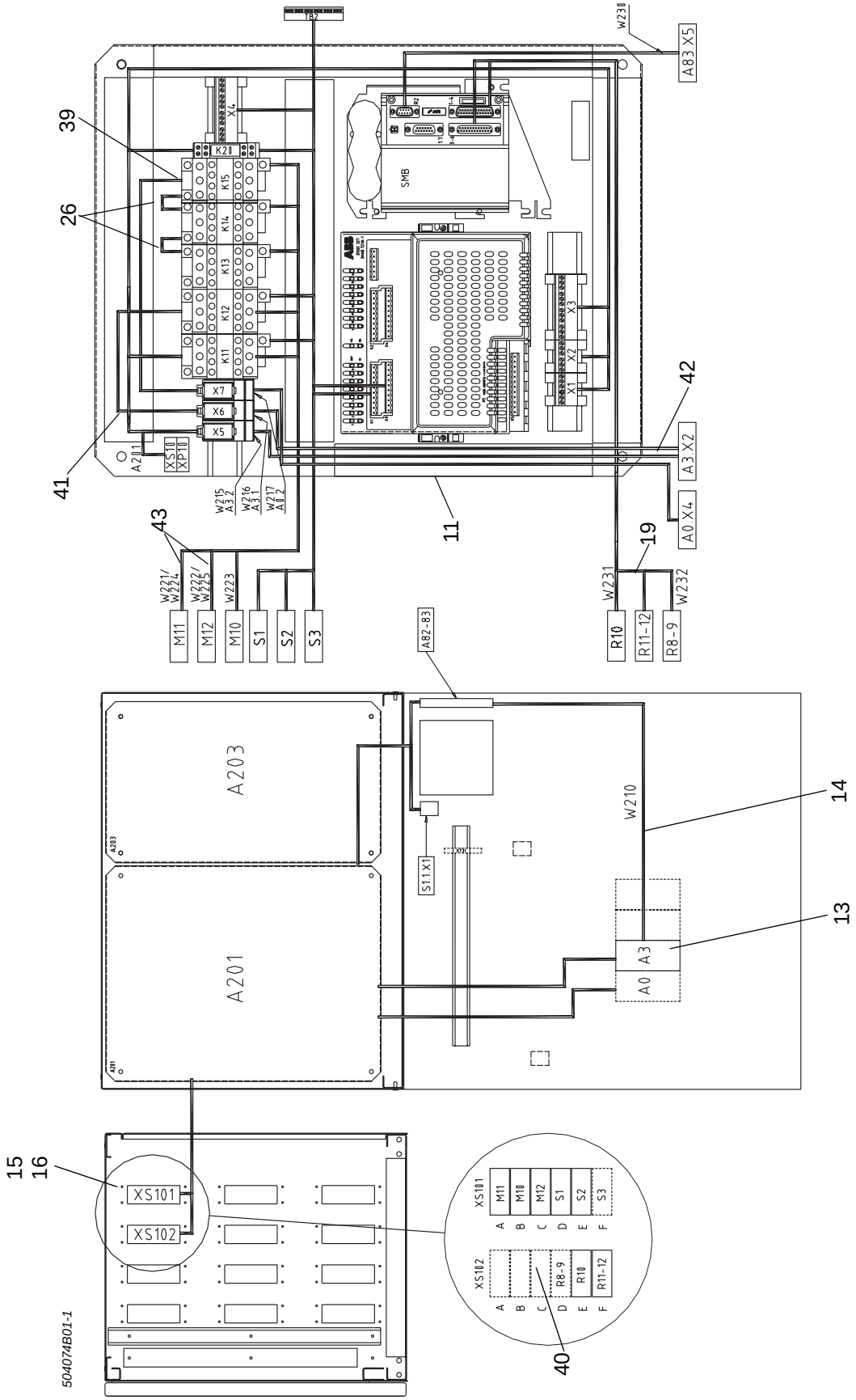
Reservdelar beställs genom ABB Automation Technology Products AB. Vid beställning var vänlig uppge typ och tillverkningsnummer samt benämningar och beställningsnummer enligt reservdelsförteckningen.

Rätt till ändring av specifikationer utan avisering förbehålles.

Spare parts are to be ordered from ABB Automation Technology Products AB. Kindly indicate type of unit, serial number, denominations and ordering number according to the spare parts list.

Rights to reserved to alter specifications without notice.

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		504 074-880	**Lägeställargränssnitt, IRBP B/D**	**Positioner InterFace, IRBP B/D**	**M2001**
11		504 080-880	Gem. detaljer, 2 aktiveringsenheter	Common details, 2 activation unit	
13		501 111-011	Drivdon	Drive unit	2-axes
14		502 344-001	Kabel DS (Drivsystem)	Kabel DS (Drive system)	
15		193 715-110	Sockel	Housing	64-pol
16		193 715-607	Ram	Frame	6-mod A-F
19		502 514-880	Kabel	Cable	W232
26		502 780-002	Trefas kontaktorbygel	Three phase contactor jumper	
39		505 370-880	Kontaktormodul, stationsväxel	Contactor kit, interchange	
40		193 715-709	Modulinsats	Module element	12-pol
41		504 156-880	Kabelstam, 2 kontaktorer	Cable harness, 2 contactors	
42		502 338-880	Kabel	Cable	W215-216
43		502 505-881	Kabel	Cable	W224-225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A3 X2
A0 X4
W230
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W232
W210
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M12
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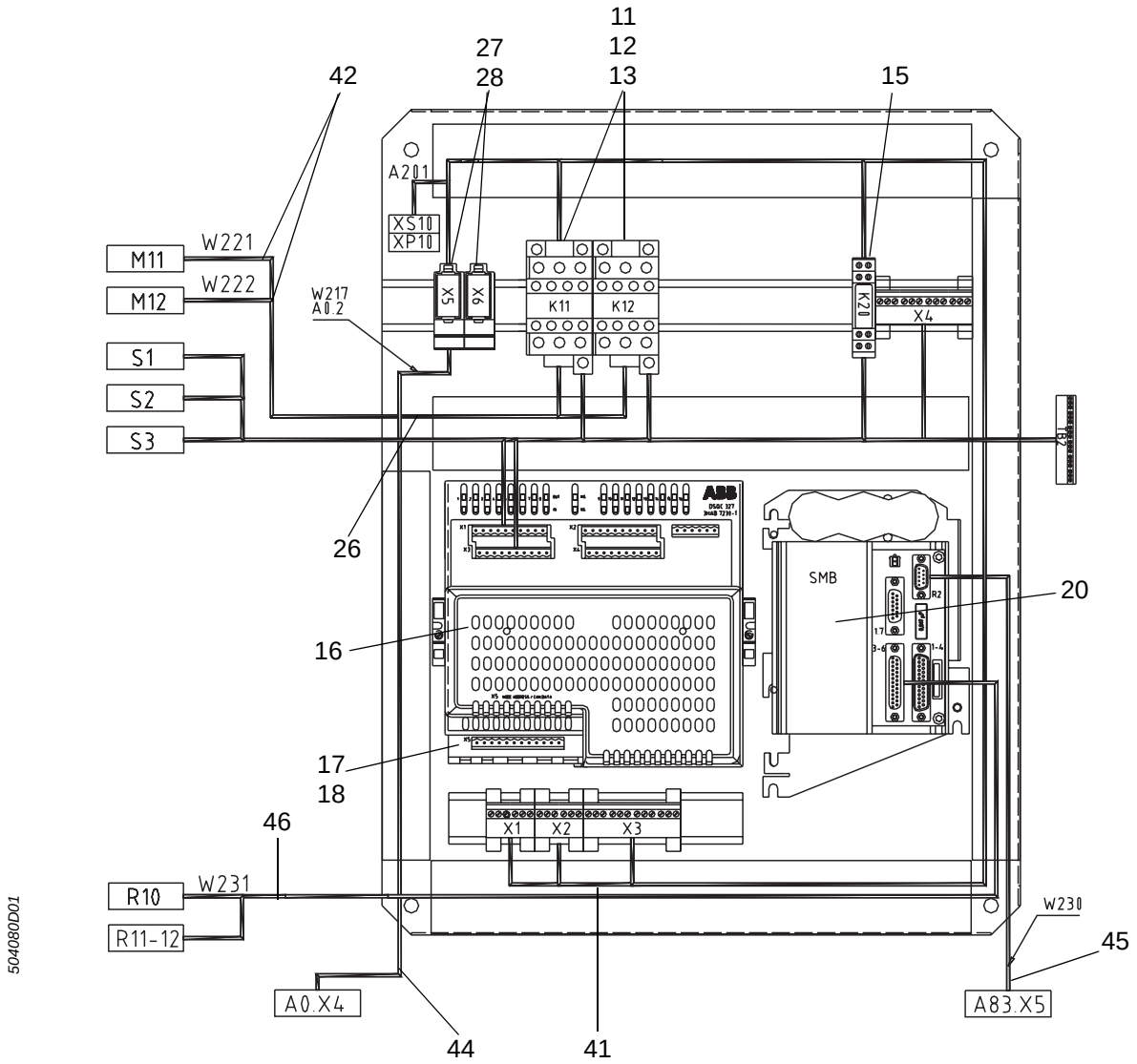
S1
S2
S3
R10
R11-12
R8-9
A82-83
A203
A201
S1.1 X1
A3
A0
XS101
XS102
504074B01-1

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		504 080-880	**Gem. detaljer, 2 aktiveringsenheter**	**Common parts, 2 activation unit**	**M2001**
11		193 751-055	Kontaktor	Contactor	
12		193 861-002	Förstärkarblock	Amplifier block	
13		193 751-105	Hjälpkontaktblock	Auxilliary contact block	
15		500 861-881	Säkerh. relä kompl. 2 växl	Safety relay compl. 2 change over contact	
16		501 112-001	Digitalt I/O-kort	Digital I/O board	
17		489 947-244	Anslutningsdon, Combi-Con	Connector, CombiCon	7-pol
18		500 958-001	Insticksbrygga	Address key	7-pol
20		505 966-880	Seriemätkort, kompl.	Serial measurement board, compl.	SMB
20.1		505 966-001	Seriemätkort	Serial measurement board	
20.5		505 966-003	Batterienhet	Battery unit	
26		500 157-001	Skärmklämma	Clamp	6-16 mm
27		193 715-707	Modulhållare	Module bracket	
28		193 715-708	Modulhållare	Module bracket	
31		502 152-880	Plåt kompl.	Plate compl.	
41		504 150-880	Kabelstam, 2 akt.enhet	Cable harness, 2 act.unit	
42		502 505-880	Kabel	Cable	W221-223
44		502 341-881	Kabel	Cable	W217
45		502 511-880	Kabel	Cable	W230
46		502 517-880	Kabel	Cable	W231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K11
K12
K27
X4
S1
S2
S3
X81
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SMB
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16
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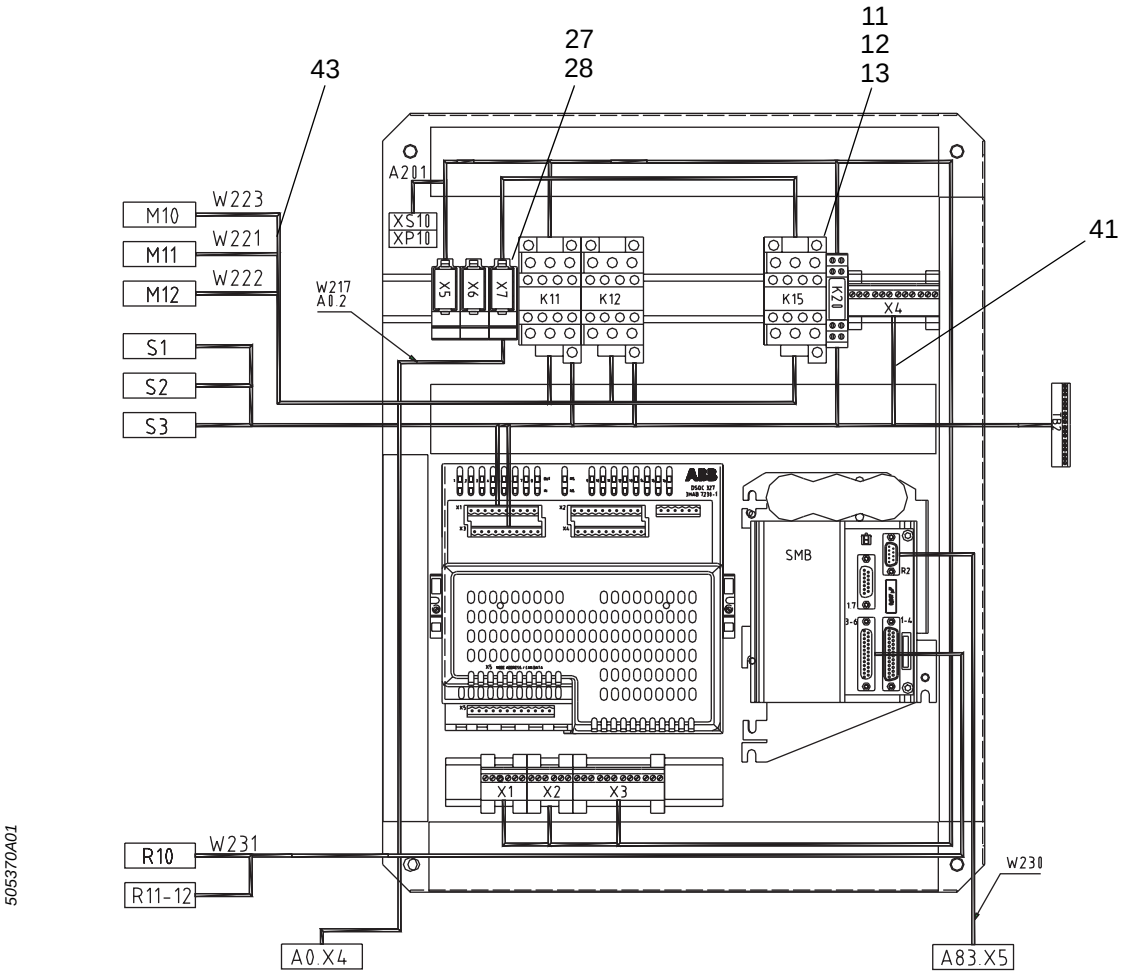
18
X1
X2
X3
46
R10
W231
R11-12
W230
45
A0.X4
A83.X5
44
41
504080D01

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		505 370-880	**Kontaktormodul, stationsväxel**	**Contactor kit, inter-change**	
11		193 751-055	Kontaktor	Contactor	
12		193 861-002	Förstärkarblock	Amplifier block	
13		193 751-105	Hjälpkontaktblock	Auxiliary contact block	
27		193 715-707	Modulhållare	Module holder	12p
28		193 715-708	Modulhållare	Module holder	12p
41		505 367-880	Kabelstam	Cable harness	
43		502 505-880	Kabel	Cable	W221-223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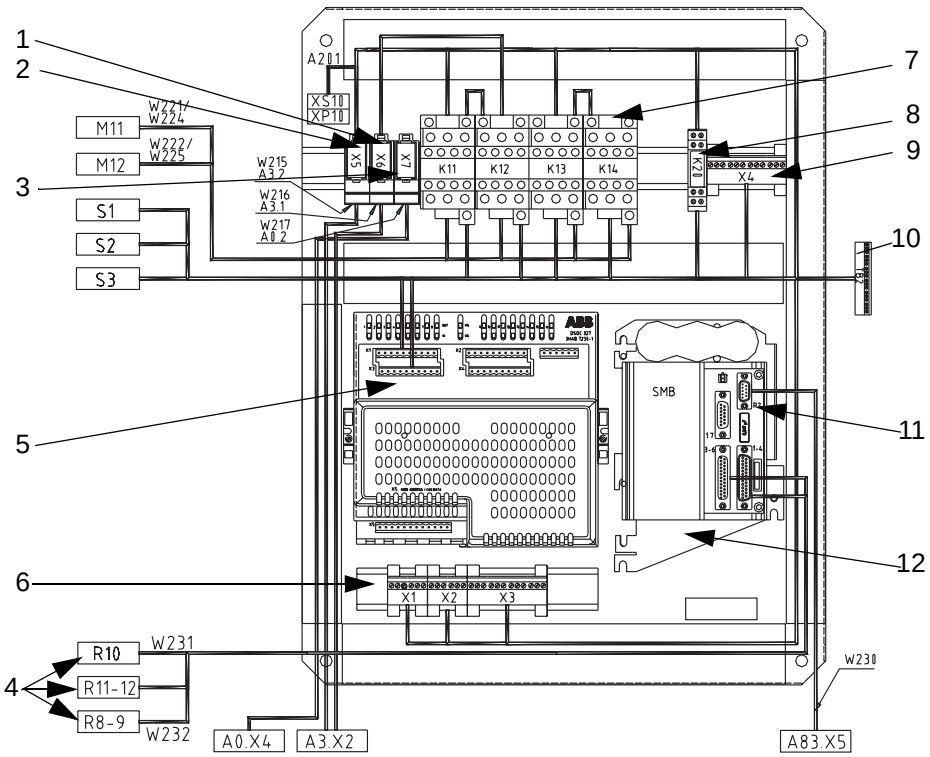
XS10
XP10
X5
X6
X7
K11
K12
K15
K22
X4
M10
M11
M12
W223
W221
W222
W217
A0.2
S1
S2
S3
SMB
X1
X2
X3
R10
R11-12
W231
W230
A0.X4
A83.X5
505370A01

3.17 Positioner interface types IRBP A

Between the control system and the included positioner there is a modular based interface fitted to the left of the top cabinet's rear panel.



504075D01-2

1 Connection X6 Motor Manipulator

2 Connection X5 Motor Manipulator (arm)

3 Connection X7 (not used)

4 Resolver connections

5 Digital I/O card

6 Signal connection

7 Motor contactors

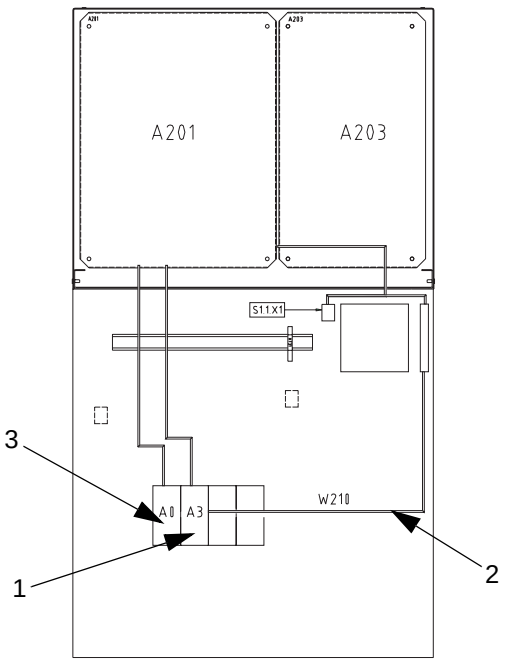
8 Brake relay

9 Adapter X4

10 Connection TB2 safety signals

11 Communication cable (MS2) connection

12 Serial measurement board



504075a01-3

1 Drive unit G/U

2 Communication cable (DS2) connection

3 Rectifier with drive unit DC 4/U

Drive system

For this positioner the drive system consists of:

- Axis computer 2/connector card (DS2)
- Communications cable (DS2)
- Rectifier DC4
- Drive unit U (included in the rectifier module)
- Drive unit G/U
- Cables and connectors for connecting the motors

A thermal contact for temperature monitoring is fitted to the manipulator's motor to provide protection against overheating. This signal is connected to the control system's PTC-loop.

Measurement system

For these positioners the measurement system consists of:

- Axis computer 2/connector card (MS2)
- Communication cable (MS2)
- Serial measurement board
- Cables for connecting resolvers

Axis selector

Two contactors that connect the drive unit voltage to the motors are used to activate respective manipulators' axes. Each contactor is operated using a 24V DC amplifier block, which is controlled by a digital output from the control system. The control voltage for the contact coil is 230V AC.

Activating/deactivating

Activating/deactivating of the positioner's respective axes can be performed from

- the control program or
- by using the function key from the jogging menu on the programming unit.

The contactors for the axes in question are operated via a digital output on activation. After the ready signal on the acknowledgement input, the brake release relay is activated by a digital output.

When deactivating, the motors are stopped before the contactors cut the drive unit voltage.

Connecting the manipulator

The motor and resolver signals for respective manipulators' motors are gathered in a common output on the control cabinet and the manipulator is connected to this output.

- Positioner for station 1 is connected to the output XS101 and
- positioner for station 2 is connected to the output XS102.

Safety

Contactors and auxiliary contact blocks are of an approved redundant type in order to guarantee assured monitoring of the active motor axes. The function of the contactors is supervised by the safety equipment.

Working area demarcation

A working area demarcation of the positioner's arm is made in software. This is done to protect the cable harness to external motor from accumulated torsional stress.

3.18 Reservdelsförteckning/*Spare Parts List*

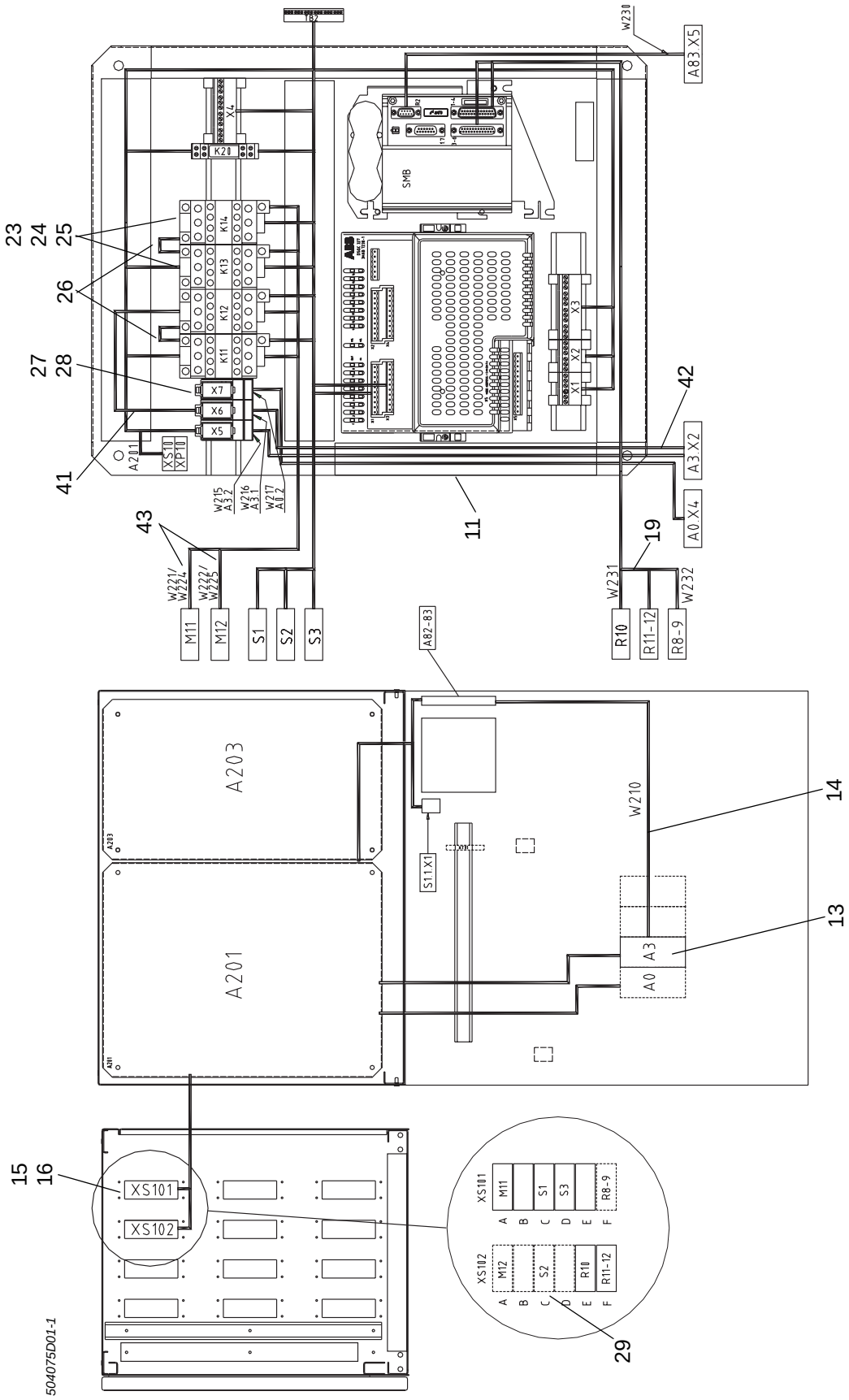
Reservdelar beställs genom ABB Automation Technology Products AB. Vid beställning var vänlig uppge typ och tillverkningsnummer samt benämningar och beställningsnummer enligt reservdelsförteckningen.

Rätt till ändring av specifikationer utan avisering förbehålles.

Spare parts are to be ordered from ABB Automation Technology Products AB. Kindly indicate type of unit, serial number, denominations and ordering number according to the spare parts list.

Rights to reserved to alter specifications without notice.

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		504 075-880	**Lägeställargränssnitt, IRBP A**	**Positioner InterFace, IRBP A**	**M2001**
11		504 080-880	Gem. detaljer, 2 aktiveringsenheter	Common parts, 2 activation unit	
13		501 111-011	Drivdon	Drive unit	2-axes
14		502 344-001	Kabel DS	Cable DS	Drive system
15		193 715-110	Sockel	Housing	64-pol
16		193 715-607	Ram	Frame	6-mod A-F
19		502 514-880	Kabel	Cable	W232
23		193 751-055	Kontaktor	Contactor	
24		193 861-002	Förstärkarblock	Amplifier block	
25		193 751-105	Hjälpkontaktblock	Auxilliary contact block	
26		502 780-002	Trefas kontaktorbygel	Three phase jumper	
27		193 715-707	Modulhållare	Module bracket	
28		193 715-708	Modulhållare	Module bracket	
29		504 739-880	Byglingsdon	Jumper	
39		505 371-880	Anslutningsdon, CombiCon	Conntector, CombiCon	12-pol.
41		504 156-880	Kabelstam + 2 kontaktorer	Cable harness + 2 contactors	
42		502 338-880	Kabel	Cable	W215-216
43		502 505 881	Kabel	Cable t	W224-225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A3 X2
A0 X4
W231
W232
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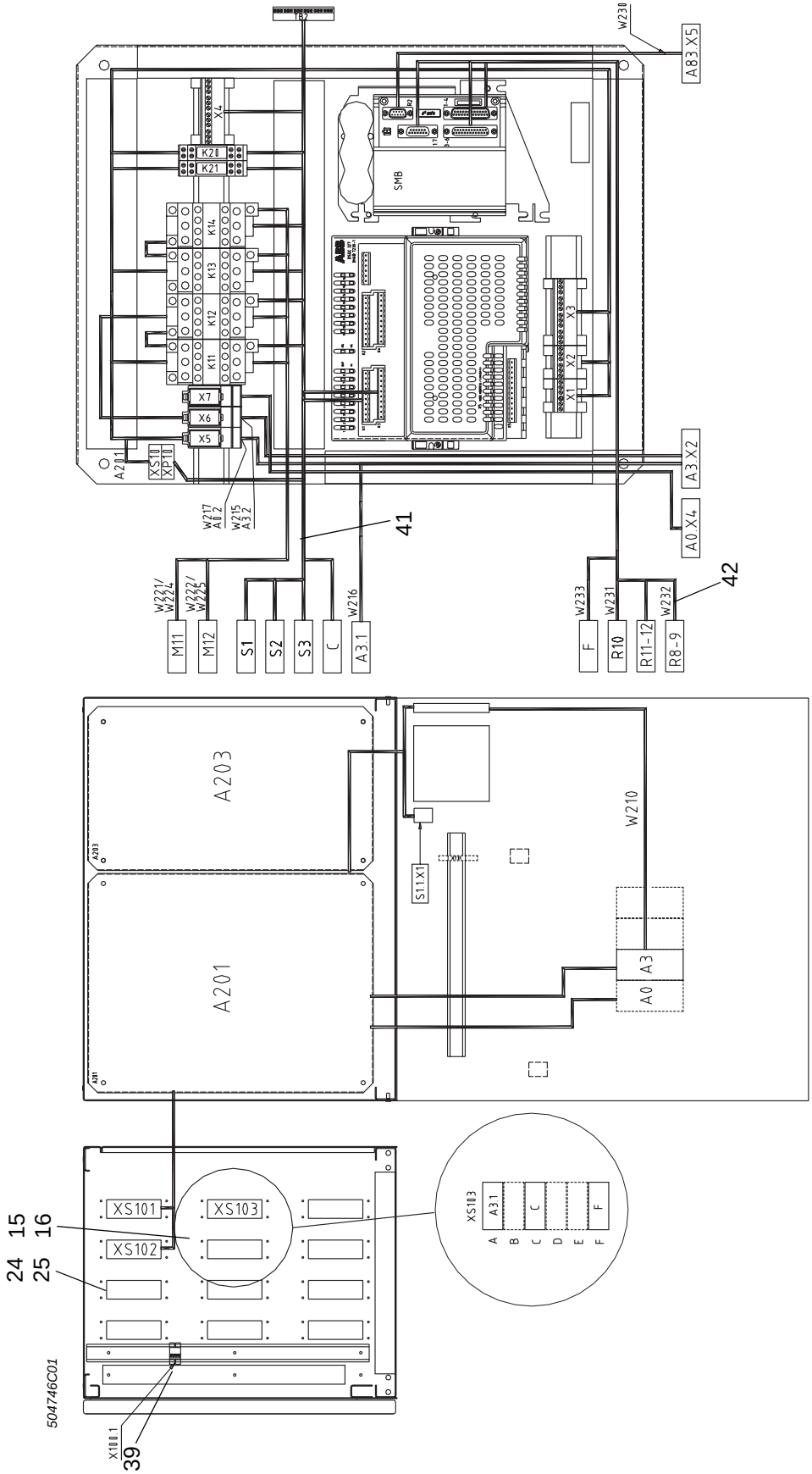
Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
			OPTION	**OPTION**	
		504 746-880	**Åkbana RTT, 1400/2400 + A**	**Travel track RTT, 1400/ 2400 + A**	**M2001**
15		193 715-110	Sockel	Housing	64-pol
16		193 715-607	Ram	Frame	6-mod A-F
24		193 715-152	Kåpa	Hood	
25		193 715-151	Delad kåpa	Shared hood	
39		489 947-443	Anslutningsdon, Combi-Con	Connector, CombiCon	4-pol
41		504 159-880	Kabelstam	Cable harness	
42		502 508-880	Kabel	Cable	W233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XS10
XP10
W230
A83:X5
A3:X2
A0:X4
W217
A0:2
W215
A3:2
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42
W221/
W224
W222/
W225
W216
M11
M12
S1
S2
S3
C
A3:1
W233
W231
W232
F
R10
R11-12
R8-9
W210
S11:X1
A3
A0
XS101
XS102
XS103
XS103
A3:1
A
B
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X100:1
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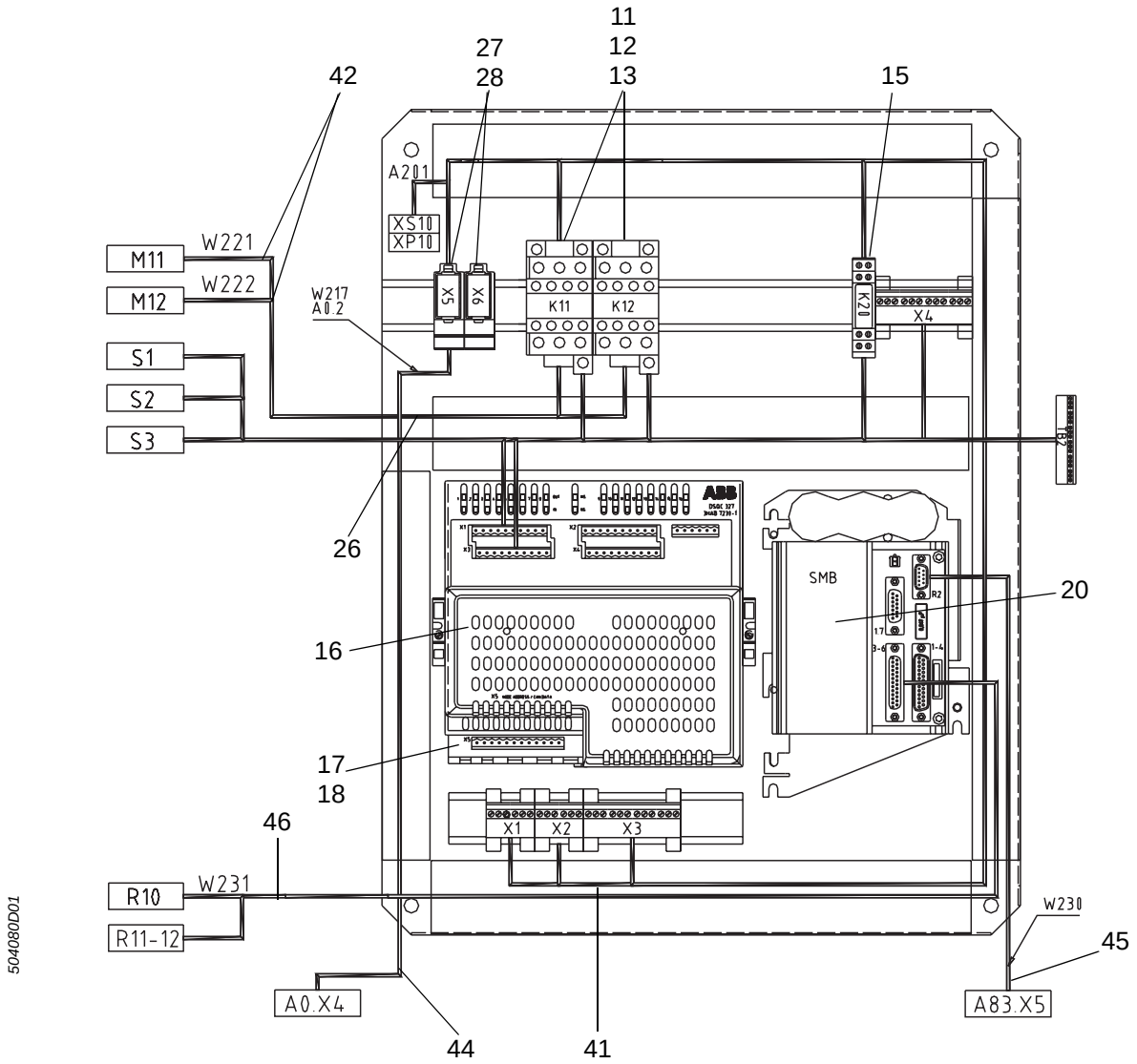
Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		504 080-880	**Gem. detaljer, 2 aktiveringsenheter**	**Common parts, 2 activation unit**	**M2001**
11		193 751-055	Kontaktor	Contactor	
12		193 861-002	Förstärkarblock	Amplifier block	
13		193 751-105	Hjälpkontaktblock	Auxilliary contact block	
15		500 861-881	Säkerh. relä kompl. 2 växl	Safety relay compl. 2 change over contact	
16		501 112-001	Digitalt I/O-kort	Digital I/O board	
17		489 947-244	Anslutningsdon, Combi-Con	Connector, CombiCon	7-pol
18		500 958-001	Insticksbrygga	Address key	7-pol
20		505 966-880	Seriemätkort, kompl.	Serial measurement board, compl.	SMB
20.1		505 966-001	Seriemätkort	Serial measurement board	
20.5		505 966-003	Batterienhet	Battery unit	
26		500 157-001	Skärmklämma	Clamp	6-16 mm
27		193 715-707	Modulhållare	Module bracket	
28		193 715-708	Modulhållare	Module bracket	
31		502 152-880	Plåt kompl.	Plate compl.	
41		504 150-880	Kabelstam, 2 akt.enhet	Cable harness, 2 act.unit	
42		502 505-880	Kabel	Cable	W221-223
44		502 341-881	Kabel	Cable	W217
45		502 511-880	Kabel	Cable	W230
46		502 517-880	Kabel	Cable	W231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R10
R11-12
W231
W230
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A0.X4
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504080D01

4 Interface for process equipment

4.1 General

Software

Connection of process equipment for arc welding requires a control cabinet ordered with one of the software options 551/552, ARCWARE/ARCWAREplus.

Welding equipment

For robots IRB140/1400/2400 there is fully prepared welding equipment available adapted for connection to the system:

Some welding equipment with the wire-feed unit mounted on the robot’s upper arm utilise the internal cable harness in the robot for connection of signals. In these cases the robot must be ordered with option 042 "Integrated wire-feed unit cables".

Accessories

The system is prepared for the easy connection of different accessories to the process equipment such as:

- Mechanical gun cleaner
- Calibration equipment
- Joint location equipment
- Joint tracking equipment

4.2 System design

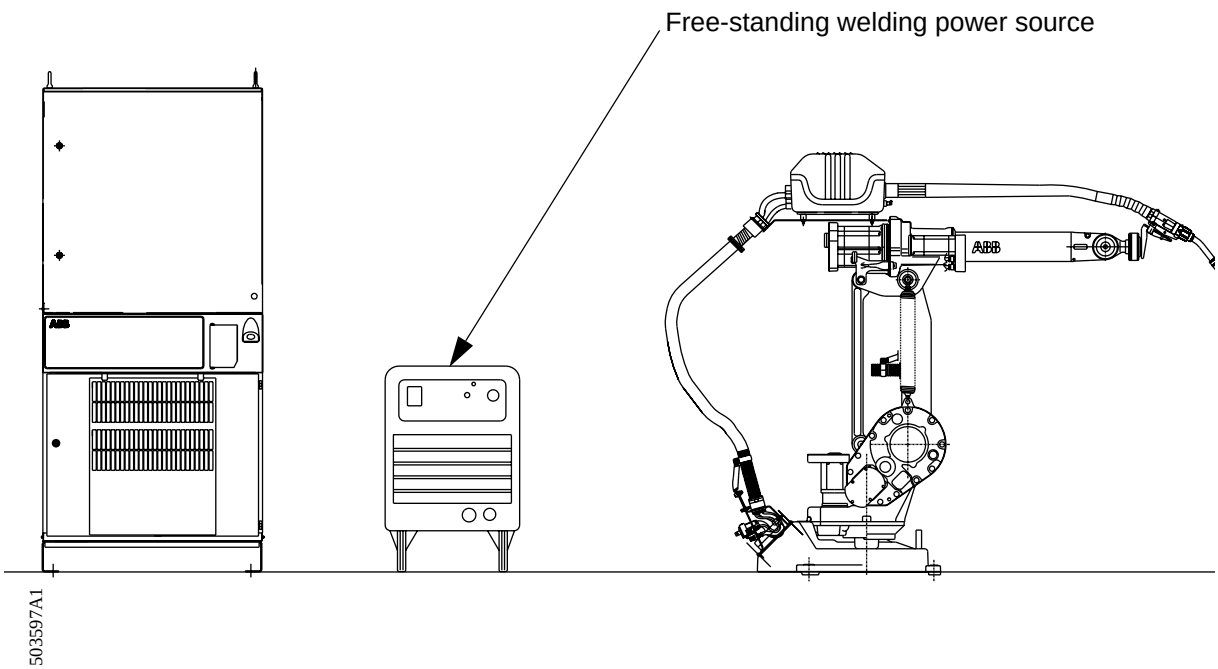
4.2.1 Free-standing welding power source

There is a process control card for communication with the robot's control system for control and supervision of the welding power source, wire-feed system and connected accessories. This is mounted on a module together with other components for control of the process equipment in the control cabinet.

A process control card with integrated motor regulator is used for welding equipment from the standard range.

Communication between the process control card and the control system takes place via a CAN-bus.

This system also makes it possible to control some welding power sources from other OEM-brands.



Connection of an OEM power source requires you to be fully conversant with the

- operation of the power source,
- how signal transfer should be handled and
- how configuration

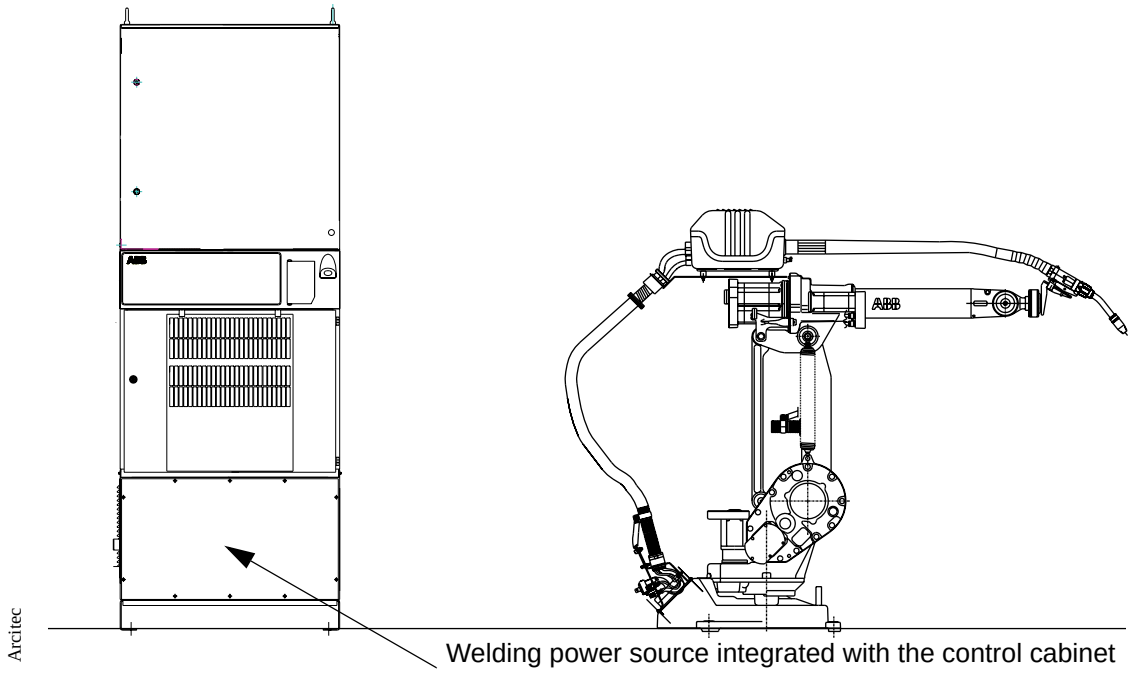
of the power source in question should be carried out in the control system.

4.2.2 Welding power source integrated with the control cabinet

Communication with the control system takes place directly via the CAN-bus for this type of welding power source.

The welding power source is available in two designs, integrated with the control cabinet or free-standing.

A process control card is used for communication with the robot's control system for control and supervision of the wire-feed system and connected accessories.



4.3 Connection

The cable harness to external equipment is connected to the output on the left-hand side of the top cabinet or to jackable terminals mounted internally by the two-piece cable gland.

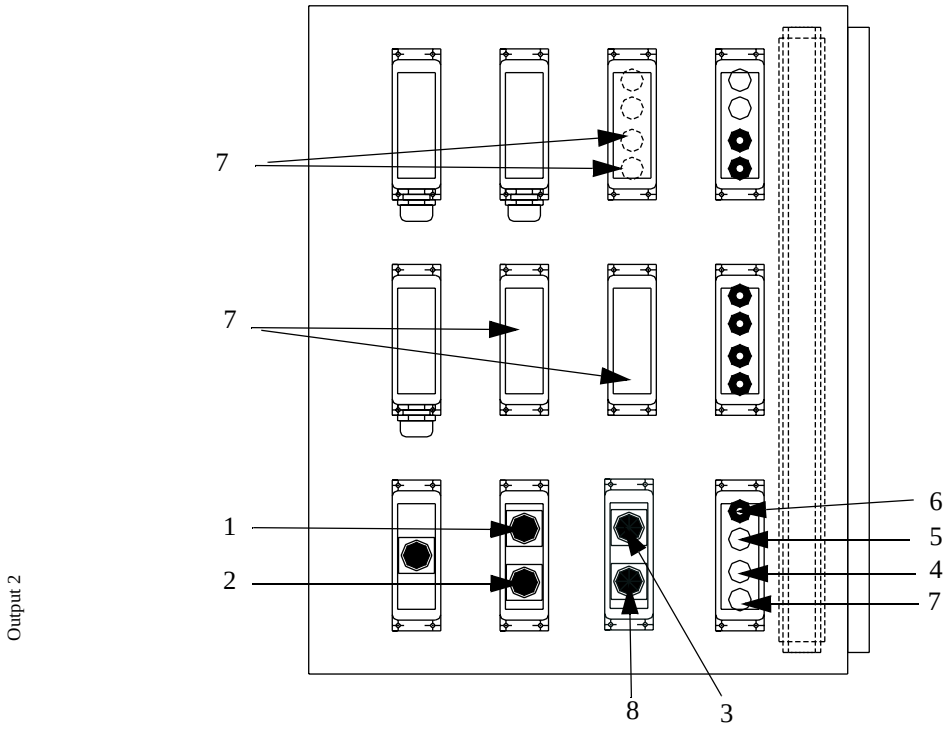


Figure 17 Connection

1 Wire feed unit motor

2 Wire feed unit - signal

3 Power source

4 Wire feed unit ALU 40 kg

5 TCP tool / Cooling unit

6 Mechanical cleaner

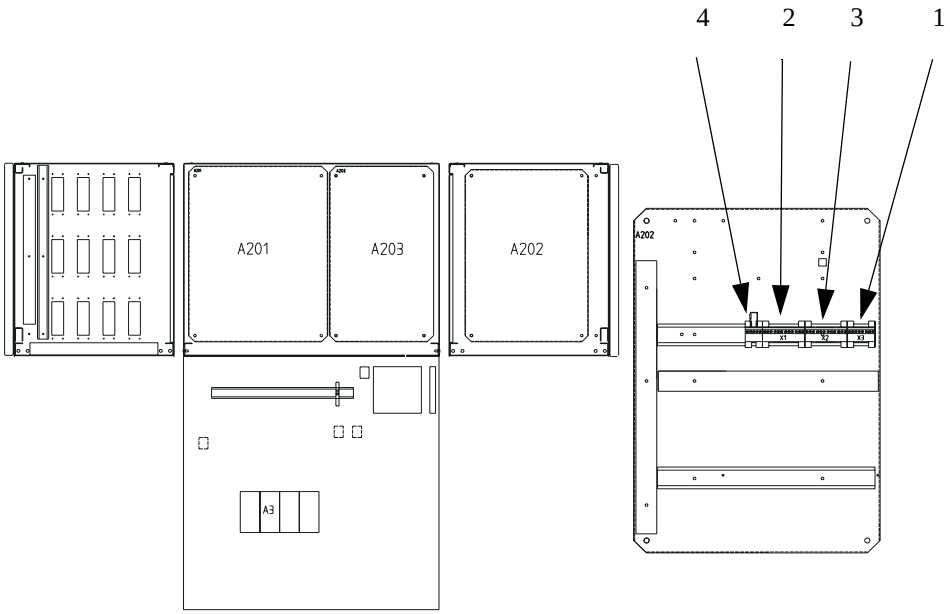
7 Spare / Power source LRC

8 Wire feed unit ALU 40 kg

4.4 No process equipment - Jumper device NO AW

The welding equipment's interface is replaced by an assembly plate on installations without welding equipment . All requisite jumper settings, etc for internal cabling included in the top cabinet are fitted on this.

The assembly plate is fitted on the right-hand side, inside the top cabinet and can be used as spare space for other customer specific equipment.



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1 Power supply. A202-X3

2 Jumper device emergency stop. A202-X3

3 Jumper device run chain. A202-X3

4 Termination CAN bus. A202-X3

Power supply

The following voltages are available on the jackable terminal A202-X3:

- 24V DC (24V I/O)
- 115V AC
- 230V AC

4.4.1 Control

Interlocks

The following run chain signals are available on the jackable terminal A202-X2:

- Auto stop
- General stop
- External motors on
- External motors on contactor control

The following emergency stop signals are available on the jackable terminal A202-X1:

- External push button
- Emergency stop out
- External limit switches

CAN-bus

The terminated CAN bus channel A202-TB2 can be used, e.g. for the connection of extra I/O cards.

4.5 Spare Parts List

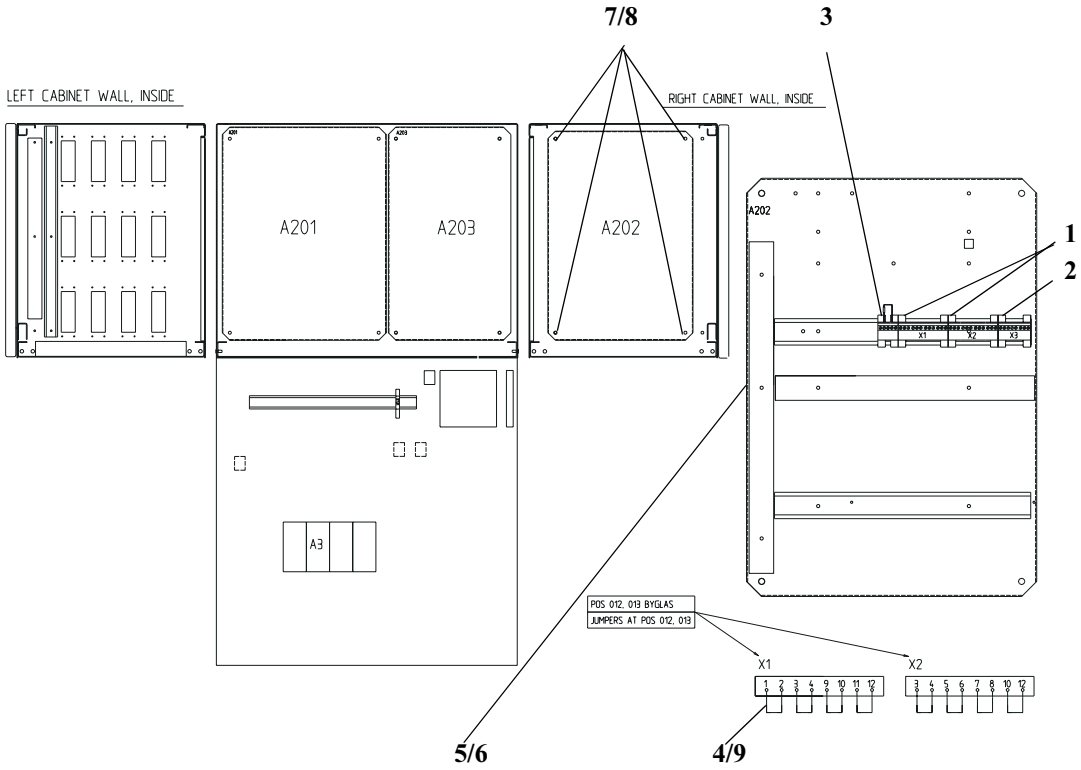
Reservdelar beställs genom ABB Automation Technology Products AB. Vid beställning var vänlig uppge typ och tillverkningsnummer samt benämningar och beställningsnummer enligt reservdelsförteckningen.

Rätt till ändring av specifikationer utan avisering förbehålles.

Spare parts are to be ordered from ABB Automation Technology Products AB. Kindly indicate type of unit, serial number, denominations and ordering number according to the spare parts list.

Rights to reserved to alter specifications without notice.

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		503 270-880	**Processutrustning, NO PROC IF**	**Process device, NO PROC IF**	
1		489 947-451	Anslutningsdon, Combi-Con	Connector, CombiCon	12 pol
2		489 947-447	Anslutningsdon, Combi-Con	Connector, CombiCon	8 pol
3		502 796-881	CANBUS-terminering hona	CAN-bus termination female	
4		193 817-003	Ändhylsa	End sleeve	1.0
5		418 883-006	Kabelkanal	Cable trunking	
6		489 327-025	Skruv	Screw	M5X8
7		2126 011-09	Mutter	Nut	M8
8		2195 013-11	Bricka	Washer	
9		502 940-087	Enledarkabel	Single core	


7/8
3
LEFT CABINET WALL, INSIDE
RIGHT CABINET WALL, INSIDE
A201
A203
A202
A3
1
2
POS 012, 013 BYGLAS
JUMPERS AT POS 012, 013
X1
X2
1 2 3 4 9 10 11 12
3 4 5 6 7 8 10 12
5/6
4/9

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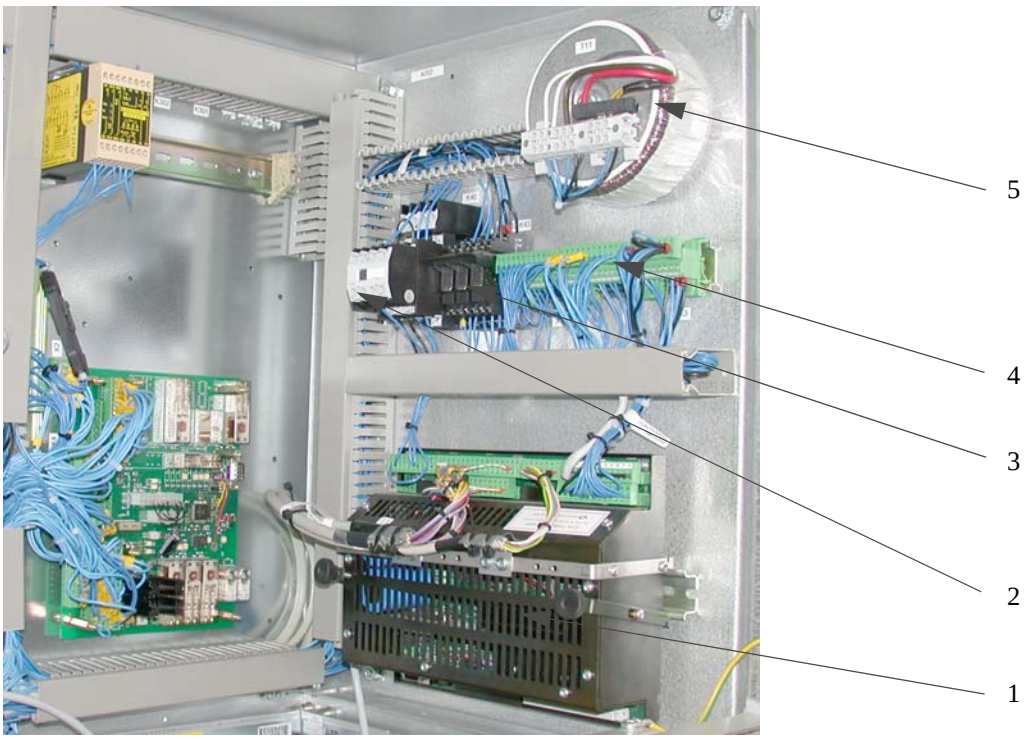
4.6 Power source LAW/RPA/OEM

There is a modular based interface between the control system and component welding equipment fitted on the right-hand side, inside the top cabinet.



1 PIB

2 Main contactor

3 Interlock relays

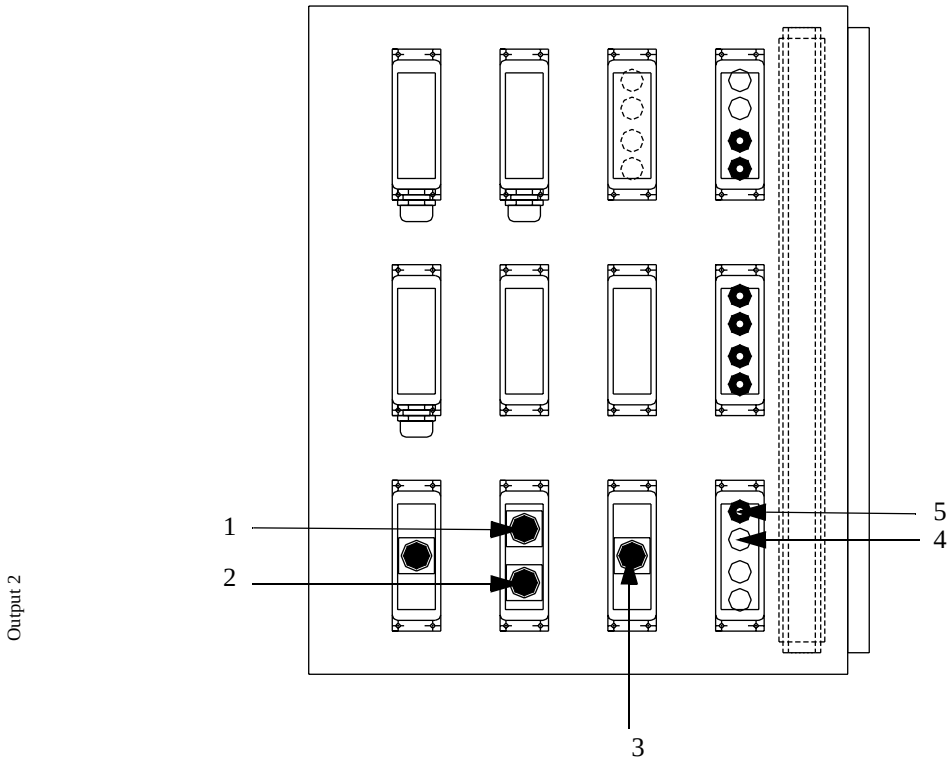
4 Signal connection

5 Transformer

The interface is fitted with internal wiring for connection to the robot control system.

External connection

The cable harness to external equipment is connected to the output on the left-hand side of the top cabinet or to jackable terminals mounted internally by the two-piece cable gland.



1 Wire feed unit motor

2 Wire feed unit - signal

3 Power source

4 TCP tool

5 Mechanical cleaner

Power supply

The voltage supply consists of a ring core transformer with double secondary windings 230/42(28)/28V AC (see technical specification for PIB).

This feeds the motor regulator part on the process control card with 42V AC and the rectifier part on the process control card with 28V AC.

4.6.1 OPERATION and CONNECTIONS

Emergency stop

Cabinet_S4Cplus_12

1 Motors on

2 Emergency stop

3 Operating mode selector

4 Running time meter

All emergency stop buttons included in the system are as standard connected in series and directly affect the control system’s emergency stop loop.

There is a possibility of connecting this in series with the other push buttons in the system if the process equipment is fitted with emergency stop push button.

The equipment is normally interlocked via the emergency stop relay on the control system’s panel card A81.

The "Extended emergency stop function" option gives the possibility of supplementing the equipment with components. Optional redundant auxiliary relays can then be easily connected for this purpose.

Figure 18 and Figure 19 below show the theory behind how the emergency stop loop is used to control connected equipment.

For detailed information about the design of the emergency stop loop refer to the ***"The robot's User's Manual"***

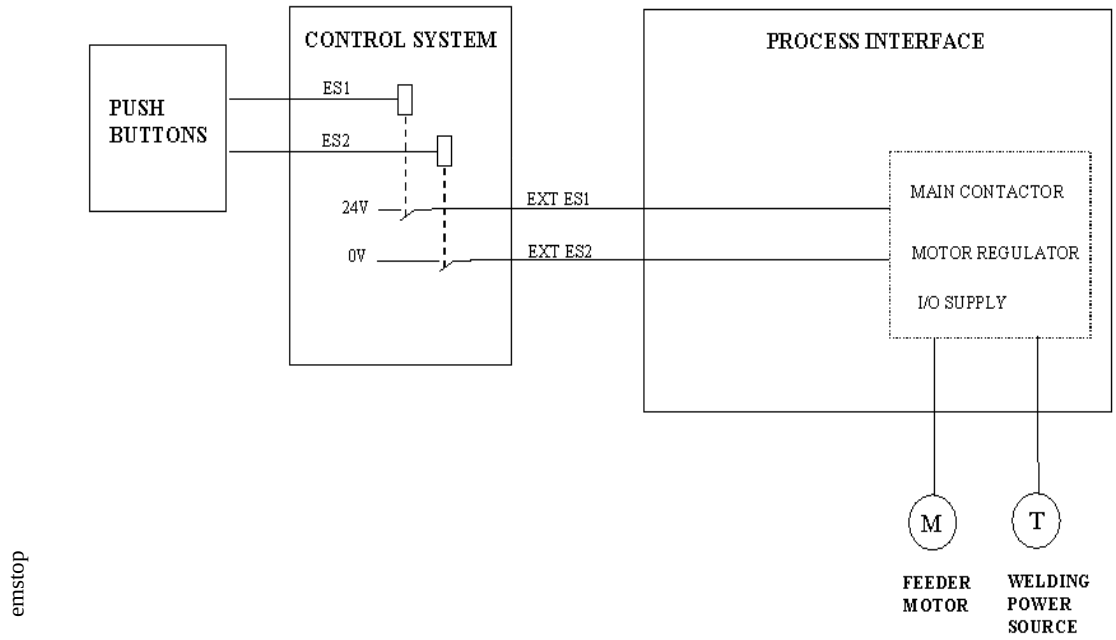


Figure 18 Emergency stop loop

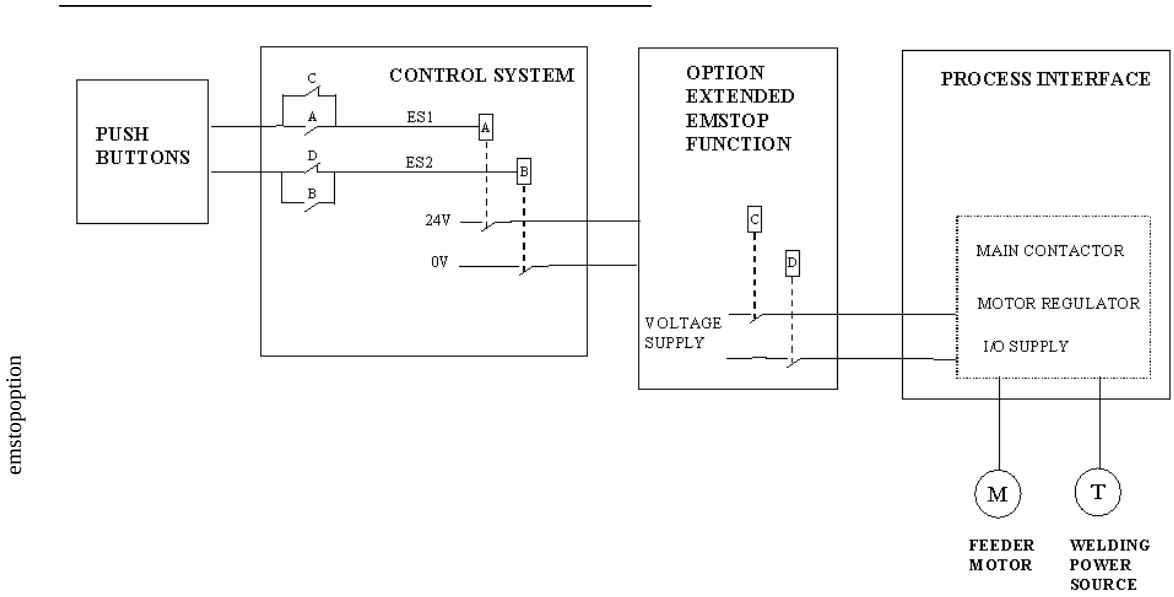


Figure 19 Emergency stop loop with the addition "Extended emergency stop function"

4.6.2 Interlocks

Operating stop loop

Figure 20 below shows the theory behind how the operating stop loop is used to control connected equipment.

For detailed information about the design of the operating stop loop refer to the ***"The robot's User's Manual"***

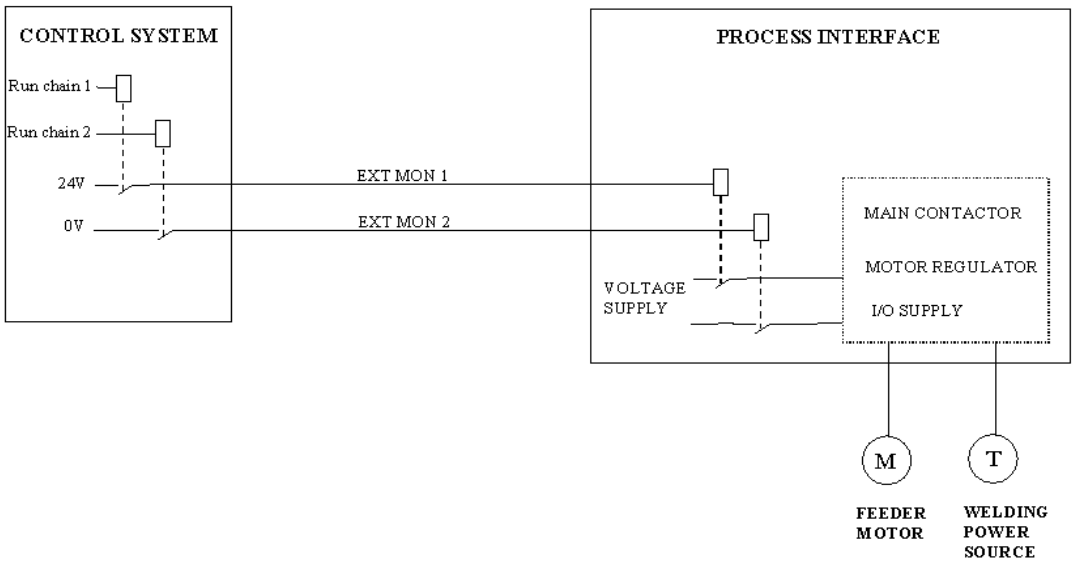


Figure 20 Operating stop loop

Two channel break up of the operating stop loop on the process control card.

In order to run the wire feed motor and welding equipment in all operating modes requires:

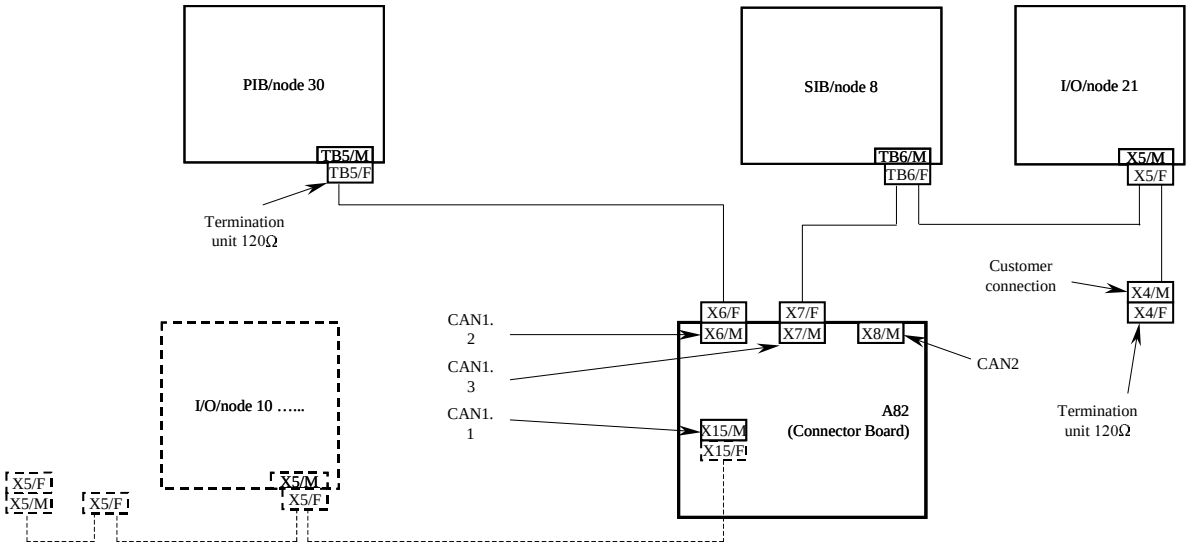
- all safety loops to be intact and
- that the system has been started (MOTORS_ON).

In order to run the wire feed motor at a limited speed requires:

- the emergency stop loop to be intact
- operating mode "MAN" and the system set to "MOTORS OFF"

CAN bus

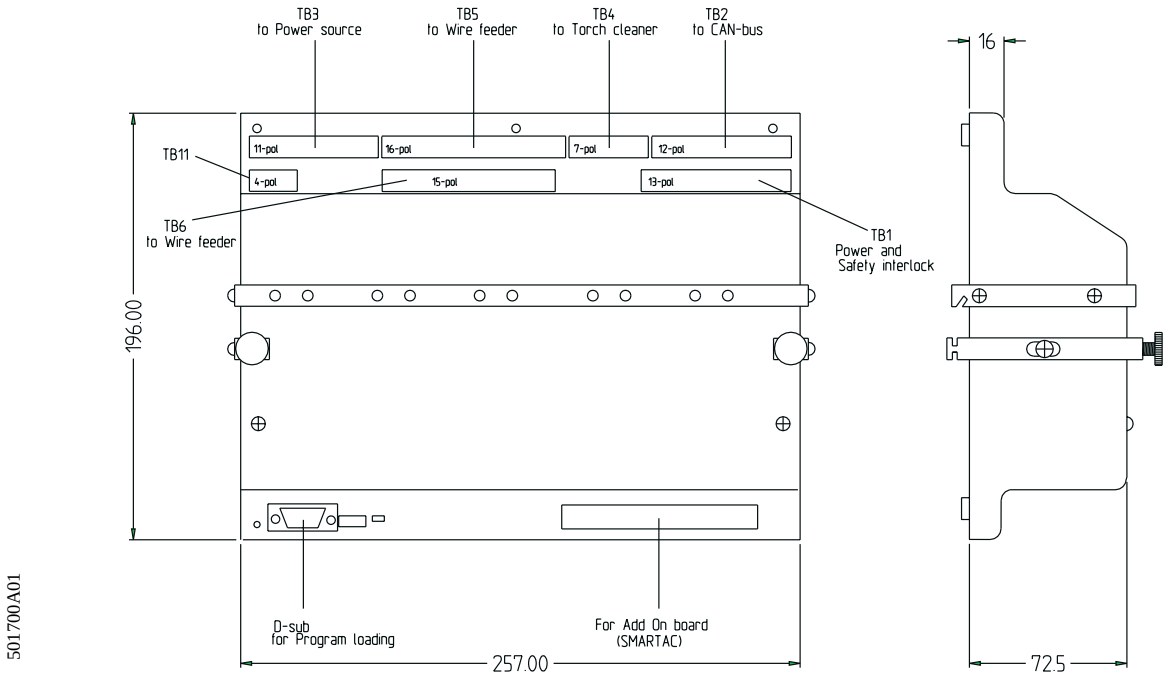
CAN-bus Connection LAW/RPA



- Connection of the process control card is made to the control system's CAN-bus channel CAN1.2, output X6 on the contact card A82.
- The connection cable should be fitted with a termination resistance, 120Ω

Process control card

The control card houses the hardware and software for control and regulation of the arc welding equipment.



- See the Product Manual for the welding equipment/S4Cplus.

4.6.3 Connections for external equipment

Welding power source

1 Welding power sources type LAW/RPA are connected to output XS107.

- A detailed account of available signals is given in the separate manual for the process control card in the section “Process equipment” chapter PIB.

2 Power sources from other manufacturer's can be connected to this output under the condition that they comply with the specifications described in the manual "Welding equipment" in the section "Process equipment" chapter PIB.

3 If another type/configuration of the output is required, the cable W240 can be replaced by another internal cable.

4 If the welding power supply is fitted with an emergency stop it can be connected to the jackable terminal A202-X1.

- See the separate manual in the section “Power Source” for a description of included welding power sources.

Feed mechanism system

Feed mechanism system types A140E, A314E resp. A324E-L are connected to outputs XS105 and XS106.

- See the separate manual in the section “Process equipment” chapter PIB for a description of included feed mechanism systems.

Other accessories

1 The equipment is prepared for the connection of, e.g. mechanical cleaners and calibration tools.

2 Cabling from the welding gun equipment is inserted through the two-piece cover and is connected to the jackable terminal X108 located on the left-hand side, inside the top cabinet.

3 See the separate manual under section "Cooling unit" and "Gun service unit" for a description of component products.

4.7 Spare Parts List

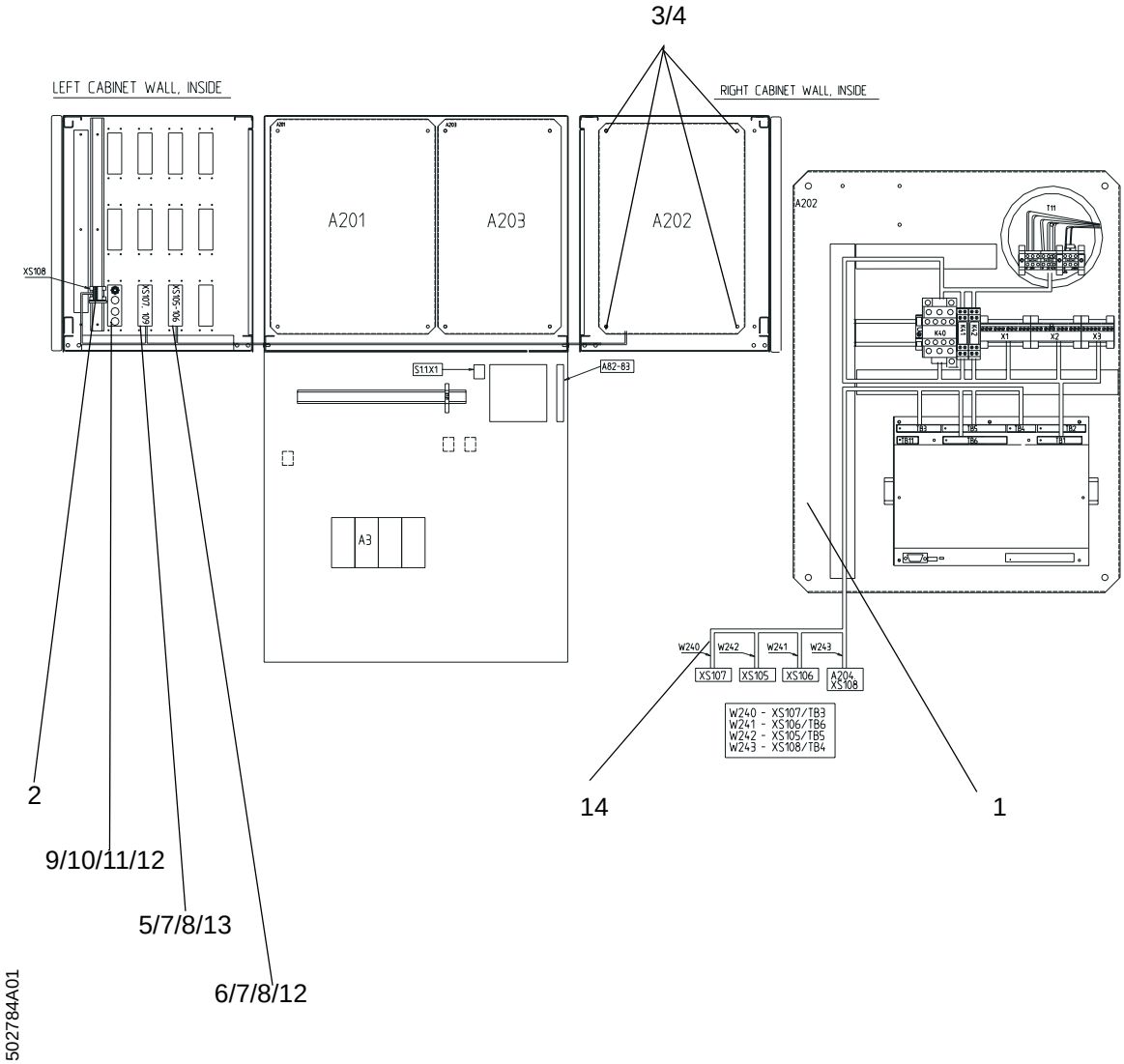
Reservdelar beställs genom ABB Automation Technology Products AB. Vid beställning var vänlig uppge typ och tillverkningsnummer samt benämningar och beställningsnummer enligt reservdelsförteckningen.

Rätt till ändring av specifikationer utan avisering förbehålles.

Spare parts are to be ordered from ABB Automation Technology Products AB. Kindly indicate type of unit, serial number, denominations and ordering number according to the spare parts list.

Rights to reserved to alter specifications without notice.

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		502 784-880	**Processutrustning**	**Process equipment**	**LAW/RPA**
1		502 501-880	Gem.det. matarverk 42V	Common details wire feed unit 42V	
2		436 829-009	Jordklämma	Clamp	
3		2126 011-09	Mutter	Nut	M8
4		2195 013-11	Bricka	Washer	
5		418 159-020	Täcklock fläns	Cover cap flange	8+12 pol
6		418 159-019	Täcklock fläns	Cover cap flange	19+23 pol
7		489 327-012	Skruv	Screw	M3X12
8		2126 011-03	Mutter	Nut	M3
9		193 715-152	Kåpa	Hood	
10		193 715-151	Delad kåpa, max 4 kablar	Shared hood,max 4 cables	
11		193 715-167	Blindpropp	Blind plug	
12		489 327-019	Skruv	Screw	M4x12
13		192 230-110	Blindpropp	Blind plug	D=20
14		503 260-880	Kabel till strömkälla (intern)	Cable to power source (internal)	W240


3/4
LEFT CABINET WALL, INSIDE
RIGHT CABINET WALL, INSIDE
A201
A203
A202
XS108
S11X1
A82-83
A3
A202
T11
K40
X1
X2
X3
W240
W242
W241
W243
XS107
XS105
XS106
A204, XS108
W240 - XS107/TB3
W241 - XS106/TB6
W242 - XS105/TB5
W243 - XS108/TB4
2
9/10/11/12
5/7/8/13
6/7/8/12
14
1
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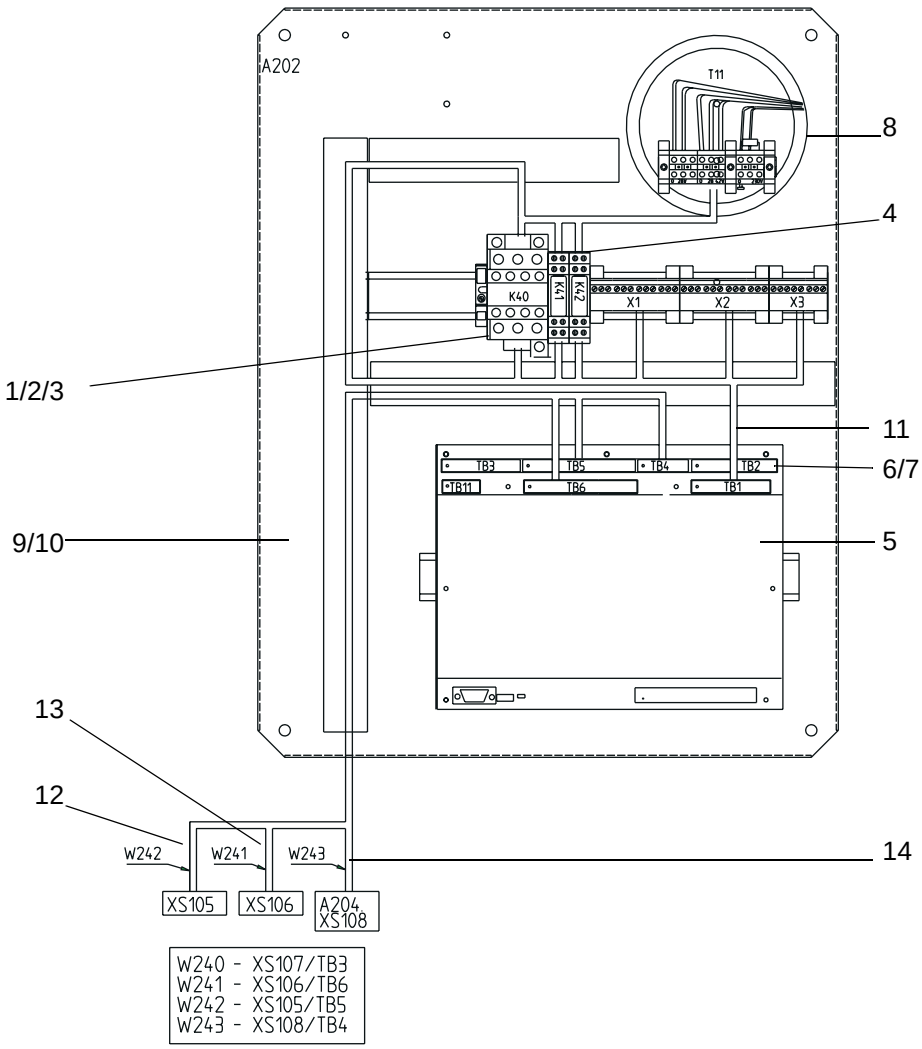
Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		502 501-880	**Gem. detaljer till matarverk 42V**	**Common details to wire feed unit 42V**	
1		193 751-055	Kontaktor	Contactor	
2		193 861-002	Förstärkarblock	Amplifier block	
3		193 751-105	Hjälpkontaktblock	Auxilliary contact block	
4		500 861-881	Säkerh.relä kompl.2växl	Safety relay compl. 2 Change over contact	
5		501 700-880	Process interface board	Process interface board	PIB
6		489 947-244	Anslutningsdon, Combi-Con	Connector, CombiCon	7pol
7		500 958-001	Insticksbrygga	Address key	7-pol
8		501 714-001	Trafo PIB standard	Transformer PIB standard	
9		418 883-006	Kabelkanal	Cable trunking	
10		489 327-025	Skruv	Screw	M5X8
11		502 777-880	Kabelstam	Cable harness	
12		503 251-880	Kabel till matarverk, internt 1	Cable to wire feed unit, internal 1	W241
13		503 254-880	Kabel till matarverk, internt 2	Cable to wire feed unit, internal 2	W242
14		503 257-880	Kabel, BullsEye/TC	Cable, BullsEye/TC	W243


A202
T11
8
4
K40
X1
X2
X3
1/2/3
11
TB3
TB5
TB4
TB2
6/7
TB11
TB6
TB1
9/10
5
13
12
W242
W241
W243
14
XS105
XS106
A204
XS108
W240 - XS107/TB3
W241 - XS106/TB6
W242 - XS105/TB5
W243 - XS108/TB4

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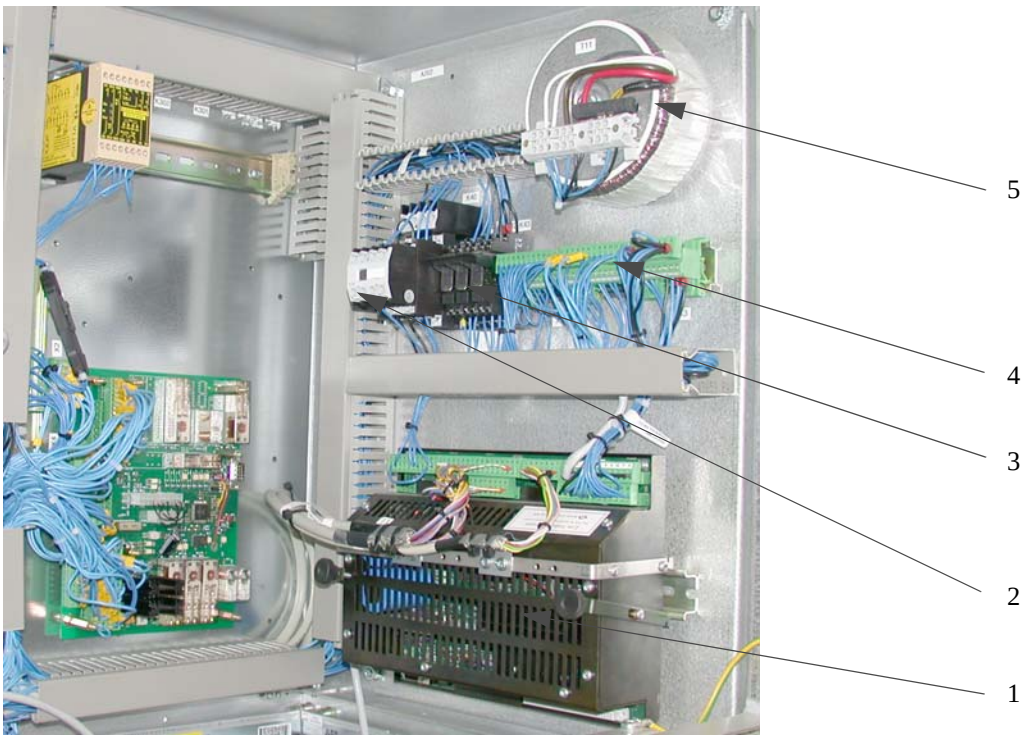
4.8 MILLER

There is a modular based interface between the control system and component welding equipment fitted on the right-hand side, inside the top cabinet.



1 PIB

2 Main contactor

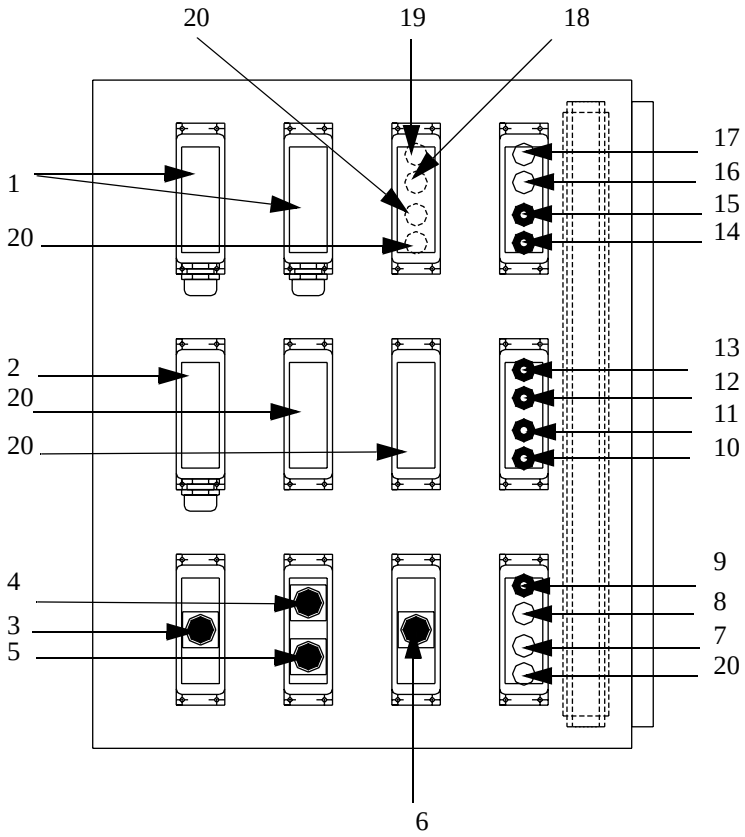
3 Interlock relays

4 Signal connection

5 Transformer

- The interface is fitted with internal wiring for connection to the robot control system.

- The cable harness to external equipment is connected to the output on the left-hand side of the top cabinet or to jackable terminals mounted internally by the two-piece cable gland.



Output 2

1. Positioner
2. Conveyor motor/resolver
3. Operator’s panel
4. Wire feed unit motor
5. Wire feed unit - signal
6. Power source
7. Wire cutter
8. TCP tool
9. Mechanical cleaner
10. Timer reset stn 2
11. Timer resetting stn 1
12. Light barrier 2
13. Light barrier 1
14. Gate switch
15. Gate reset
16. Activation unit work area 2/Home Sensor 2
17. Activation unit work area 1/Home Sensor 1
18. Limit switch for conveyor
19. Position indicator for conveyor
20. Spare

Power supply

The voltage supply consists of a ring core transformer with double secondary windings 230/115/28V AC (see technical specification for PIB).

This feeds the motor regulator part on the process control card with 115V AC and the rectifier part on the process control card with 28V AC.

4.8.1 OPERATION and CONNECTIONS

Emergency stop

Cabinet_S4Cplus_12

1 Motors on

2 Emergency stop

3 Operating mode selector

4 Running time meter

All emergency stop buttons included in the system are as standard connected in series and directly affect the control system's emergency stop loop.

There is a possibility of connecting this in series with the other push buttons in the system if the process equipment is fitted with emergency stop push button.

The equipment is normally interlocked via the emergency stop relay on the control system's panel card A81.

The "Extended emergency stop function" option gives the possibility of supplementing the equipment with components. Optional redundant auxiliary relays can then be easily connected for this purpose.

Figure 21 and Figure 22 below show the theory behind how the emergency stop loop is used to control connected equipment.

For detailed information about the design of the emergency stop loop refer to the ***"The robot's User's Manual"***

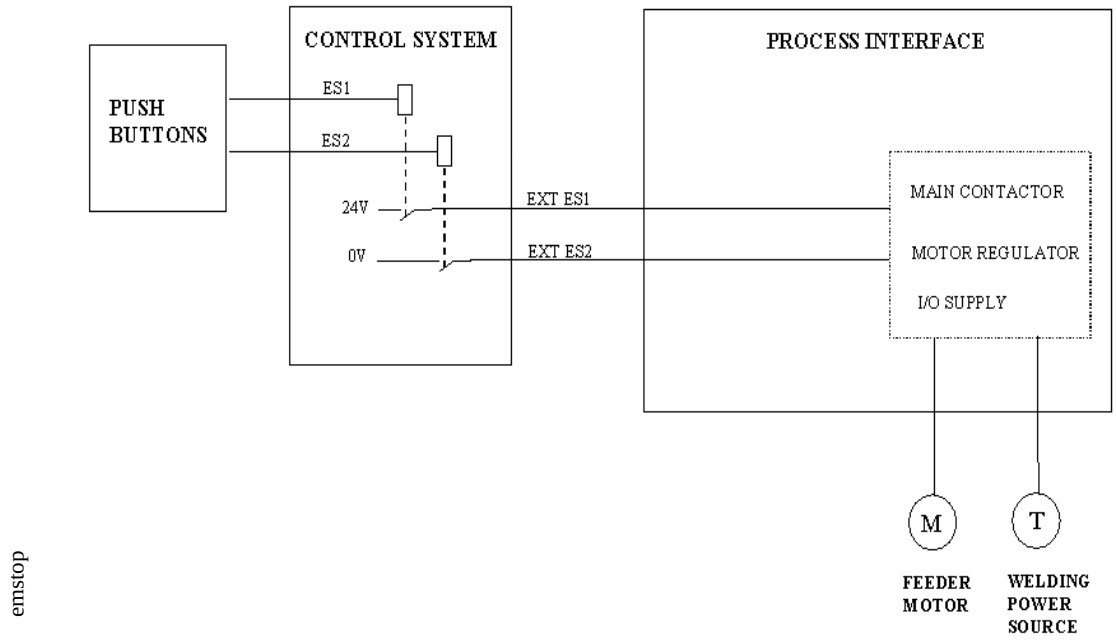


Figure 21 Emergency stop loop

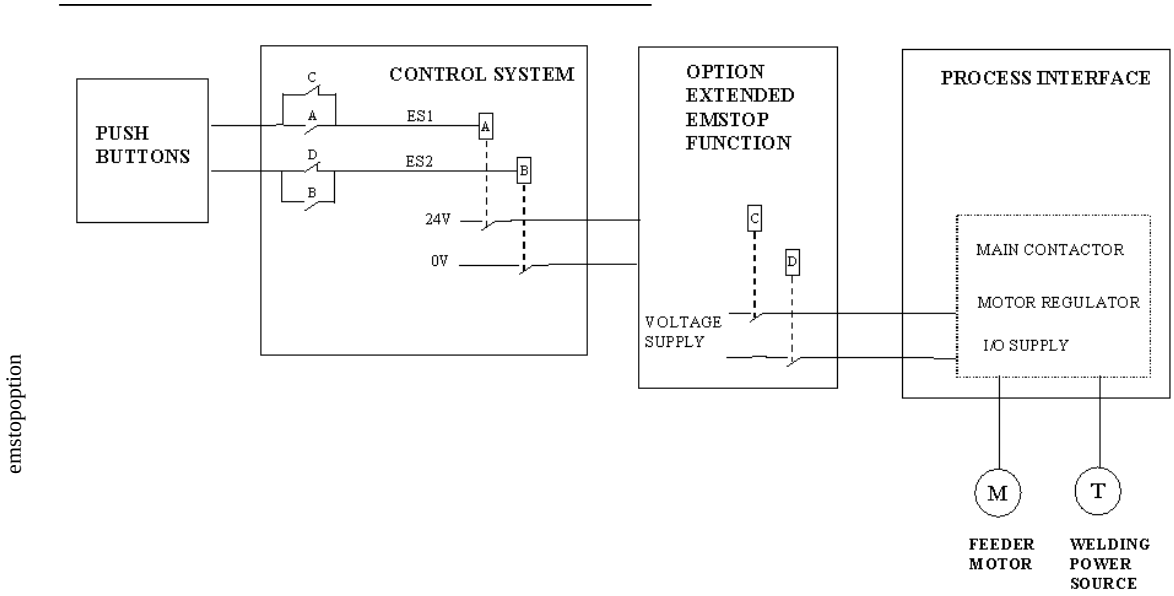


Figure 22 Emergency stop loop with the addition "Extended emergency stop function"

4.8.2 Interlocks

Operating stop loop

Figure 23 below shows the theory behind how the operating stop loop is used to control connected equipment.

For detailed information about the design of the operating stop loop refer to the ***"The robot's User's Manual"***

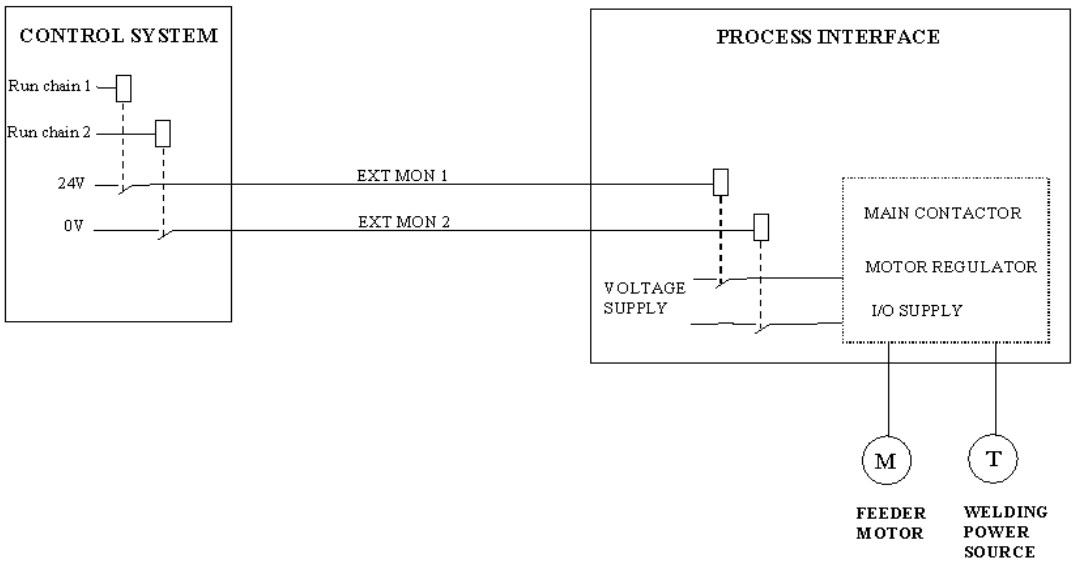


Figure 23 Operating stop loop

Two channel break up of the operating stop loop on the process control card.

In order to run the wire feed motor and welding equipment in all operating modes requires:

- all safety loops to be intact and
- that the system has been started (MOTORS_ON).

In order to run the wire feed motor at a limited speed requires:

- the emergency stop loop to be intact
- operating mode "MAN" and the system set to "MOTORS OFF"

CAN-bus

CAN-bus Connection LAW/RPA

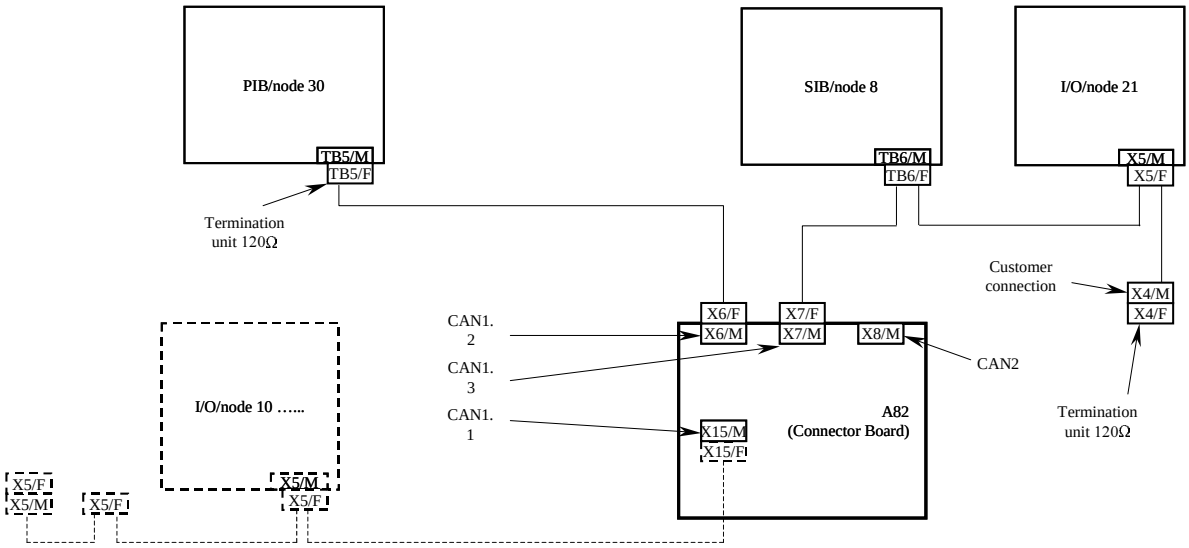
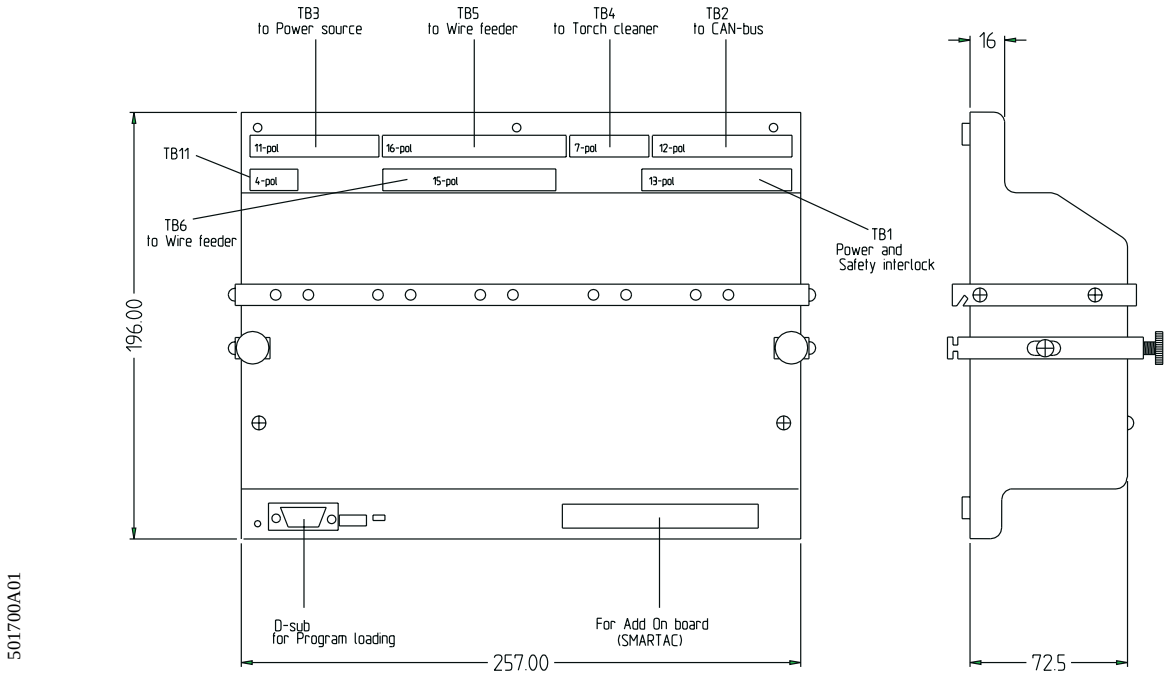


Figure 24 CAN-bus

- Connection of the process control card is made to the control system's CAN-bus channel CAN1.2, output X6 on the contact card A82.
- The connection cable should be fitted with a termination resistance, 120Ω.

Process control card

The control card houses the hardware and software for control and regulation of the arc welding equipment.



See the Product Manual for the welding equipment/S4Cplus.

4.8.3 Connections for external equipment

Welding power source

1 Welding power sources type Miller are connected to output XS107.

- A detailed account of available signals is given in the separate manual for the process control card in the section “Process equipment” chapter PIB.

2 Power sources from other manufacturer's can be connected to this output under the condition that they comply with the specifications described in the manual "Welding equipment" in the section "Process equipment" chapter PIB.

3 If another type/configuration of the output is required, the cable W240 can be replaced by another internal cable.

4 If the welding power supply is fitted with an emergency stop it can be connected to the jackable terminal A202-X1.

Feed mechanism system

Feed mechanism systems type A140E, A314E and A324E-L are connected to outputs XS105 and XS106.

- See the separate manual in the section “Process equipment” chapter PIB for a description of included feed mechanism systems.

Other accessories

1 The equipment is prepared for the connection of, e.g. mechanical cleaners and calibration tools.

2 Cabling from the welding gun equipment is inserted through the two-piece cover and is connected to the jackable terminal X108 located on the left-hand side, inside the top cabinet.

3 See the separate manual under section "Cooling unit" and "Gun service unit" for a description of component products.

4.9 Spare Parts List

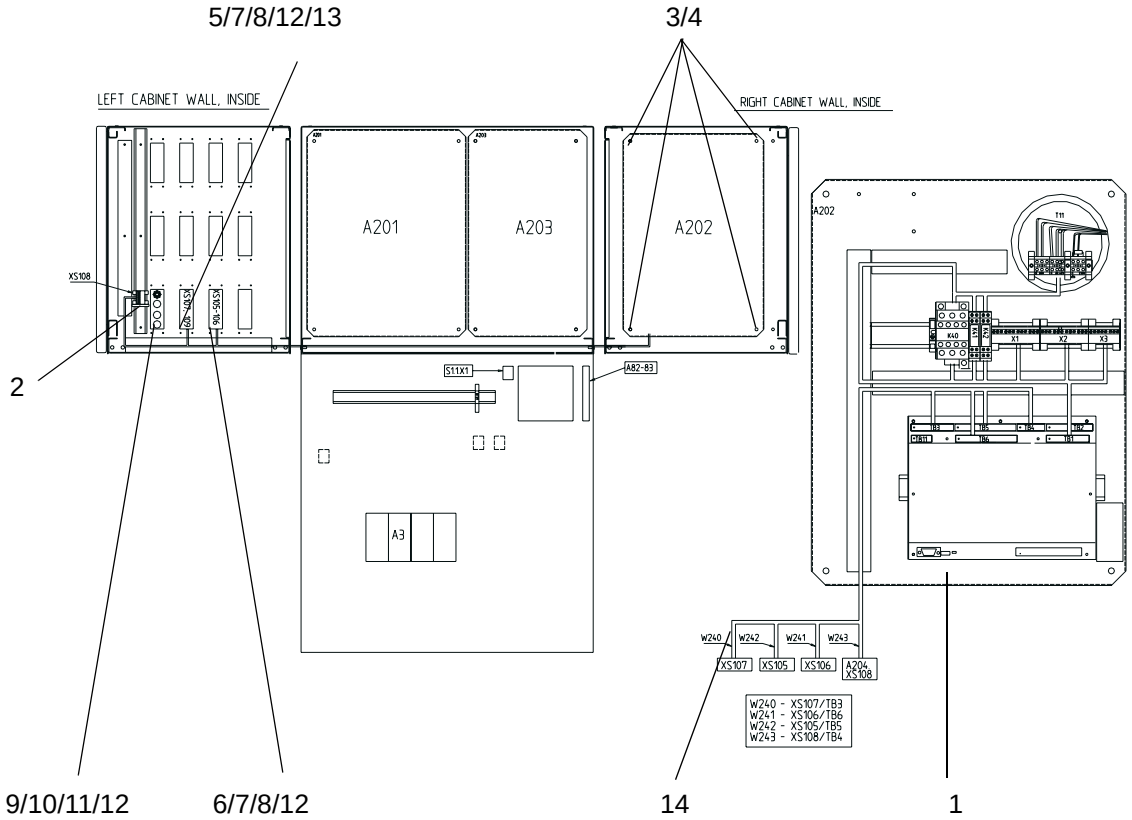
Reservdelar beställs genom ABB Automation Technology Products AB. Vid beställning var vänlig uppge typ och tillverkningsnummer samt benämningar och beställningsnummer enligt reservdelsförteckningen.

Rätt till ändring av specifikationer utan avisering förbehålles.

Spare parts are to be ordered from ABB Automation Technology Products AB. Kindly indicate type of unit, serial number, denominations and ordering number according to the spare parts list.

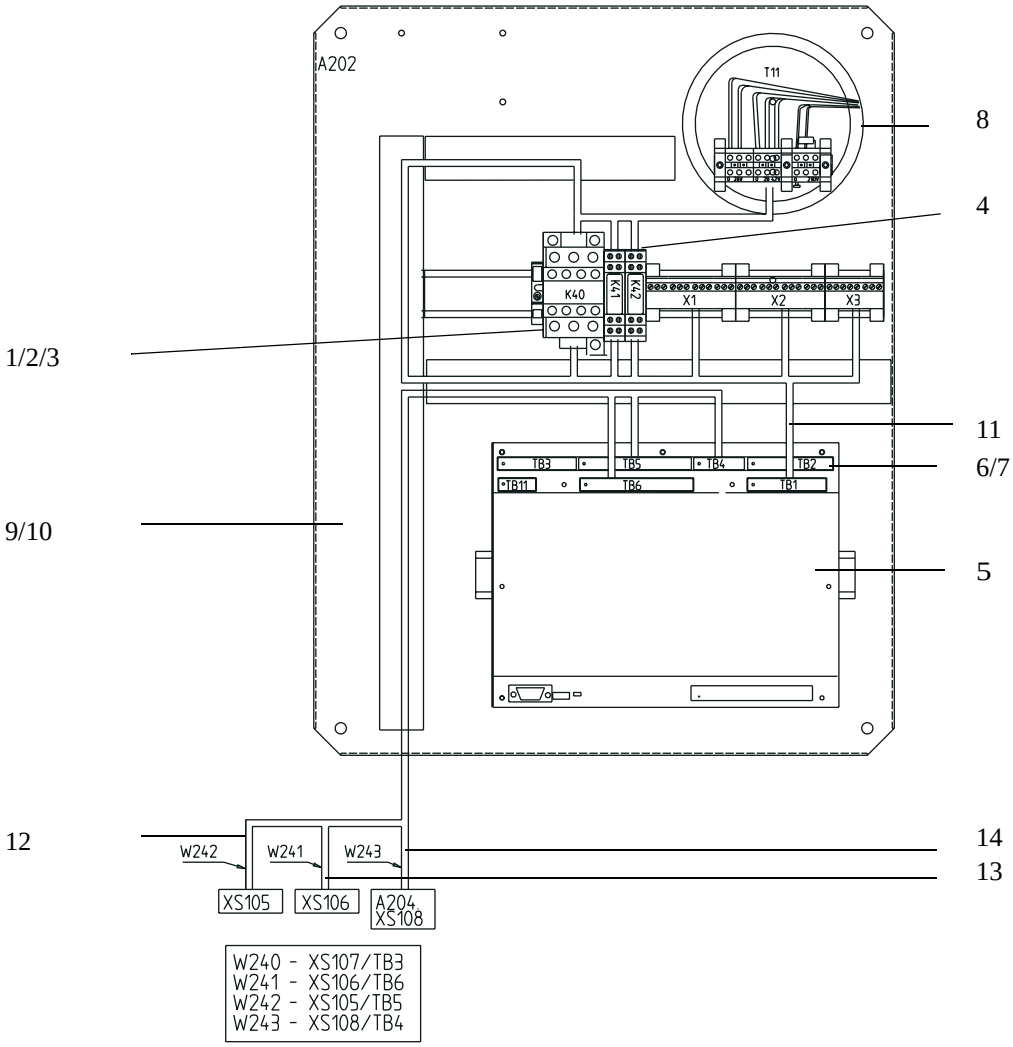
Rights to reserved to alter specifications without notice.

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		502 786-880	**Processutrustning**	**Process equipment**	**MILLER**
1		502 503-880	Gem.det. matarverk 115V	Common details wire feed unit 115V	
2		436 829-009	Jordklämma	Clamp	
3		2126 011-09	Mutter	Nut	M8
4		2195 013-11	Bricka	Washer	
5		418 159-020	Täcklock fläns	Cover cap flange	8+12 pol
6		418 159-019	Täcklock fläns	Cover cap flange	19+23 pol
7		489 327-012	Skruv	Screw	M3X12
8		2126 011-03	Mutter	Nut	M3
9		193 715-152	Kåpa	Hood	
10		193 715-151	Delad kåpa, max 4 kablar	Shared hood, max 4 cables	
11		193 715-167	Blindpropp	Blind plug	
12		489 327-019	Skruv	Screw	M4X12
13		192 230-110	Blindpropp	Blind plug	D=20
14		503 260-880	Kabel till strömkälla, intern	Cable to power source, internal	W240


5/7/8/12/13
3/4
LEFT CABINET WALL, INSIDE
RIGHT CABINET WALL, INSIDE
A201
A203
A202
XS108
2
S11X1
A82-83
A3
A202
W240
W242
W241
W243
XS107
XS105
XS106
A204
XS108
W240 - XS107/TB3
W241 - XS106/TB6
W242 - XS105/TB5
W243 - XS108/TB4
9/10/11/12
6/7/8/12
14
1

502786

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		502 503-880	**Gem. detaljer, matarverk 115V**	**Common details, wire feed unit 115V**	
1		193 751-055	Kontaktor	Contactor	
2		193 861-002	Förstärkarblock	Amplifier block	
3		193 751-105	Hjälpkontaktblock	Auxilliary contact block	
4		500 861-881	Säkerh.relä kompl.2växl	Safety relay compl. 2 change over contact	
5		501 700-881	Process interface board	Process interface board	PIB
6		489 947-244	Anslutningsdon, Combi-Con	Connector, CombiCon	7pol
7		500 958-001	Insticksbrygga	Address key	7-pol
8		501 714-002	Trafo PIB för MILLER	Transformer PIB for MILLER	
9		418 883-006	Kabelkanal	Cable trunking	
10		489 327-025	Skruv	Screw	M5X8
11		502 777-880	Kabelstam proc	Cable harness proc	
12		503 251-880	Kabel till matarverk, internt 1	Cable to wire feed unit, internal 1	W241
13		503 254-880	Kabel till matarverk, internt 2	Cable to wire feed unit, internal 2	W242
14		503 257-880	Kabel till Bullseye/TC	Cable to Bullseye/TC	W243


A202
T11
8
4
K40
K41
K42
X1
X2
X3
1/2/3
11
6/7
TB3
TB5
TB4
TB2
TB11
TB6
TB1
9/10
5
12
14
13
W242
W241
W243
XS105
XS106
A204
XS108
W240 - XS107/TB3
W241 - XS106/TB6
W242 - XS105/TB5
W243 - XS108/TB4

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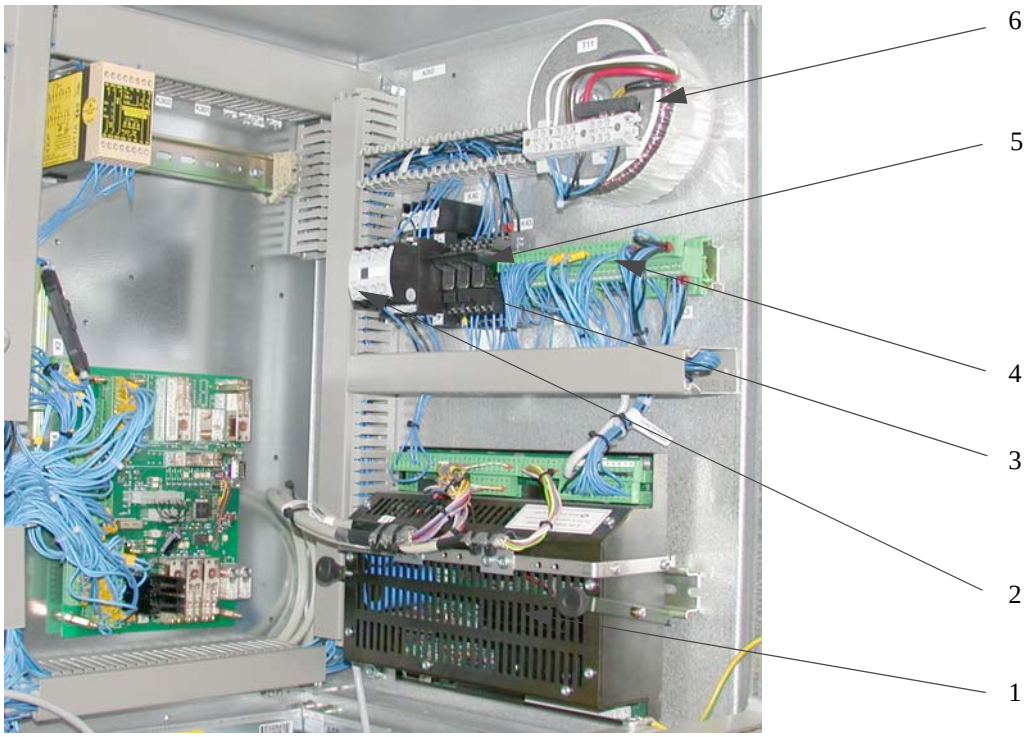
4.10 Power source ARCITEC-LRB

There is a modular based interface between the control system and component welding equipment fitted on the right-hand side, inside the top cabinet.



1 PIB

2 Main contactor

3 Interlock relays

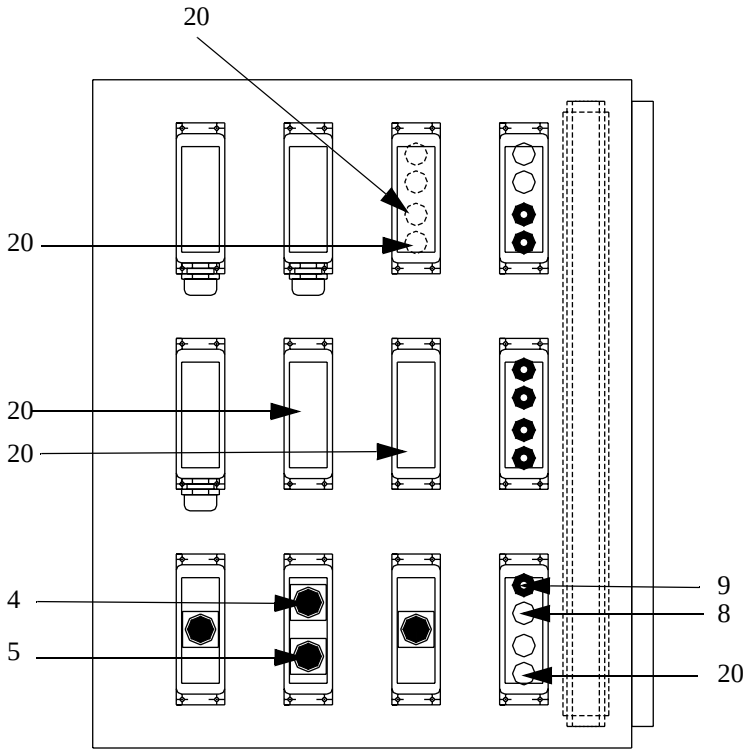
4 Signal connection

5 Auxiliary fan, cooling unit

6 Transformer

- The interface is fitted with internal wiring for connection to the robot control system.

- The cable harness to external equipment is connected to the output on the left-hand side of the top cabinet or to jackable terminals mounted internally by the two-piece cable gland. Internal cables for control signals to the welding power source are also connected here.



Output 2

4. Wire feed unit motor

5. Wire feed unit - signal

8. TCP tool

9. Mechanical cleaner

20. Spare

Power supply

The voltage supply consists of a ring core transformer with double secondary windings 230/42(28)/28V AC (see technical specification for PIB).

This feeds the motor regulator part on the process control card with 42V AC and the rectifier part on the process control card with 28V AC.

4.10.1 OPERATION and CONNECTIONS

Emergency stop

Cabinet_S4Cplus_12

1 Motors on

2 Emergency stop

3 Operating mode selector

4 Running time meter

All emergency stop buttons included in the system are as standard connected in series and directly affect the control system’s emergency stop loop.

There is a possibility of connecting this in series with the other push buttons in the system if the process equipment is fitted with emergency stop push button.

The equipment is normally interlocked via the emergency stop relay on the control system’s panel card A81.

The "Extended emergency stop function" option gives the possibility of supplementing the equipment with components. Optional redundant auxiliary relays can then be easily connected for this purpose.

Figure 25 and Figure 26 below show the theory behind how the emergency stop loop is used to control connected equipment.

For detailed information about the design of the emergency stop loop refer to the ***"The robot's User's Manual"***

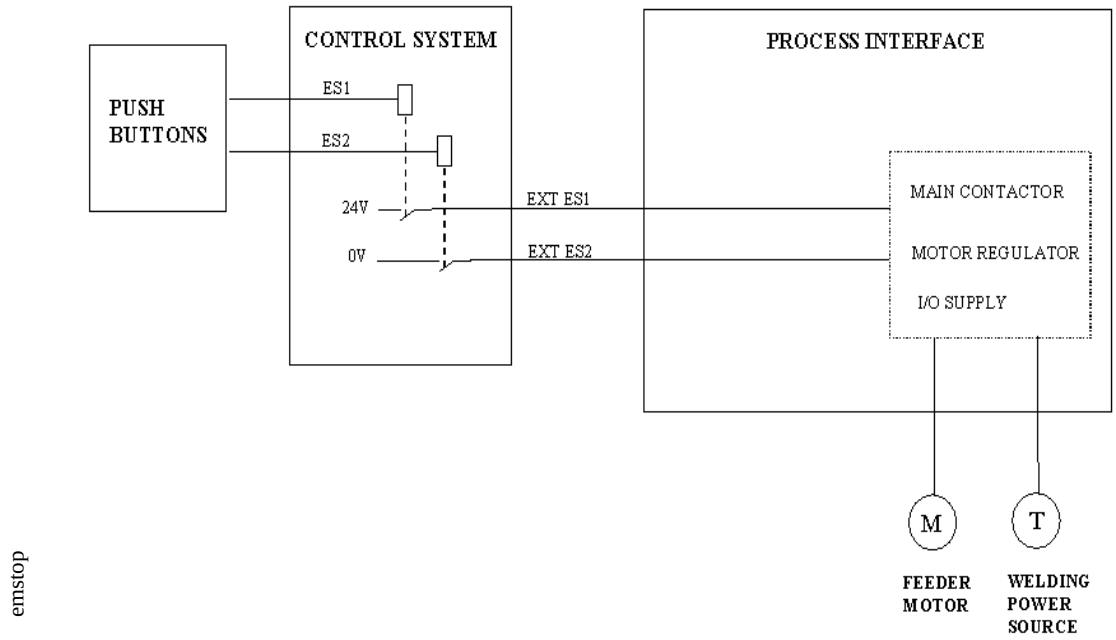


Figure 25 Emergency stop loop

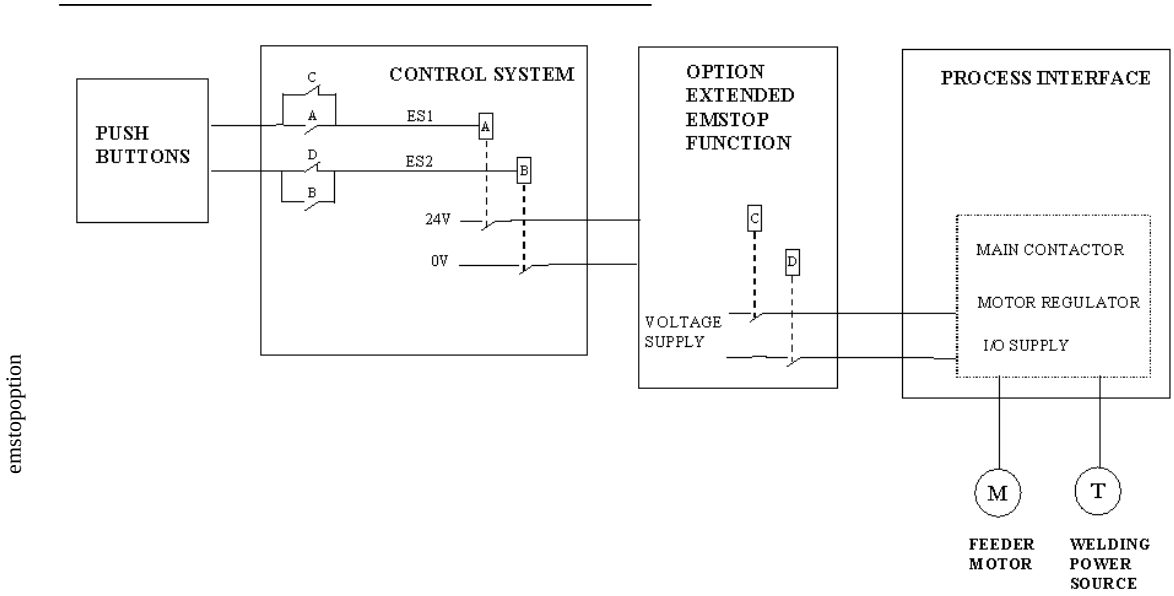


Figure 26 Emergency stop loop with the addition "Extended emergency stop function"

4.10.2 Interlocks

Operating stop loop

Figure 27 below shows the theory behind how the operating stop loop is used to control connected equipment.

For detailed information about the design of the operating stop loop refer to the ***"The robot's User's Manual"***

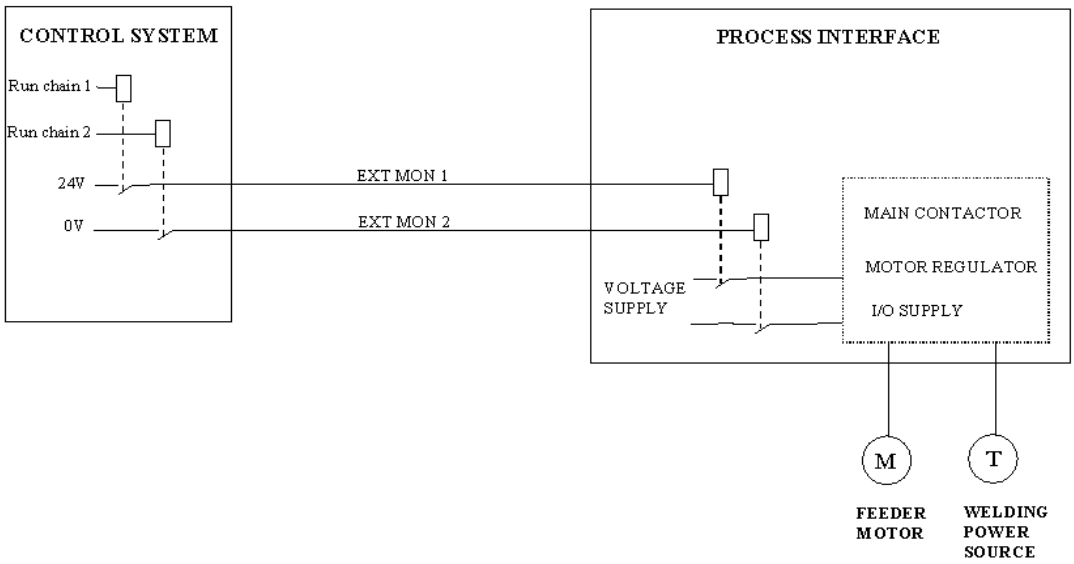


Figure 27 Operating stop loop

Two channel break up of the operating stop loop on the process control card.

In order to run the wire feed motor and welding equipment in all operating modes requires:

- all safety loops to be intact and
- that the system has been started (MOTORS_ON).

In order to run the wire feed motor at a limited speed requires:

- the emergency stop loop to be intact
- operating mode "MAN" and the system set to "MOTORS OFF"

CAN bus

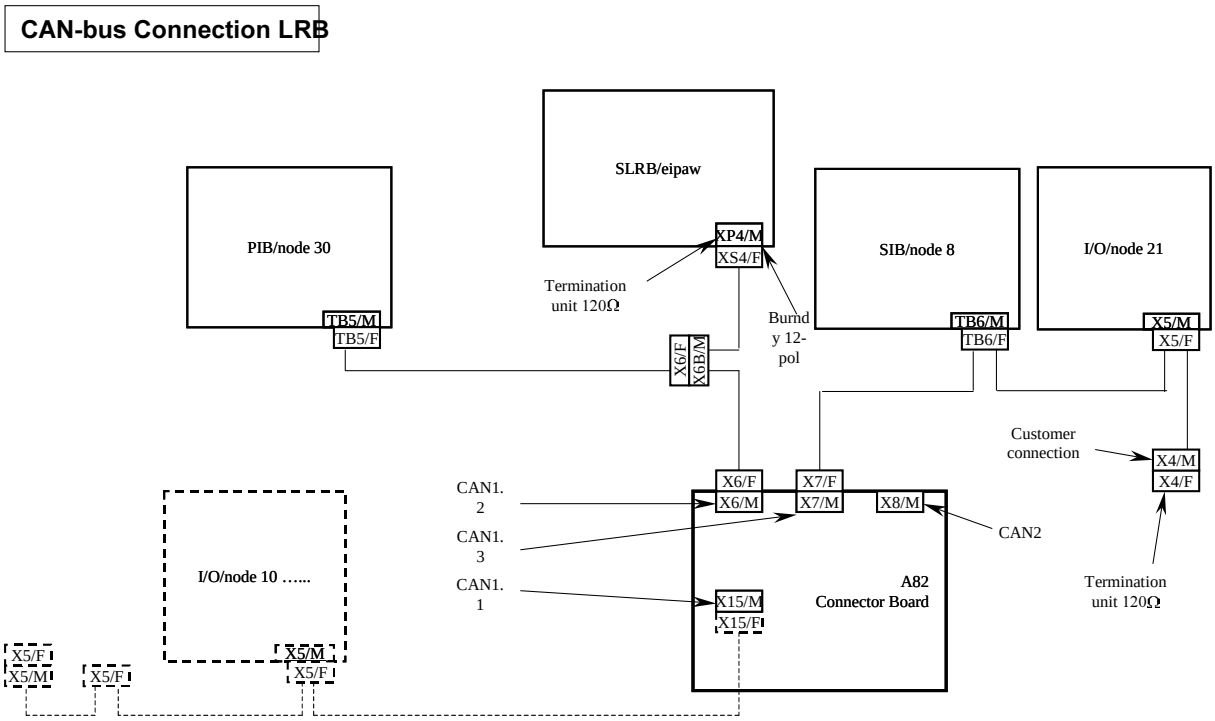
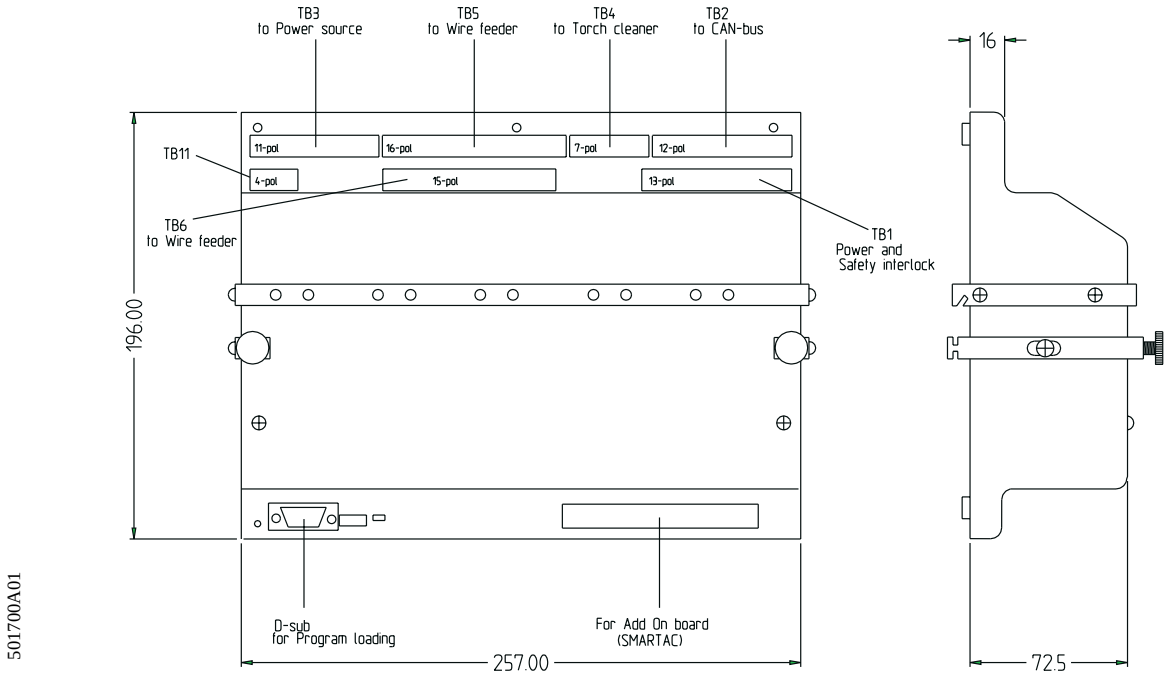


Figure 28 CAN-bus

- The welding power source is connected to the control system's CAN-bus channel CAN1.2, output X6 on contact card A82, using a branch cable.
- The process control card's connection cable is connected to the same CAN-bus channel via output X6B on this branch cable.
- The connection cable should be fitted with a termination resistance, 120Ω.

Process control card

The control card houses the hardware and software for control and regulation of the arc welding equipment.



See the Product Manual for the welding equipment/S4Cplus.

4.10.3 Connecting integrated welding power sources

1 The cables for the supply voltage are connected to the control cabinet's main power switch.

2 Connections for communication with the control cabinet's CAN-bus are made to output X6 on contact card A82

3 Cables for control signals to welding power sources type LRB are connected to the jackable terminal X202.

4 See the separate manual in the section "Power Source" for a description of included welding power sources.

4.10.4 Connections for external equipment

Feed mechanism system

Feed mechanism system types A140E, A314E resp. A324E-L are connected to outputs XS105 and XS106.

- See the separate manual in the section "Process equipment" chapter PIB for a description of included feed mechanism systems.

Other accessories

1 The equipment is prepared for the connection of, e.g. mechanical cleaners and calibration tools.

2 Cabling from the welding gun equipment is inserted through the two-piece cover and is connected to the jackable terminal X108 located on the left-hand side, inside the top cabinet

- See the separate manual under section "Cooling unit" and "Gun service unit" for a description of component products.

3 A cooling unit is required if a water cooled gun is included.

- The cable from the cooling unit is inserted through the two-piece cover and is connected to the jackable terminal X202 located on the left-hand side, inside the top cabinet.
- See the separate manual under section "Cooling unit" for a description of the cooling unit.

4.11 Spare Parts List

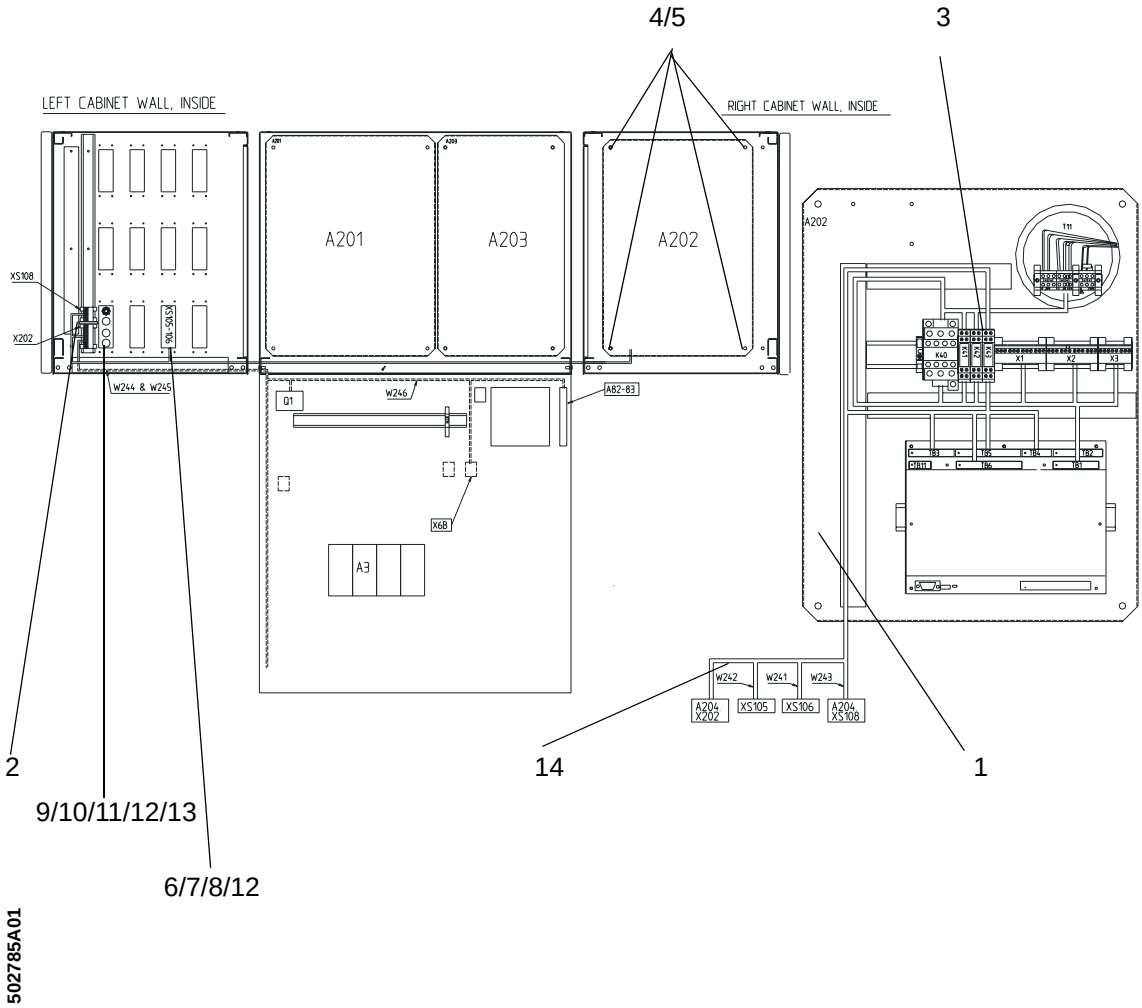
Reservdelar beställs genom ABB Automation Technology Products AB. Vid beställning var vänlig uppge typ och tillverkningsnummer samt benämningar och beställningsnummer enligt reservdelsförteckningen.

Rätt till ändring av specifikationer utan avisering förbehålles.

Spare parts are to be ordered from ABB Automation Technology Products AB. Kindly indicate type of unit, serial number, denominations and ordering number according to the spare parts list.

Rights to reserved to alter specifications without notice.

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		502 785-880	**Processutrustning**	**Process equipment**	**LRB**
1		502 501-880	Gem. detaljer för matarverk 42V	Common details wire feed unit 42V	
2		436 829-009	Jordklämma	Clamp	
3		500 861-881	Säkerh.relä kompl.2växl	Safety relay compl. 2 change over contact	
4		2126 011-09	Mutter	Nut	M8
5		2195 013-11	Bricka	Washer	
6		418 159-019	Täcklock fläns	Cover cap flange	19+23 pol
7		489 327-012	Skruv	Screw	M3X12
8		2126 011-03	Mutter	Nut	M3
9		193 715-152	Kåpa	Hood	
10		193 715-151	Delad kåpa, max 4 kablar	Shared hood,max 4 cables	
11		193 715-167	Blindpropp	Blind plug	
12		489 327-019	Skruv	Screw	M4X12
13		193 715-159	Kabel tätning	Cable gland	D=9-10mm
14		502 797 880	Kabelstam LRB (ARCI-TEC)	Cable harness LRB (ARCITEC)	


4/5
3
LEFT CABINET WALL, INSIDE
RIGHT CABINET WALL, INSIDE
A201
A203
A202
XS108
X202
W244 & W245
Q1
W246
A82-B3
X6B
A3
A202
W242
W241
W243
A204 X202
XS105
XS106
A204 XS108
2
14
1
9/10/11/12/13
6/7/8/12
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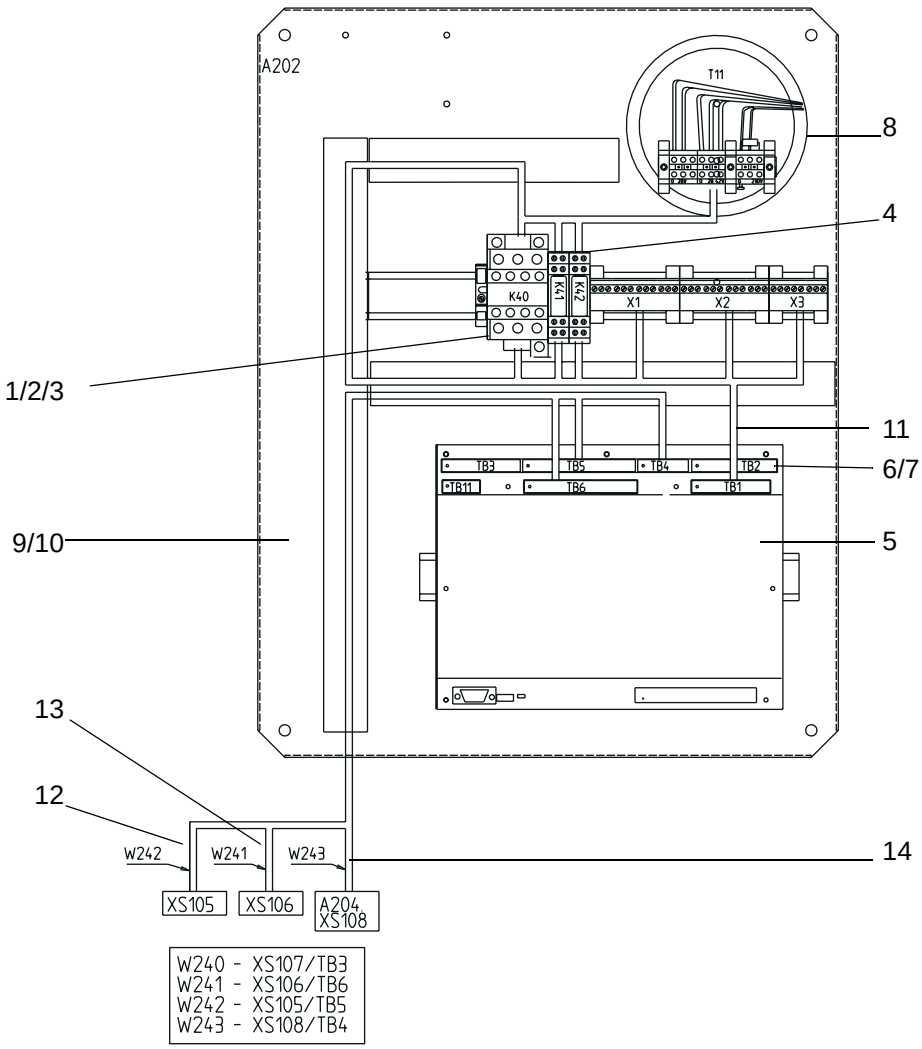
Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		502 501-880	**Gem. detaljer till matarverk 42V**	**Common details to wire feed unit 42V**	
1		193 751-055	Kontaktor	Contactor	
2		193 861-002	Förstärkarblock	Amplifier block	
3		193 751-105	Hjälpkontaktblock	Auxilliary contact block	
4		500 861-881	Säkerh.relä kompl.2växl	Safety relay compl. 2 Change over contact	
5		501 700-880	Process interface board	Process interface board	PIB
6		489 947-244	Anslutningsdon, Combi-Con	Connector, CombiCon	7pol
7		500 958-001	Insticksbrygga	Address key	7-pol
8		501 714-001	Trafo PIB standard	Transformer PIB standard	
9		418 883-006	Kabelkanal	Cable trunking	
10		489 327-025	Skruv	Screw	M5X8
11		502 777-880	Kabelstam	Cable harness	
12		503 251-880	Kabel till matarverk, internt 1	Cable to wire feed unit, internal 1	W241
13		503 254-880	Kabel till matarverk, internt 2	Cable to wire feed unit, internal 2	W242
14		503 257-880	Kabel, BullsEye/TC	Cable, BullsEye/TC	W243


A202
T11
8
4
K40
X1
X2
X3
1/2/3
11
TB3
TB5
TB4
TB2
6/7
TB11
TB6
TB1
9/10
5
13
12
W242
W241
W243
14
XS105
XS106
A204
XS108
W240 - XS107/TB3
W241 - XS106/TB6
W242 - XS105/TB5
W243 - XS108/TB4

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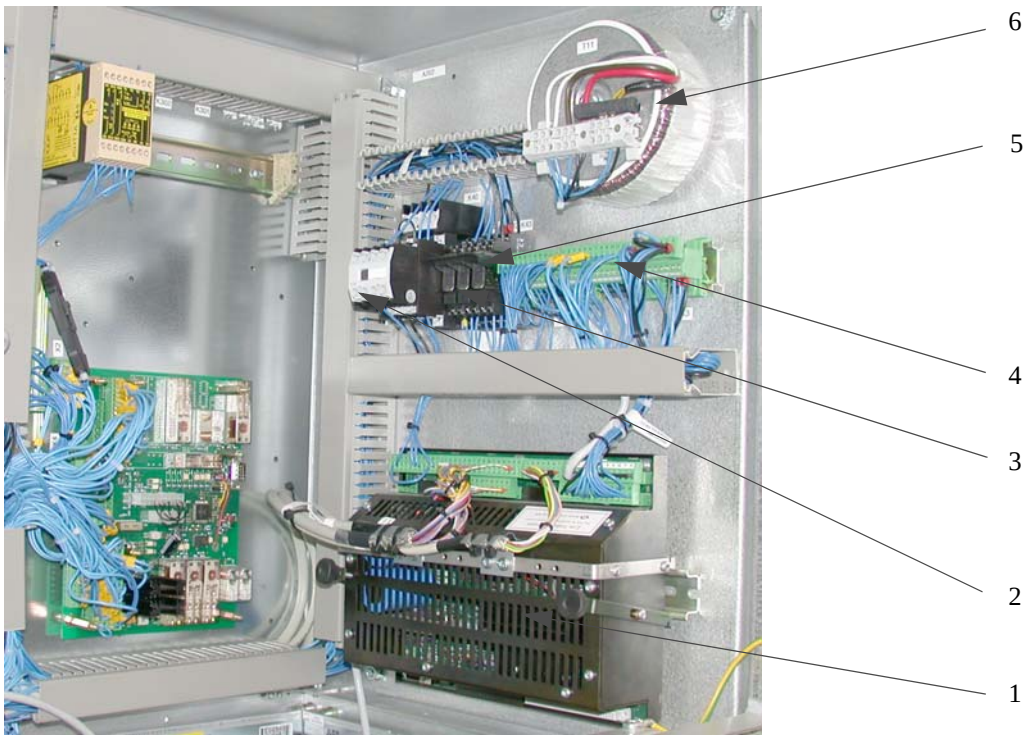
4.12 Power source ARCITEC-LRC

There is a modular based interface between the control system and component welding equipment fitted on the right-hand side, inside the top cabinet.



1 PIB

2 Main contactor

3 Interlock relays

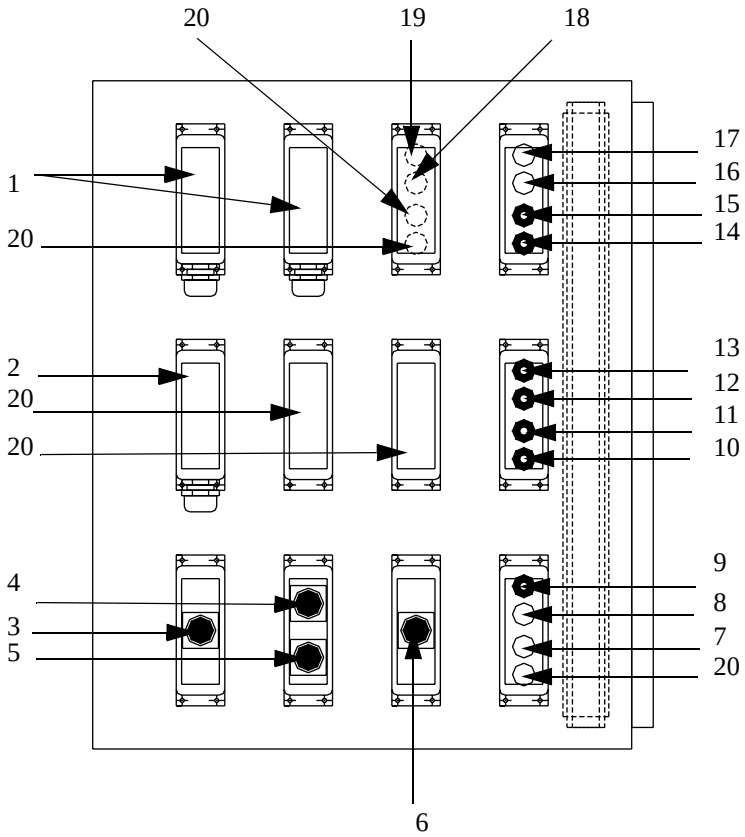
4 Signal connection

5 Auxiliary fan, cooling unit

6 Transformer

- The interface is fitted with internal wiring for connection to the robot control system.

- The cable harness to external equipment is connected to the output on the left-hand side of the top cabinet or to jackable terminals mounted internally by the two-piece cable gland. External cables for control signals to the welding power source are also connected here.



Output 2

1. Positioner
2. Conveyor motor/resolver
3. Operator’s panel
4. Wire feed unit motor
5. Wire feed unit - signal
6. Power source
7. Wire cutter
8. TCP tool
9. Mechanical cleaner
10. Timer reset stn 2
11. Timer resetting stn 1
12. Light barrier 2
13. Light barrier 1
14. Gate switch
15. Gate reset
16. Activation unit work area 2/Home Sensor 2
17. Activation unit work area 1/Home Sensor 1
18. Limit switch for conveyor
19. Position indicator for conveyor
20. Spare

Power supply

The voltage supply consists of a ring core transformer with double secondary windings 230/42(28)/28V AC (see technical specification for PIB).

This feeds the motor regulator part on the process control card with 42V AC and the rectifier part on the process control card with 28V AC.

4.12.1 OPERATION and CONNECTIONS

Emergency stop

Cabinet_S4Cplus_12

1 Motors on

2 Emergency stop

3 Operating mode selector

4 Running time meter

All emergency stop buttons included in the system are as standard connected in series and directly affect the control system's emergency stop loop.

There is a possibility of connecting this in series with the other push buttons in the system if the process equipment is fitted with emergency stop push button.

The equipment is normally interlocked via the emergency stop relay on the control system's panel card A81.

The "Extended emergency stop function" option gives the possibility of supplementing the equipment with components. Optional redundant auxiliary relays can then be easily connected for this purpose.

Figure 29 and Figure 30 below show the theory behind how the emergency stop loop is used to control connected equipment.

For detailed information about the design of the emergency stop loop refer to the ***"The robot's User's Manual"***

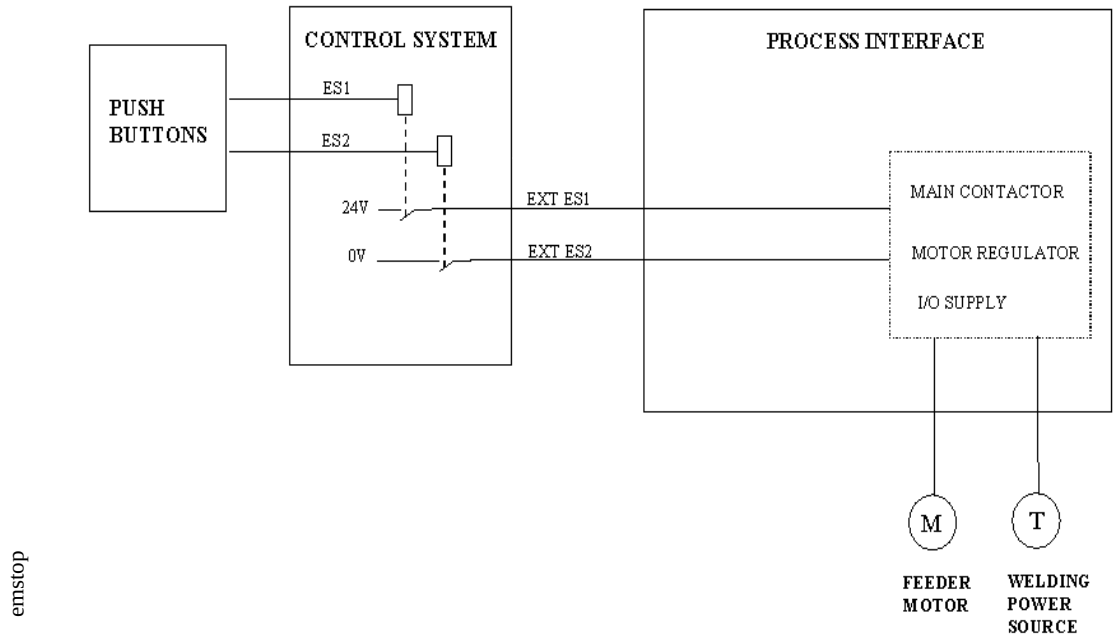


Figure 29 Emergency stop loop

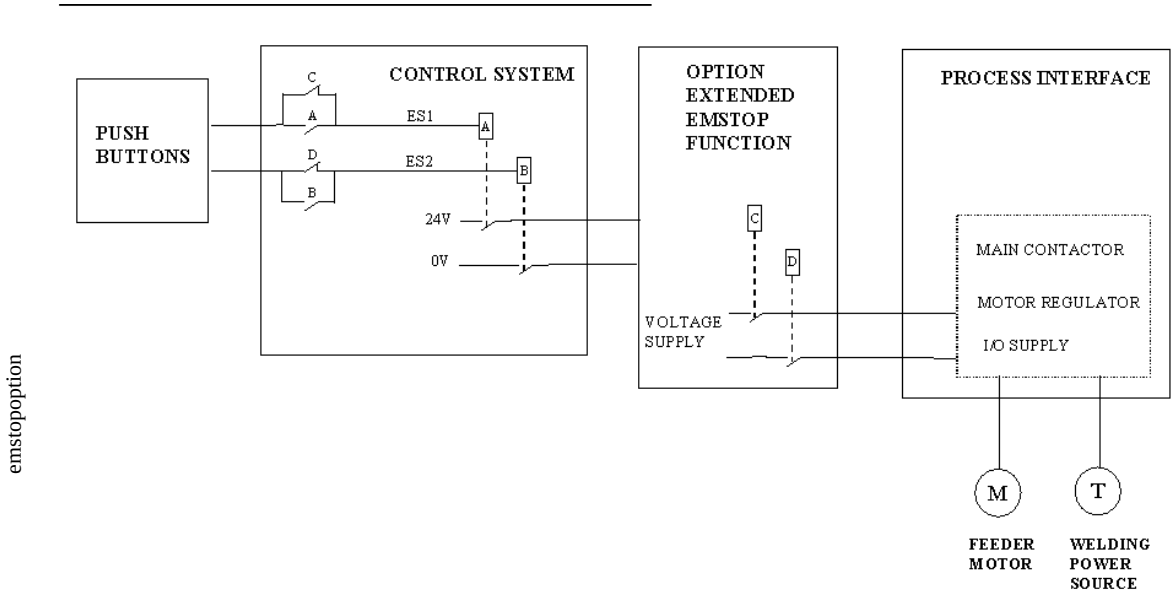


Figure 30 Emergency stop loop with the addition "Extended emergency stop function"

4.12.2 Interlocks

Operating stop loop

Figure 31 below shows the theory behind how the operating stop loop is used to control connected equipment.

For detailed information about the design of the operating stop loop refer to the ***"The robot's User's Manual"***

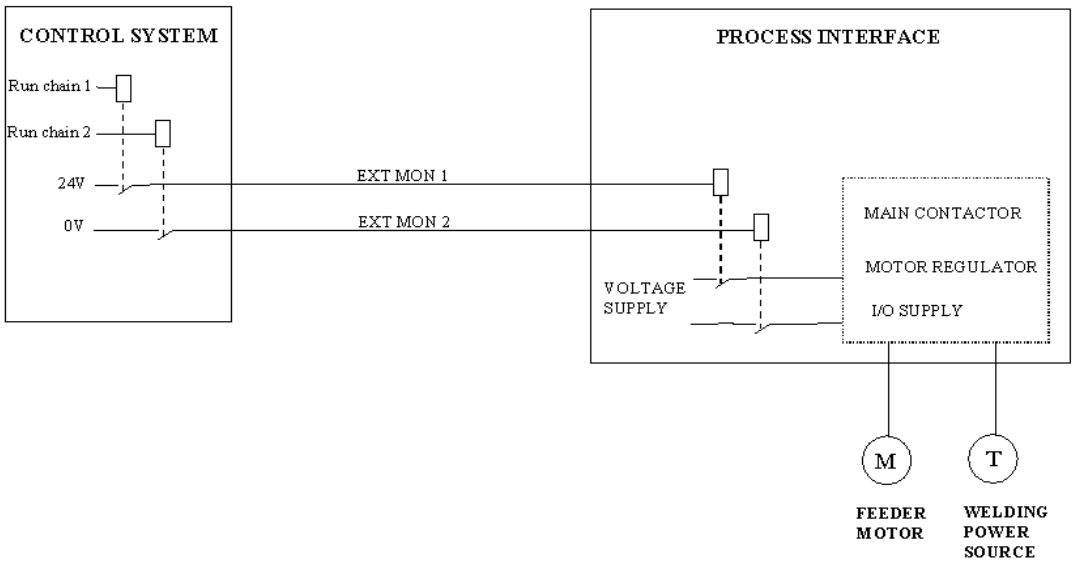


Figure 31 Operating stop loop

Two channel break up of the operating stop loop on the process control card.

In order to run the wire feed motor and welding equipment in all operating modes requires:

- all safety loops to be intact and
- that the system has been started (MOTORS_ON).

In order to run the wire feed motor at a limited speed requires:

- the emergency stop loop to be intact
- operating mode "MAN" and the system set to "MOTORS OFF"

CAN bus

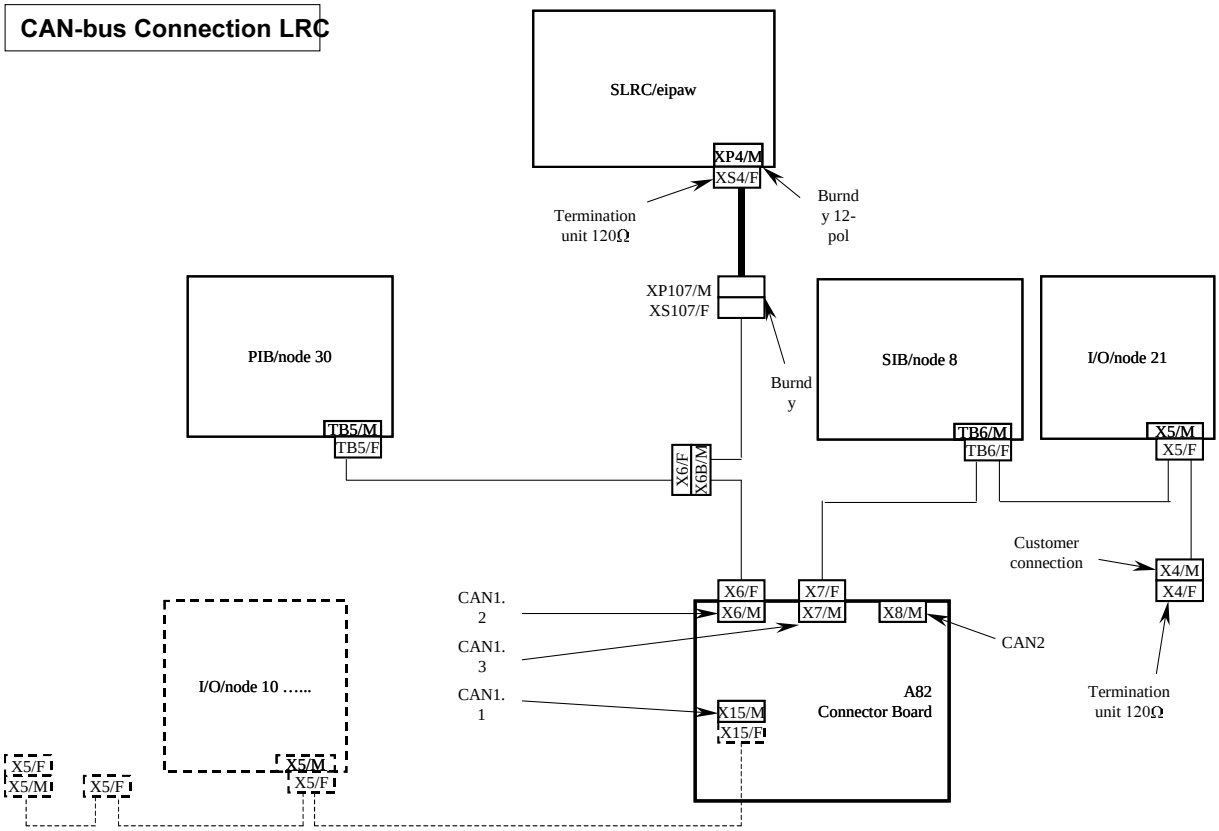
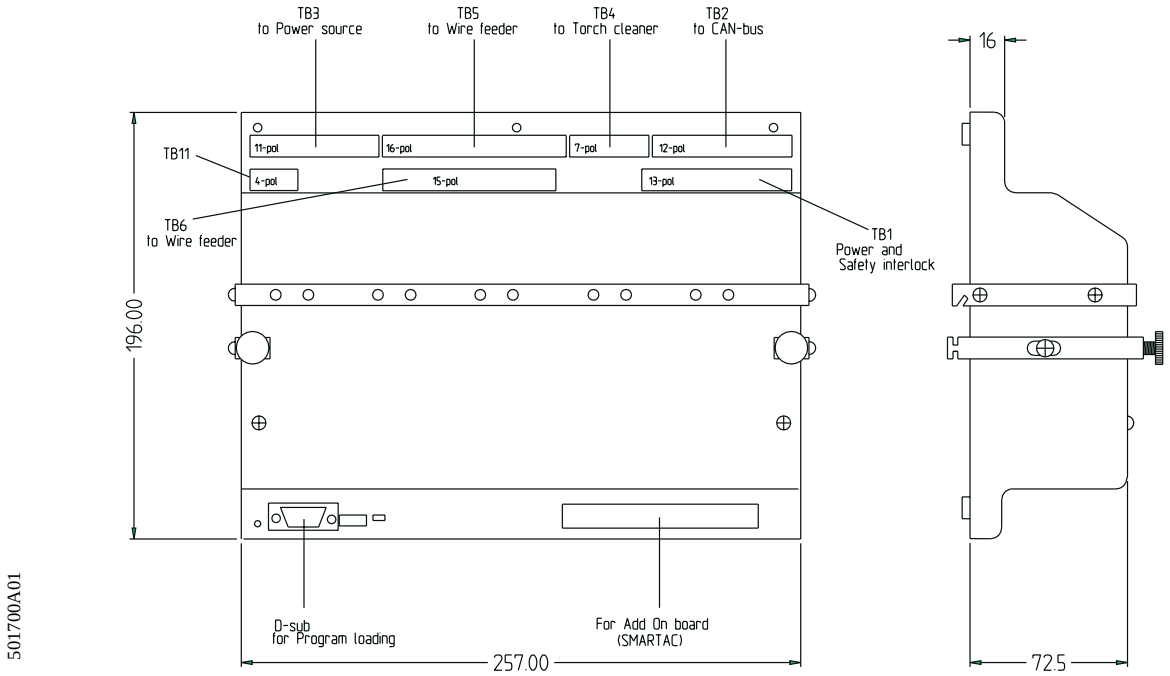


Figure 32 CAN-bus

- The CAN-bus cable to the welding power source is connected to output X107. This output is internally connected to the control system's CAN-bus channel CAN1.2, output X6 on contact card A82, using a branch cable.
- The process control card's connection cable is connected to the same CAN-bus channel via output X6B on this branch cable.
- The connection cable should be fitted with a termination resistance, 120Ω.

Process control card

The control card houses the hardware and software for control and regulation of the arc welding equipment.



See the Product Manual for the welding equipment/S4Cplus.

4.12.3 Connecting integrated welding power sources

1 Connections for communication with the control cabinet's CAN-bus are made to output X107 on the control cabinet.

2 Cables for control signals to welding power sources type LRB are connected to the jackable terminal X202.

3 See the separate manual in the section "Power Source" for a description of included welding power sources.

4.12.4 Connections for external equipment

Feed mechanism system

Feed mechanism system types A140E, A314E resp. A324E-L are connected to outputs XS105 and XS106.

- See the separate manual in the section "Process equipment" chapter PIB for a description of included feed mechanism systems.

Other accessories

1 The equipment is prepared for the connection of, e.g. mechanical cleaners and calibration tools.

2 Cabling from the welding gun equipment is inserted through the two-piece cover and is connected to the jackable terminal X108 located on the left-hand side, inside the top cabinet

3 See the separate manual under section "Cooling unit" and "Gun service unit" for a description of component products.

- A cooling unit is required if a water cooled gun is included.
- The cable from the cooling unit is inserted through the two-piece cover and is connected to the jackable terminal X202 located on the left-hand side, inside the top cabinet
- See the separate manual under section "Cooling unit" for a description of the cooling unit.

4.13 Spare Parts List

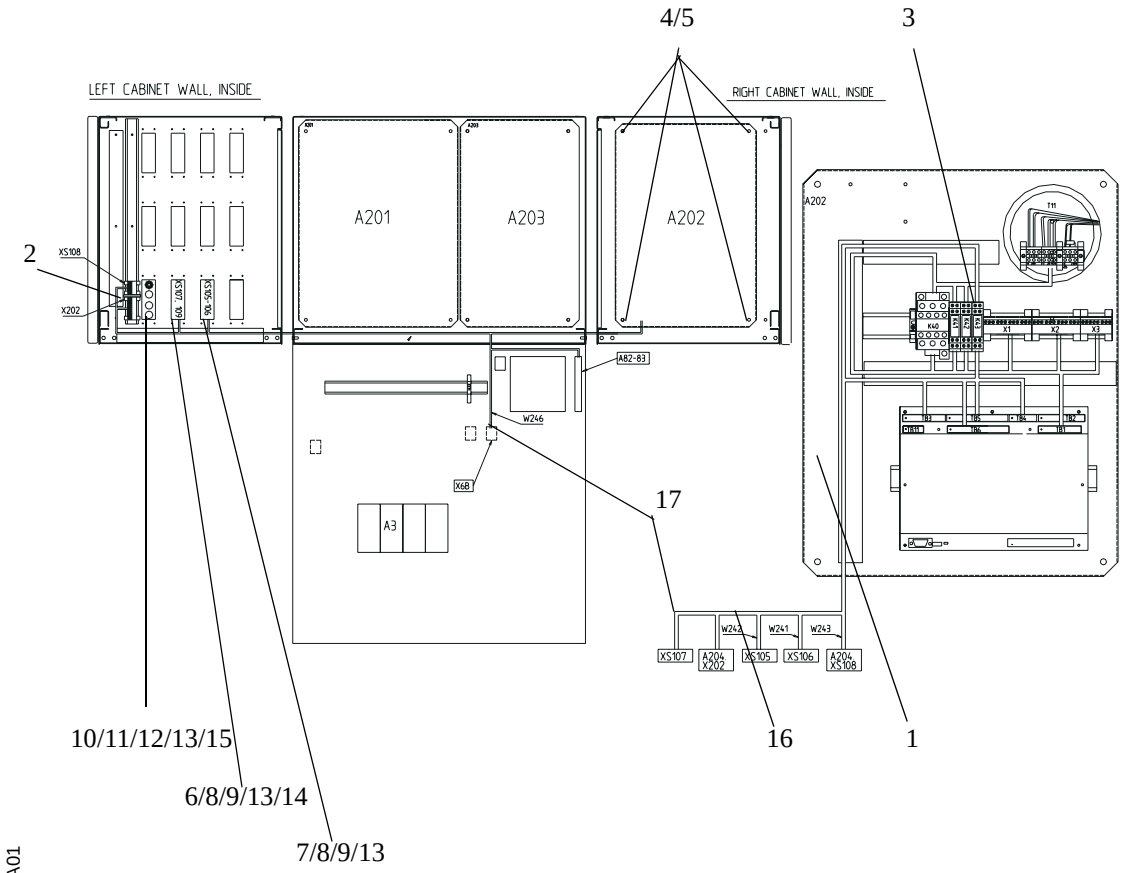
Reservdelar beställs genom ABB Automation Technology Products AB. Vid beställning var vänlig uppge typ och tillverkningsnummer samt benämningar och beställningsnummer enligt reservdelsförteckningen.

Rätt till ändring av specifikationer utan avisering förbehålles.

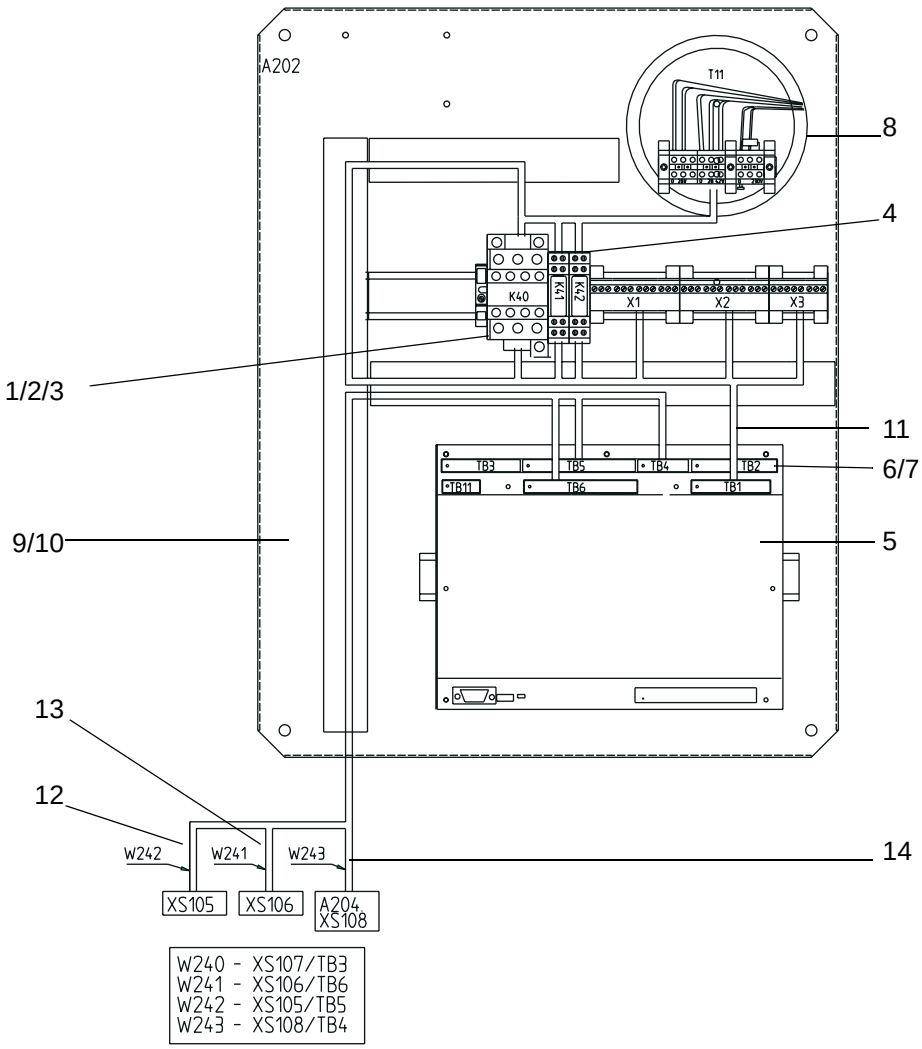
Spare parts are to be ordered from ABB Automation Technology Products AB. Kindly indicate type of unit, serial number, denominations and ordering number according to the spare parts list.

Rights to reserved to alter specifications without notice.

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		503 360-880	**Processutrustning**	**Process equipment**	**LRC**
1		502 501-880	Gem.det. matarverk 42V	Common details wire feed unit 42V	
2		436 829-009	Jordklämma	Clamp	
3		500 861-881	Säkerh.relä kompl.2växl	Safety relay compl. 2 change over contact	
4		2126 011-09	Mutter	Nut	M8
5		2195 013-11	Bricka	Washer	
6		418 159-020	Täcklock fläns	Cover cap flange	8+12 pol
7		418 159-019	Täcklock fläns	Cover cap flange	19+23 pol
8		489 327-012	Skruv	Screw	M3X12
9		2126 011-03	Mutter	Nut	M3
10		193 715-152	Kåpa	Hood	
11		193 715-151	Delad kåpa, max 4 kablar	Shared hood, max 4 cables	
12		193 715-167	Blindpropp	Blind plug	
13		489 327-019	Skruv	Screw	M4X12
14		192 230-110	Blindpropp	Blind plug	D=20
15		193 715-159	Kabel tätning	Cable gland	D=9-10mm
16		502 797 880	Kabelstam LRB (ARCI-TEC II)	Cable harness LRB (ARCITEC)	
17		503 078-881	Int.kabel CANBUS W246 LRC	Int.cable CAN-bus W246 LRC	


4/5
3
LEFT CABINET WALL, INSIDE
RIGHT CABINET WALL, INSIDE
A201
A203
A202
2
XS108
X202
A82-83
W246
X6B
A3
17
W242
W241
W243
XS107
A201 X202
XS105
XS106
A204 XS108
A202
10/11/12/13/15
16
1
6/8/9/13/14
7/8/9/13
503360A01

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		502 501-880	**Gem. detaljer till matarverk 42V**	**Common details to wire feed unit 42V**	
1		193 751-055	Kontaktor	Contactor	
2		193 861-002	Förstärkarblock	Amplifier block	
3		193 751-105	Hjälpkontaktblock	Auxilliary contact block	
4		500 861-881	Säkerh.relä kompl.2växl	Safety relay compl. 2 Change over contact	
5		501 700-880	Process interface board	Process interface board	PIB
6		489 947-244	Anslutningsdon, Combi-Con	Connector, CombiCon	7pol
7		500 958-001	Insticksbrygga	Address key	7-pol
8		501 714-001	Trafo PIB standard	Transformer PIB standard	
9		418 883-006	Kabelkanal	Cable trunking	
10		489 327-025	Skruv	Screw	M5X8
11		502 777-880	Kabelstam	Cable harness	
12		503 251-880	Kabel till matarverk, internt 1	Cable to wire feed unit, internal 1	W241
13		503 254-880	Kabel till matarverk, internt 2	Cable to wire feed unit, internal 2	W242
14		503 257-880	Kabel, BullsEye/TC	Cable, BullsEye/TC	W243


A202
T11
8
4
K40
X1
X2
X3
1/2/3
11
TB3
TB5
TB4
TB2
6/7
TB11
TB6
TB1
9/10
5
13
12
W242
W241
W243
14
XS105
XS106
A204
XS108
W240 - XS107/TB3
W241 - XS106/TB6
W242 - XS105/TB5
W243 - XS108/TB4

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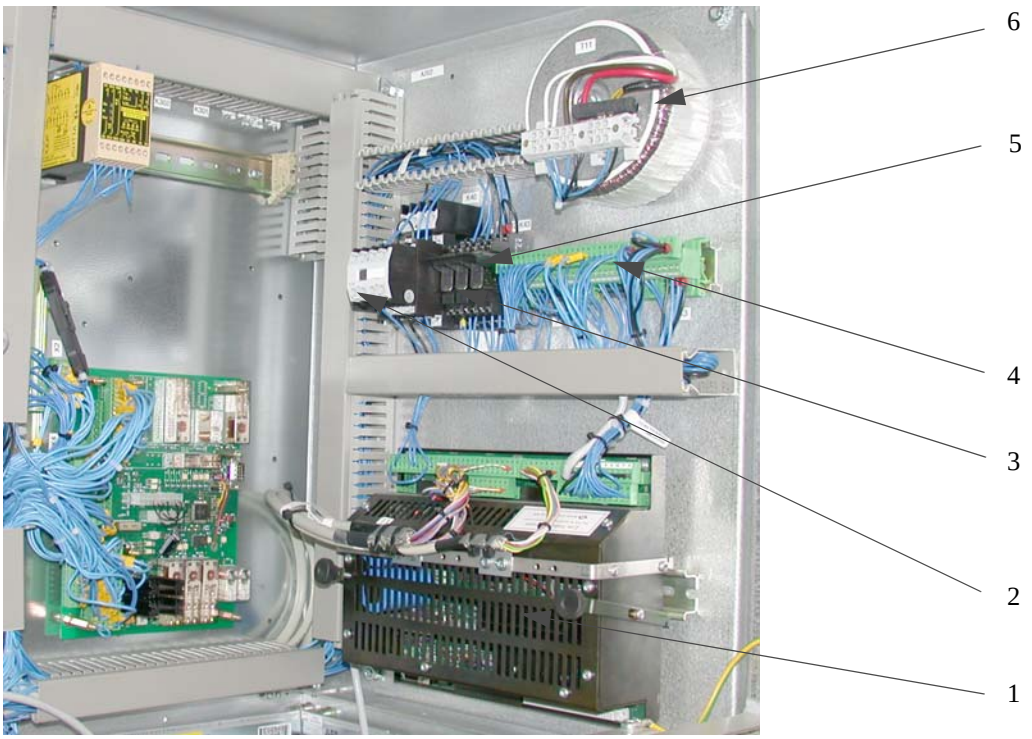
4.14 Power source ARCITEC-LRB ALUMINIUM

There is a modular based interface between the control system and component welding equipment fitted on the right-hand side, inside the top cabinet.



1 PIB

2 Main contactor

3 Interlock relays

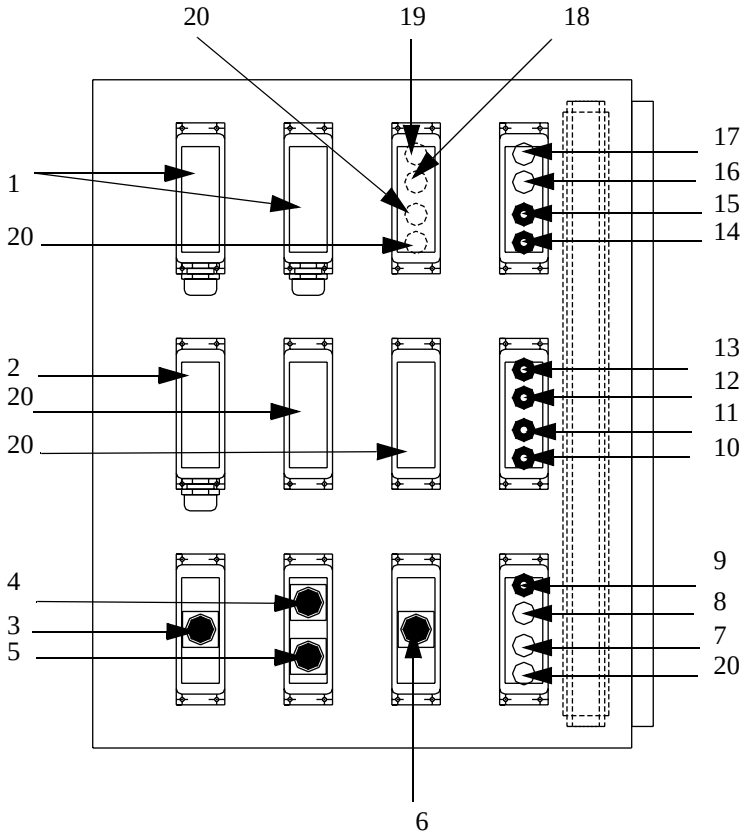
4 Signal connection

5 Auxiliary fan, cooling unit

6 Transformer

- The interface is fitted with internal wiring for connection to the robot control system.

- The cable harness to external equipment is connected to the output on the left-hand side of the top cabinet or to jackable terminals mounted internally by the two-piece cable gland. Internal cables for control signals to the welding power source are also connected here.



Output 2

1. Positioner
2. Conveyor motor/resolver
3. Operator’s panel
4. Wire feed unit motor
5. Wire feed unit - signal
6. Power source
7. Wire cutter
8. TCP tool
9. Mechanical cleaner
10. Timer reset stn 2
11. Timer resetting stn 1
12. Light barrier 2
13. Light barrier 1
14. Gate switch
15. Gate reset
16. Activation unit work area 2/Home Sensor 2
17. Activation unit work area 1/Home Sensor 1
18. Limit switch for conveyor
19. Position indicator for conveyor
20. Spare

Power supply

The voltage supply consists of a ring core transformer with double secondary windings 230/(42) 28/28V AC (see technical specification for PIB).

This feeds the motor regulator part on the process control card with 115V AC and the rectifier part on the process control card with 28V AC.

4.14.1 OPERATION and CONNECTIONS

Emergency stop

Cabinet_S4Cplus_12

1 Motors on

2 Emergency stop

3 Operating mode selector

4 Running time meter

All emergency stop buttons included in the system are as standard connected in series and directly affect the control system's emergency stop loop.

There is a possibility of connecting this in series with the other push buttons in the system if the process equipment is fitted with emergency stop push button.

The equipment is normally interlocked via the emergency stop relay on the control system's panel card A81.

The "Extended emergency stop function" option gives the possibility of supplementing the equipment with components. Optional redundant auxiliary relays can then be easily connected for this purpose.

Figure 33 and Figure 34 below show the theory behind how the emergency stop loop is used to control connected equipment.

For detailed information about the design of the emergency stop loop refer to the ***"The robot's User's Manual"***

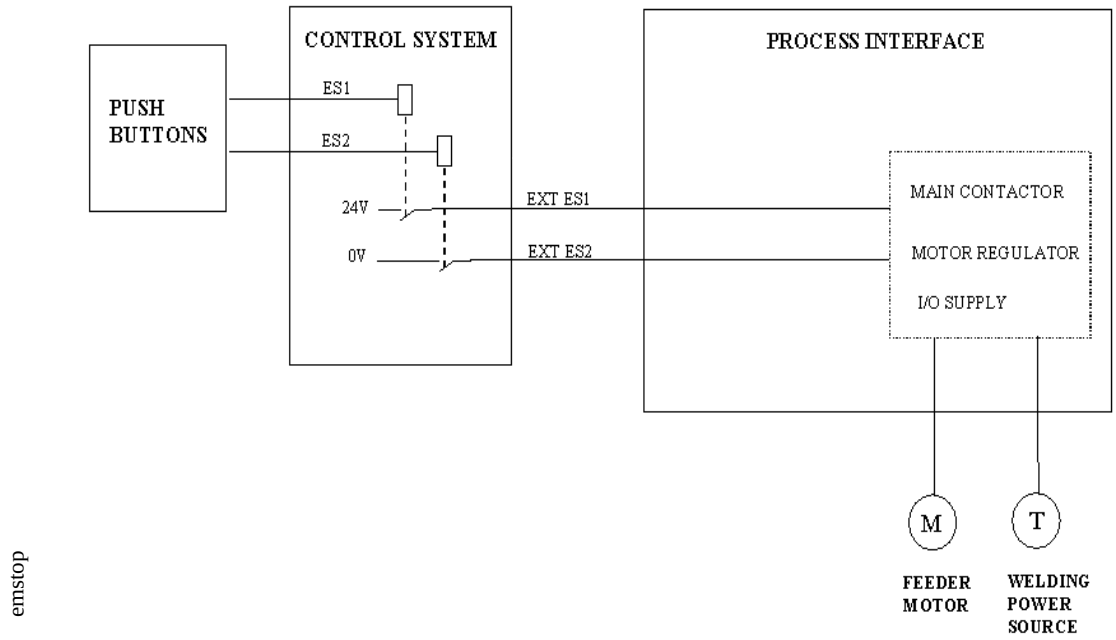


Figure 33 Emergency stop loop

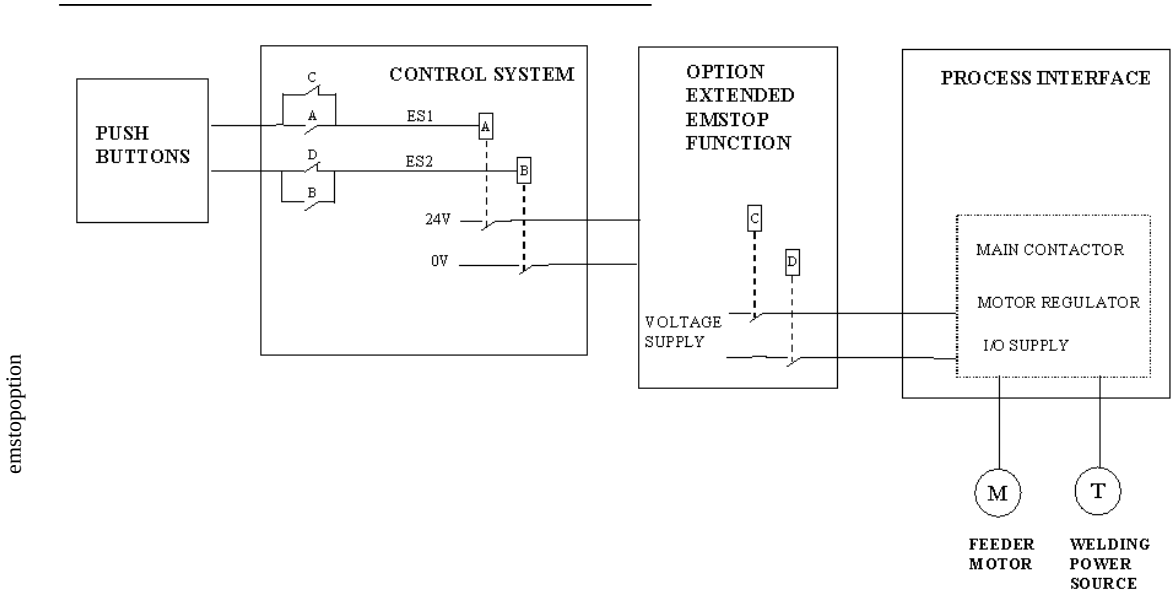


Figure 34 Emergency stop loop with the addition "Extended emergency stop function"

4.14.2 Interlocks

Operating stop loop

Figure 35 below shows the theory behind how the operating stop loop is used to control connected equipment.

For detailed information about the design of the operating stop loop refer to the ***"The robot's User's Manual"***

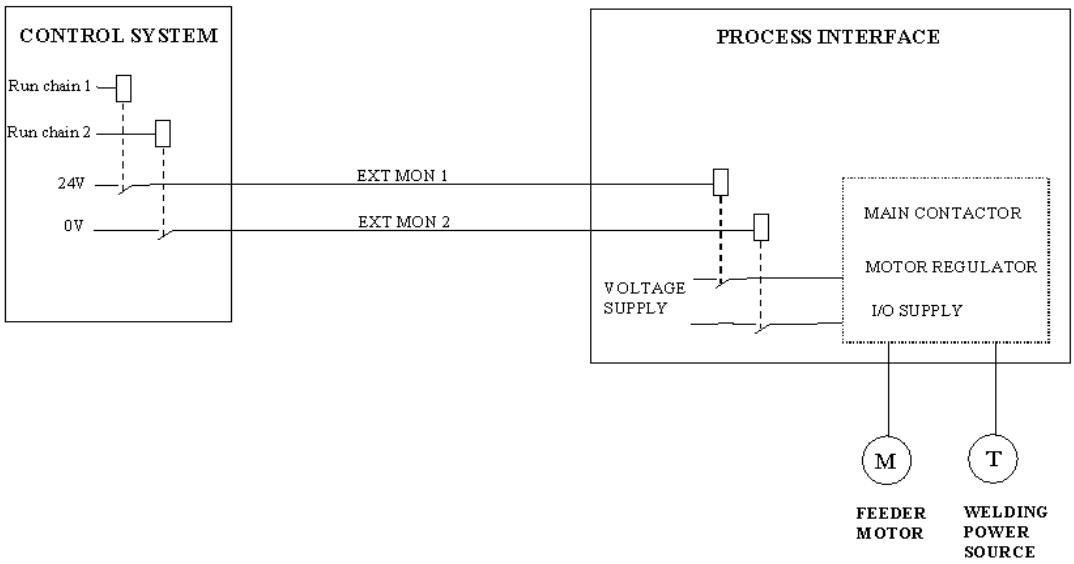


Figure 35 Operating stop loop

Two channel break up of the operating stop loop on the process control card.

In order to run the wire feed motor and welding equipment in all operating modes requires:

- all safety loops to be intact and
- that the system has been started (MOTORS_ON).

In order to run the wire feed motor at a limited speed requires:

- the emergency stop loop to be intact
- operating mode "MAN" and the system set to "MOTORS OFF"

CAN-bus

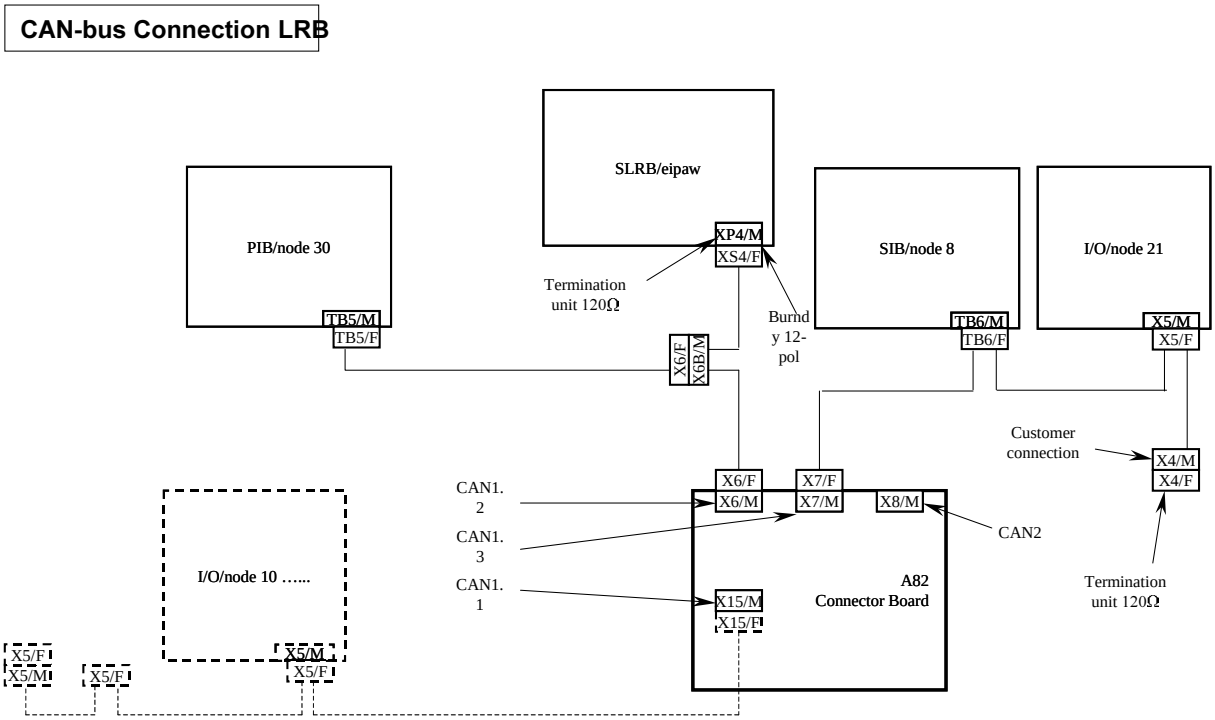
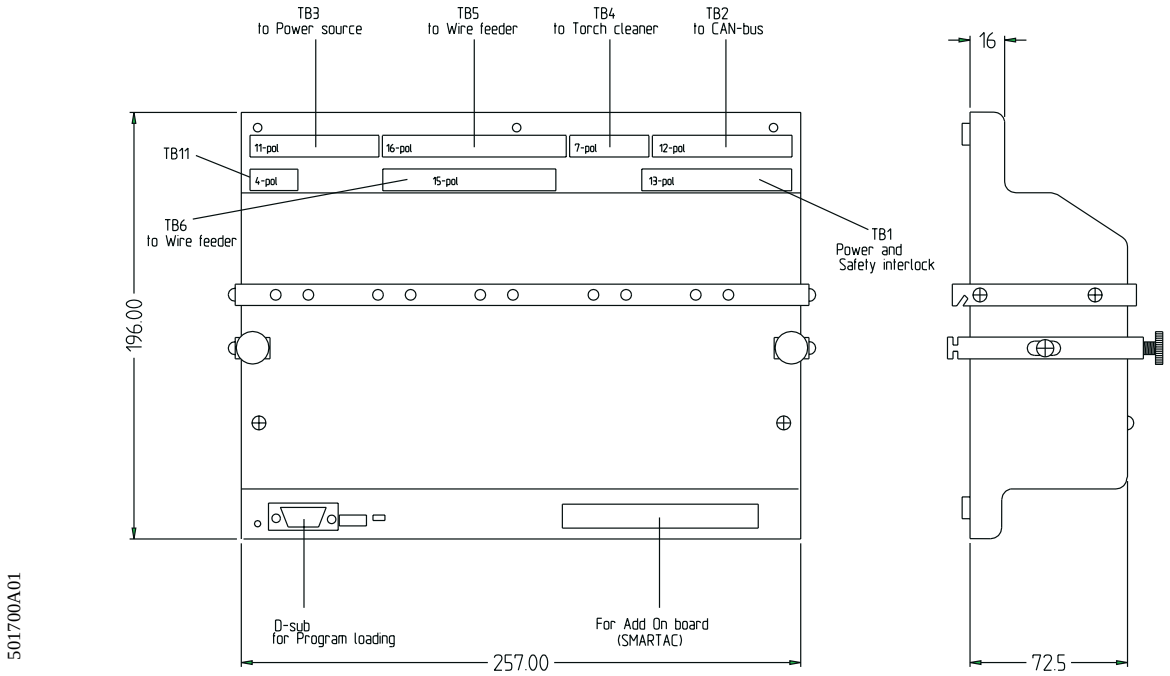


Figure 36 CAN-bus

- The welding power source is connected to the control system's CAN-bus channel CAN1.2, output X6 on contact card A82, using a branch cable.
- The process control card's connection cable is connected to the same CAN-bus channel via output X6B on this branch cable.
- The connection cable should be fitted with a termination resistance, 120Ω.

Process control card

The control card houses the hardware and software for control and regulation of the arc welding equipment.



See the Product Manual for the welding equipment/S4Cplus.

4.14.3 Connecting integrated welding power sources

1 The cables for the supply voltage are connected to the control cabinet's main power switch.

2 Connections for communication with the control cabinet's CAN-bus are made to output X6 on contact card A82

3 Cables for control signals to welding power sources type LRB are connected to the jackable terminal X202.

4 See the separate manual in the section "Power Source" for a description of included welding power sources.

4.14.4 Connections for external equipment

Feed mechanism system

Feed mechanism system types A314E, A324E-L resp. A314i ALU and A324iL ALU are connected to outputs XS105 and XS106

- See the separate manual in the section "Process equipment" chapter PIB for a description of included feed mechanism systems.

Other accessories

1 The equipment is prepared for the connection of, e.g. mechanical cleaners and calibration tools.

2 Cabling from the welding gun equipment is inserted through the two-piece cover and is connected to the jackable terminal X108 located on the left-hand side, inside the top cabinet

3 See the separate manual under section "Cooling unit" and "Gun service unit" for a description of component products.

4 A cooling unit is required if a water cooled gun is included.

- The cable from the cooling unit is inserted through the two-piece cover and is connected to the jackable terminal X202 located on the left-hand side, inside the top cabinet
- See the separate manual under section "Cooling unit" for a description of the cooling unit.

4.15 Spare Parts List

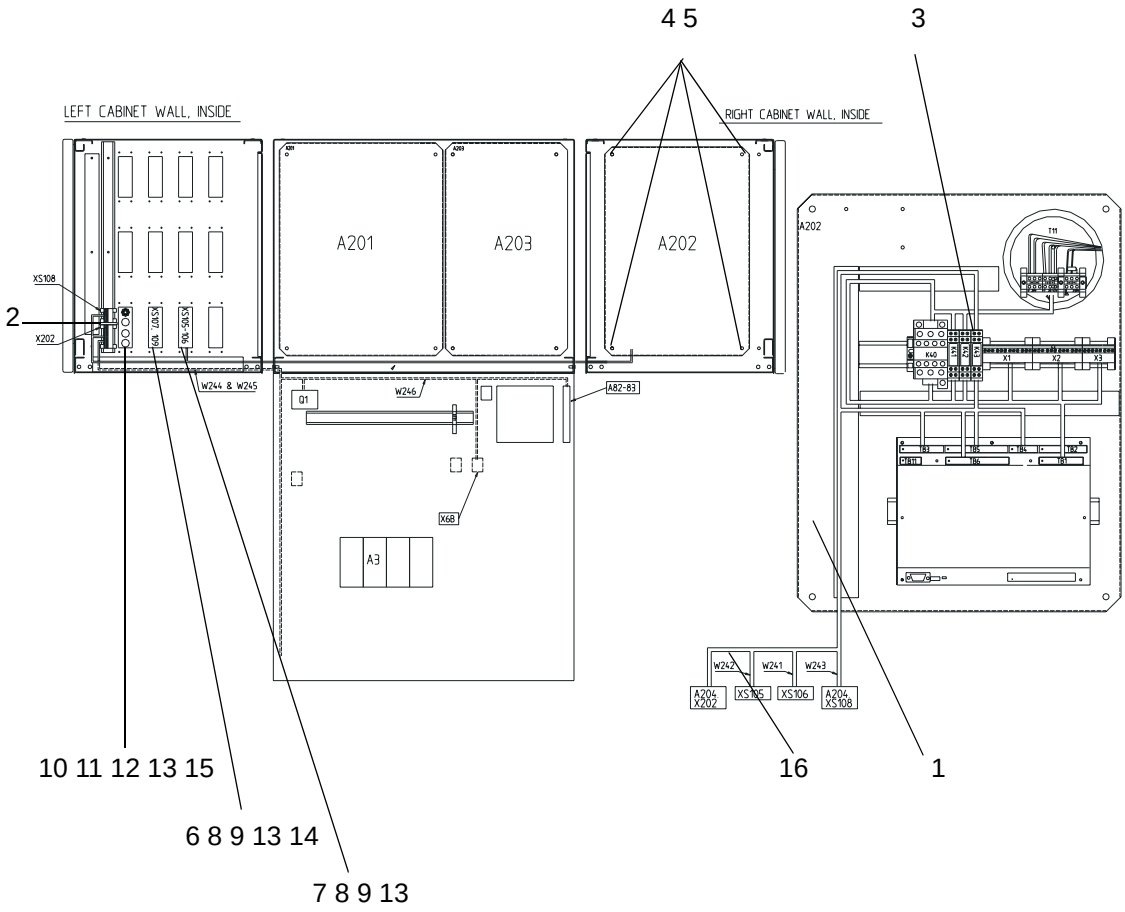
Reservdelar beställs genom ABB Automation Technology Products AB. Vid beställning var vänlig uppge typ och tillverkningsnummer samt benämningar och beställningsnummer enligt reservdelsförteckningen.

Rätt till ändring av specifikationer utan avisering förbehålles.

Spare parts are to be ordered from ABB Automation Technology Products AB. Kindly indicate type of unit, serial number, denominations and ordering number according to the spare parts list.

Rights to reserved to alter specifications without notice.

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		502 891-880	**Process utrustning, Aluminium**	**Process equipment, Aluminium**	**7 kg**
1		502 501-880	Gem.det. matarverk 42V	Common details wire feed unit 42V	
2		436 829-009	Jordklämma	Clamp	
3		500 861-881	Säkerh.relä kompl.2växl	Safety relay compl. 2 change over contact	
4		2126 011-09	Mutter	Nut	M8
5		2195 013-11	Bricka	Washer	
6		418 159-020	Täcklock fläns	Cover cap flange	8+12 pol
7		418 159-019	Täcklock fläns	Cover cap flange	19+23 pol
8		489 327-012	Skruv	Screw	M3X12
9		2126 011-03	Mutter	Nut	M3
10		193 715-152	Kåpa	Hood	
11		193 715-151	Delad kåpa, max 4 kablar	Shared hood, max 4 cables	
12		193 715-167	Blindpropp	Blind plug	
13		489 327-019	Skruv	Screw	M4X12
14		192 230-110	Blindpropp	Blind plug	D=20
15		193 715-159	Kabel tätning	Cable gland	D=9-10mm
16		502 797 880	Kabelstam LRB (ARCI-TEC II)	Cable harness LRB (ARCITEC)	


4 5
3
LEFT CABINET WALL, INSIDE
RIGHT CABINET WALL, INSIDE
A201
A203
A202
A202
XS108
2
X202
W244 & W245
Q1
W246
A82-83
X68
A3
W242
W241
W243
A204 X202
XS105
XS106
A204 XS108
10 11 12 13 15
6 8 9 13 14
7 8 9 13
16
1

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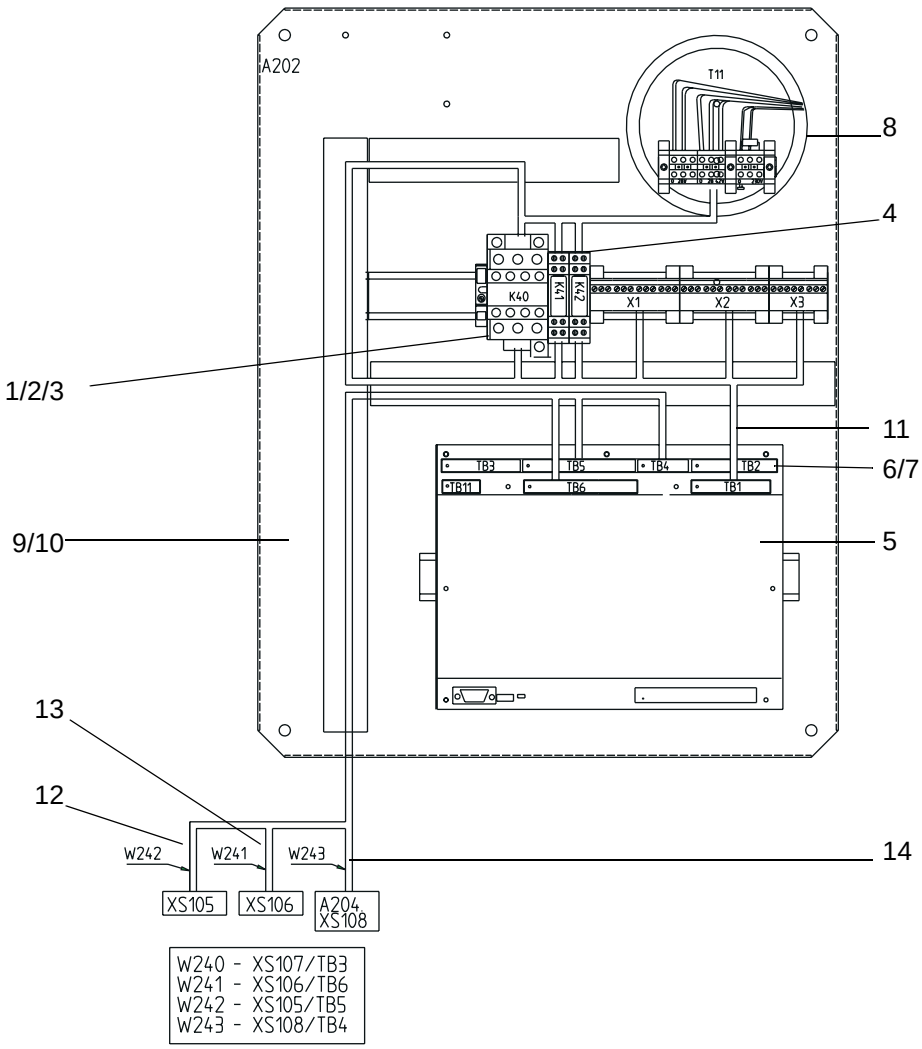
Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		502 501-880	**Gem. detaljer till matarverk 42V**	**Common details to wire feed unit 42V**	
1		193 751-055	Kontaktor	Contactor	
2		193 861-002	Förstärkarblock	Amplifier block	
3		193 751-105	Hjälpkontaktblock	Auxilliary contact block	
4		500 861-881	Säkerh.relä kompl.2växl	Safety relay compl. 2 Change over contact	
5		501 700-880	Process interface board	Process interface board	PIB
6		489 947-244	Anslutningsdon, Combi-Con	Connector, CombiCon	7pol
7		500 958-001	Insticksbrygga	Address key	7-pol
8		501 714-001	Trafo PIB standard	Transformer PIB standard	
9		418 883-006	Kabelkanal	Cable trunking	
10		489 327-025	Skruv	Screw	M5X8
11		502 777-880	Kabelstam	Cable harness	
12		503 251-880	Kabel till matarverk, internt 1	Cable to wire feed unit, internal 1	W241
13		503 254-880	Kabel till matarverk, internt 2	Cable to wire feed unit, internal 2	W242
14		503 257-880	Kabel, BullsEye/TC	Cable, BullsEye/TC	W243


A202
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K40
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X2
X3
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TB3
TB5
TB4
TB2
6/7
TB11
TB6
TB1
9/10
5
13
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W242
W241
W243
14
XS105
XS106
A204
XS108
W240 - XS107/TB3
W241 - XS106/TB6
W242 - XS105/TB5
W243 - XS108/TB4

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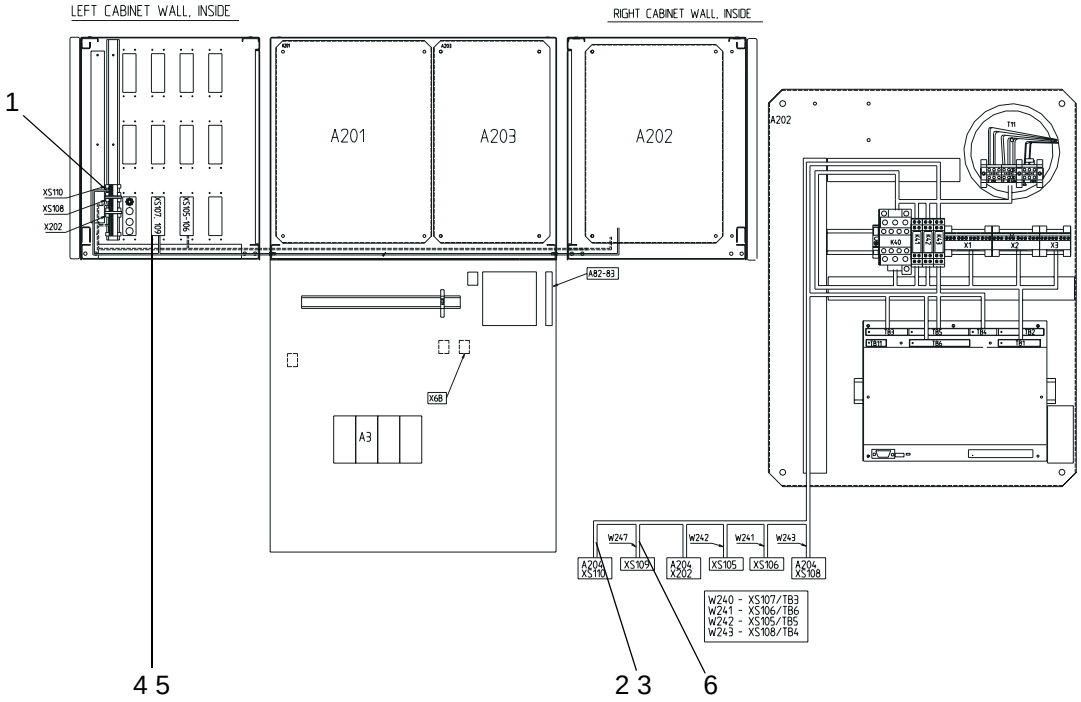
Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		502 891-881	**Process utrustning, Aluminium**	**Process equipment, Aluminium**	**40 kg**
X		502 891-880	Proc.utr. ALUMINIUM 7kg	Proc.equip. ALUMINIUM 7kg	see earlier page
1		489 947-445	Anslutningsdon, Combi-Con	Connector, CombiCon	6 pol
2		193 817-004	Ändhylsa	End bracket	
3		502 940-101	Enledarkabel	Single core	
4		489 327-012	Skruv	Screw	M3X12
5		212 601-103	Mutter	Nut	M3
6		503 087-880	Kabelm internt. OPT:ALU	Cable, internal. OPT.ALU	W247


LEFT CABINET WALL, INSIDE
RIGHT CABINET WALL, INSIDE
1
A201
A203
A202
XS110
XS108
X202
A82-83
X68
A3
A202
W247
W242
W241
W243
A204 XS110
XS109
A204 X202
XS105
XS106
A204 XS108
W240 - XS107/TB3
W241 - XS106/TB6
W242 - XS105/TB5
W243 - XS108/TB4
4 5
2 3
6

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5 Interface for operator communications and safety

5.1 General

There is complete equipment available for operator communications and safety supervision adapted to the system for station solutions where the layout follows standard layout principles.

Through the addition of different accessories for this equipment, handling can be adapted to meet special requirements.

Operator communication

Communication between the operator and the control system takes place via a panel with push-buttons and status lamps.

Operations and acknowledgements are converted to digital input and output signals.

5.1.1 Safety functions

Emergency stop loop

All emergency stop buttons included in the station are usually connected to the control system’s emergency stop loop. If one of these push-buttons is activated all dangerous machine movement is stopped immediately and the system is set in "Motors off mode".

Operating stop loop

Connected safety supervision equipment normally works with the control system’s operating stop loop. If something unpermitted occurs either the general stop or auto stop is tripped depending on the incident.

This results in dangerous machine movement being stopped immediately and the system being set in "Motors off mode".

For further information about the design of the safety system refer to the robot’s "User Guide".

Note! Connected safety functions must not be overridden under any circumstances. This can result in serious personal injury.

Read the instructions in the System Manual, chapter 1 "Introduction and Safety" before the station is used.

5.1.2 Accessories

The system is prepared for the connection of different accessories in order to optimise handling as required, these are:

- Operator panel
- Light barriers
- Gate supervision
- Timer resetting
- Home position/transport position indication
- Station indication with the service position
- Activation from extended programming area
- Roller door (FlexArc)

For further information about the safety equipment, refer to the Product Manual for the ***"Safety equipment"***

5.2 System solutions

Continuous status supervision of safety components, operator communications and moving machine parts is required in order to prevent personal danger when entering supervised areas.

This is provided by a circuit card for safety supervision, located in the top cabinet. The circuit card includes functions to immediately cut the control system's operating loop when a course of events occur that can result in personal danger.

Examples of events are:

- hardware failure in safety equipment
- incorrect operation
- carelessness
- machine fault

Safety equipment is designed according to category 4 described in EN 954-1, doubled and self-supervision.

The equipment can be adapted for optimal handling in each individual case by connecting different accessories to the circuit board.

5.2.1 Traditional welding robot station

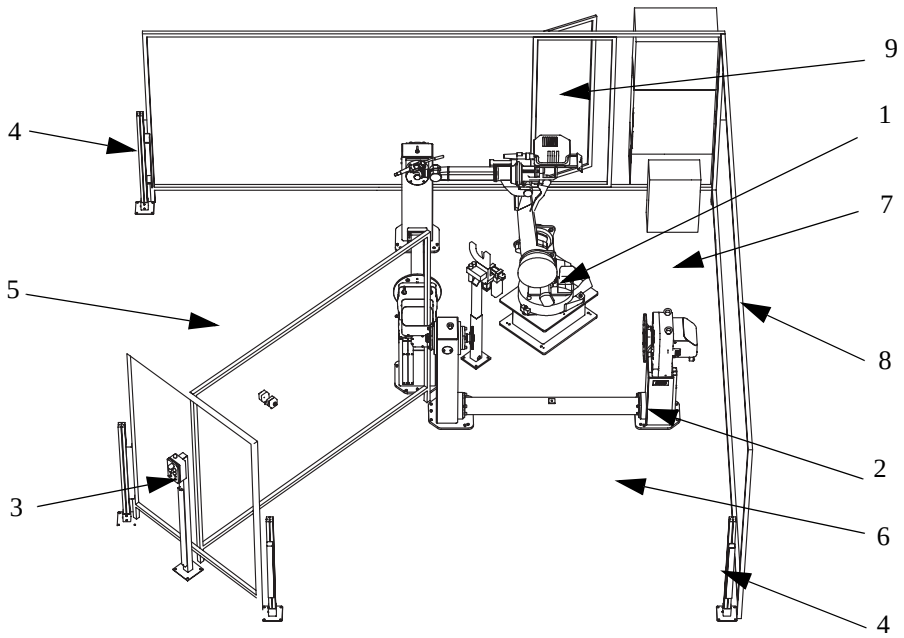


Figure 37 Traditional welding robot station

1	Robot	**6**	Supervised area station 2
2	Positioner	**7**	Supervised programming area
3	Operator panel	**8**	Barrier
4	Light barriers	**9**	Service door
5	Supervised area station 1		

5.2.2 FlexArc

FlexArc is a complete welding robot station built on a base plate including walls. The total solution gives easy connection and rapid start-up.

FlexArc always incorporates safety with a light barrier or roller door.

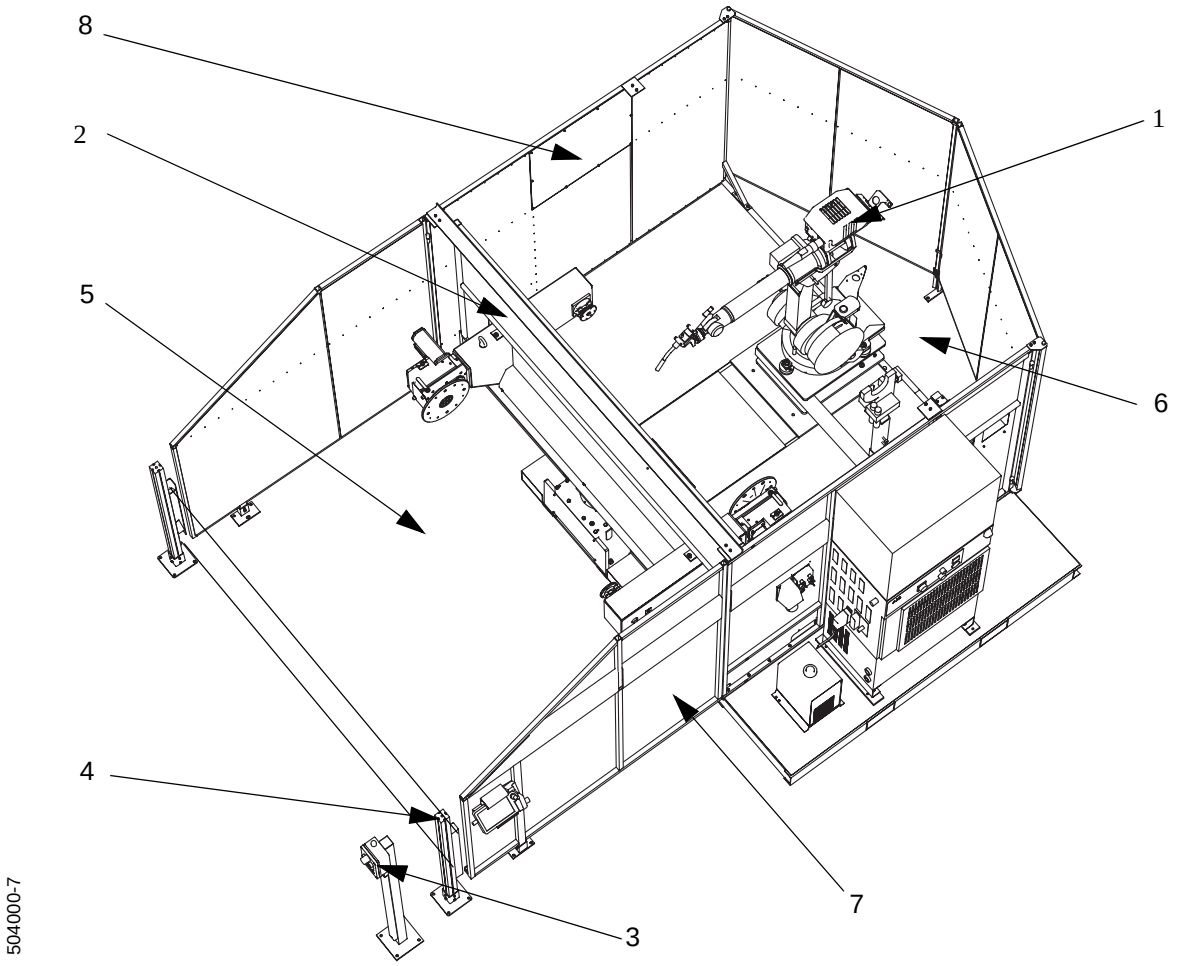


Figure 38 FlexArc 250R with light barriers

1	Robot	**5**	Supervised area
2	Positioner	**6**	Supervised programming area
3	Operator panel	**7**	Barrier
4	Light barriers	**8**	Service door

5.3 Connections

The cable harness to external equipment is connected to the output on the left-hand side of the top cabinet or to jackable terminals mounted internally by the two-piece cable gland.

5.3.1 General

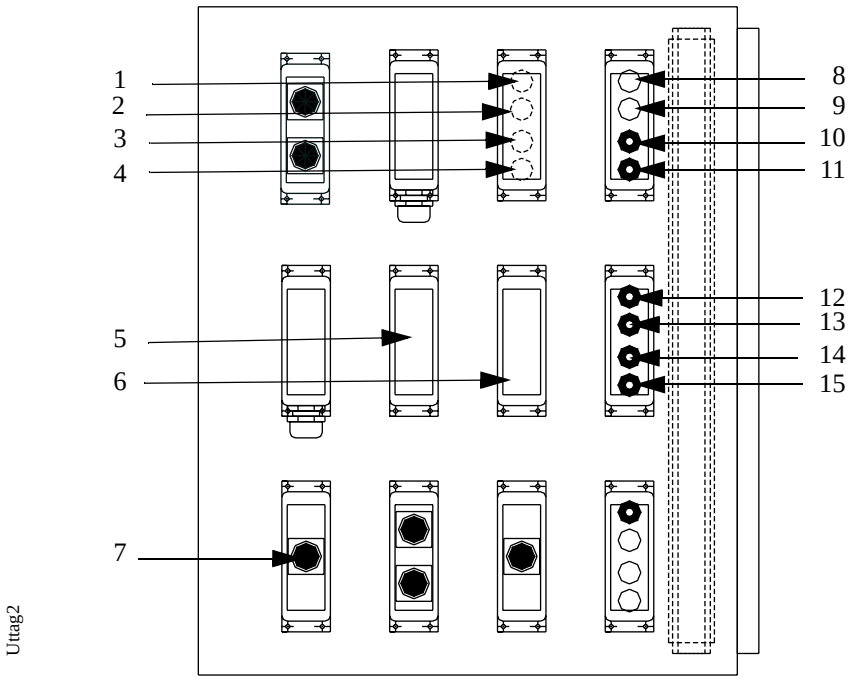


Figure 39 General connections

1 Gate switch	**10** Light curtain (återställnings-skydd) station 2
2 Gate reset	**11** Light barrier 2
3 Home position/transport indicator	**12** Activation unit working area 1
4 Position indicator for robot/travel track	**13** Timer resetting station 1/ Light curtain station 1
5 Roller door station 1	**14** Light curtain (återställnings-skydd) station 1
6 Roller door station 2	**15** Light barrier 1
7 Operator panel	
8 Activation unit working area 2	
9 Timer resetting station 2/ Light curtain station 2	

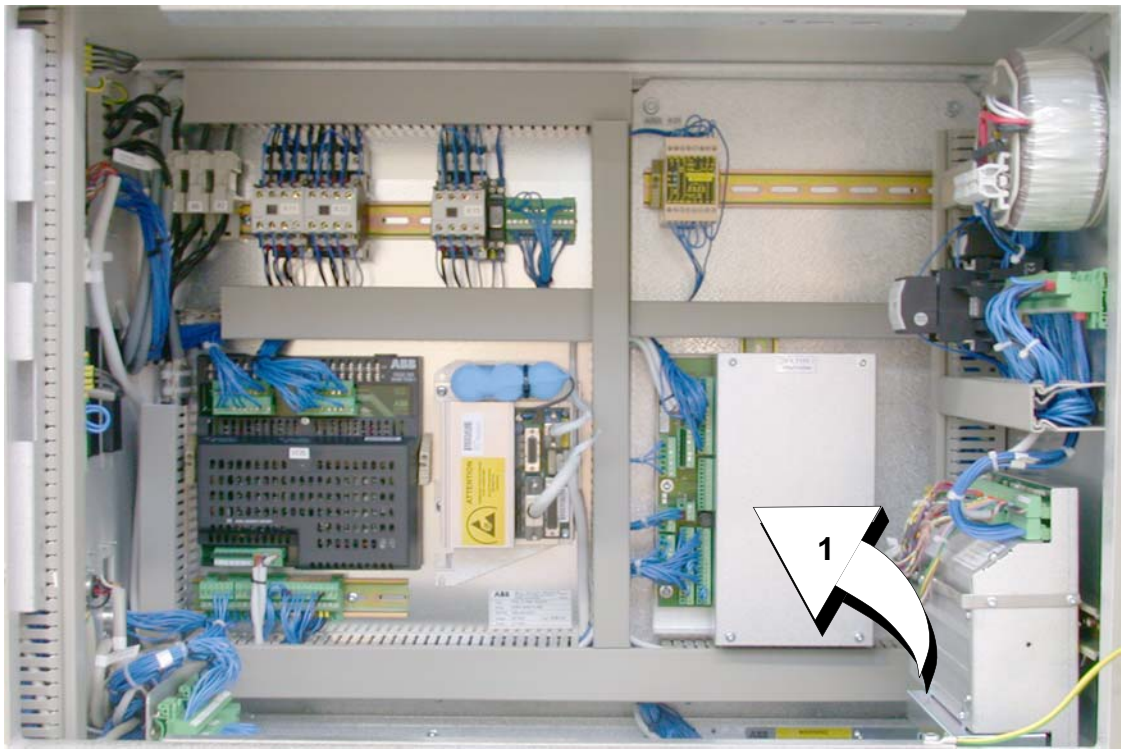
5.4 Operator communications for positioner types C/R/K

There is a modular based interface fitted to the left of the top cabinet's rear panel for operator communications and safety equipment.

The interface includes:

- a circuit card for safety supervision
- a cabling harness prepared for connection of external safety components.

skåpinsida.jpg



1 Circuit card for safety supervision SIB

Connections

External safety components are connected to the jackable terminal blocks fitted internally by the two-piece cable glands on the left-hand side of the top cabinet.

Any included standard components are connected according to Figure 40.

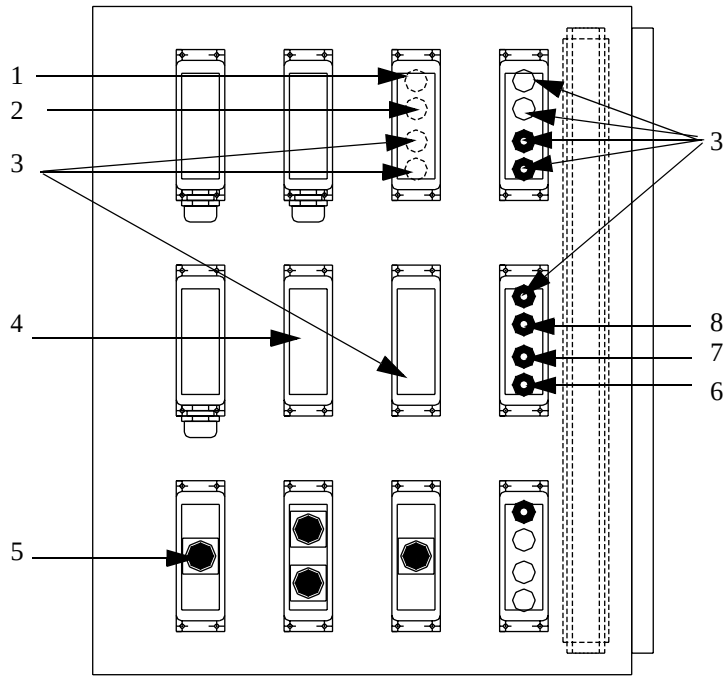


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Figure 40 Connections

1	Gate switch	**5**	Operator panel
2	Gate reset	**6**	Light barrier 1
3	Spare	**7**	Light curtain station 1
4	Roller door station 1	**8**	Timer resetting station 1/ Light curtain station 1

Power supply

The safety equipment is fed with 24V DC from an internal supply unit (24V I/O).

The supply to external safety components is fuse protected internally on the circuit card for safety supervision and may be loaded with max. 1.5 A continuously.

5.4.1 OPERATION and CONNECTIONS

Emergency stop

Cabinet_S4Cplus_12

1 Motors on

2 Emergency stop

3 Operating mode selector

4 Running time meter

All emergency stop buttons included in the system are as standard connected in series and directly affect the control system’s emergency stop loop.

Included on external safety equipment, available in the standard range, are:

- an emergency stop button on the operator’s panel
- an emergency stop button on the equipment cabinet for the roller door.

The "Extended emergency stop function" option gives the possibility of supplementing equipment with components for, e.g. gate interlocking via the emergency stop of fixtures.

Optional redundant auxiliary relays can then be easily connected for this purpose.

The following two figures show the theory behind how the emergency stop loop is used to control the connected equipment.

For detailed information about the design of the emergency stop loop refer to the ***"The robot's User's Manual"***

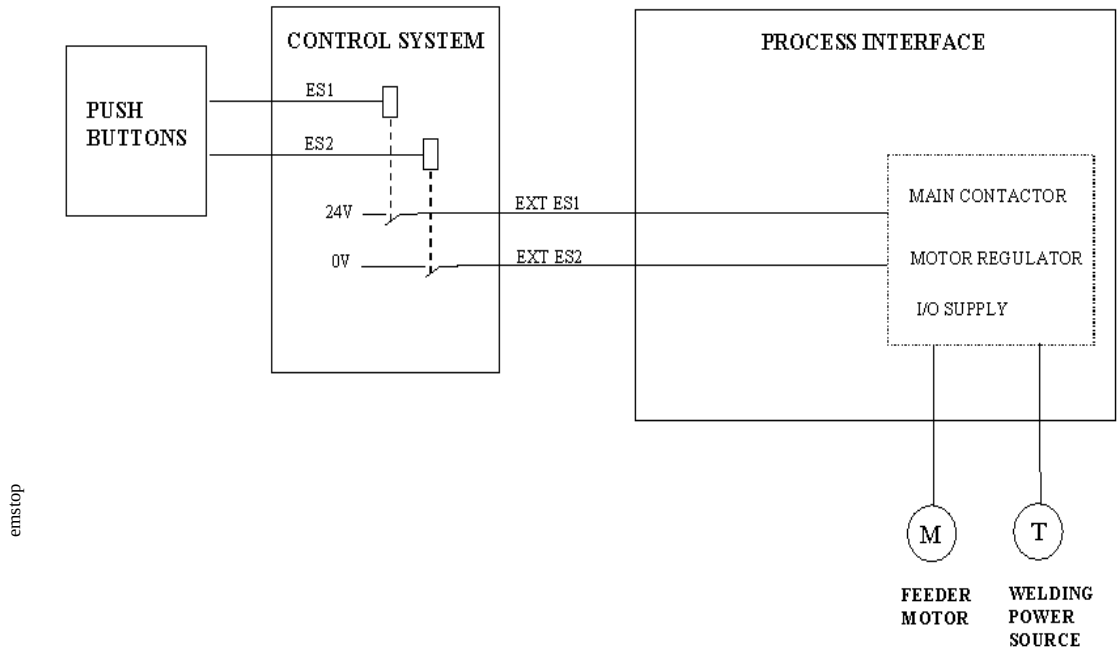


Figure 41 Emergency stop loop

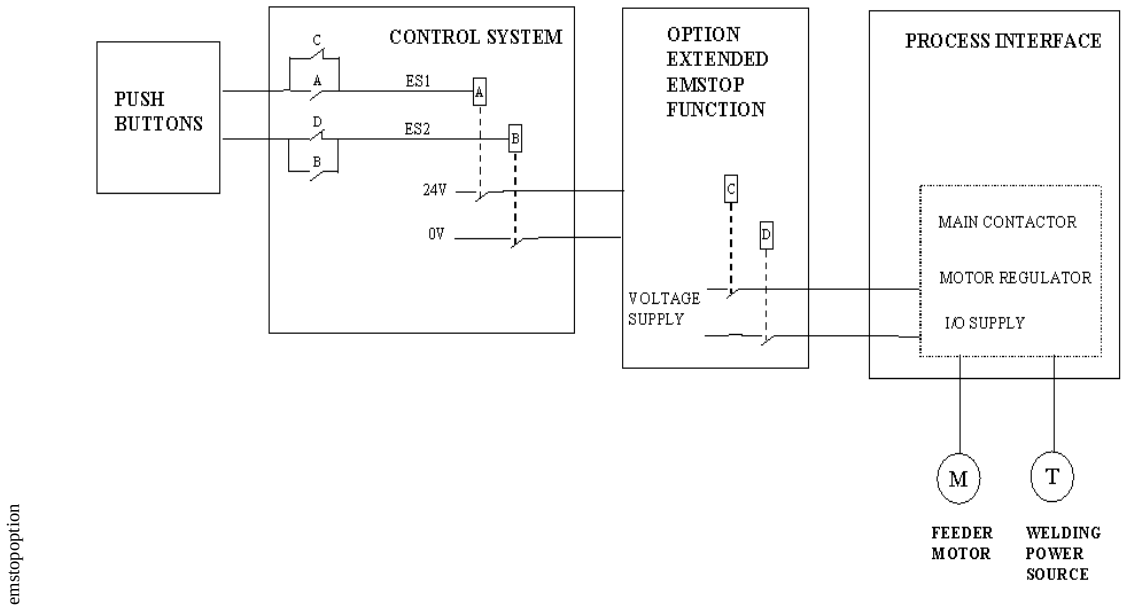


Figure 42 Emergency stop loop with the addition "Extended emergency stop function"

5.4.2 Interlocks

Operating stop loop

The figure below shows the theory behind how the operating stop loop is used to control connected equipment.

For detailed information about the design of the operating stop loop refer to the ***"The robot's User's Manual"***

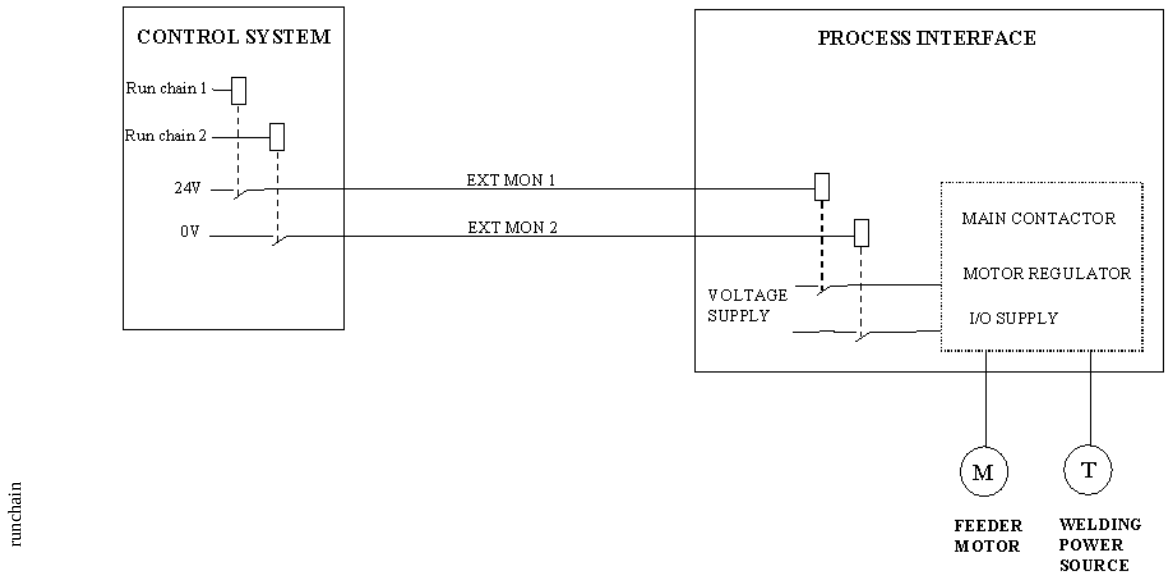


Figure 43 Operating stop loop

Two channel break up of the operating stop loops takes place using the circuit card for safety supervision and the gate switch.

The safety functions on the circuit card are connected to the:

- "GENERAL STOP"

The gate switch is connected to the:

- "AUTO STOP".

In order to run the robot and positioner in the "AUTO" operating mode requires:

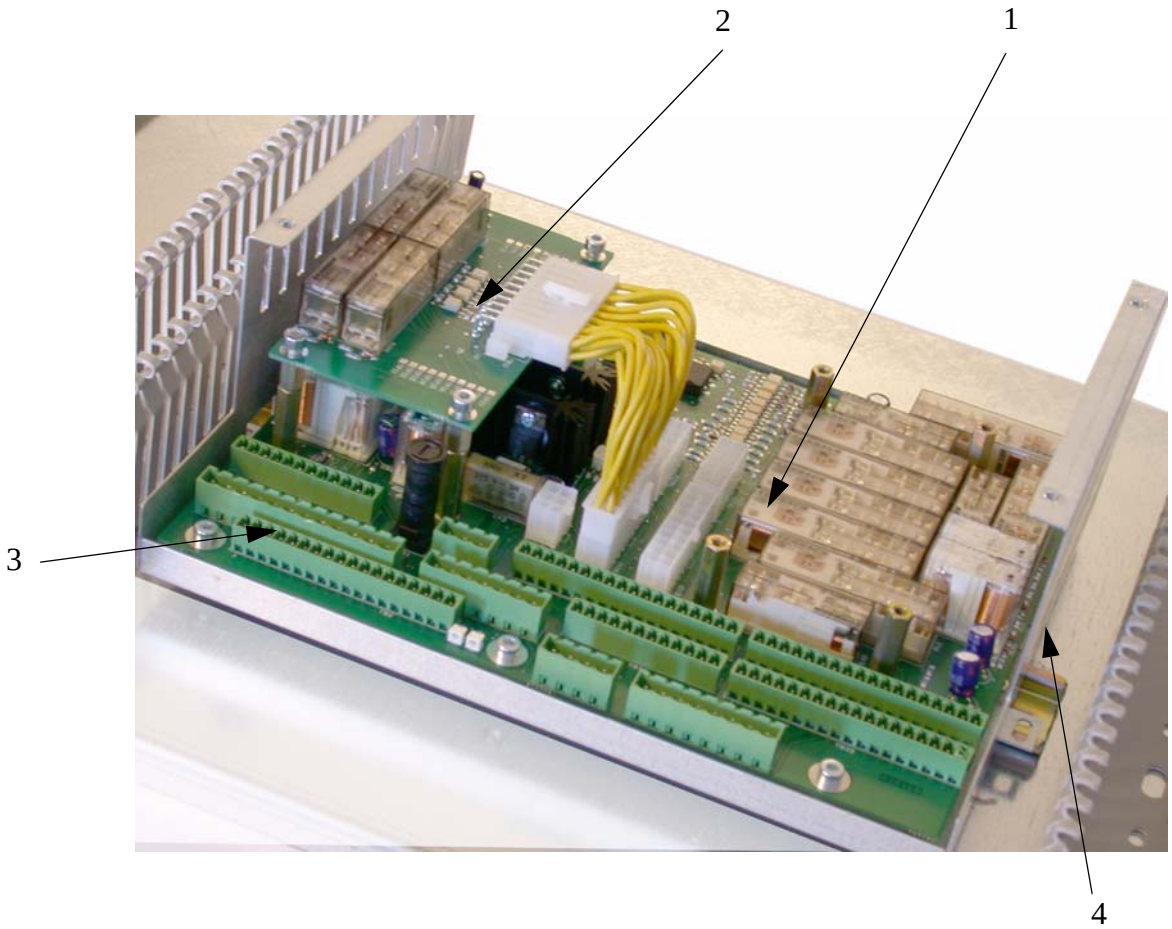
- all safety loops to be intact and
- that the system has been started (MOTORS_ON).

Operation of the positioner's station switching unit and work station in the supervised area is not permitted in the MAN FS (Mode MANUAL - Full speed) operating mode.

Circuit board for supervision

The circuit card includes functions for the supervision of:

- entry protection (light barriers, roller door)
- station mode (limit switch)
- activated positioner axes (engaging and disengaging the motors)



Figur 44 Safety module with option card.

1	Safety module	**3**	Connection
2	Option card	**4**	Enclosure

The functions are built up of safety components, where the function and status of these are supervised via the CAN bus by the control system.

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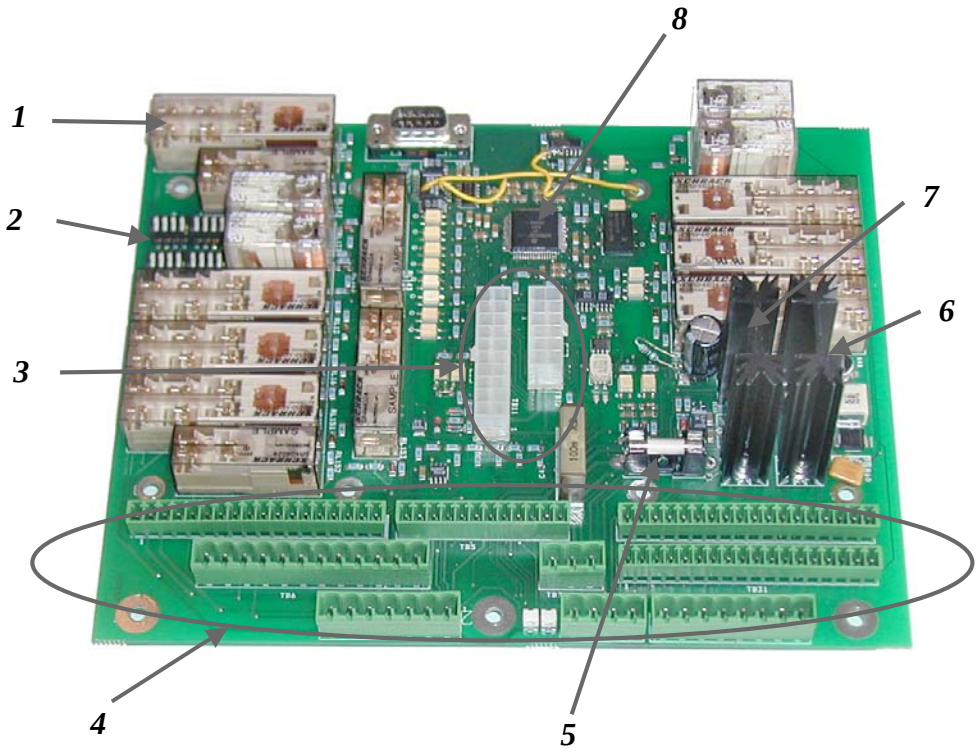


Figur 45 Module for safety surveillance.

1	Safety relays	**5**	Fuse
2	DIL switch	**6**	Voltage regulator
3	Internal connections	**7**	Voltage regulator
4	External connections	**8**	CAN-processor

The safety functions can be expanded using different option cards connected to the circuit card depending on the selected station solution.

5.5 Connection instructions

5.5.1 Connection of the supply voltage

The SIB V module safety circuits are fed with a 24V DC voltage.

- The supply is connected to the jackable terminal TB7.

If necessary, the 0 V level on the supply voltage can be assured by

- connecting a potential equalising conductor to the earth potential in the environment where the ***SIB V*** module is located.

Normally the supply is connected to the control cabinet's voltage supply to the I/O system (24V I/O, 0V I/O), but the safety system can also be connected to its own power supply.

The SIB V module's CAN bus system is galvanically isolated from the other circuits and receives its supply via the control system's CAN-bus loop on the jackable terminal TB6.

The outgoing voltage supply to the connected safety components is fuse protected internally on the ***SIB V*** module and may be loaded with max 1.5 A continuously.

The voltage can be accessed on the jackable terminal TB3.

In Figure 46 - Figure 49 some different connection options to TB7 and TB3 are shown.

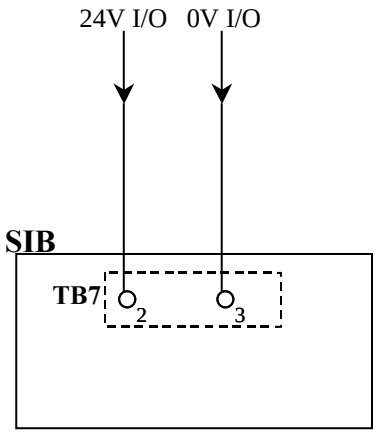


*Figure 46 Internal voltage supply of the safety module **SIB V***

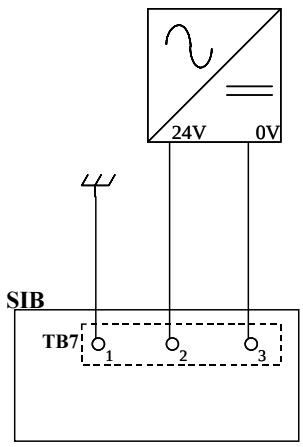


*Figure 47 External voltage supply of the safety module **SIB V***

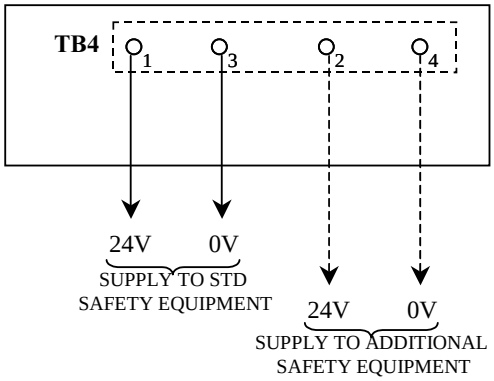


Figure 48 Supply to External safety components <1.5A

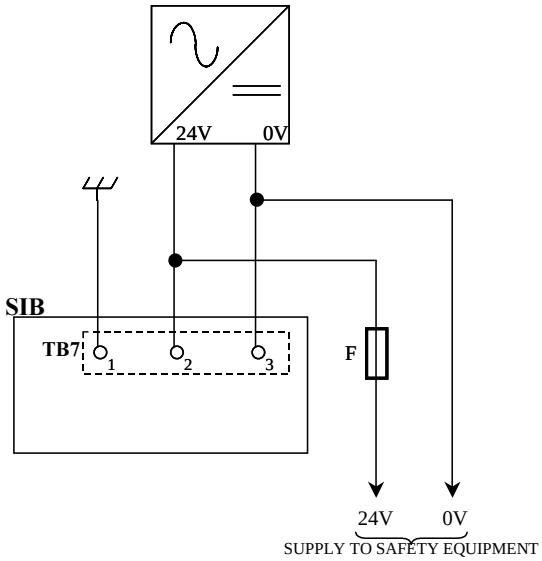


Figure 49 Supply to External safety components >1.5 A

5.5.2 Entry protection

The SIB V module can be configured for the connection of entry protection with numerous safety output variants. This can be done without adding any extra components.

Entry protection can consist of:

- light barrier
- light curtain
- door/roller door with safety limit switch
- door/roller door with safety magnetic switch
- pressure mat
- zone detector

The safety outputs can be of the type:

- double NC (normally closed) relay contacts or safety switch contacts
- one NC and one NO (normally open) relay contact or safety switch contact
- double PNP transistor outputs
- one PNP transistor output and one NPN transistor output
- one PNP transistor output and an INVERTED PNP transistor output

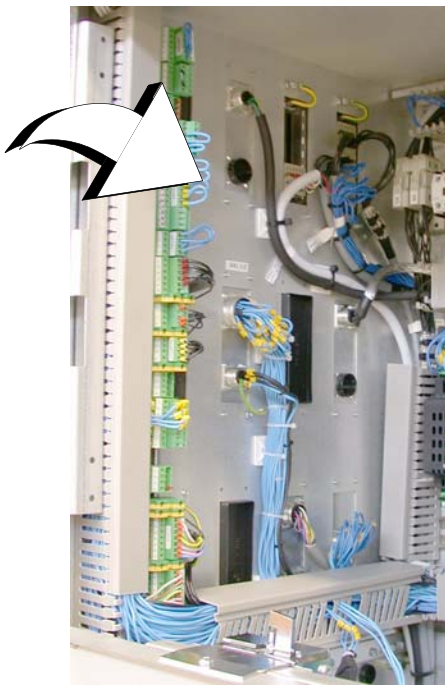
The connected entry protection should be designed to comply with category 4 in accordance with EN 954-1.

Connection

Connection/configuration of the entry protection is done on a jackable terminal located on the top left inside wall of the cabinet.

- Equipment for area 1 is connected to X41
- Equipment for area 2 to X42.

Cable entry can easily be made through the two-piece cover.



The output signals are distributed from the jackable terminals on the entry protection to the ***SIB V*** module as set out in the example in Figure 51.

Note! Input A (24V) must be made at the same time or before input B (0V) in solutions according to Figure 56 in order to permit resetting of the safety circuit.

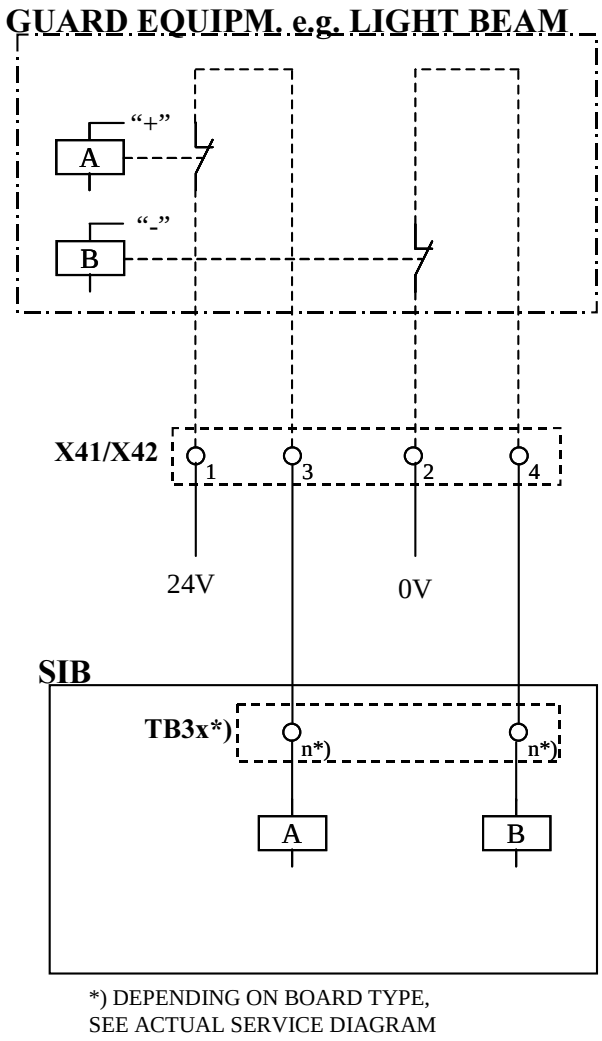


Figure 50 Entry protection with relay outputs. The status shown with active protection.

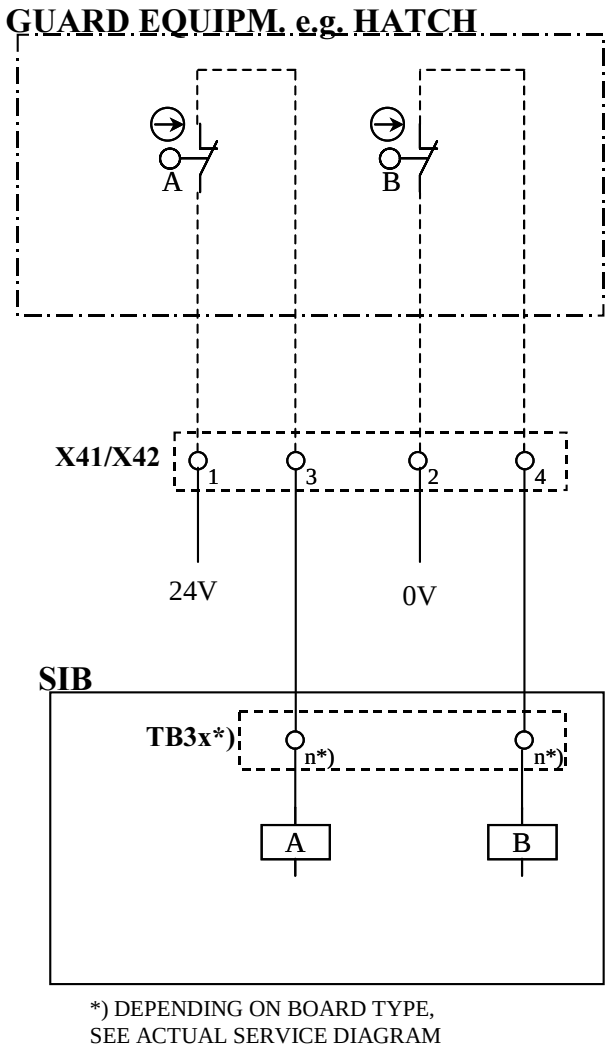


Figure 51 Entry protection with limit switch. The status shown with active protection.

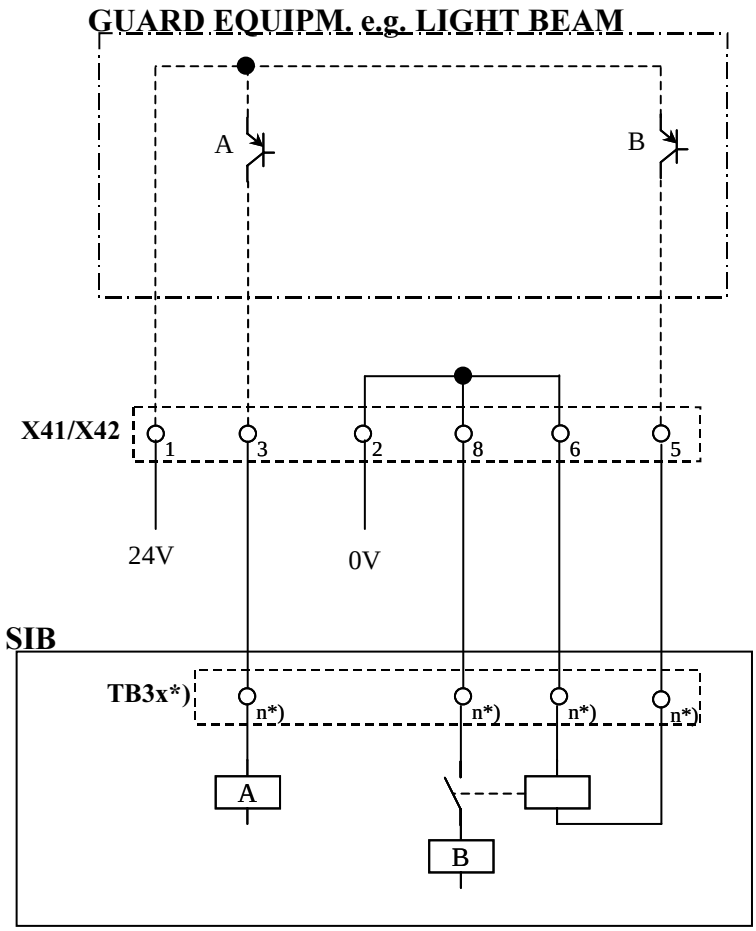


Figure 52 Entry protection with double PNP-outputs

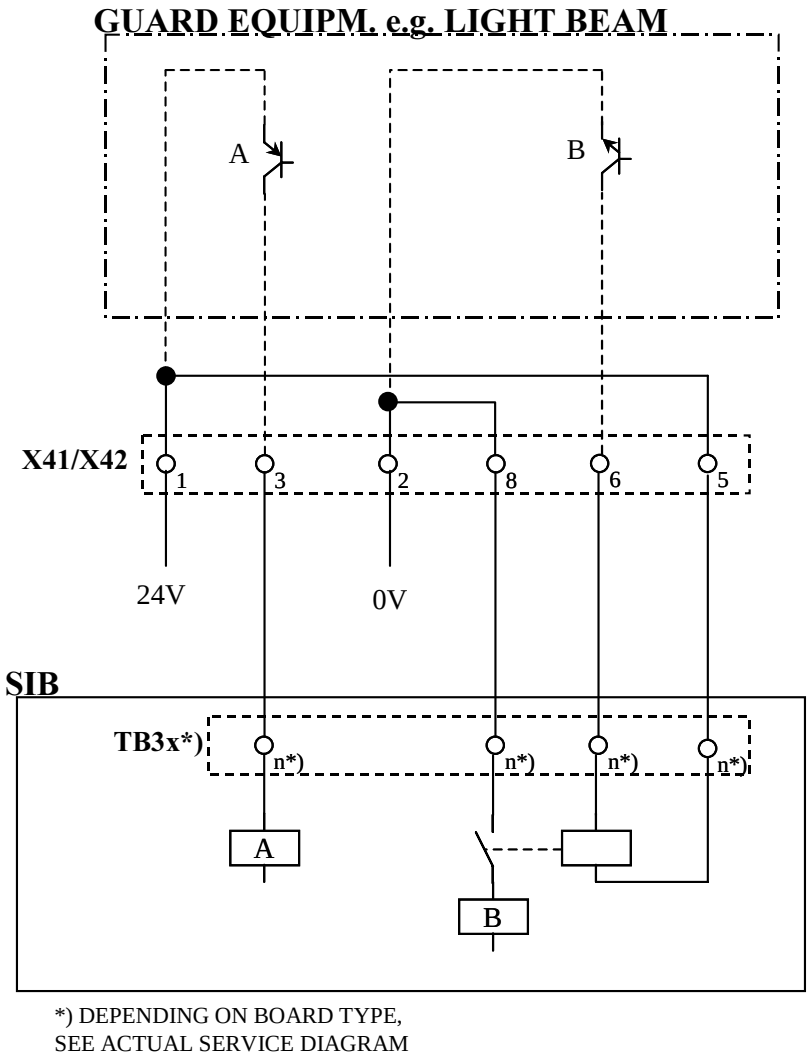
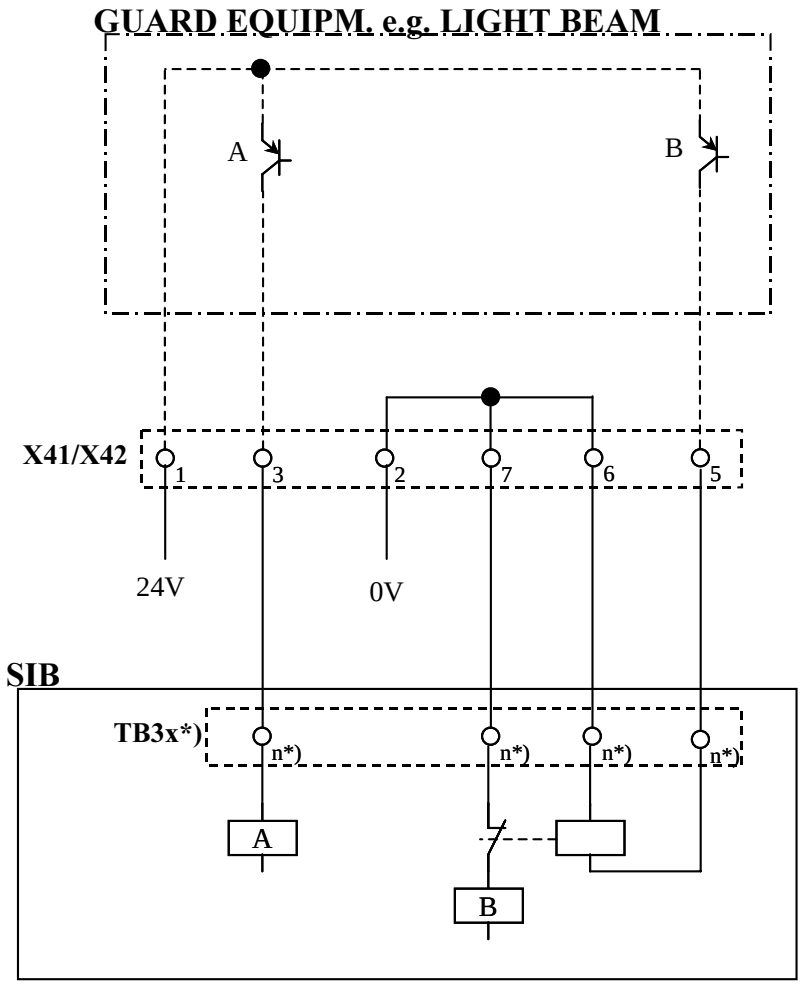


Figure 53 Entry protection with one PNP-output and one NPN-output



*) DEPENDING ON BOARD TYPE,
SEE ACTUAL SERVICE DIAGRAM

Figure 54 Entry protection with one PNP-output and one INVERTED PNP-output

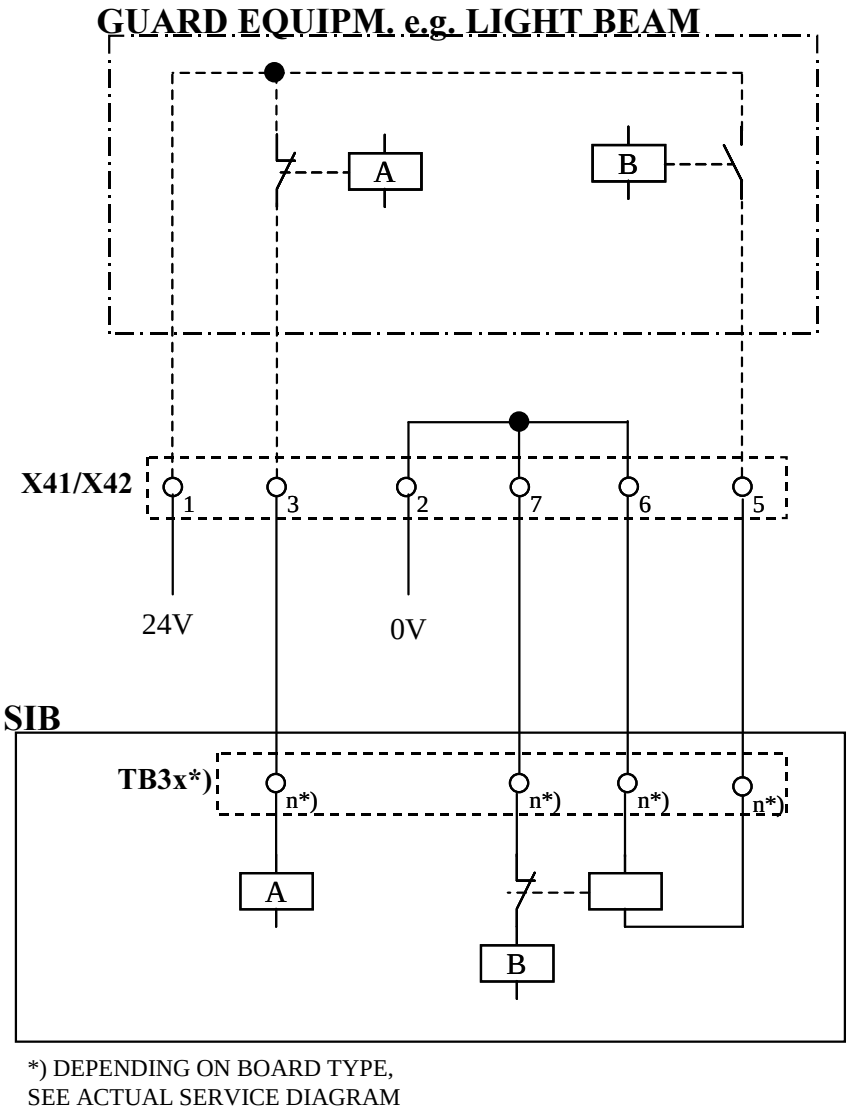


Figure 55 Entry protection with one NC and one NO-output. The status shown with active protection (relay or limit switch)

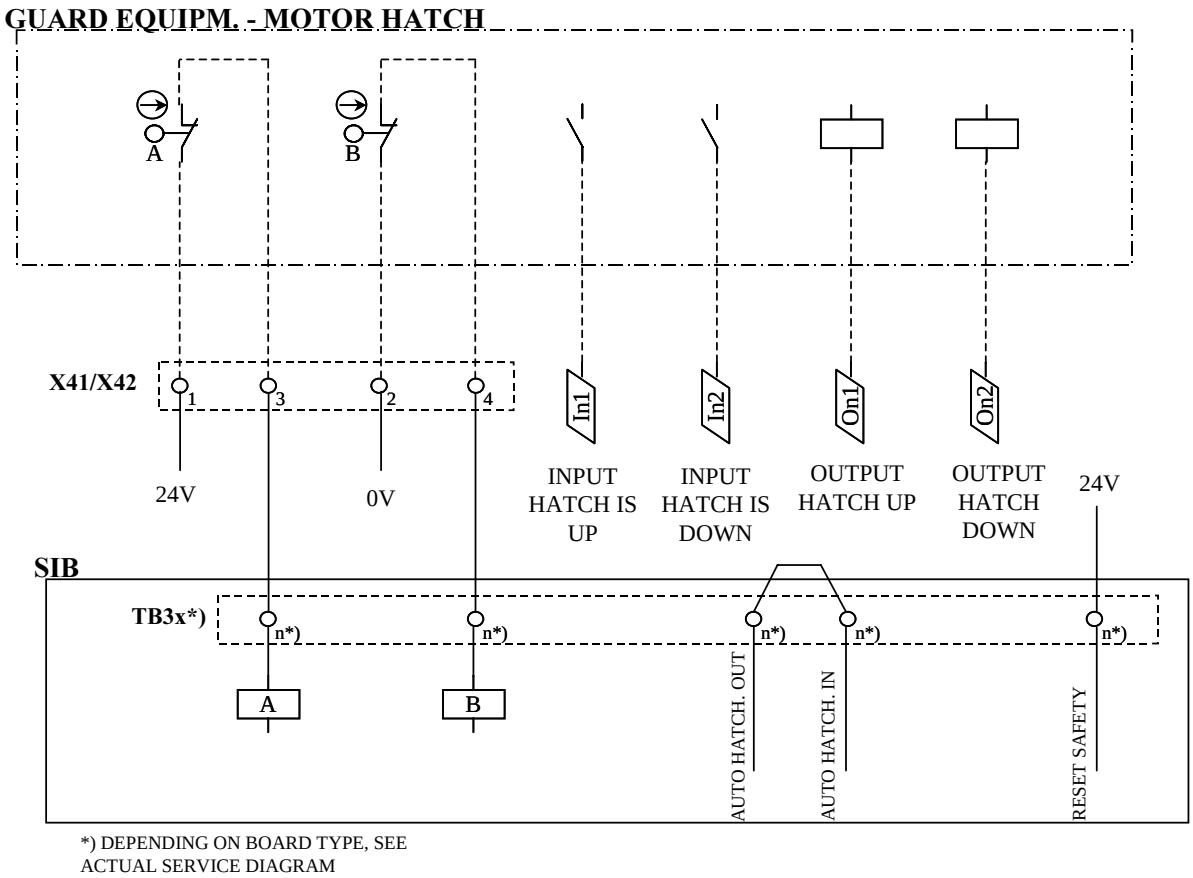


Figure 56 Entry protection - principle for connection of a roller door

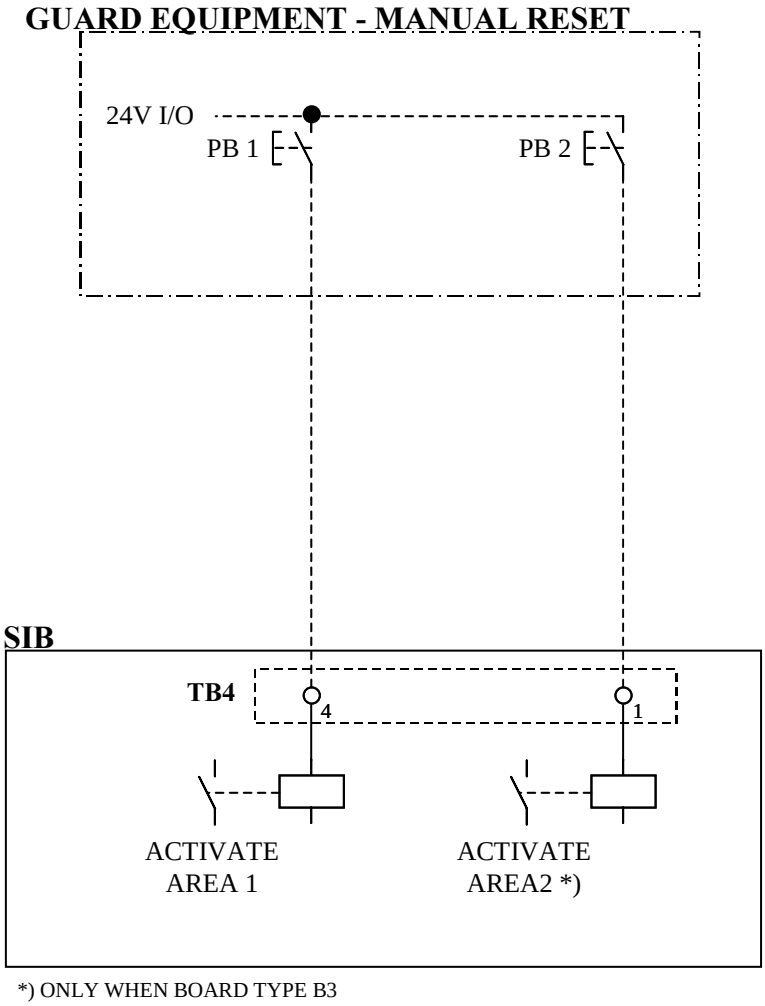
Resetting

The entry protection is connected to the safety inputs on the ***SIB V*** module.

These input circuits are doubled and supervised as well as protected against short circuiting or hardware failure if connection of the entry protection is carried out as shown in the example.

The input circuits are normally reset using a push-button, located outside of the risk zone, when the selected entry protection can be passed.

Automatic resetting can be used on protection where this is acceptable from a safety standpoint.



Figur 57 Manual resetting of entry protection.

Testing

If more protected outputs are required than those available on the ***SIB V*** module, extra relays can be connected in parallel with the relays in the safety circuits on the ***SIB V*** module.

The relays must be approved for safety applications, with positive closing contacts.

The outputs on the ***SIB V*** module are fed with 24V DC/0V DC and can be loaded with max 100 mA.

The operation of the relays can be tested using a NC contact connected to the resetting circuit for entry protection as set out in the examples in Figure 58 and Figure 59.

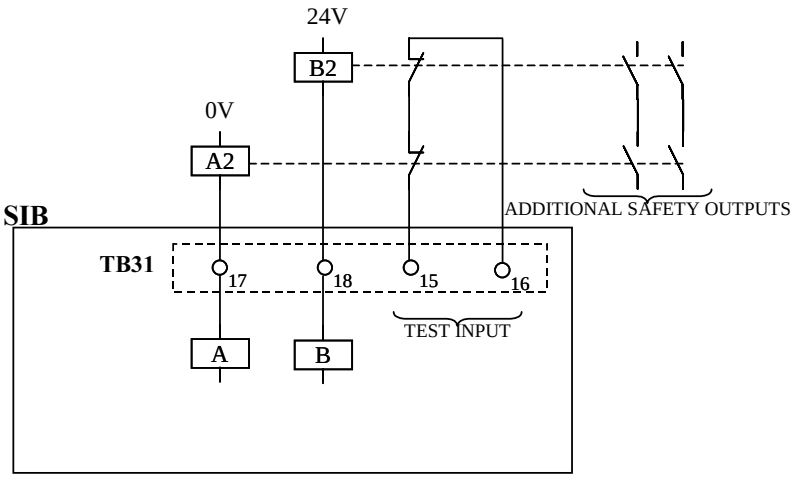


*Figure 58 Connection and testing of the extra safety relay for entry protection. Applies to safety module **SIB-V, type 1/2.***

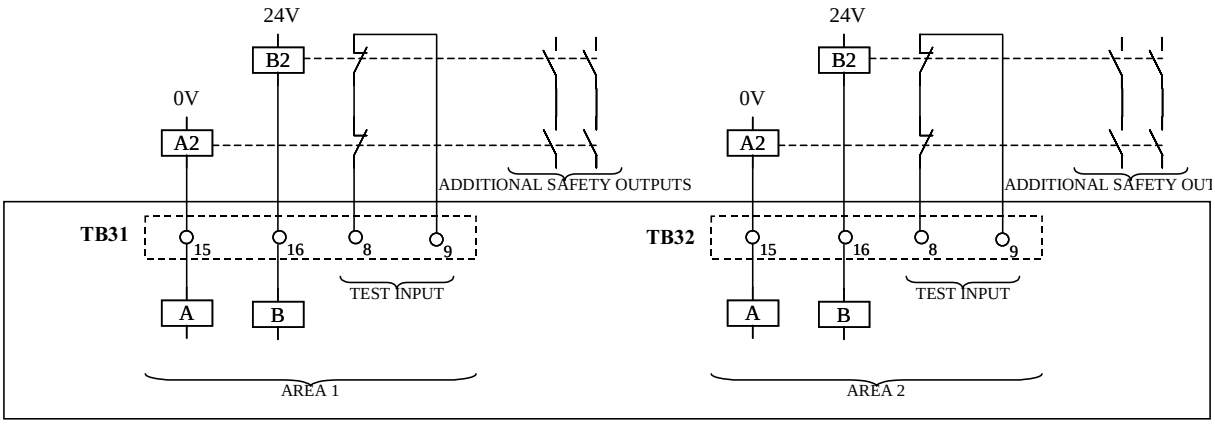


*Figure 59 Connection and testing of the extra safety relay for entry protection. Applies to safety module **SIB-V, type 3.***

Resetting of the protected outputs on the ***SIB V*** module will fail if a fault occurs on any of the relays.

5.5.3 Limit switch for the service door

Interlocking of the service door can, depending on the station solution, be performed with manual or automatically resetting.

Automatic resetting

Automatic resetting is selected when the control cabinet is placed in the immediate vicinity of the service door so that the operator has a view of the programming area during the start of the production run.

In this case the limit switch circuits are connected directly to the control cabinet's auto-stop-loops.

The auto-stop-loop is reset when:

1 the operator closes the door, for example, after program adjustment and

2 the control system is reset to production mode using:

- the operating mode selector on the control cabinet.
- motors in operation.

The limit switch should be approved

- with double, positive closing and positive opening NC contacts.

Connection example

The circuit breaker is connected to the:

- jackable terminal X92, located on the top left inside wall of the cabinet.

Principle for connection of the limit switch in the safety system is shown in Figure 60.

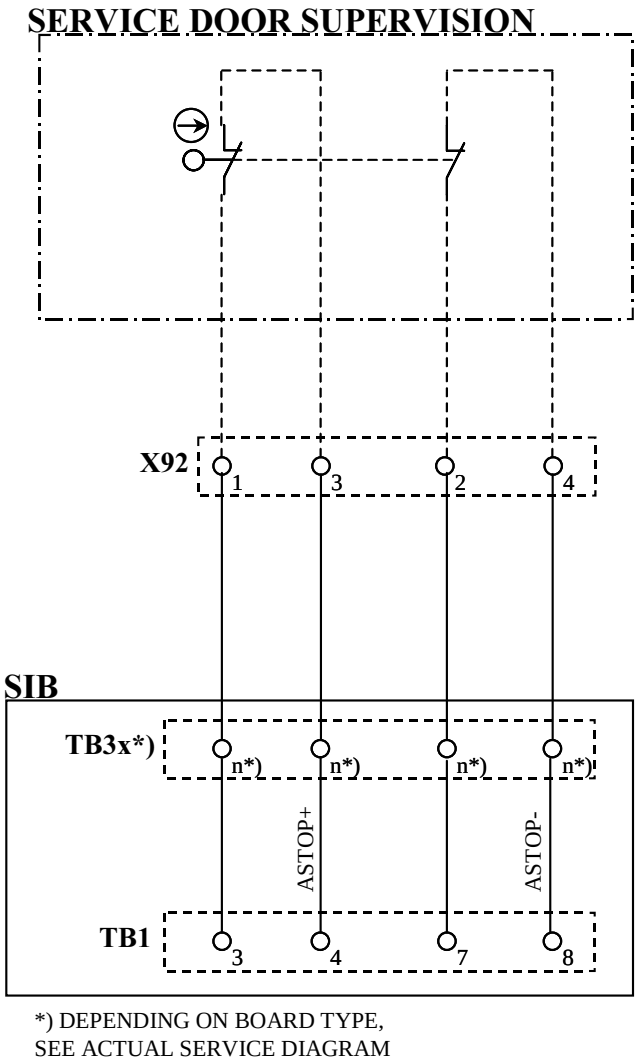


Figure 60 Service door with automatic resetting of the protection

Manual resetting

Manual resetting must be used when the control cabinet's placement means that the operator cannot be sure whether someone has passed through the service door after the operator has left the programming area and moved to the control cabinet to start the production run.

In this case the SIB V module is supplemented with a safety function that resets the auto-stop-loops once

- the door is closed and
- the safety functions are reset using a push-button placed on the outside of the programming area by the service door.

If anyone passes through the door, the operator is not allowed to switch to production mode before the safety function has been reset again.

Resetting and testing

The safety function consists of an option card, which is connected to the ***SIB V*** module. The safety circuit is doubled and supervised.

The input from the push-button is protected against short-circuiting as this must be both closed and opened in order for the safety circuits' outputs to be reset.

Connection example

Limit switch and resetting push-button are connected to

- jackable terminals X92 and X91.

The connection principle for the function is shown in Figure 61.

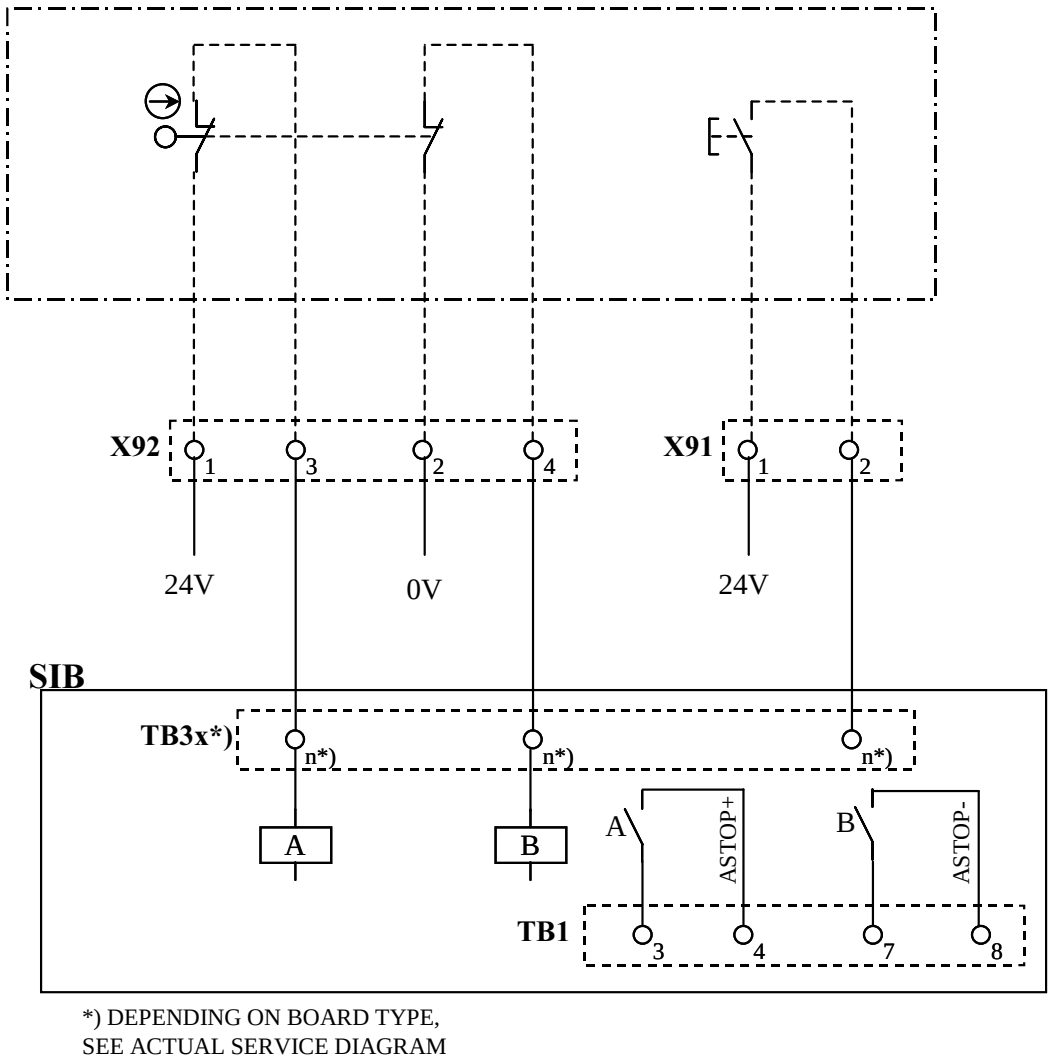


Figure 61 Service door with the limit switch - manual resetting of the protection

5.5.4 Timer resetting protection

The timer resetting protection is used to prevent anyone remaining in the risk zone when the entry protection is reset and the ready for start of a new cycle signal is given to the control system.

This interlock can, for example, be designed as a time function or as a sensing function.

The offered timer resetting unit consists of

- an option card connected directly to the ***SIB V*** module as well as
- an activation push-button, which should be placed within respective risk zones.

Resetting and testing

The safety function consists of an option card, which is connected to the ***SIB V*** module. The safety circuit is doubled and supervised.

The input from the push-button is protected against short-circuiting as this must be both closed and opened in order for the safety circuits' outputs to be reset.

Connection example

Connection of the timer resetting protection is done on a jackable terminal located on the top left inside wall of the cabinet.

- Equipment for area 1 is connected to X81
- Equipment for area 2 to X82.

Cable entry can easily be made through the two-piece cover.

The activation signal is distributed from the jackable terminals to the ***SIB V*** module as set out in the figure below.

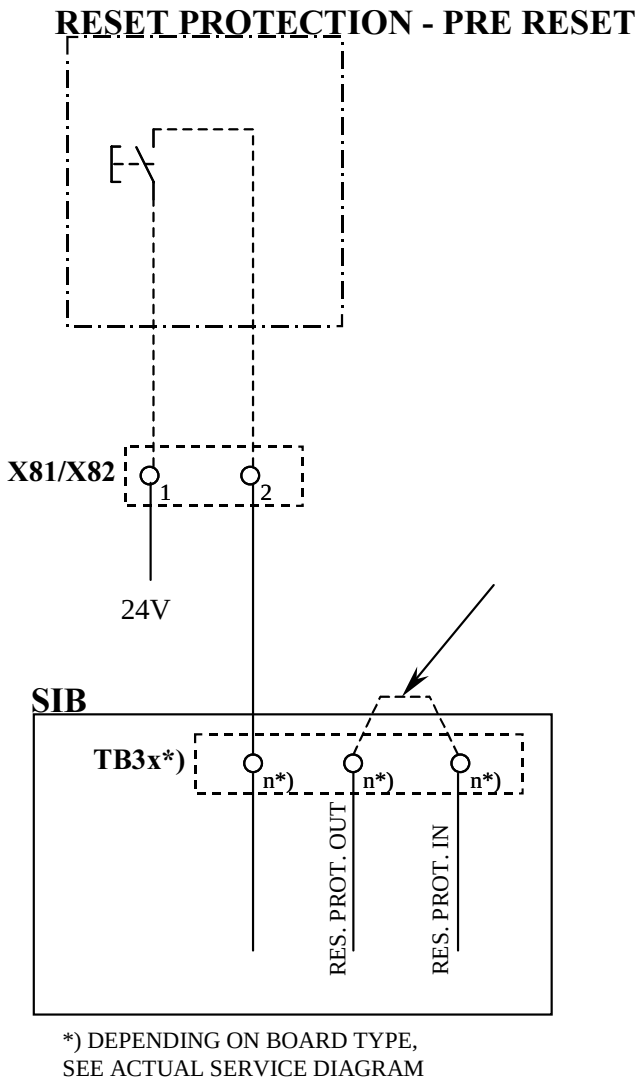


Figure 62 Activation push-button for the timer resetting unit

If some form of sensing unit is used instead of timer resetting protection, a safe output from this unit must be connected to the ***SIB V*** module as set out in the example in Figure 63.

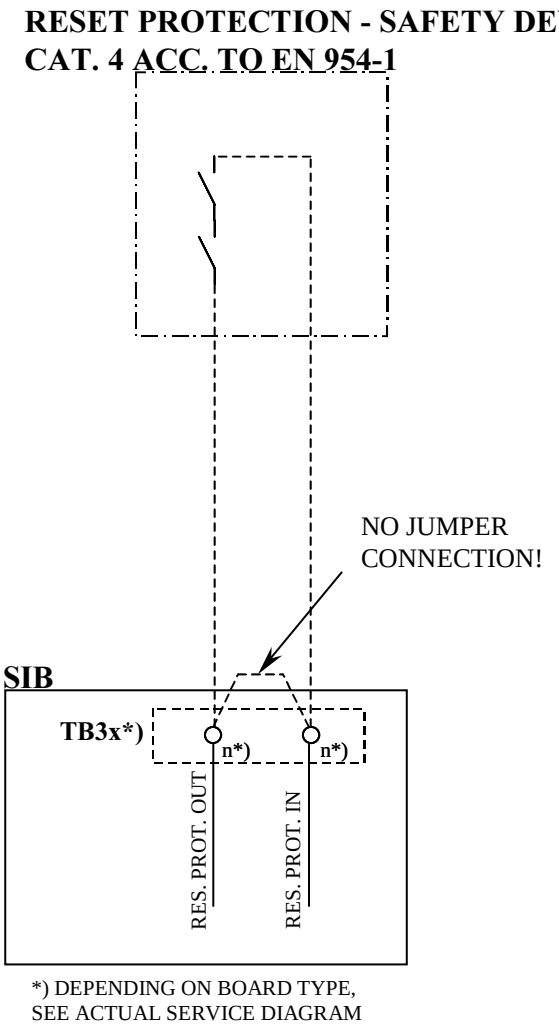


Figure 63 Timer resetting protection with optional safety unit

The connected sensing unit should be designed to comply with category 4 in accordance with EN 954-1.

5.5.5 Movement/station indication for the positioner side

The main functions of the safety switches are

- to detect non-permitted movement on the positioner's station switching unit.

Some signals are also used by the I/O system

- to indicate which station side is in position by the robot.

The limit switches are placed in the station switching unit.

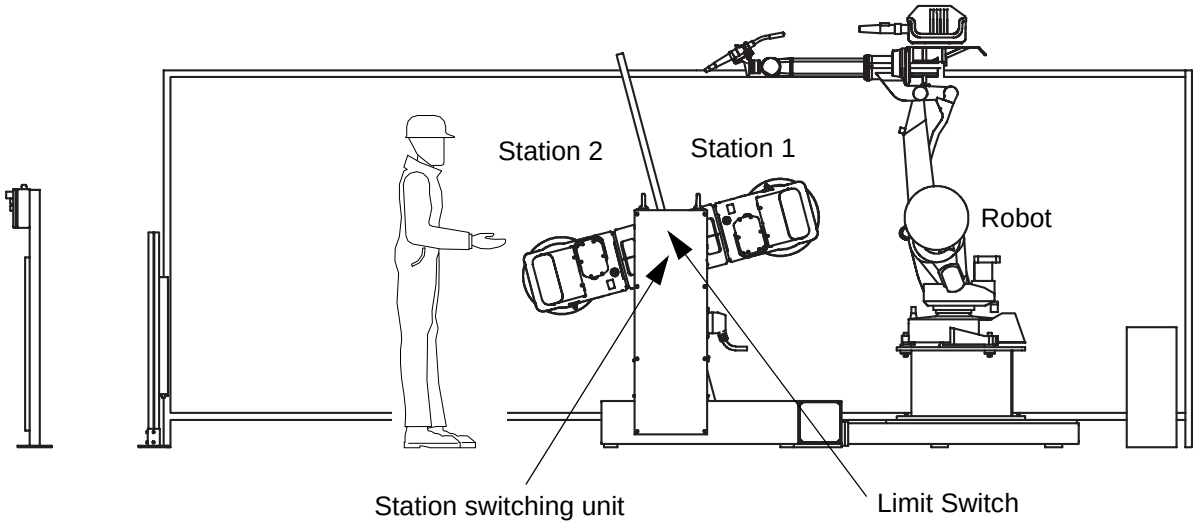


Figure 64 Example of station indication on a positioner with a station switching unit and two stations.

Connection

This function is only included on ***SIB V*** module types 1 and 2.

Signals from limit switch on the positioner are pre-routed to a jackable terminal on the safety module.

The terminal can be connected directly to the ***SIB V*** module on output TB2. The signals are utilised by the safety circuits, which activate the control system's operating loop.

Principle solutions for different positioner types are shown in Figure 65 and Figure 66.

Note! The input circuits on the safety switches are

- galvanically isolated from the other safety circuits on the ***SIB V***-module and
- are fed from the positioner's positioner interface.

This must be considered when a possible supplement to the safety system is made so that safety functions are not bypassed due to mixed voltage supplies.

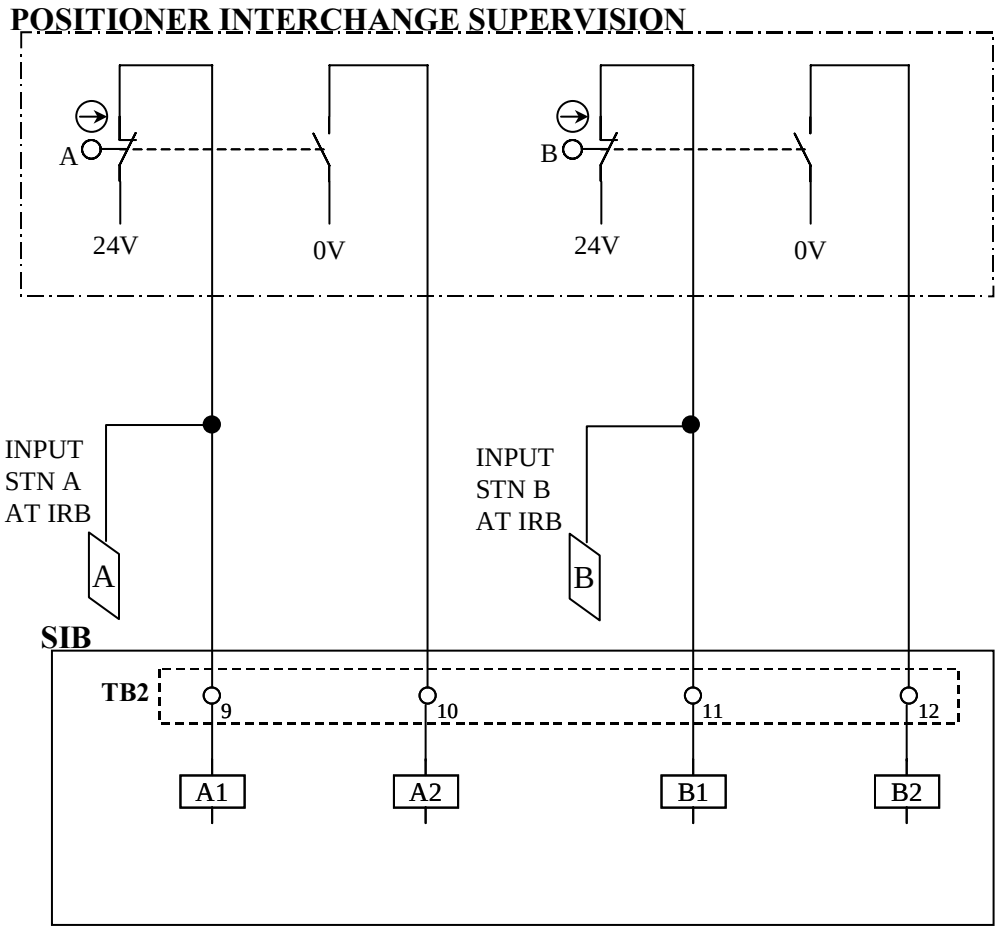


Figure 65 Supervision of the positioner's movement and station indication with a 2-station solution

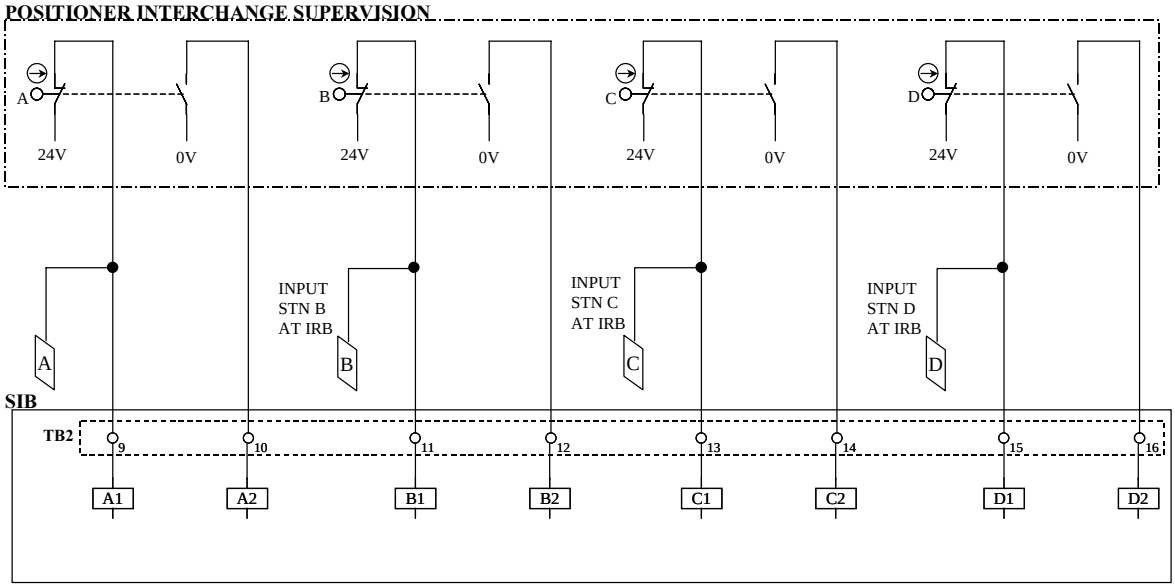


Figure 66 Supervision of the positioner's movement and station indication with a 3/4-station solution

"NOTE!

Equipment used to monitor positioner movement and to indicate the station side (inputs A - D in the fugures above), should be designed so it cannot switch on the safety inputs on the SIB V module in the event of a fault arising."

Resetting

The signals from the safety switch are connected to double supervised safety inputs on the ***SIB V*** module.

These input circuits are doubled and supervised as well as protected against short circuiting or hardware failure if connection is carried out as shown in the example.

Testing

The safety circuit is designed so that:

- the limit switch and the input circuits are checked and reset automatically with station switching before a new working cycle is started.

5.5.6 Station indication for the robot/conveyor

This function is used to

- supervise in which working area the robot is in during production operations.

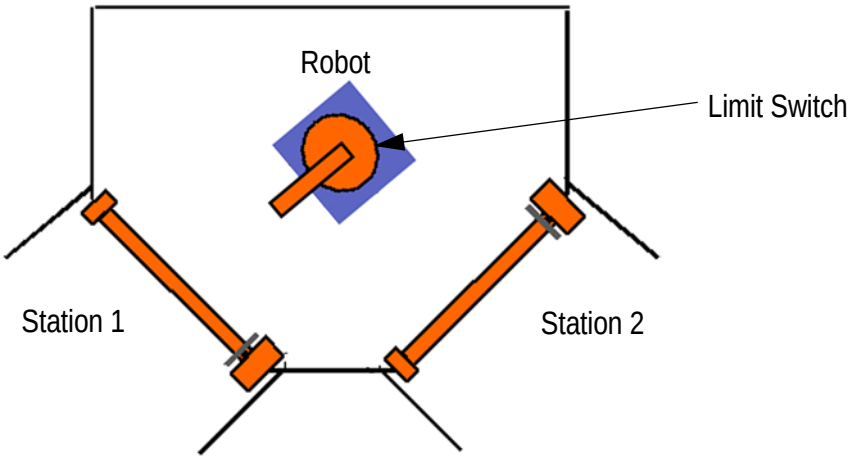


Figure 67 Example station indication on the robot with two work stations.

When the limit switches are mounted on the base of the robot these are activated by a common cam rod.

The switch function results in:

- station indication
- a supervised service position, where the robot can be set, for example, for cleaning the tool. This area is permanently linked to the 0-position for the robot's axis 1 and permits a movement of ±7°.

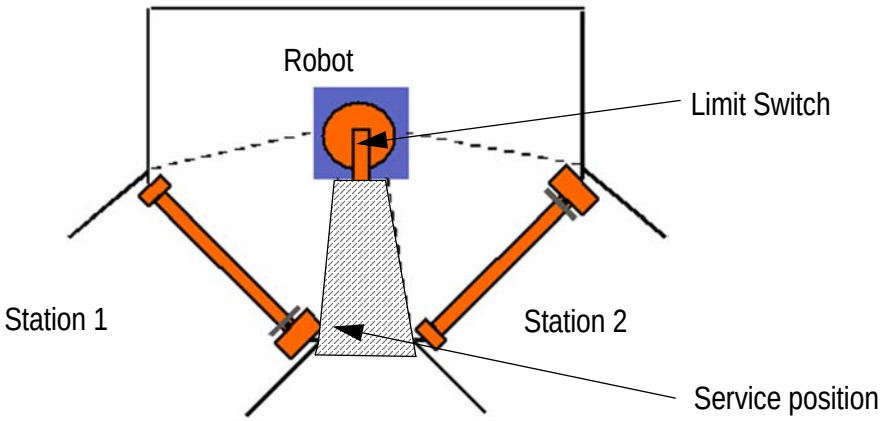


Figure 68 Example service position for a robot with two work stations.

If the function for an installation with the conveyor is used, the safety switches can instead be mounted on the conveyor's carriage and are then actuated by individual cam rods. A service position between work stations is not permitted with this solution.

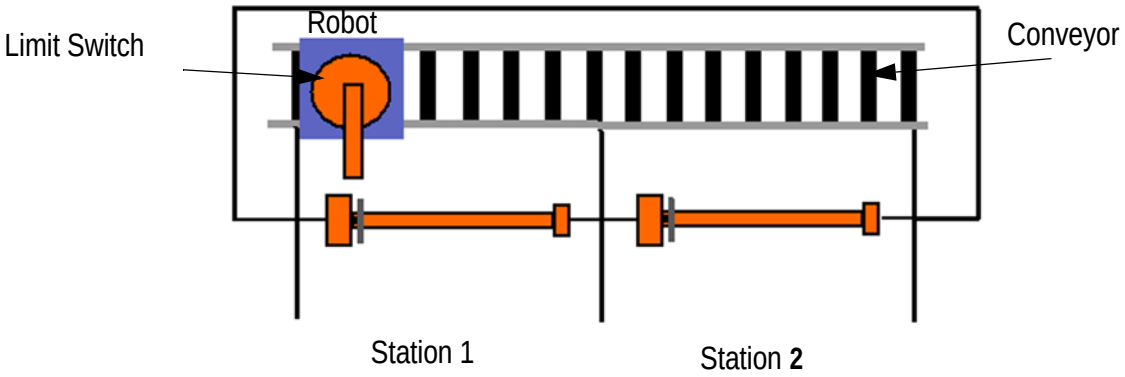


Figure 69 Example 3 Station indication on the conveyor for the robot with two work stations.

Depending on the selected station solution, the switches can also be mounted on the base of the robot when a conveyor is included.

Connection

The switches are connected to jackable terminal X100, located on the top left inside wall of the cabinet.

Cable entry can easily be made through the two-piece cover.

The output signals from the switches are distributed from the jackable terminals to the ***SIB V*** module as set out in Figure 70.

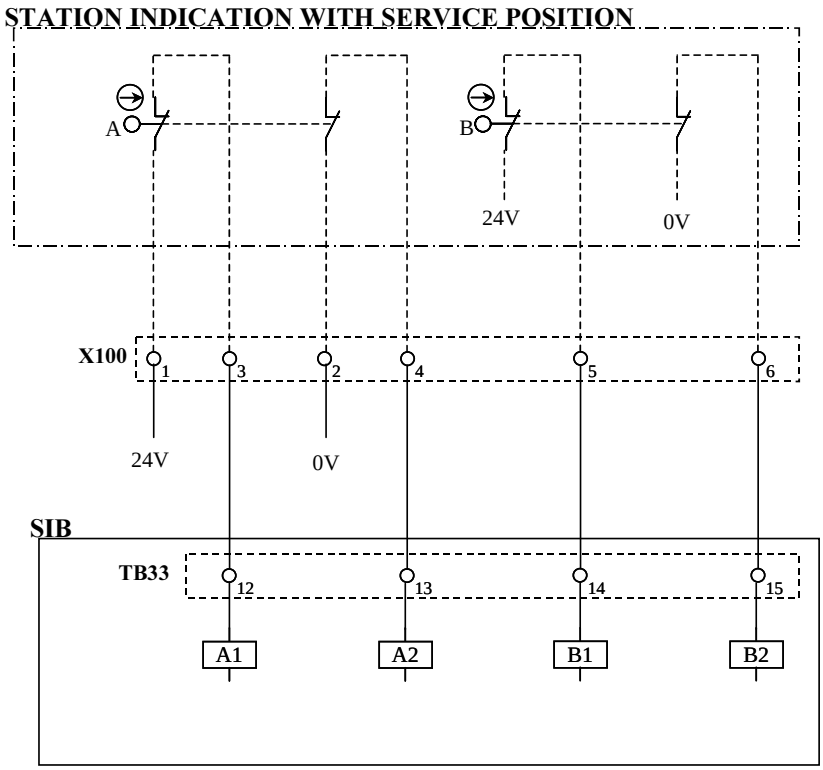


Figure 70 Stations supervision IRB/RTT with the limit switch

Resetting and testing

The safety functions for station indication and service position are included as standard on the ***SIB V*** module type 3.

The safety circuit is doubled and supervised and protect against short-circuiting or hardware failure.

The safety circuit is designed so that

- the limit switch and the input circuits are checked and reset automatically with movement between station sides, or station side and the service position**,** before a new working cycle is started.

5.5.7 Indication for the home position/transport position

This function is used to

- to supervise that the robot, under production operations, is in a defined safety area when the selected station solution so demands.

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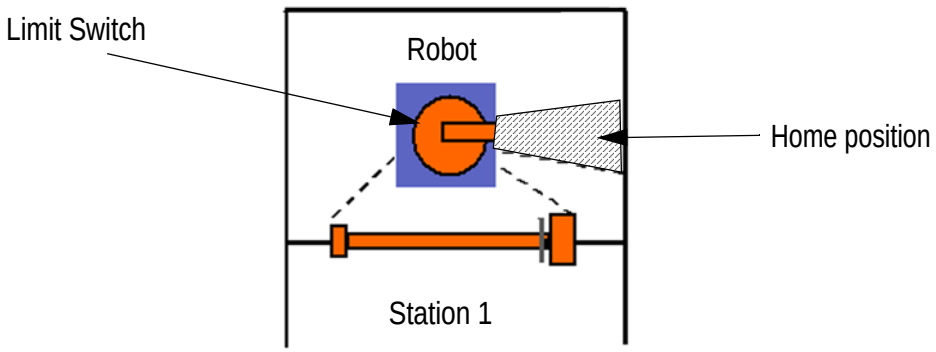


Figure 71 Example home position for the robot with one work station

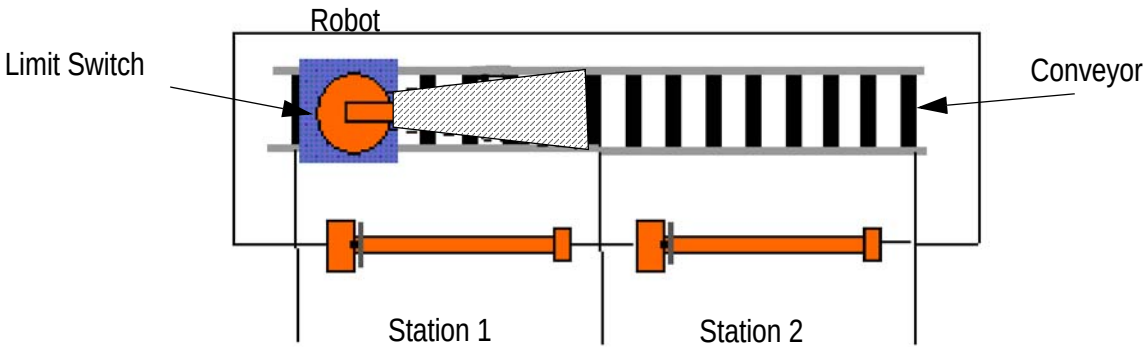


Figure 72 Example transport position for the robot.

Safety switches are mounted on the base of the robot. They are actuated by an adjustable cam rod that permits a movement of the robot's axis 1 by ±20° in the safe position.

The area can be adjusted by 30° interval around the robot's axis 1.

Connection

The switch is connected to

- the jackable terminal X111 located on the top left inside wall of the cabinet.

Cable entry can easily be made through the two-piece cover.

The output signals from the switches are distributed from the jackable terminals to the ***SIB V*** module as set out in Figure 73.

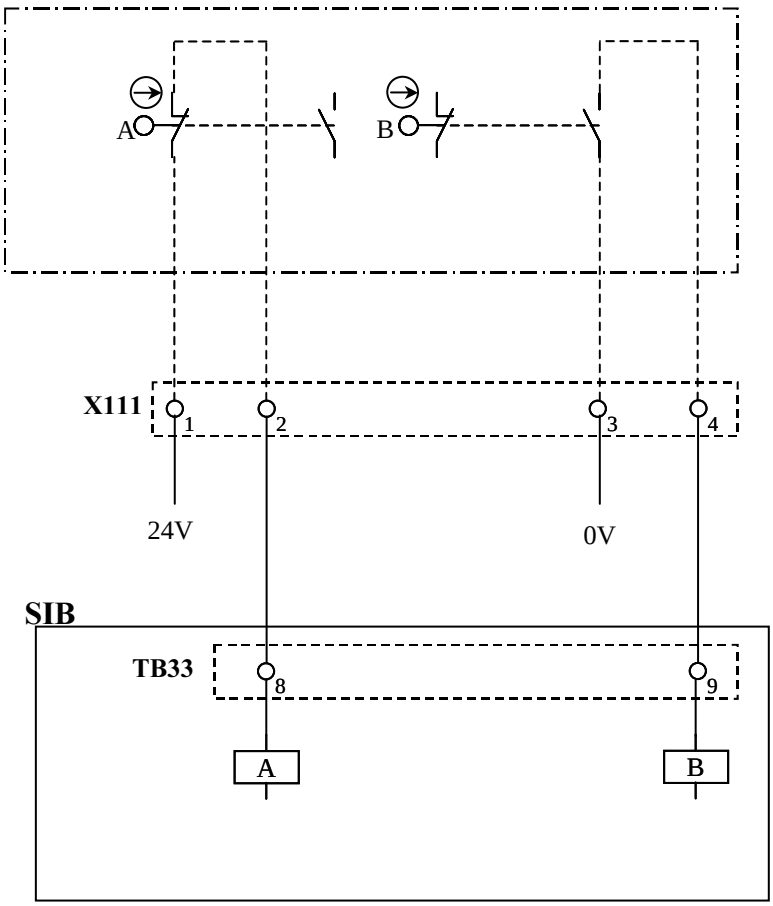


Figure 73 Supervision of the home position/transport position with the limit switch

Resetting and testing

The safety function consists of an option card, which is connected to the ***SIB V*** module.

Note! This function only works with the ***SIB V*** module type 3.

The safety circuit is doubled and supervised and protects against short-circuiting or hardware failure.

The safety circuit is designed so that

- the limit switch and the input circuits are checked and reset automatically with movement to and from the home position/transport position before a new working cycle is started.

5.5.8 Activation unit

An activation unit is used when there is a need to activate the activate work station from the operator's area, for example, programming, fixture replacement, etc.

Activation is performed using a separate push-button, which is located inside the supervised area. Activation can only be done in manual operating mode.

- MANUAL REDUCED SPEED (<250 mm/s) 
- MANUAL FULL SPEED 100% 

The SIB V module type 3 is equipped with the input circuits for reception of the activation signal. This can be done without adding any extra components.

Resetting

The activation unit is connected to the supervised safety inputs on the ***SIB V*** module.

The input circuits are normally reset with

- a push-button that is located inside the entry protection and out of the reach from the outside of the activated entry protection.

The input from the push-button is protected against short-circuiting as this must be both closed and opened in order for the safety circuits' outputs to be reset.

Connection example

Connection of the activation push-button is done on a jackable terminal located on the top left inside wall of the cabinet.

- Equipment for area 1 is connected to X93
- Equipment for area 2 to X94.

Cable entry can easily be made through the two-piece cover.

The activation signals are distributed from the respective push-buttons via the jackable terminals to the ***SIB V*** module as set out in the example in Figure 74.

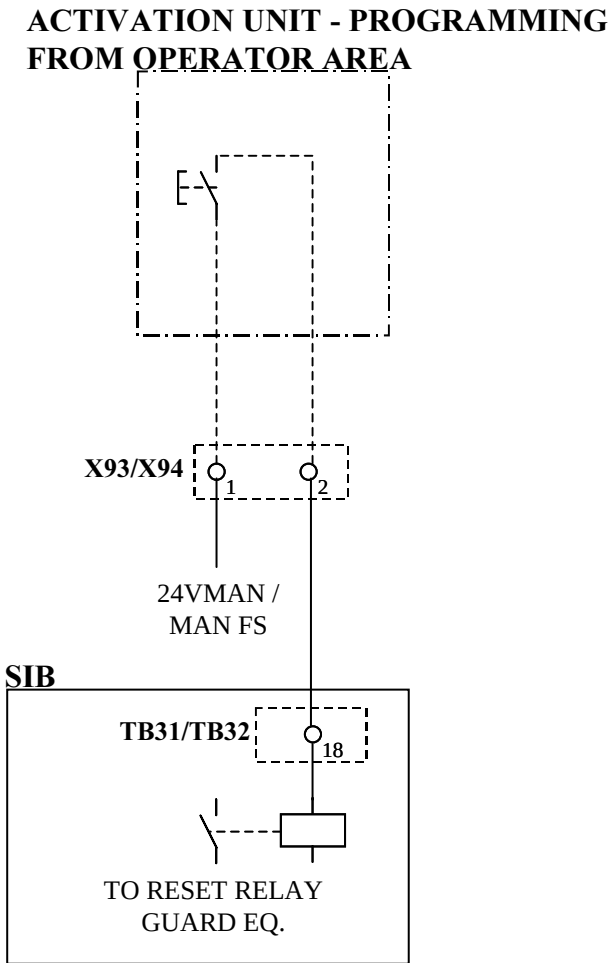


Figure 74 The activation push-button for programming from the operator's area

5.5.9 Operating loop, operating principles and connection possibilities

The SIB V module's supervision circuits are connected to the control system's operating loop with doubled and supervised safety outputs.

Depending on the safety function these outputs are activated:

- operating loop's auto stop or
- general stop level.

The operating loop is connected to the ***SIB V*** module on the jackable terminal TB1 according to Figure 75.

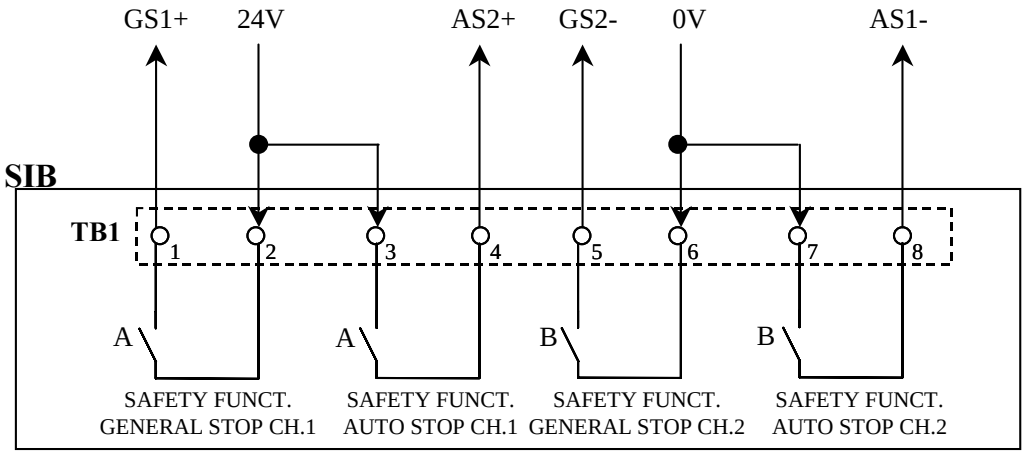


Figure 75 The operating loop's connection to the safety system

The operating principle for the protection function's activation of the auto stop and general stop level are shown in Figure 76 and Figure 77.

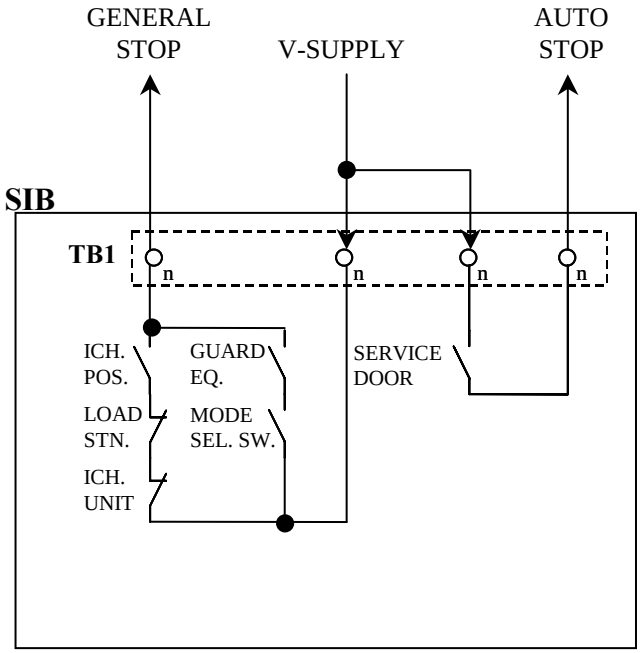


*Figure 76 The safety function's design for the safety module **SIB-V type 1/2***

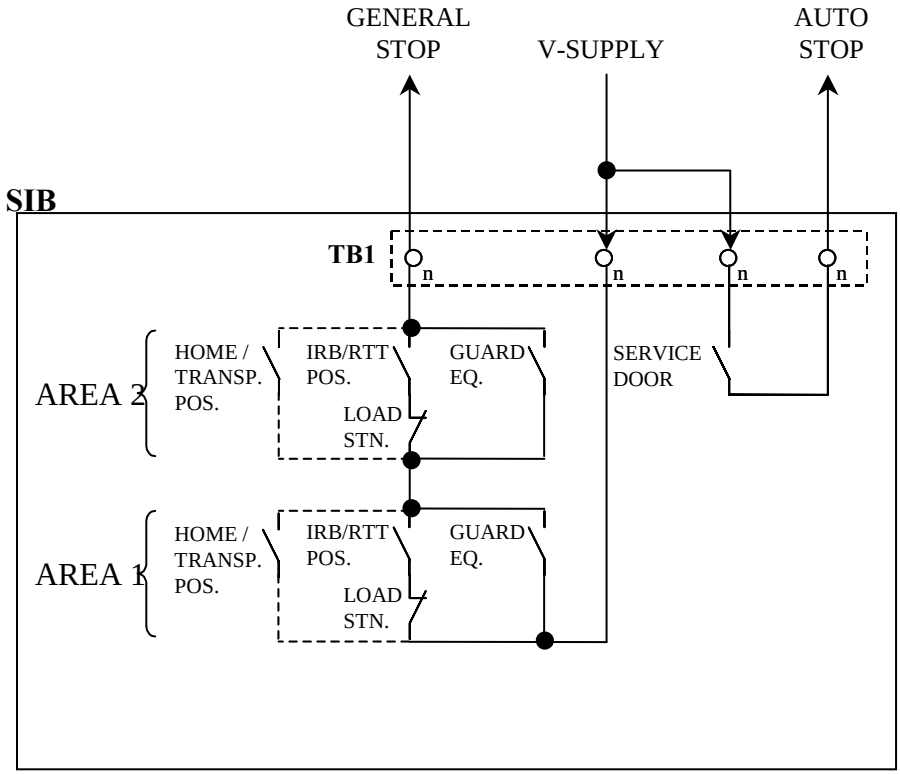


*Figure 77 The safety function's design for the safety module **SIB-V type 3***

In addition to the ***SIB V***-module's safety functions it is possible to connect further external safety functions to the break-out points in the supervision circuits. This permits the station solution to be adapted to satisfy a customer's wishes.

The connected safety function should be designed to comply with category 4 in accordance with EN 954-1.

In Figure 78 the break-out points are shown on the jackable terminals TB32 and TB34 for ***SIB V*** module type 1 /2 and some examples of how these can be used are also shown.

Note! The break-out points are normally strapped on delivery.

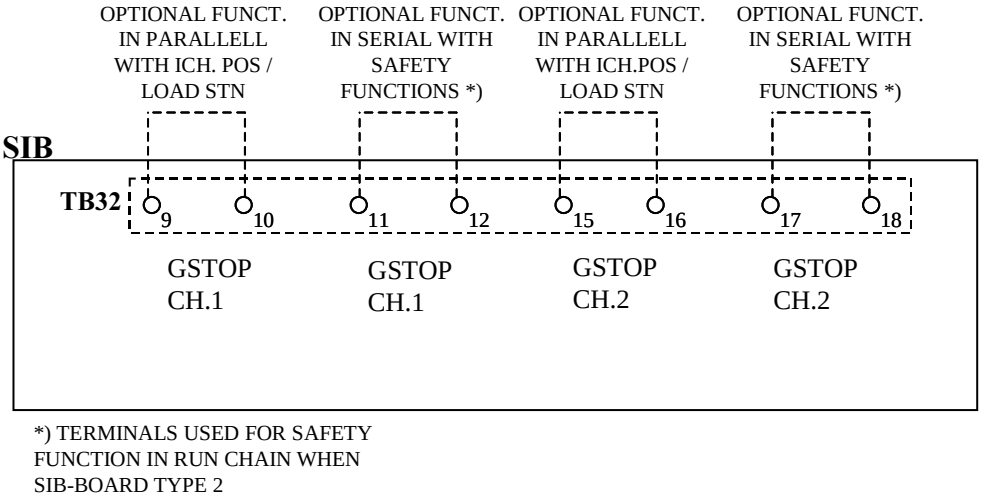


*Figure 78 The break-out points for the operating loop safety module **SIB-V type 1/2***

In Figure 79 the break-out points are shown on the jackable terminals TB32 and TB34 for ***SIB V***-module type 3 and some examples of how these can be used are also shown.

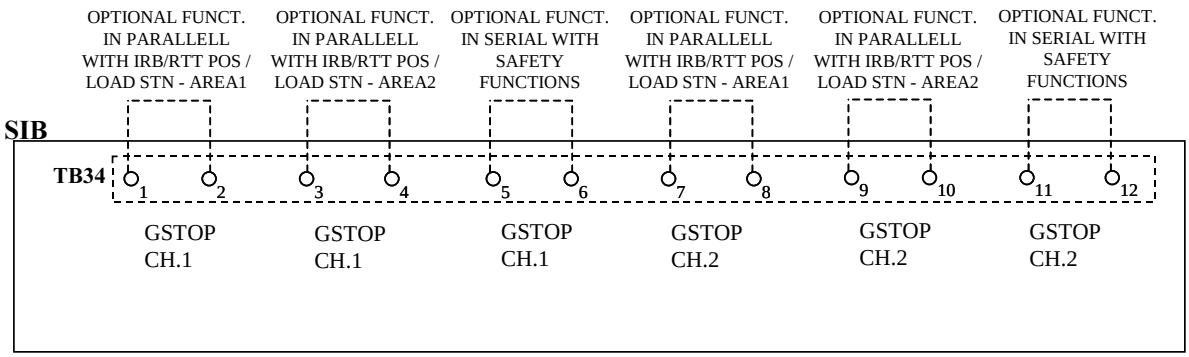


*Figure 79 The break-out points for the operating loop safety module **SIB-V type 3***

Figure 80 illustrates connection examples of the protection between the programming area, for example, inner light beam (status shown with active protection) for safety module SIB-V type 1/2.
Note! safety outputs for e.g. fixture interlocking are used!

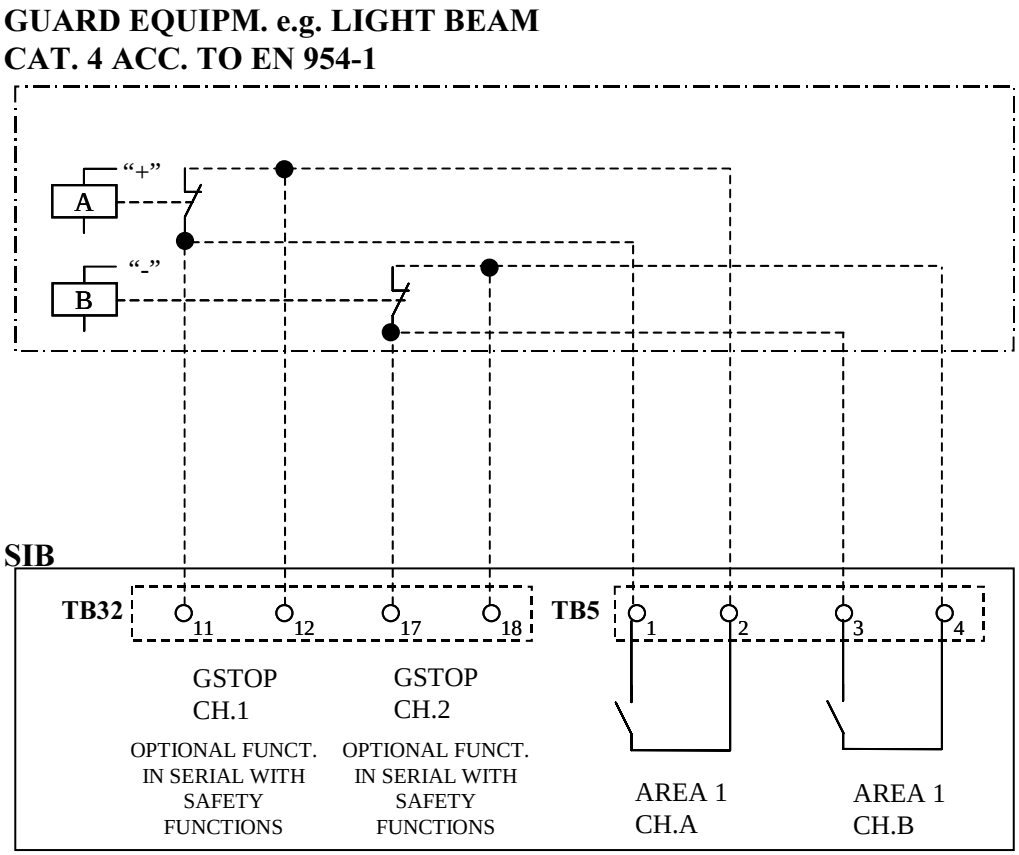


Figure 80 Examples of connecting the entry protection between the programming area.

Figure 81 illustrates connection examples of entry protection between the operator area 1 and operator area 2; the status is shown with active protection, for safety module ***SIB-V typ 3***.

Bypass passage is only permitted in operating mode MAN/ MAN FS.

Note! safety outputs for e.g. fixture interlocking are used!

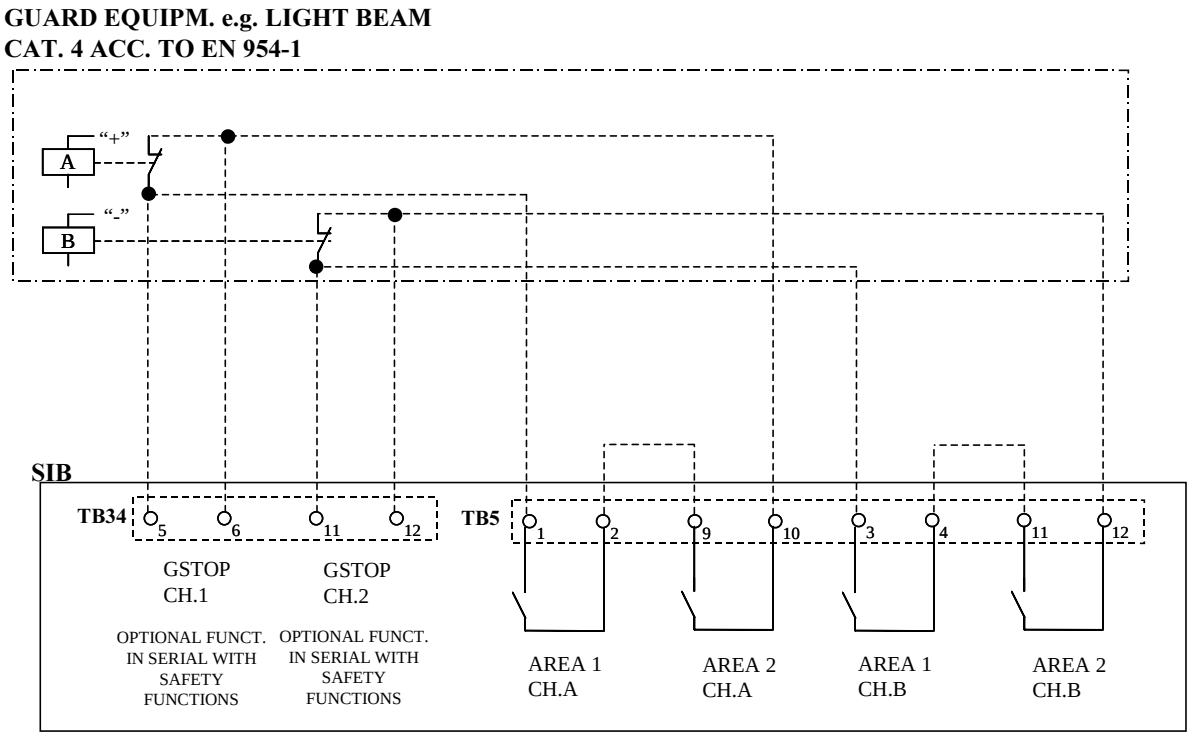


Figure 81 Examples of connecting entry protection between operator area 1 and operator area 2.

5.5.10 Safety outputs for customer connections

The SIB V module contains a number of free safety outputs that can be used to safely control and supervise your own equipment.

Jackable terminal TB4: Acknowledgement outputs activated process/resetting entry protection.

- The outputs can be utilised for signals, for example, PLC and may be loaded with max. 24V DC, **50mA(??)**.

Jackable terminal TB5: These outputs can be used, for example, in the design of safety circuits for fixture control.

- Each output can be loaded with a maximum of 24V DC, 2A.

In Figure 82 - Figure 86 some examples of how the outputs, as set out above, can be used for different station solutions are shown.

Note! Some applications demand that the signal interface is supplemented with the option ***"extended emergency stop"***.

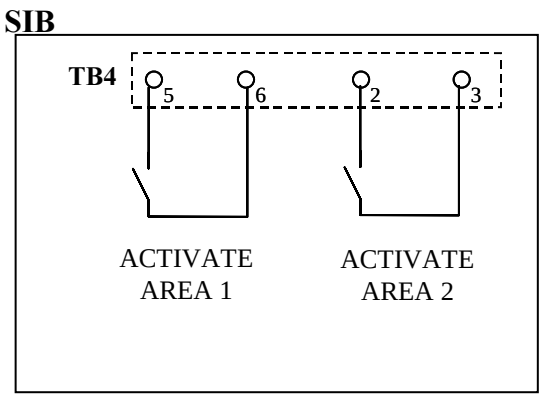


Figure 82 Safety outputs for acknowledgement of entry protection resetting, max. 50 mA

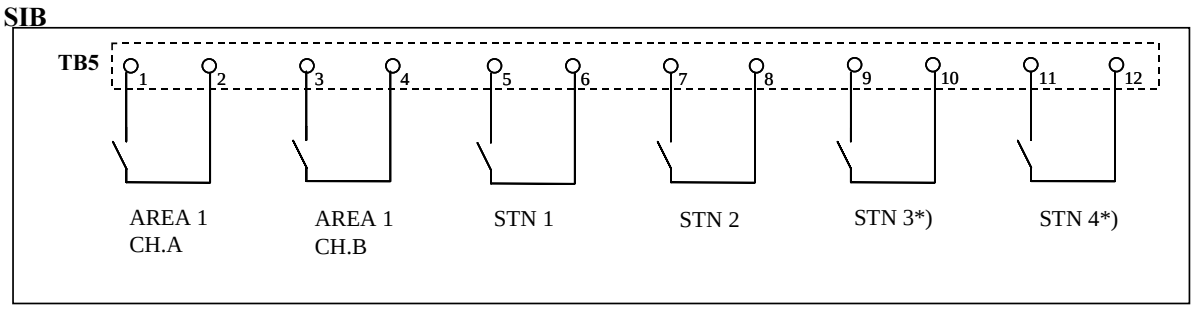


*Figure 83 Safety outputs for safety module **SIB-V type 1/2**, max. 2 A*

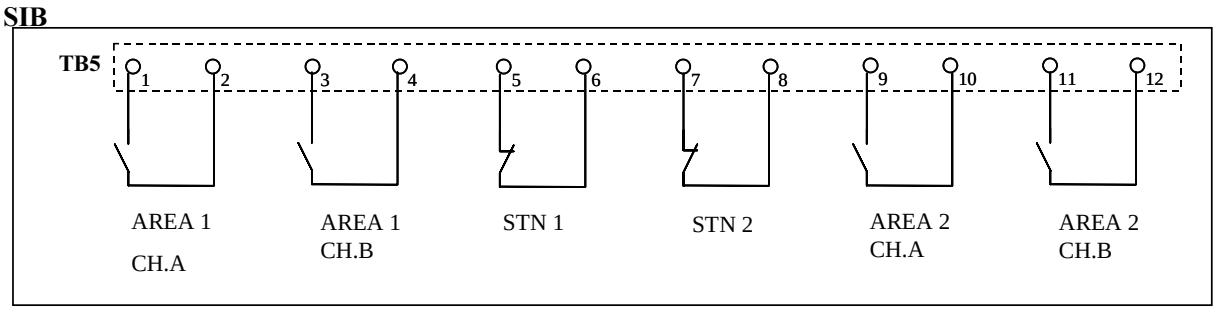


*Figure 84 Safety outputs for safety module **SIB-V type 3**, max. 2 A*

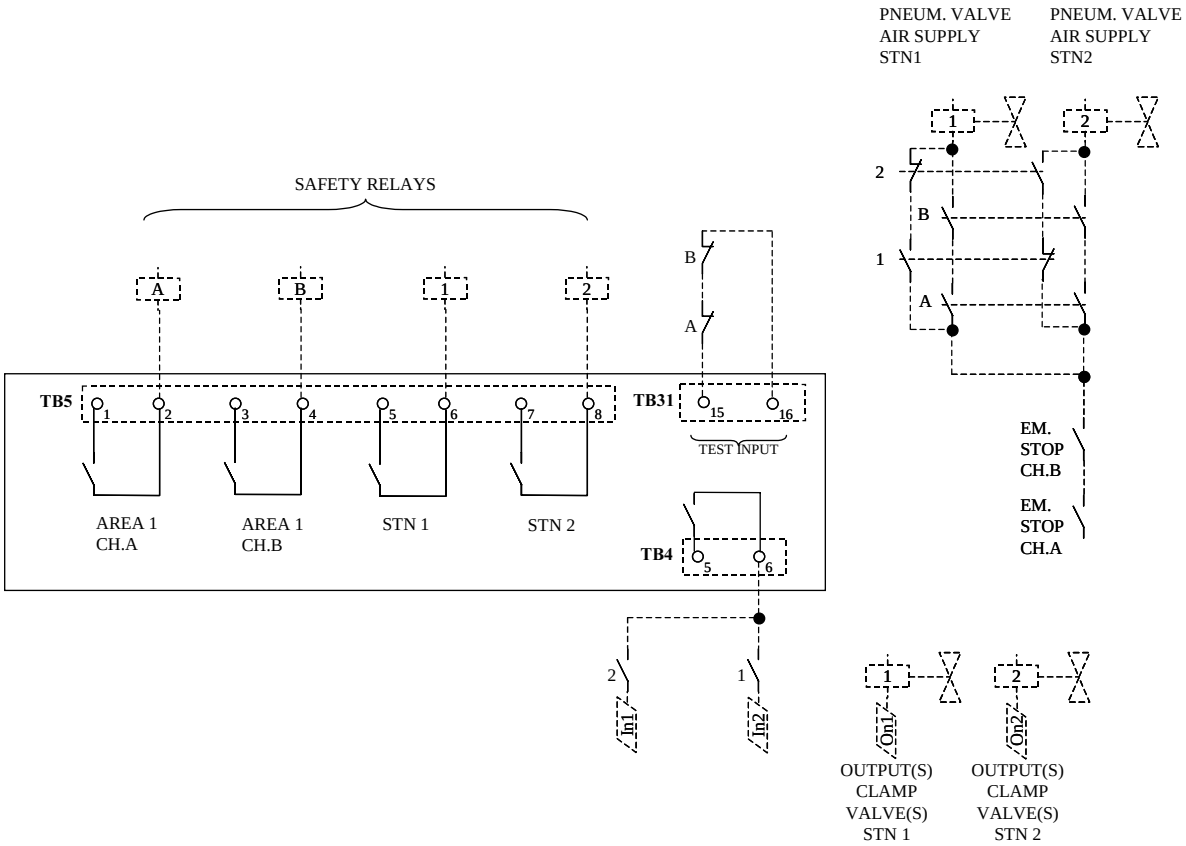


*Figure 85 Example of the fixture interlock principle with safety module **SIB-V type 1***

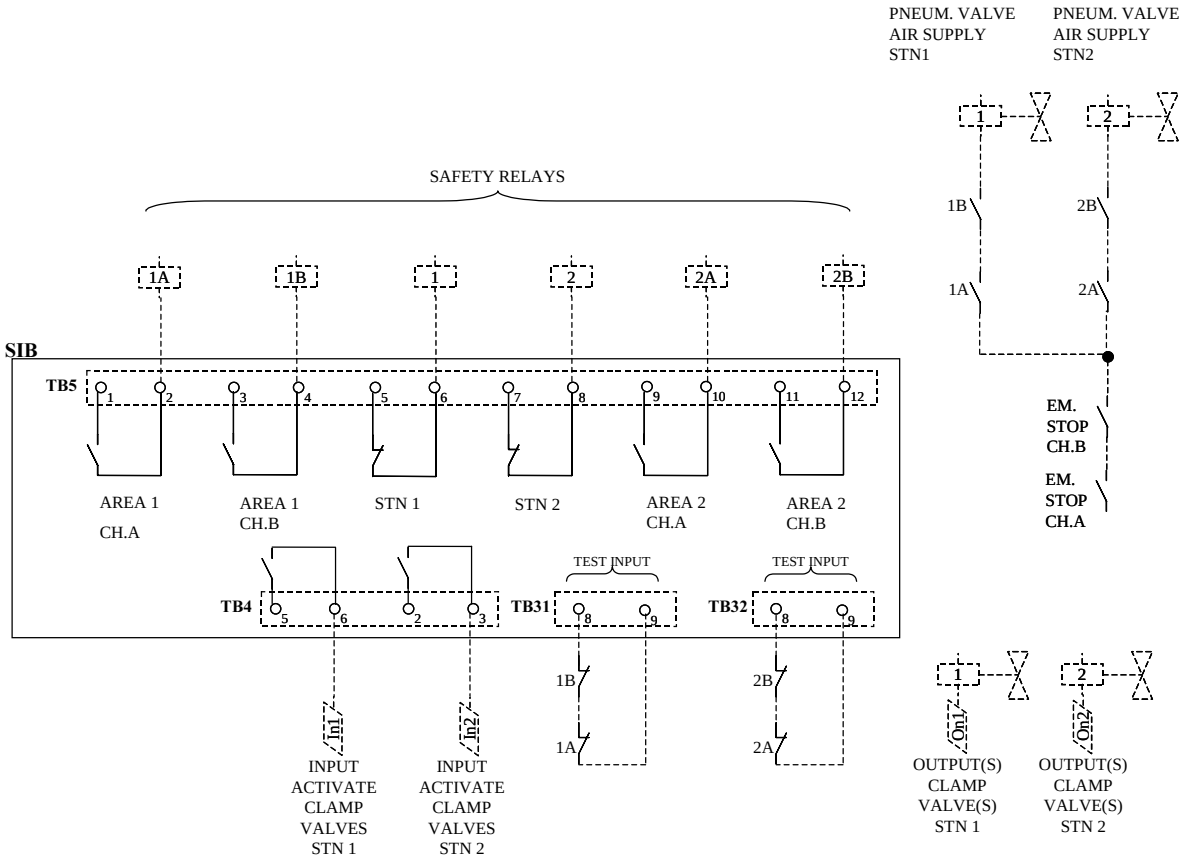


*Figure 86 Example of the fixture interlock principle with safety module **SIB-V type 3***

5.6 Reservdelsförteckning/*Spare Parts List*

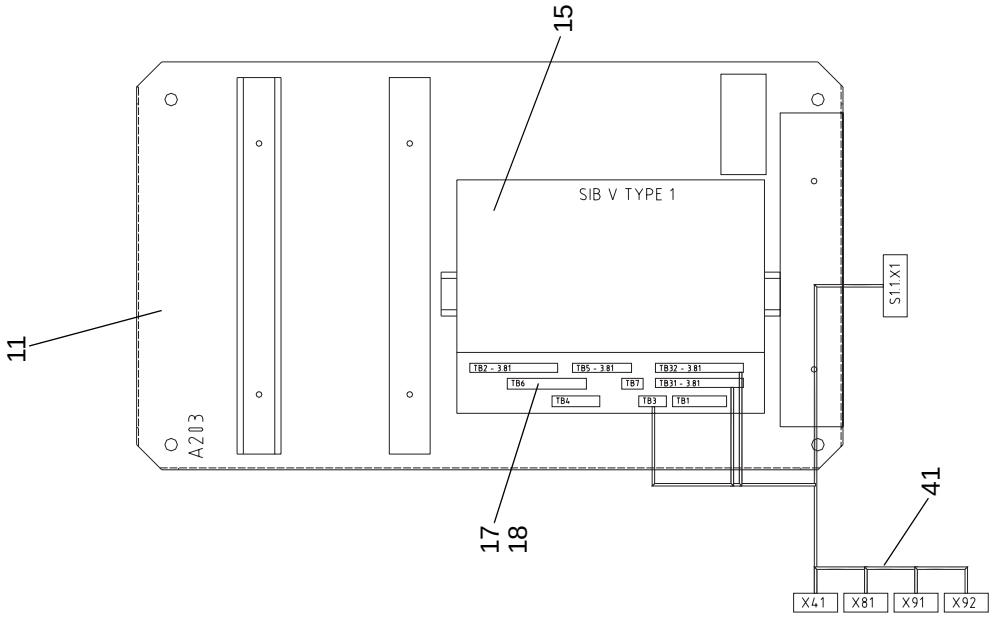
Reservdelar beställs genom ABB Automation Technology Products AB. Vid beställning var vänlig uppge typ och tillverkningsnummer samt benämningar och beställningsnummer enligt reservdelsförteckningen.

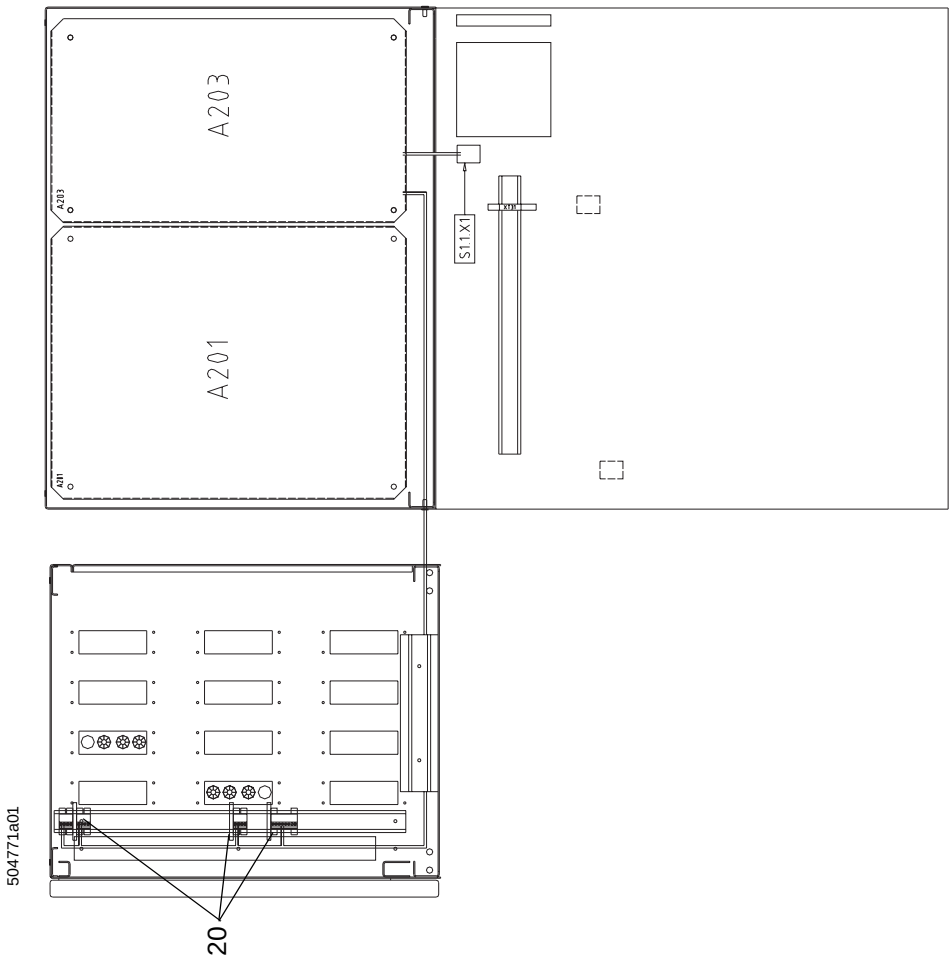
Rätt till ändring av specifikationer utan avisering förbehålles.

Spare parts are to be ordered from ABB Automation Technology Products AB. Kindly indicate type of unit, serial number, denominations and ordering number according to the spare parts list.

Rights to reserved to alter specifications without notice.

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		504 771-880	**Operatörskomm.gränss-nitt**	**Operator communica-tion InterFace**	
11		504 949-880	Plåt, kompl.	Plate, compl.	
15		504 994-880	Säkerhetskort V, Typ 1	SafetyInterfaceBoard V, Type 1	SIB
17		489 947-469	Anslutningsdon, Combi-con	Connector, Combicon	7 pol
18		500 958-001	Insticksbrygga	Bridge	7 pol
20		436 829-009	Jordklämma	Terminal	
41		502 291-880	Kabelstam	Cable harness	


15
SIB V TYPE 1
S11X1
11
A203
TB2 - 381
TB5 - 381
TB32 - 381
TB6
TB7
TB31 - 381
TB4
TB3
TB1
17
18
41
X41
X81
X91
X92


A203
A201
S11X1
504771a01
20

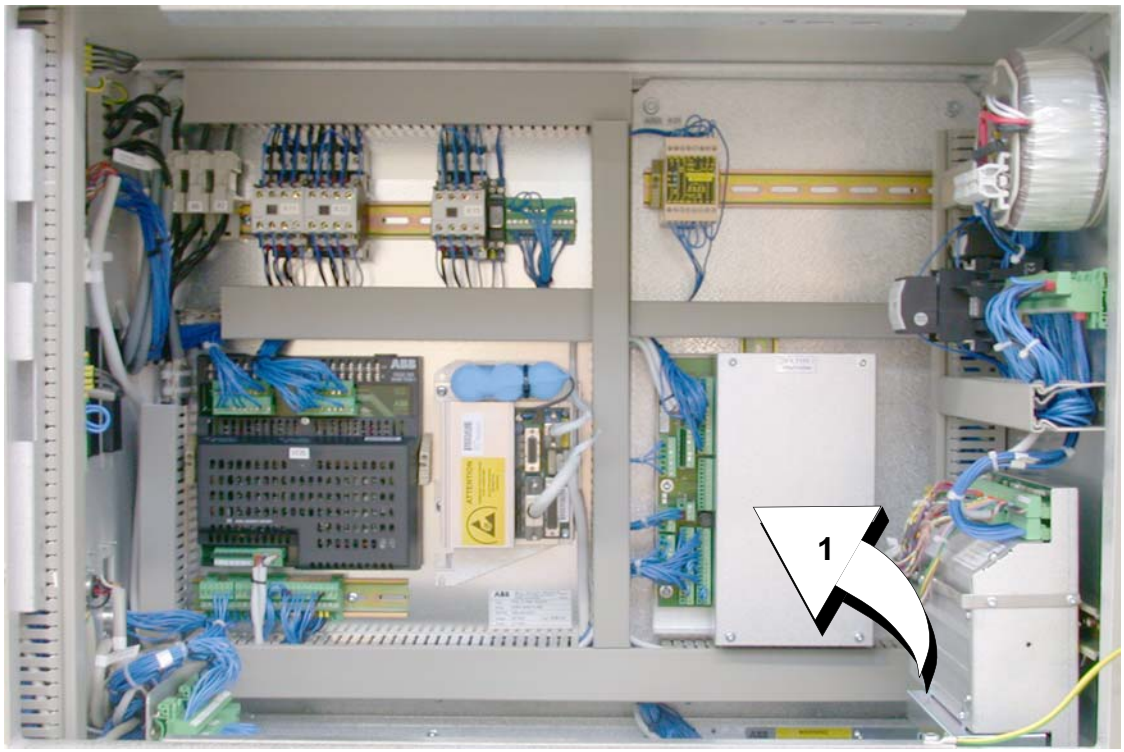
5.7 Operator communication for positioner types A/L/S

There is a modular based interface fitted to the right of the cabinet's rear panel for operator communications and safety equipment.

The interface includes:

- a circuit card for safety supervision
- a cabling harness prepared for connection of external safety components.

The interface can be used for supervision of one or two work stations without further modification depending on the selected station solution.



skåpinsida.jpg

Figure 87

1 Circuit card for safety supervision SIB

Connections

External safety components are connected to the jackable terminal blocks fitted internally by the two-piece cable glands on the left-hand side of the top cabinet.

Any included standard components are connected according to Figure 88.

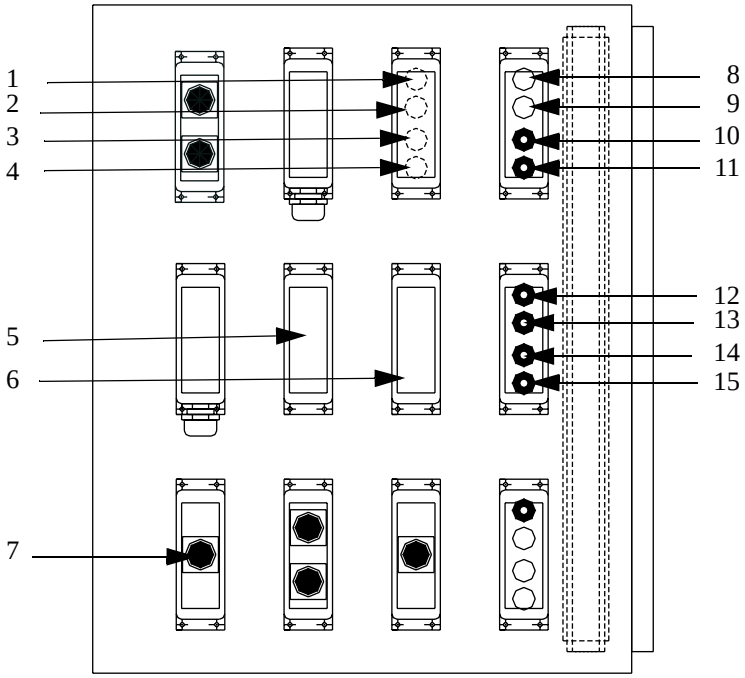


Figure 88 Connections

1 Gate switch	**10** Light curtain (återställningsskydd) station 2
2 Gate reset	**11** Light barrier 2
3 Home position/transport indicator	**12** Activation unit working area 1
4 Position indicator for robot/travel track	**13** Timer resetting station 1/ Light curtain station 1
5 Roller door station 1	**14** Light curtain (återställningsskydd) station 1
6 Roller door station 2	**15** Light barrier 1
7 Operator panel	
8 Activation unit working area 2	
9 Timer resetting station 2/ Light curtain station 2	

Power supply

The safety equipment is fed with 24V DC from an internal supply unit (24V I/O).

The supply to external safety components is fuse protected internally on the circuit card for safety supervision and may be loaded with max. 1.5 A continuously.

5.7.1 OPERATION and CONNECTIONS

Emergency stop

Cabinet_S4Cplus_12

1 Motors on

2 Emergency stop

3 Operating mode selector

4 Running time meter

All emergency stop buttons included in the system are as standard connected in series and directly affect the control system’s emergency stop loop.

Included on external safety equipment, available in the standard range, are:

- an emergency stop button on the operator’s panel
- an emergency stop button on the equipment cabinet for the roller door.

The "Extended emergency stop function" option gives the possibility of supplementing equipment with components for, e.g. gate interlocking via the emergency stop of fixtures.

Optional redundant auxiliary relays can then be easily connected for this purpose.

The following two figures show the theory behind how the emergency stop loop is used to control the connected equipment.

For detailed information about the design of the emergency stop loop refer to the ***"The robot's User's Manual"***

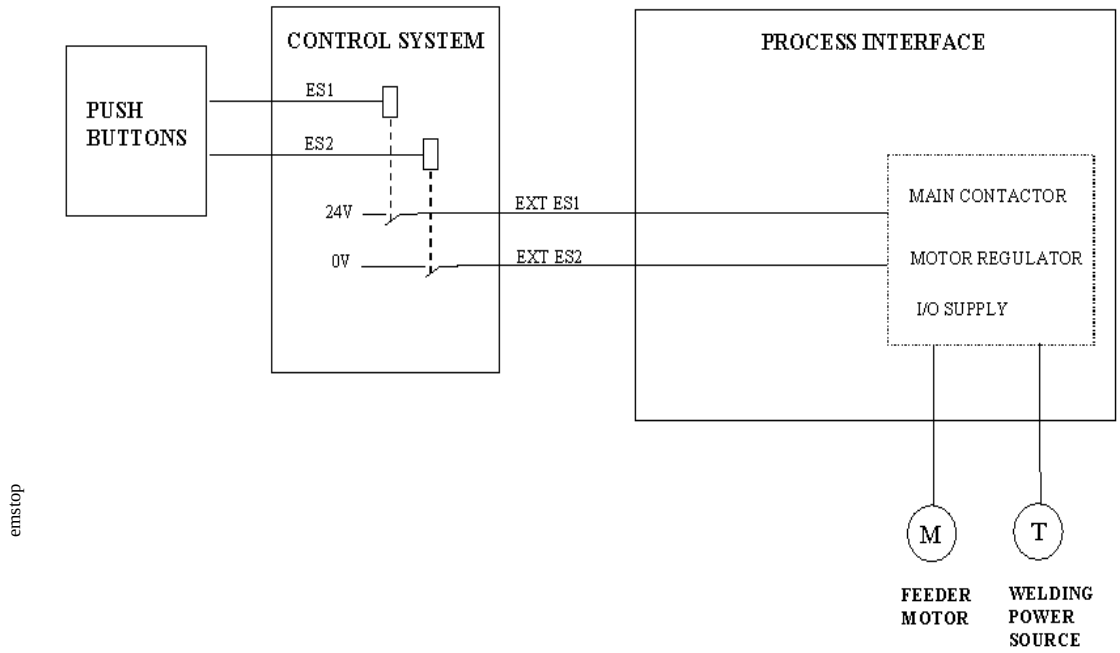


Figure 89 Emergency stop loop

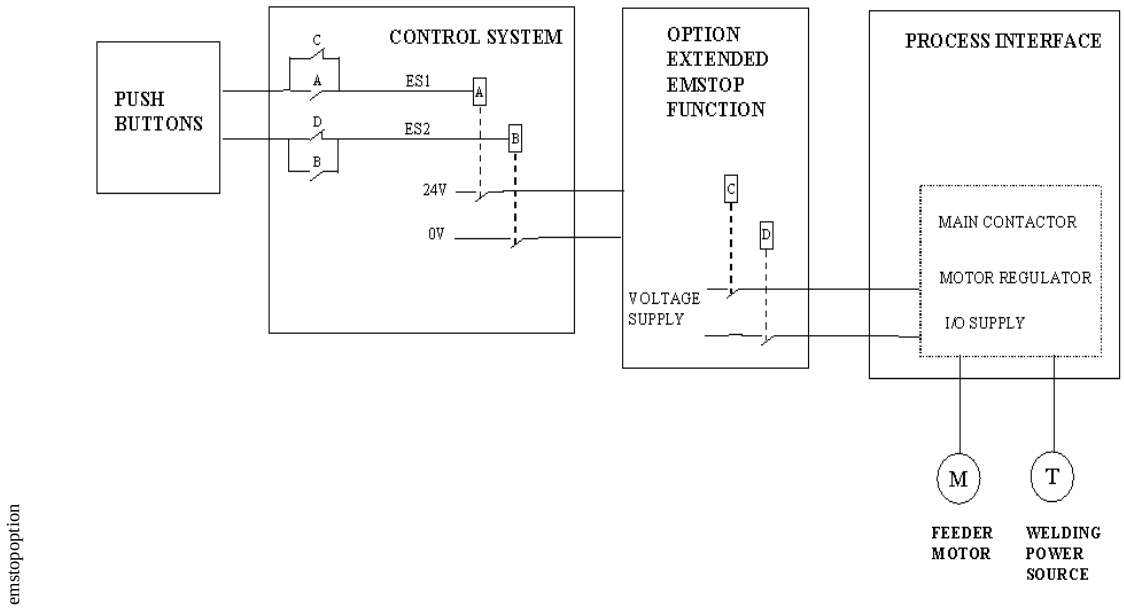


Figure 90 Emergency stop loop with the addition "Extended emergency stop function"

5.7.2 Interlocks

Operating stop loop

The figure below shows the theory behind how the operating stop loop is used to control connected equipment.

For detailed information about the design of the operating stop loop refer to the ***"The robot's User's Manual"***

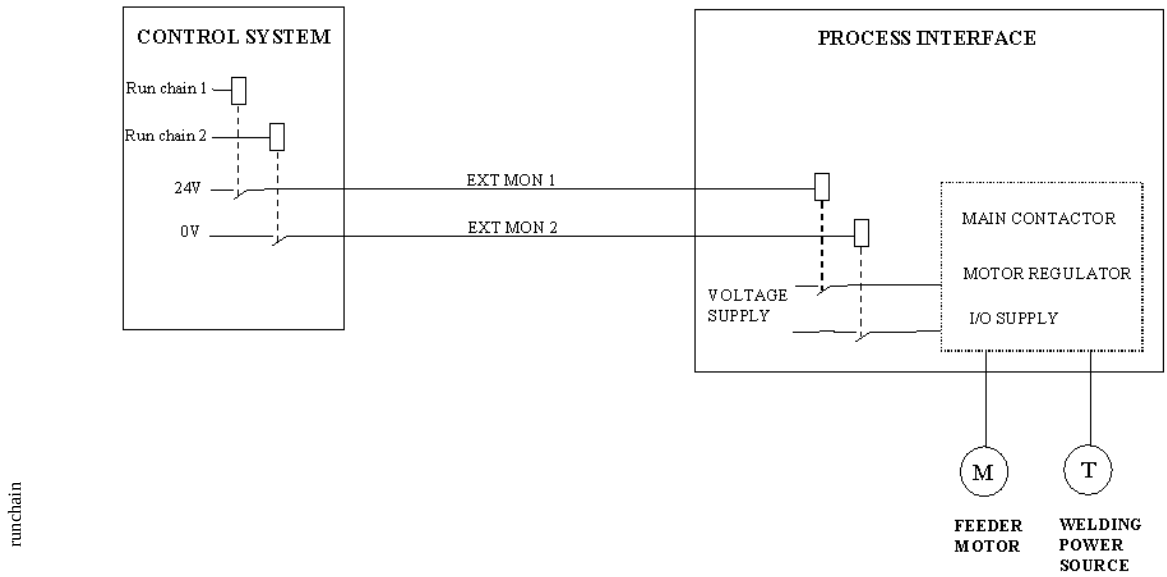


Figure 91 Operating stop loop

Two channel break up of the operating stop loops takes place using the circuit card for safety supervision and the gate switch.

The safety functions on the circuit card are connected to the:

- "GENERAL STOP"

The gate switch is connected to the:

- "AUTO STOP".

In order to run the robot and positioner in the "AUTO" operating mode requires:

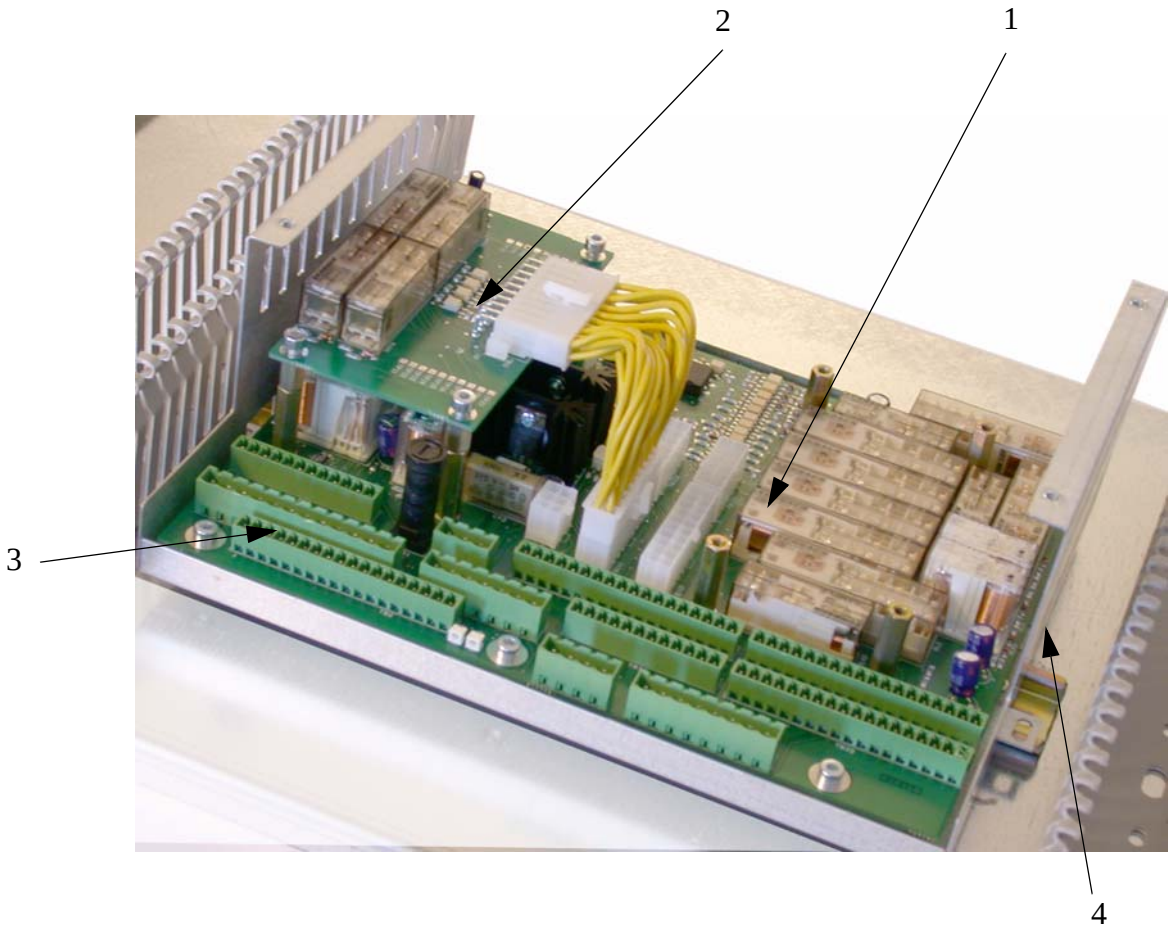
- all safety loops to be intact and
- that the system has been started (MOTORS_ON).

Operation of the positioner's station switching unit and work station in the supervised area is not permitted in the MAN FS (Mode MANUAL - Full speed) operating mode.

Circuit board for supervision

The circuit card includes functions for the supervision of:

- entry protection (light barriers, roller door)
- station mode (limit switch)
- activated positioner axes (engaging and disengaging the motors)

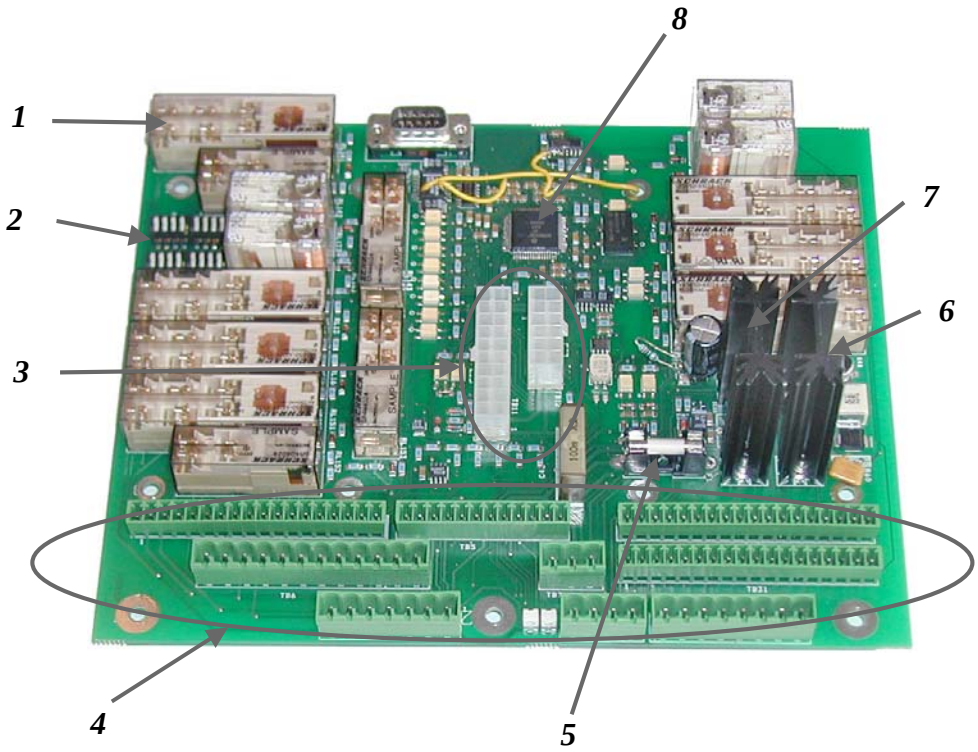


Figur 92 Safety module with option card.

1	Safety module	**3**	Connection
2	Option card	**4**	Enclosure

The functions are built up of safety components, where the function and status of these are supervised via the CAN bus by the control system.

.



Figur 93 Module for safety surveillance.

1	Safety relays	**5**	Fuse
2	DIL switch	**6**	Voltage regulator
3	Internal connections	**7**	Voltage regulator
4	External connections	**8**	CAN-processor

The safety functions can be expanded using different option cards connected to the circuit card depending on the selected station solution.

5.8 Connection instructions

5.8.1 Connection of the supply voltage

The SIB V module safety circuits are fed with a 24V DC voltage.

- The supply is connected to the jackable terminal TB7.

If necessary, the 0 V level on the supply voltage can be assured by

- connecting a potential equalising conductor to the earth potential in the environment where the ***SIB V*** module is located.

Normally the supply is connected to the control cabinet's voltage supply to the I/O system (24V I/O, 0V I/O), but the safety system can also be connected to its own power supply.

The SIB V module's CAN bus system is galvanically isolated from the other circuits and receives its supply via the control system's CAN-bus loop on the jackable terminal TB6.

The outgoing voltage supply to the connected safety components is fuse protected internally on the ***SIB V*** module and may be loaded with max 1.5 A continuously.

The voltage can be accessed on the jackable terminal TB3.

In Figure 94 - Figure 97 some different connection options to TB7 and TB3 are shown.

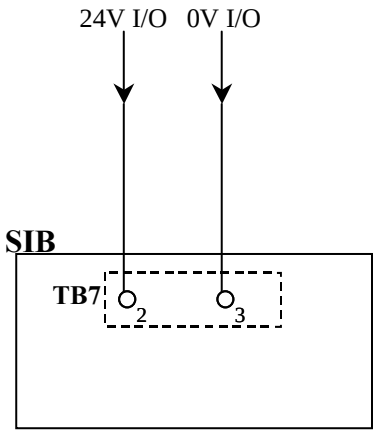


*Figure 94 Internal voltage supply of the safety module **SIB V***

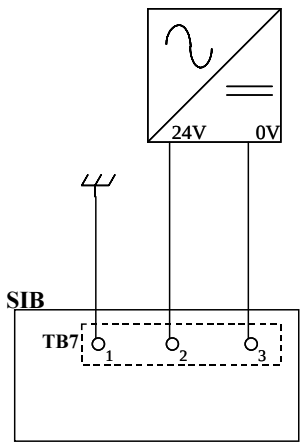


*Figure 95 External voltage supply of the safety module **SIB V***

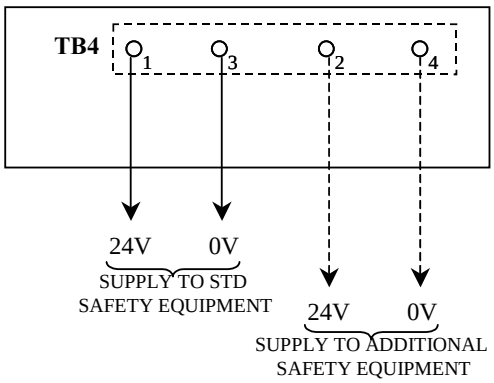


Figure 96 Supply to External safety components <1.5A

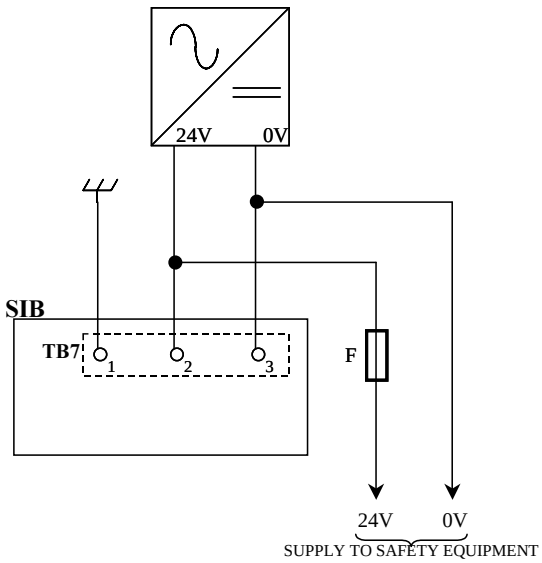


Figure 97 Supply to External safety components >1.5 A

5.8.2 Entry protection

The SIB V module can be configured for the connection of entry protection with numerous safety output variants. This can be done without adding any extra components.

Entry protection can consist of:

- light barrier
- light curtain
- door/roller door with safety limit switch
- door/roller door with safety magnetic switch
- pressure mat
- zone detector

The safety outputs can be of the type:

- double NC (normally closed) relay contacts or safety switch contacts
- one NC and one NO (normally open) relay contact or safety switch contact
- double PNP transistor outputs
- one PNP transistor output and one NPN transistor output
- one PNP transistor output and an INVERTED PNP transistor output

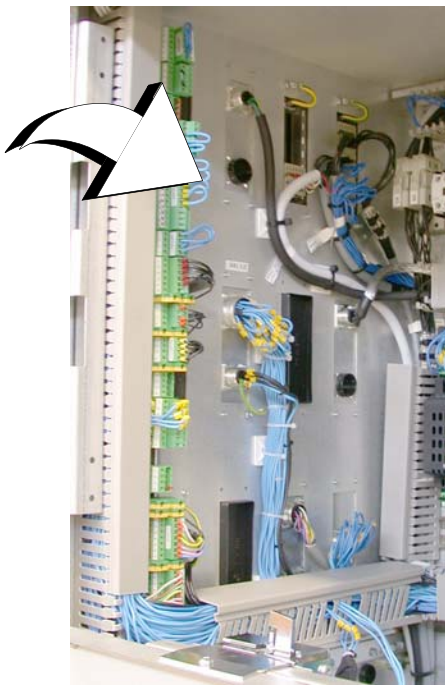
The connected entry protection should be designed to comply with category 4 in accordance with EN 954-1.

Connection

Connection/configuration of the entry protection is done on a jackable terminal located on the top left inside wall of the cabinet.

- Equipment for area 1 is connected to X41
- Equipment for area 2 to X42.

Cable entry can easily be made through the two-piece cover.



The output signals are distributed from the jackable terminals on the entry protection to the ***SIB V*** module as set out in the example in Figure 99.

Note! Input A (24V) must be made at the same time or before input B (0V) in solutions according to Figure 104 in order to permit resetting of the safety circuit.

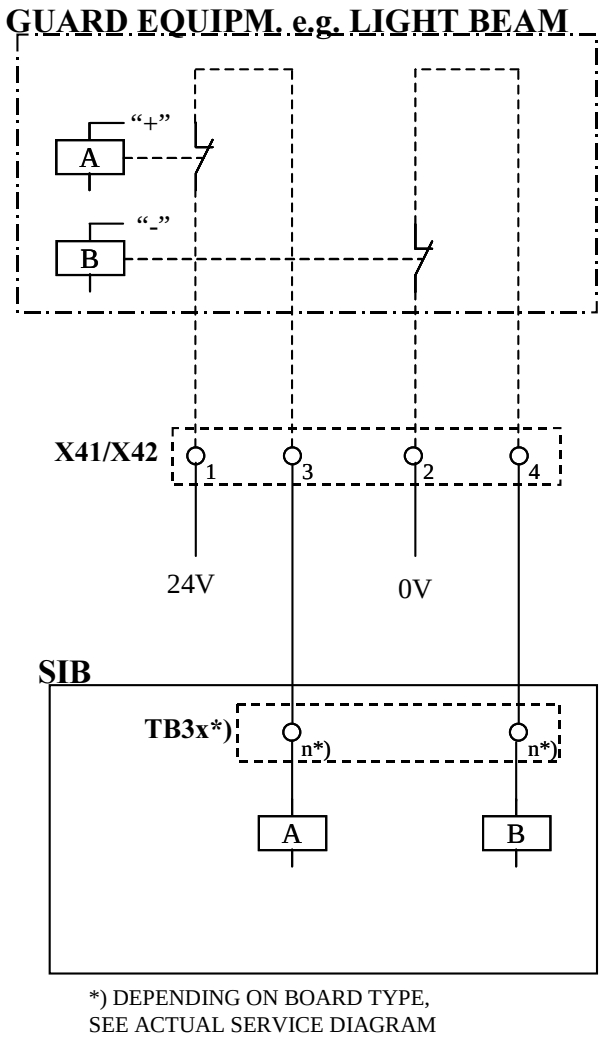


Figure 98 Entry protection with relay outputs. The status shown with active protection.

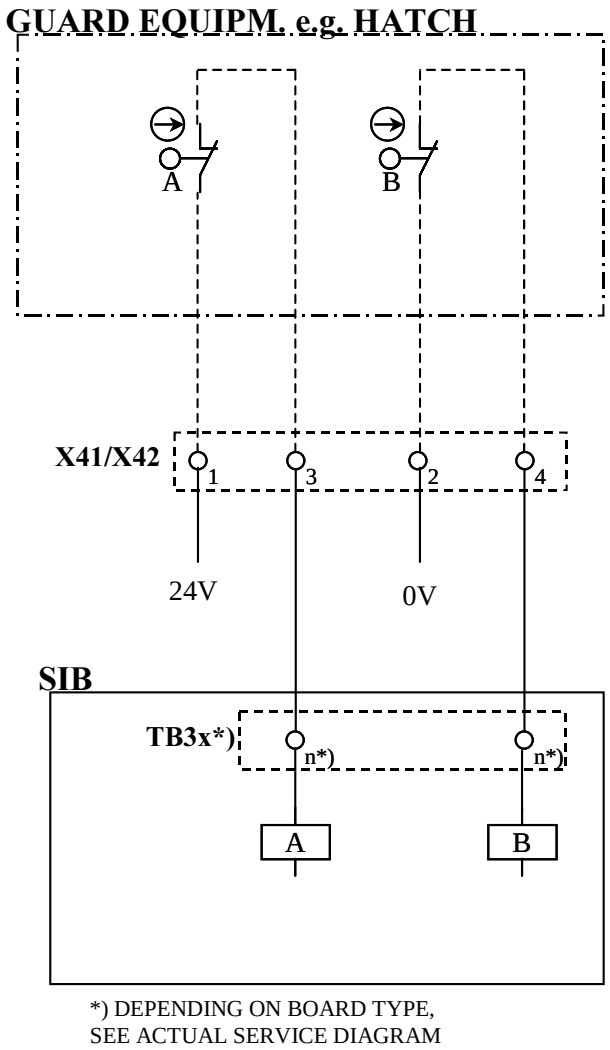
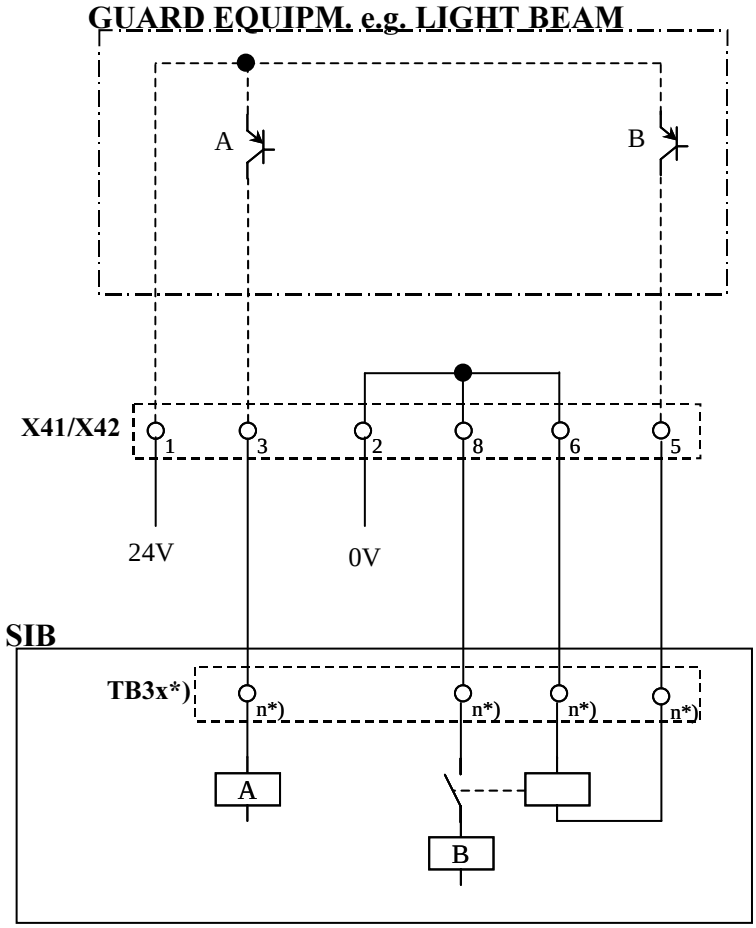


Figure 99 Entry protection with limit switch. The status shown with active protection.



*) DEPENDING ON BOARD TYPE,
SEE ACTUAL SERVICE DIAGRAM

Figure 100 Entry protection with double PNP-outputs

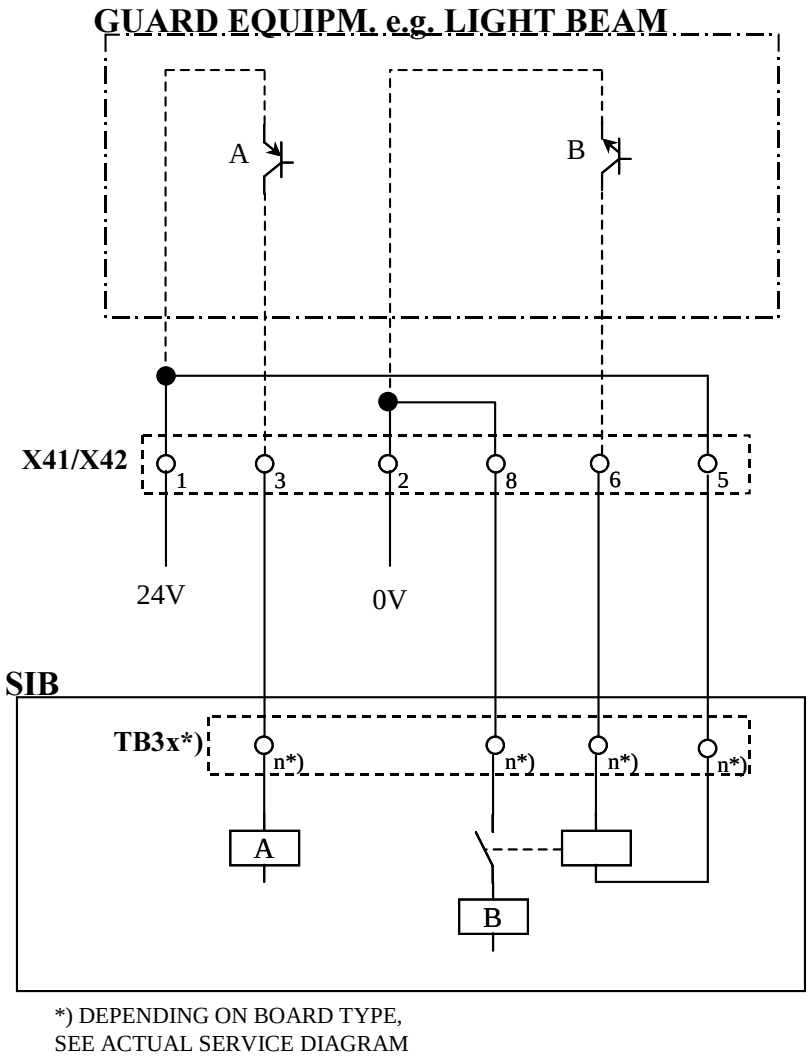


Figure 101 Entry protection with one PNP-output and one NPN-output

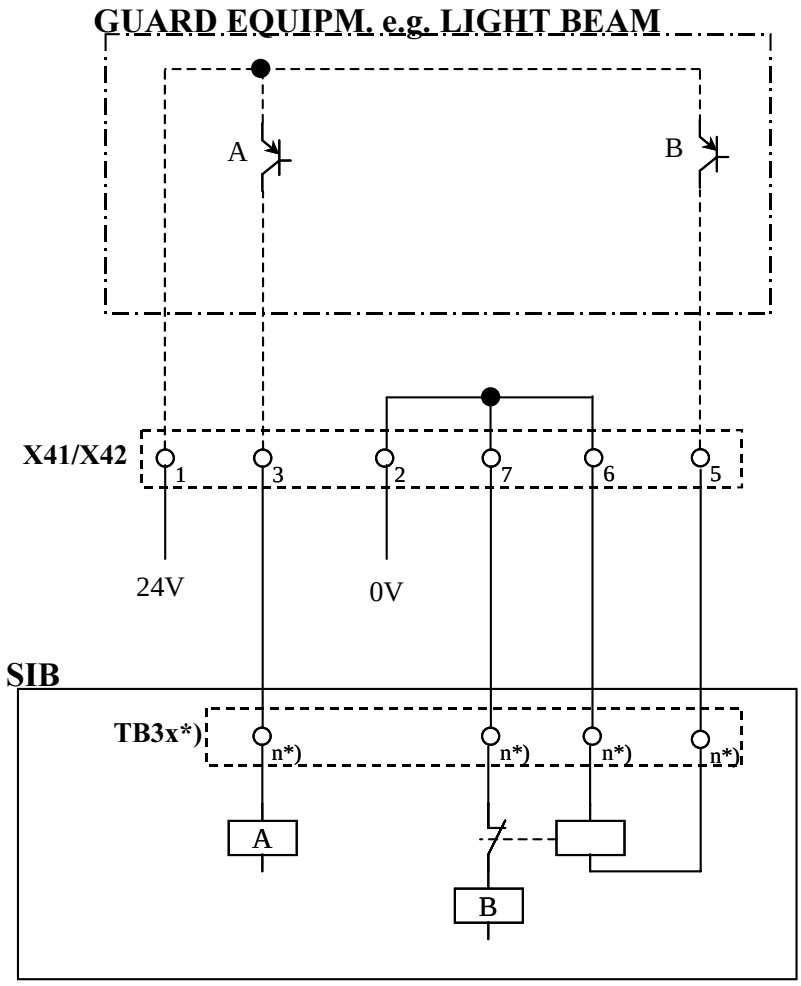


Figure 102 Entry protection with one PNP-output and one INVERTED PNP-output

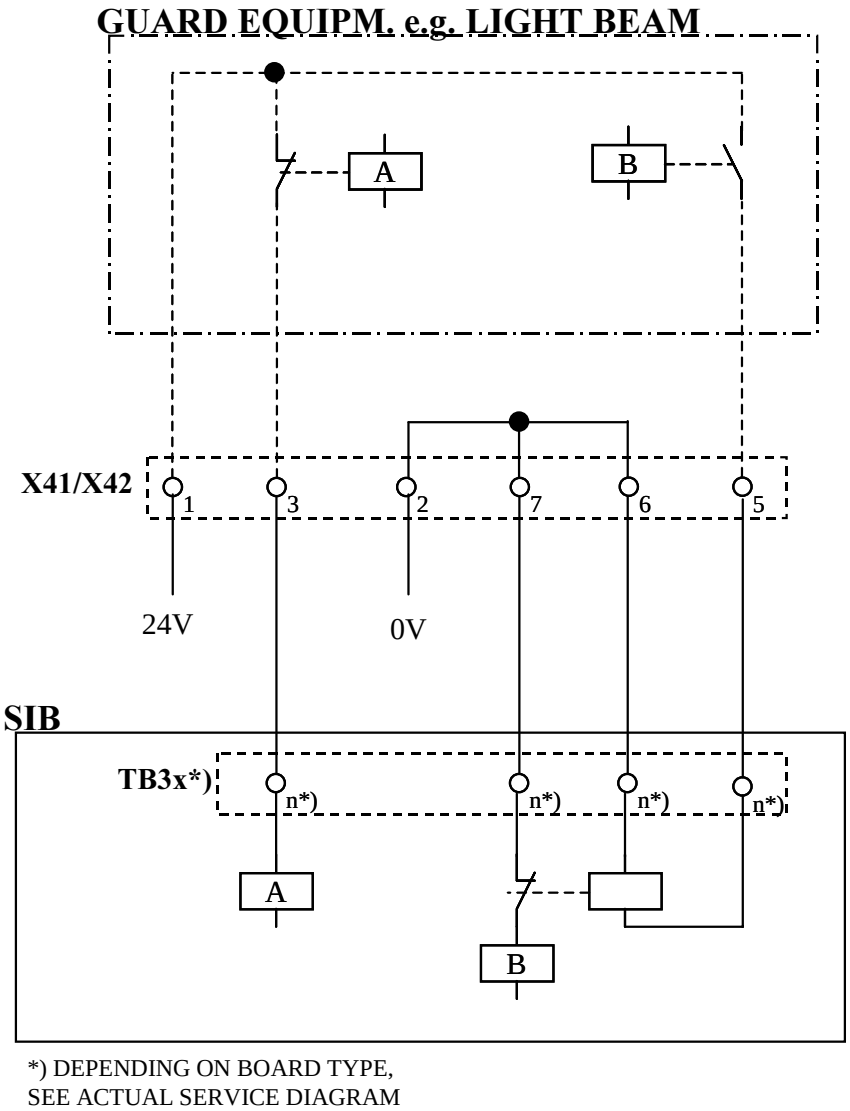


Figure 103 Entry protection with one NC and one NO-output. The status shown with active protection (relay or limit switch)

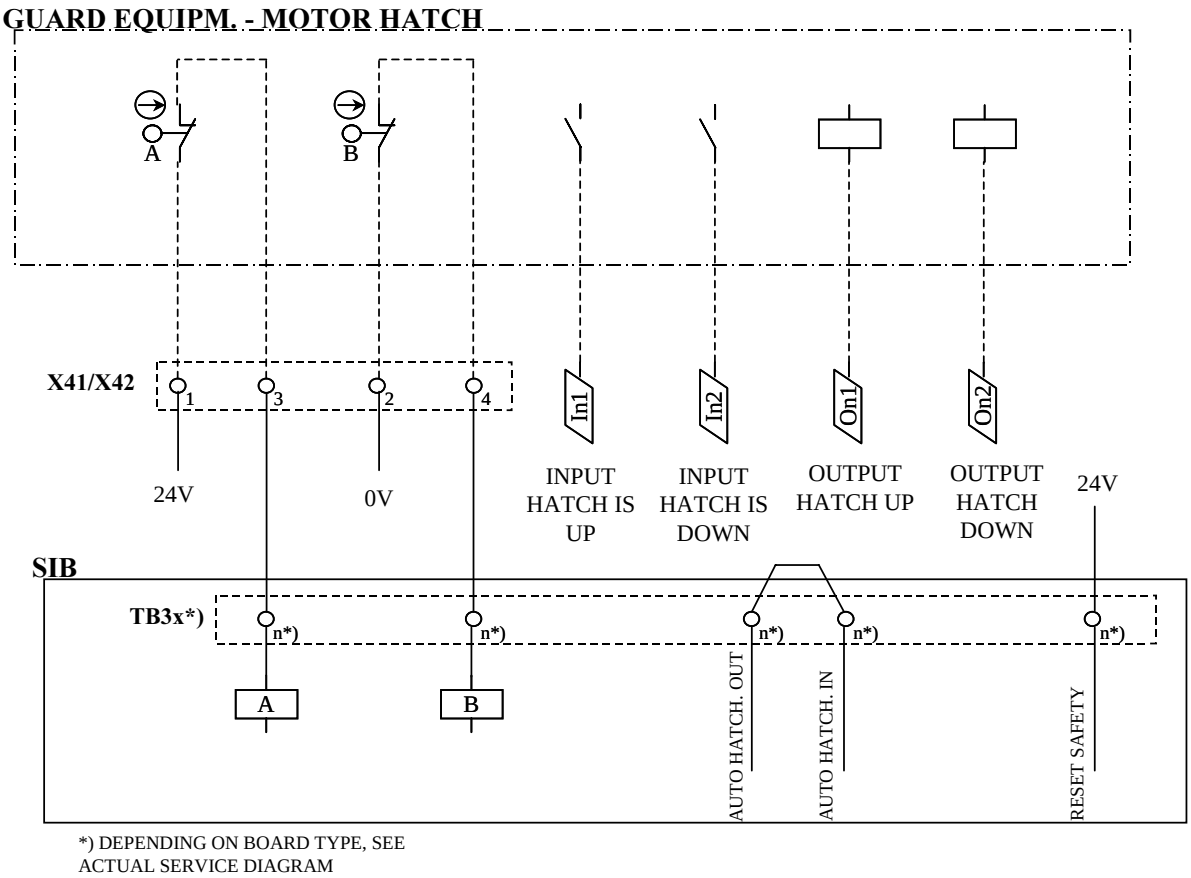


Figure 104 Entry protection - principle for connection of a roller door

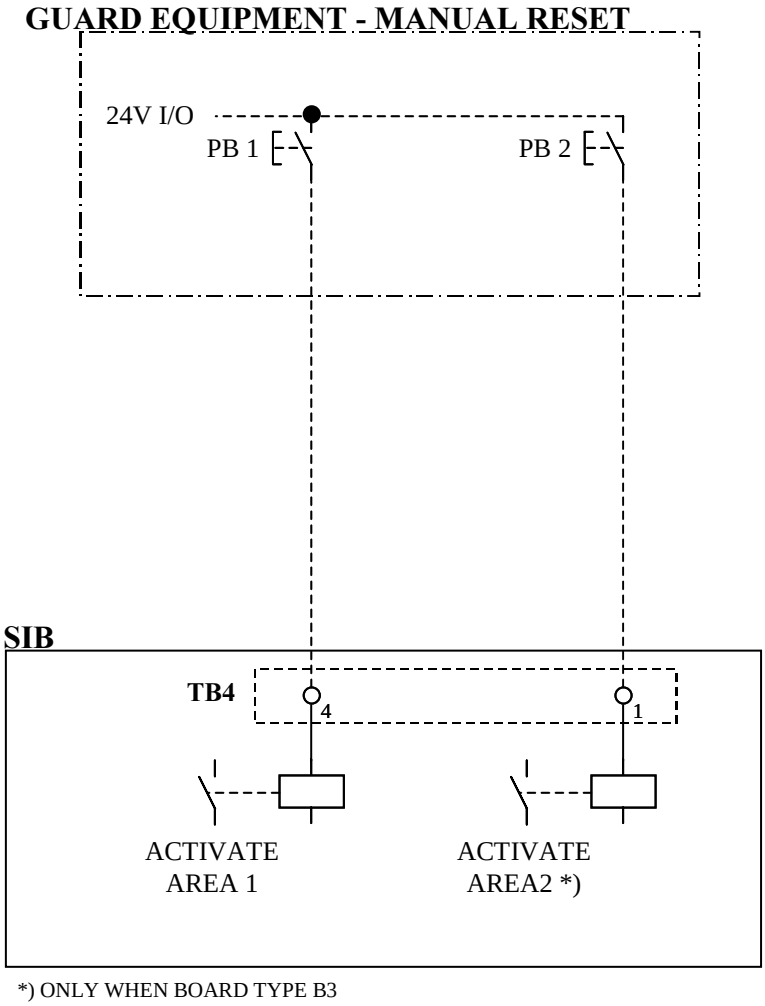
Resetting

The entry protection is connected to the safety inputs on the ***SIB V*** module.

These input circuits are doubled and supervised as well as protected against short circuiting or hardware failure if connection of the entry protection is carried out as shown in the example.

The input circuits are normally reset using a push-button, located outside of the risk zone, when the selected entry protection can be passed.

Automatic resetting can be used on protection where this is acceptable from a safety standpoint.



Figur 105 Manual resetting of entry protection.

Testing

If more protected outputs are required than those available on the ***SIB V*** module, extra relays can be connected in parallel with the relays in the safety circuits on the ***SIB V*** module.

The relays must be approved for safety applications, with positive closing contacts.

The outputs on the ***SIB V*** module are fed with 24V DC/0V DC and can be loaded with max 100 mA.

The operation of the relays can be tested using a NC contact connected to the resetting circuit for entry protection as set out in the examples in Figure 106 and Figure 107.

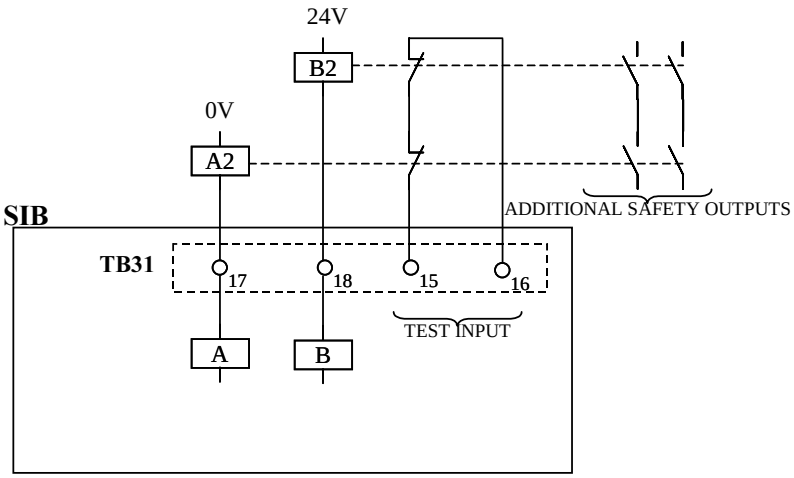


*Figure 106 Connection and testing of the extra safety relay for entry protection. Applies to safety module **SIB-V, type 1/2.***

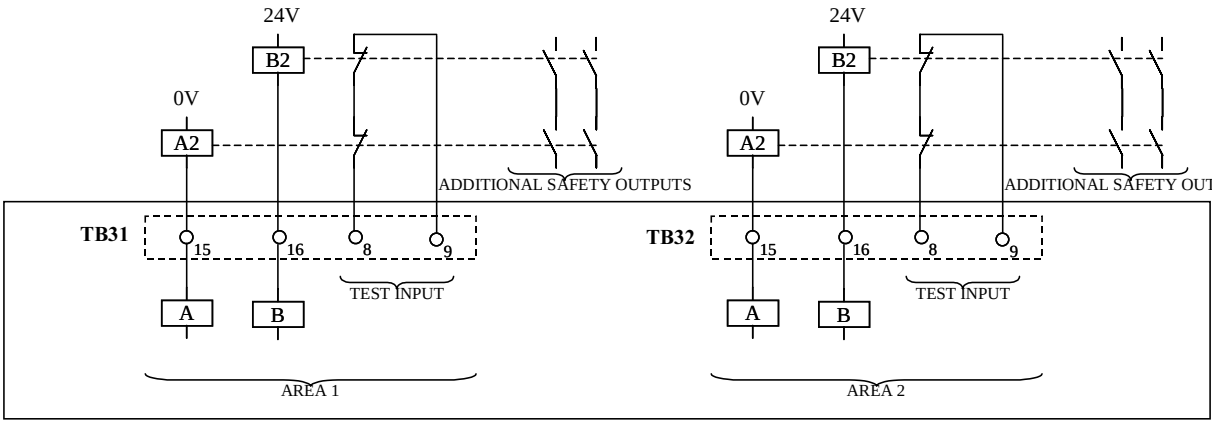


*Figure 107 Connection and testing of the extra safety relay for entry protection. Applies to safety module **SIB-V, type 3.***

Resetting of the protected outputs on the ***SIB V*** module will fail if a fault occurs on any of the relays.

5.8.3 Limit switch for the service door

Interlocking of the service door can, depending on the station solution, be performed with manual or automatically resetting.

Automatic resetting

Automatic resetting is selected when the control cabinet is placed in the immediate vicinity of the service door so that the operator has a view of the programming area during the start of the production run.

In this case the limit switch circuits are connected directly to the control cabinet's auto-stop-loops.

The auto-stop-loop is reset when:

1 the operator closes the door, for example, after program adjustment and

2 the control system is reset to production mode using:

- the operating mode selector on the control cabinet.
- motors in operation.

The limit switch should be approved

- with double, positive closing and positive opening NC contacts.

Connection example

The circuit breaker is connected to the:

- jackable terminal X92, located on the top left inside wall of the cabinet.

Principle for connection of the limit switch in the safety system is shown in Figure 108.

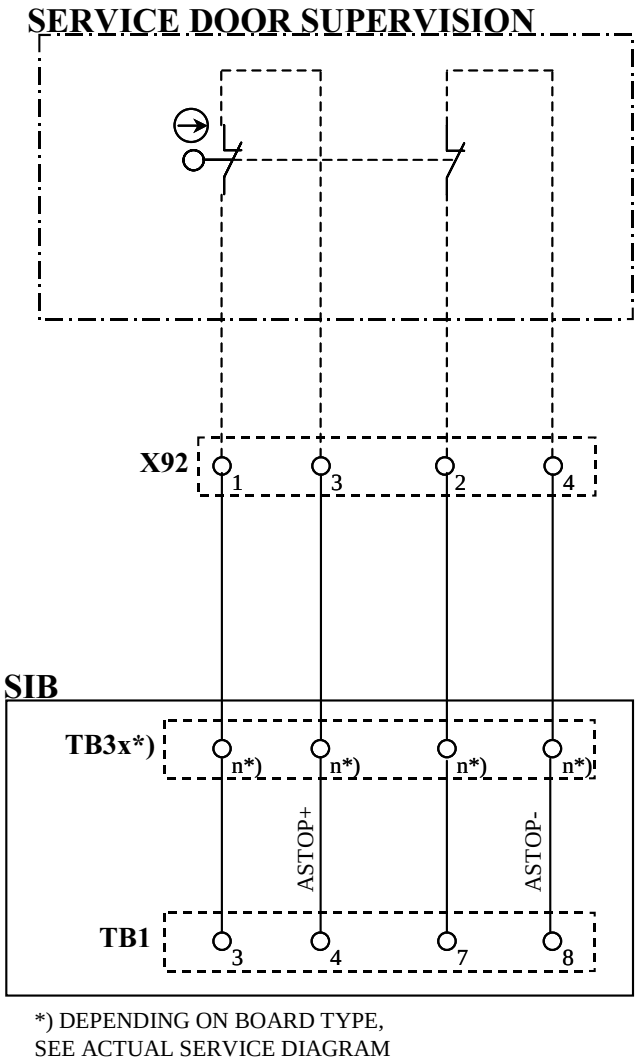


Figure 108 Service door with automatic resetting of the protection

Manual resetting

Manual resetting must be used when the control cabinet's placement means that the operator cannot be sure whether someone has passed through the service door after the operator has left the programming area and moved to the control cabinet to start the production run.

In this case the SIB V module is supplemented with a safety function that resets the auto-stop-loops once

- the door is closed and
- the safety functions are reset using a push-button placed on the outside of the programming area by the service door.

If anyone passes through the door, the operator is not allowed to switch to production mode before the safety function has been reset again.

Resetting and testing

The safety function consists of an option card, which is connected to the ***SIB V*** module. The safety circuit is doubled and supervised.

The input from the push-button is protected against short-circuiting as this must be both closed and opened in order for the safety circuits' outputs to be reset.

Connection example

Limit switch and resetting push-button are connected to

- jackable terminals X92 and X91.

The connection principle for the function is shown in Figure 109.

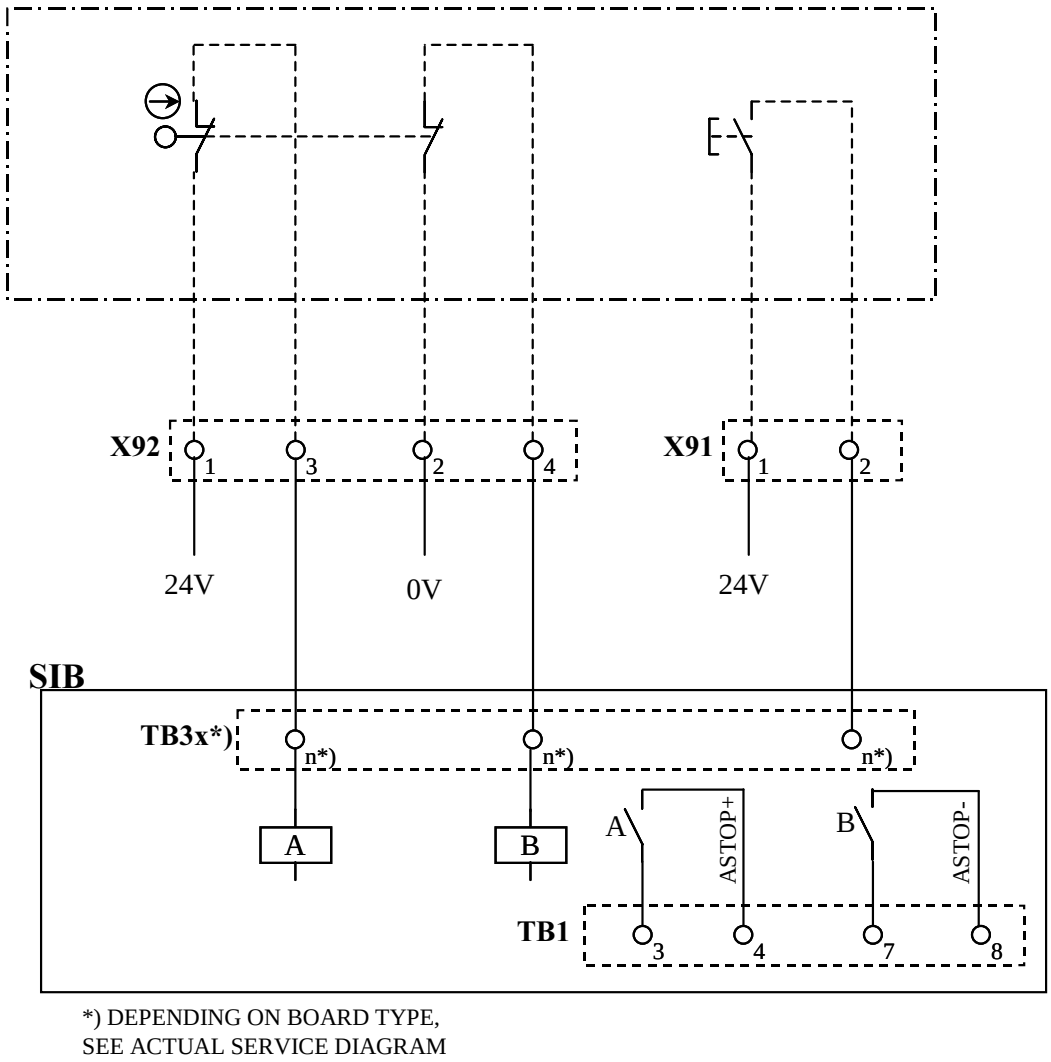


Figure 109 Service door with the limit switch - manual resetting of the protection

5.8.4 Timer resetting protection

The timer resetting protection is used to prevent anyone remaining in the risk zone when the entry protection is reset and the ready for start of a new cycle signal is given to the control system.

This interlock can, for example, be designed as a time function or as a sensing function.

The offered timer resetting unit consists of

- an option card connected directly to the ***SIB V*** module as well as
- an activation push-button, which should be placed within respective risk zones.

Resetting and testing

The safety function consists of an option card, which is connected to the ***SIB V*** module. The safety circuit is doubled and supervised.

The input from the push-button is protected against short-circuiting as this must be both closed and opened in order for the safety circuits' outputs to be reset.

Connection example

Connection of the timer resetting protection is done on a jackable terminal located on the top left inside wall of the cabinet.

- Equipment for area 1 is connected to X81
- Equipment for area 2 to X82.

Cable entry can easily be made through the two-piece cover.

The activation signal is distributed from the jackable terminals to the ***SIB V*** module as set out in the figure below.

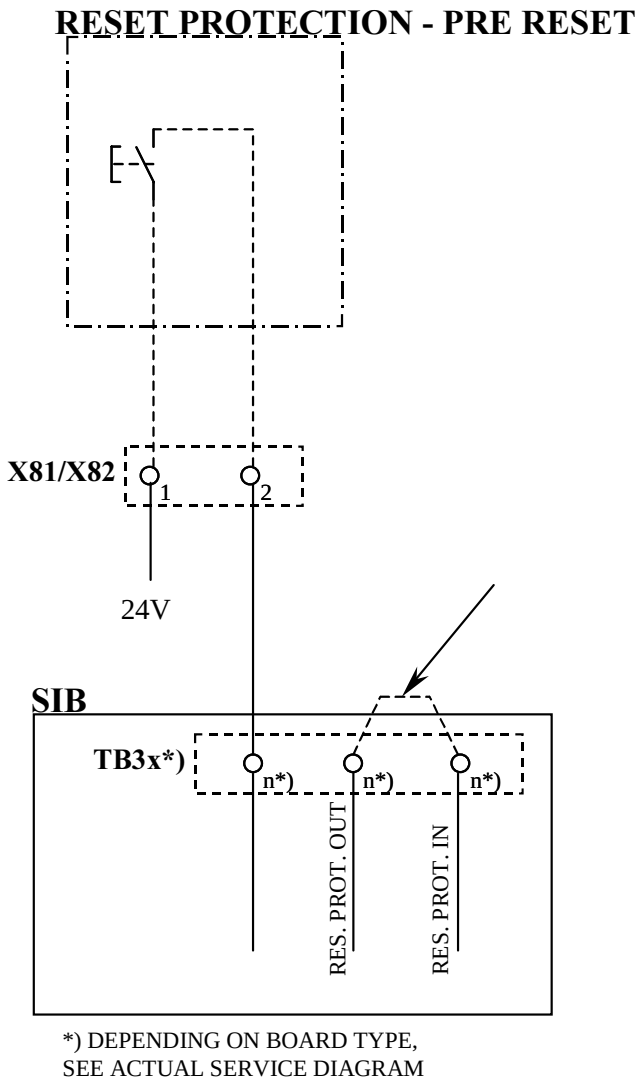


Figure 110 Activation push-button for the timer resetting unit

If some form of sensing unit is used instead of timer resetting protection, a safe output from this unit must be connected to the ***SIB V*** module as set out in the example in Figure 111.

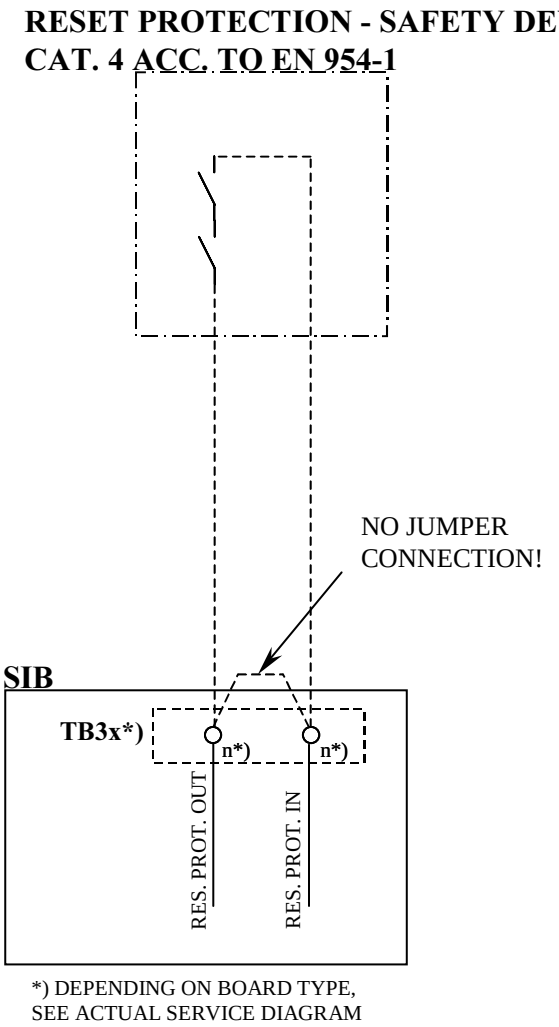


Figure 111 Timer resetting protection with optional safety unit

The connected sensing unit should be designed to comply with category 4 in accordance with EN 954-1.

5.8.5 Movement/station indication for the positioner side

The main functions of the safety switches are

- to detect non-permitted movement on the positioner's station switching unit.

Some signals are also used by the I/O system

- to indicate which station side is in position by the robot.

The limit switches are placed in the station switching unit.

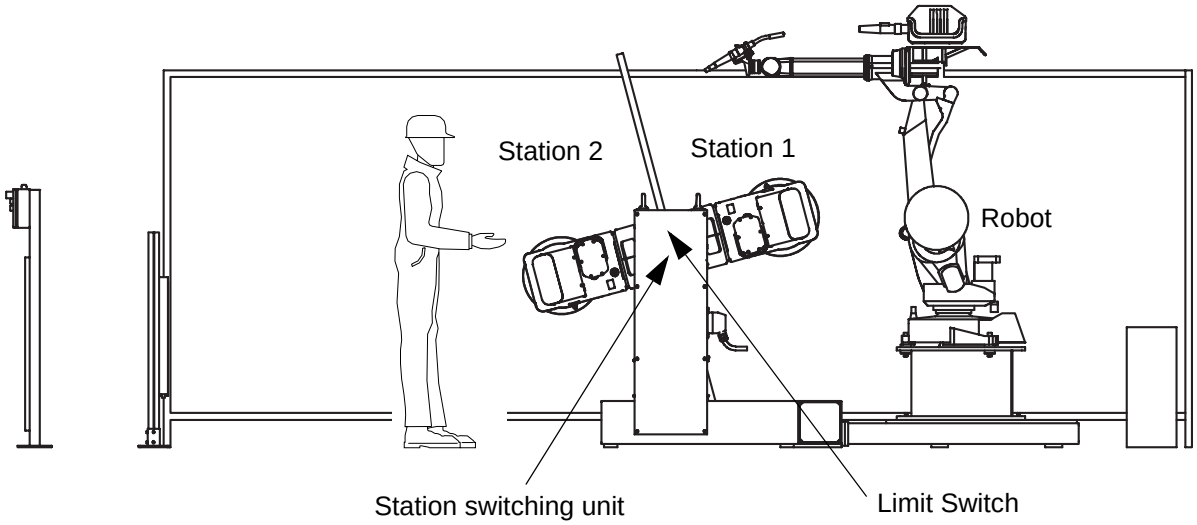


Figure 112 Example of station indication on a positioner with a station switching unit and two stations.

Connection

This function is only included on ***SIB V*** module types 1 and 2.

Signals from limit switch on the positioner are pre-routed to a jackable terminal on the safety module.

The terminal can be connected directly to the ***SIB V*** module on output TB2. The signals are utilised by the safety circuits, which activate the control system's operating loop.

Principle solutions for different positioner types are shown in Figure 113 and Figure 114.

Note! The input circuits on the safety switches are

- galvanically isolated from the other safety circuits on the ***SIB V***-module and
- are fed from the positioner's positioner interface.

This must be considered when a possible supplement to the safety system is made so that safety functions are not bypassed due to mixed voltage supplies.

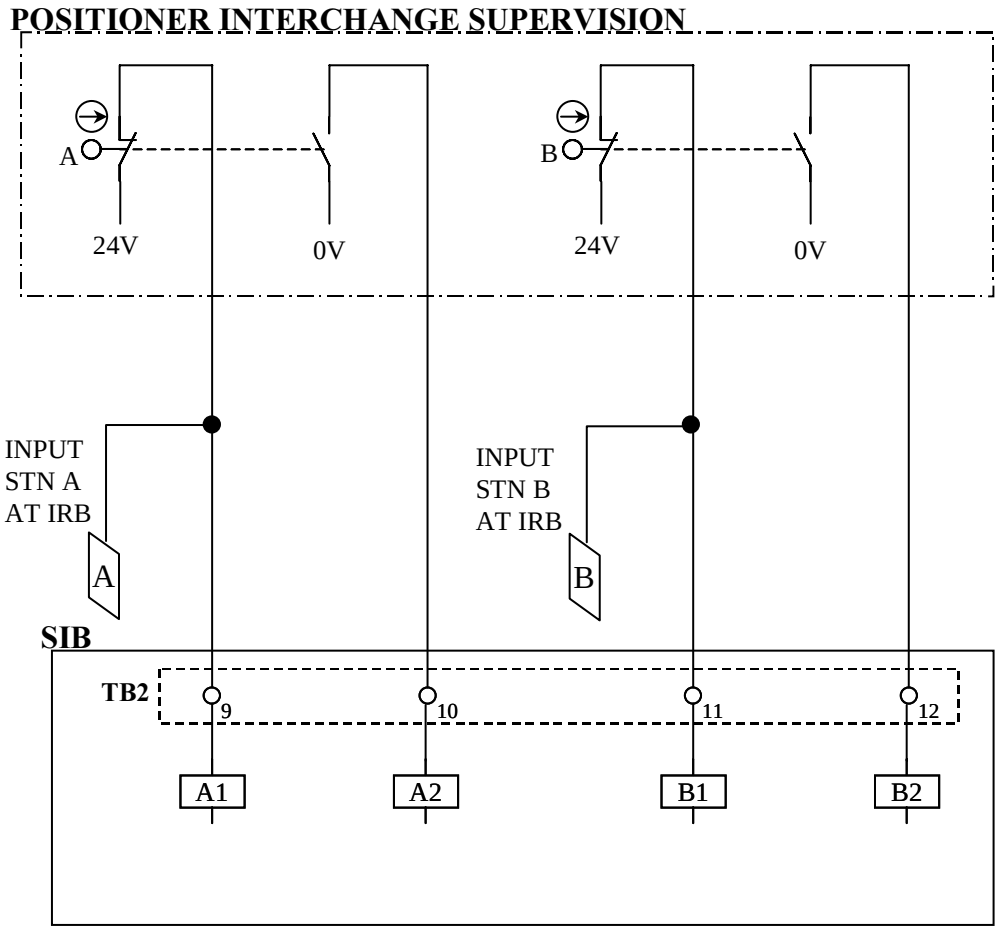


Figure 113 Supervision of the positioner's movement and station indication with a 2-station solution

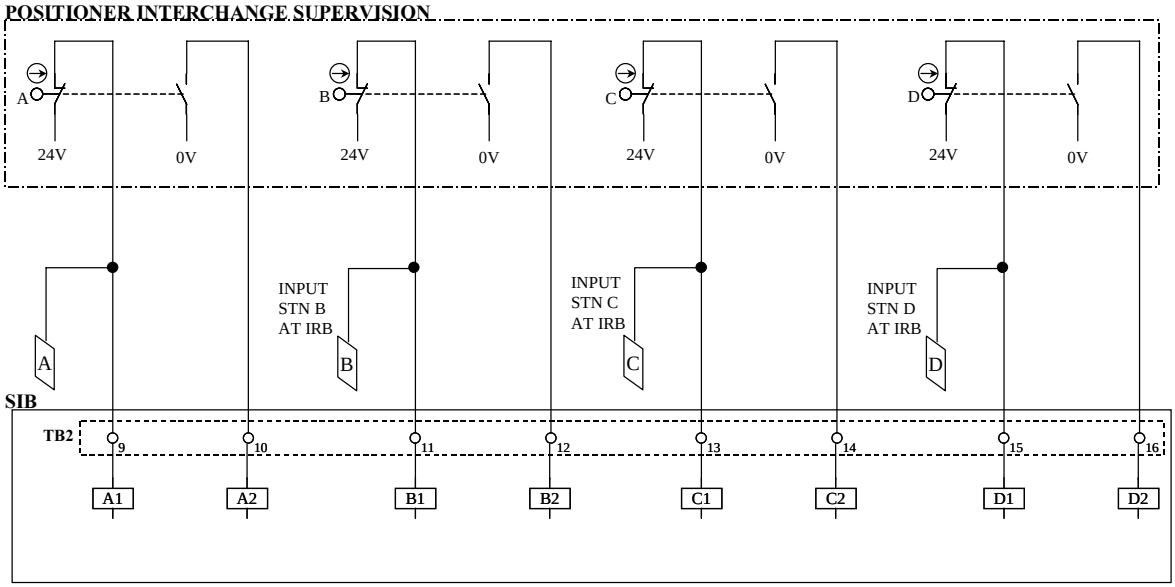


Figure 114 Supervision of the positioner's movement and station indication with a 3/4-station solution

"NOTE!

Equipment used to monitor positioner movement and to indicate the station side (inputs A - D in the fugures above), should be designed so it cannot switch on the safety inputs on the SIB V module in the event of a fault arising."

Resetting

The signals from the safety switch are connected to double supervised safety inputs on the ***SIB V*** module.

These input circuits are doubled and supervised as well as protected against short circuiting or hardware failure if connection is carried out as shown in the example.

Testing

The safety circuit is designed so that:

- the limit switch and the input circuits are checked and reset automatically with station switching before a new working cycle is started.

5.8.6 Station indication for the robot/conveyor

This function is used to

- supervise in which working area the robot is in during production operations.

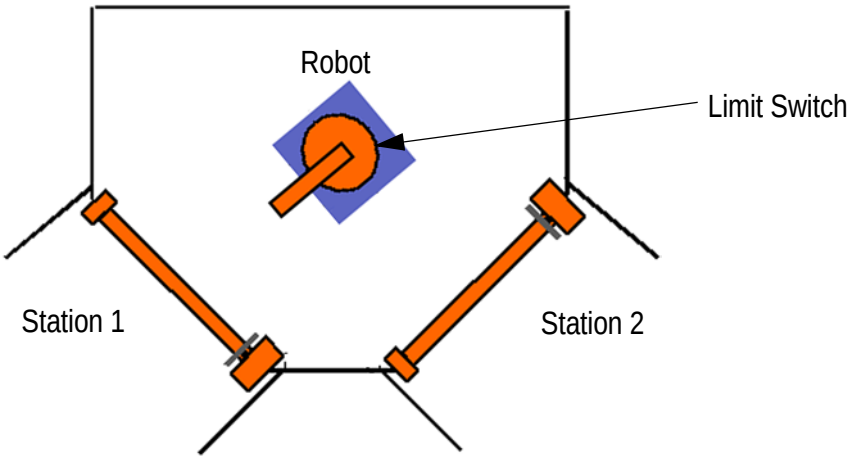


Figure 115 Example station indication on the robot with two work stations.

When the limit switches are mounted on the base of the robot these are activated by a common cam rod.

The switch function results in:

- station indication
- a supervised service position, where the robot can be set, for example, for cleaning the tool. This area is permanently linked to the 0-position for the robot's axis 1 and permits a movement of ±7°.

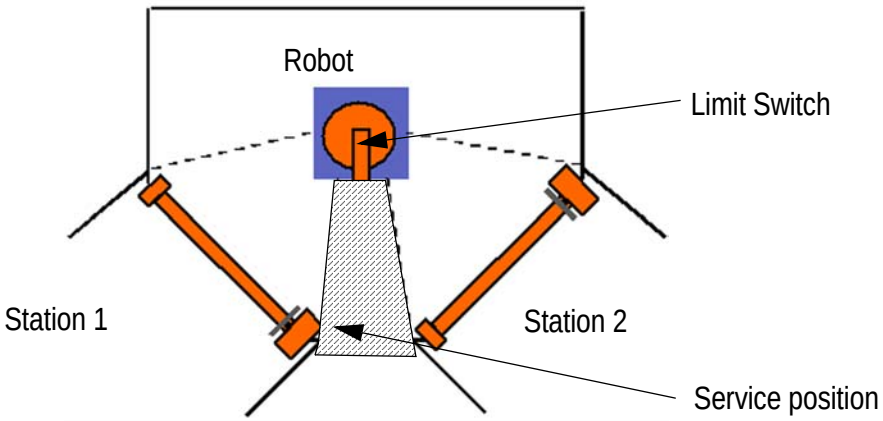


Figure 116 Example service position for a robot with two work stations.

If the function for an installation with the conveyor is used, the safety switches can instead be mounted on the conveyor's carriage and are then actuated by individual cam rods. A service position between work stations is not permitted with this solution.

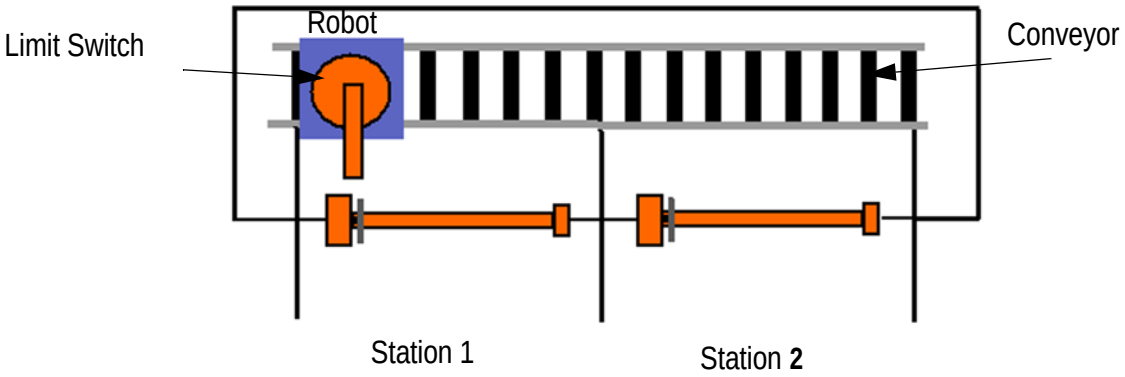


Figure 117 Example 3 Station indication on the conveyor for the robot with two work stations.

Depending on the selected station solution, the switches can also be mounted on the base of the robot when a conveyor is included.

Connection

The switches are connected to jackable terminal X100, located on the top left inside wall of the cabinet.

Cable entry can easily be made through the two-piece cover.

The output signals from the switches are distributed from the jackable terminals to the ***SIB V*** module as set out in Figure 118.

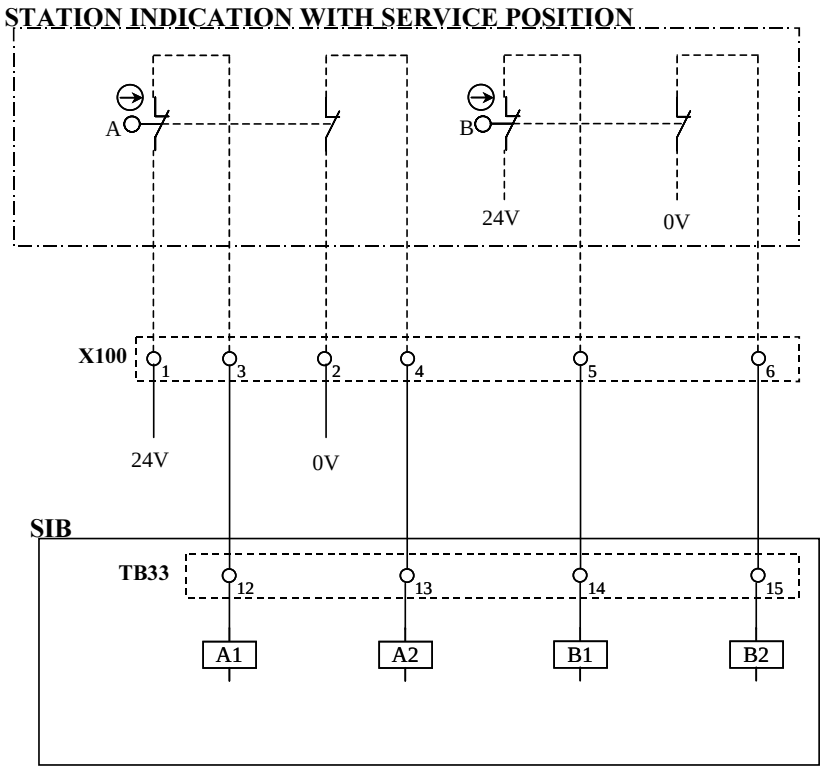


Figure 118 Stations supervision IRB/RTT with the limit switch

Resetting and testing

The safety functions for station indication and service position are included as standard on the ***SIB V*** module type 3.

The safety circuit is doubled and supervised and protect against short-circuiting or hardware failure.

The safety circuit is designed so that

- the limit switch and the input circuits are checked and reset automatically with movement between station sides, or station side and the service position**,** before a new working cycle is started.

5.8.7 Indication for the home position/transport position

This function is used to

- to supervise that the robot, under production operations, is in a defined safety area when the selected station solution so demands.

.

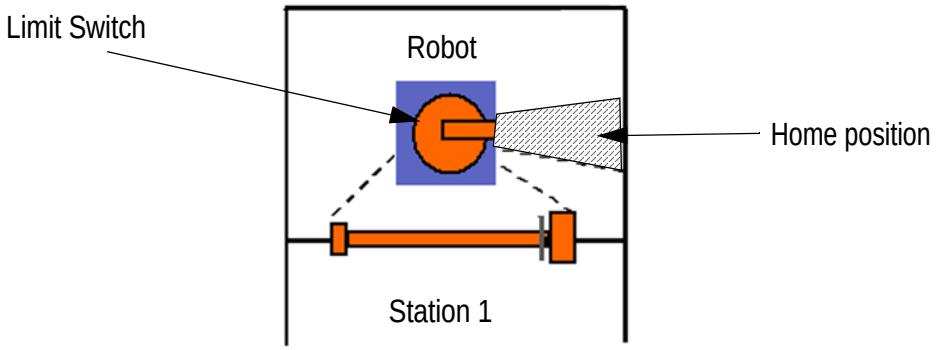


Figure 119 Example home position for the robot with one work station

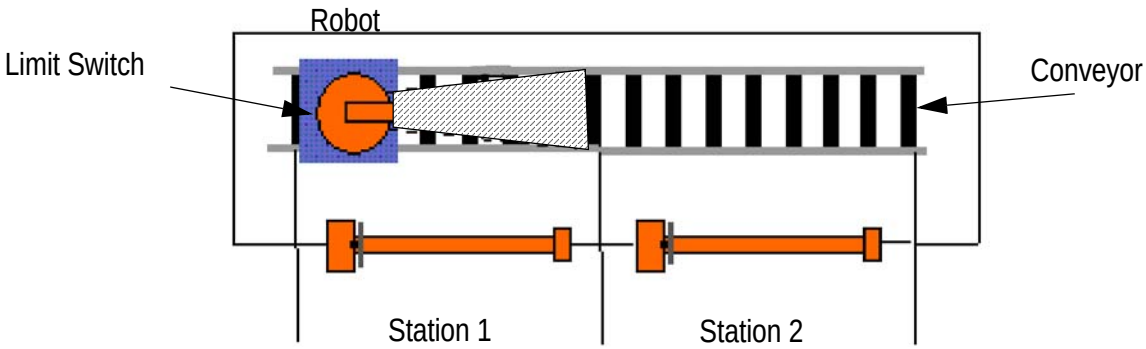


Figure 120 Example transport position for the robot.

Safety switches are mounted on the base of the robot. They are actuated by an adjustable cam rod that permits a movement of the robot's axis 1 by ±20° in the safe position.

The area can be adjusted by 30° interval around the robot's axis 1.

Connection

The switch is connected to

- the jackable terminal X111 located on the top left inside wall of the cabinet.

Cable entry can easily be made through the two-piece cover.

The output signals from the switches are distributed from the jackable terminals to the ***SIB V*** module as set out in Figure 121.

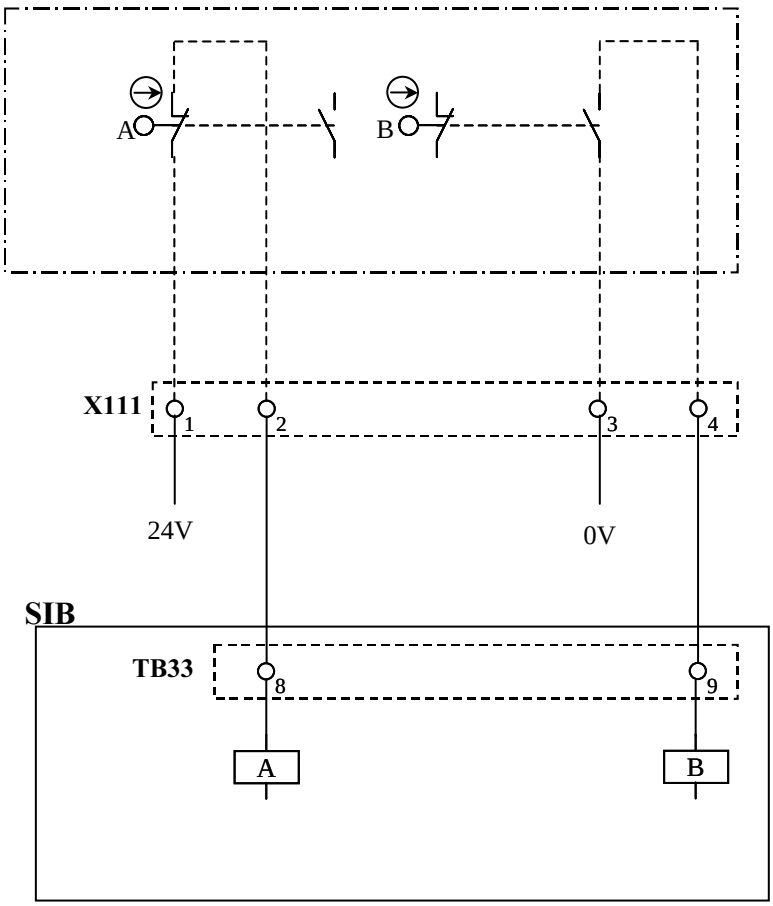


Figure 121 Supervision of the home position/transport position with the limit switch

Resetting and testing

The safety function consists of an option card, which is connected to the ***SIB V*** module.

Note! This function only works with the ***SIB V*** module type 3.

The safety circuit is doubled and supervised and protects against short-circuiting or hardware failure.

The safety circuit is designed so that

- the limit switch and the input circuits are checked and reset automatically with movement to and from the home position/transport position before a new working cycle is started.

5.8.8 Activation unit

An activation unit is used when there is a need to activate the activate work station from the operator's area, for example, programming, fixture replacement, etc.

Activation is performed using a separate push-button, which is located inside the supervised area. Activation can only be done in manual operating mode.

- MANUAL REDUCED SPEED (<250 mm/s) 
- MANUAL FULL SPEED 100% 

The SIB V module type 3 is equipped with the input circuits for reception of the activation signal. This can be done without adding any extra components.

Resetting

The activation unit is connected to the supervised safety inputs on the ***SIB V*** module.

The input circuits are normally reset with

- a push-button that is located inside the entry protection and out of the reach from the outside of the activated entry protection.

The input from the push-button is protected against short-circuiting as this must be both closed and opened in order for the safety circuits' outputs to be reset.

Connection example

Connection of the activation push-button is done on a jackable terminal located on the top left inside wall of the cabinet.

- Equipment for area 1 is connected to X93
- Equipment for area 2 to X94.

Cable entry can easily be made through the two-piece cover.

The activation signals are distributed from the respective push-buttons via the jackable terminals to the ***SIB V*** module as set out in the example in Figure 122.

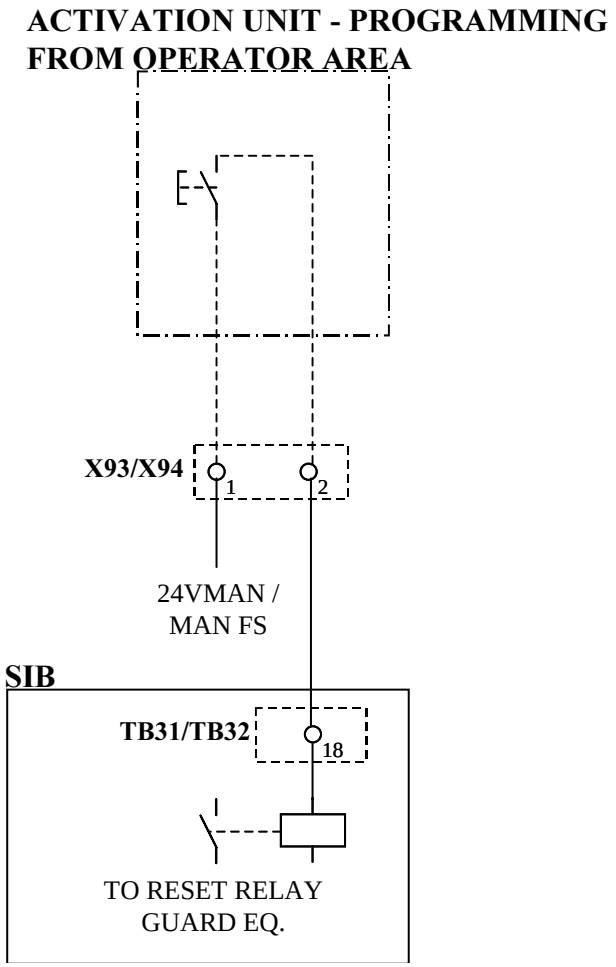


Figure 122 The activation push-button for programming from the operator's area

5.8.9 Operating loop, operating principles and connection possibilities

The SIB V module's supervision circuits are connected to the control system's operating loop with doubled and supervised safety outputs.

Depending on the safety function these outputs are activated:

- operating loop's auto stop or
- general stop level.

The operating loop is connected to the ***SIB V*** module on the jackable terminal TB1 according to Figure 123.

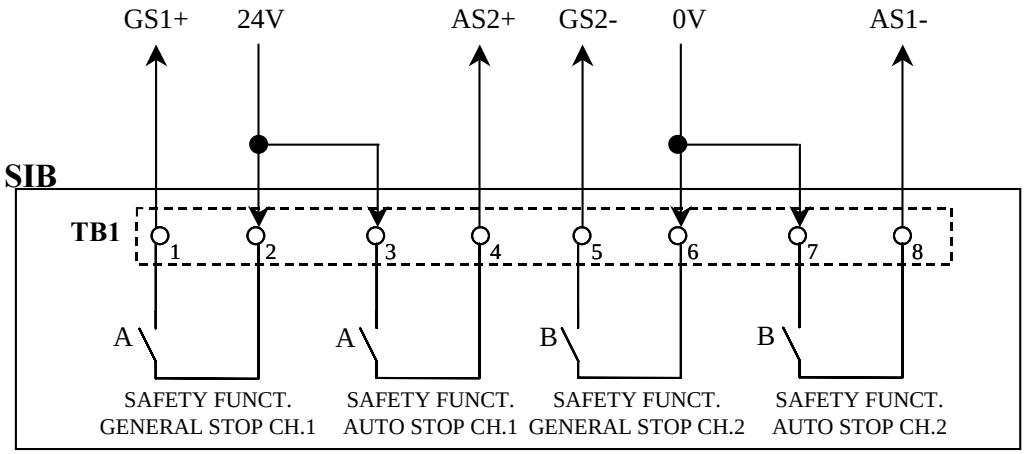


Figure 123 The operating loop's connection to the safety system

The operating principle for the protection function's activation of the auto stop and general stop level are shown in Figure 124 and Figure 125.

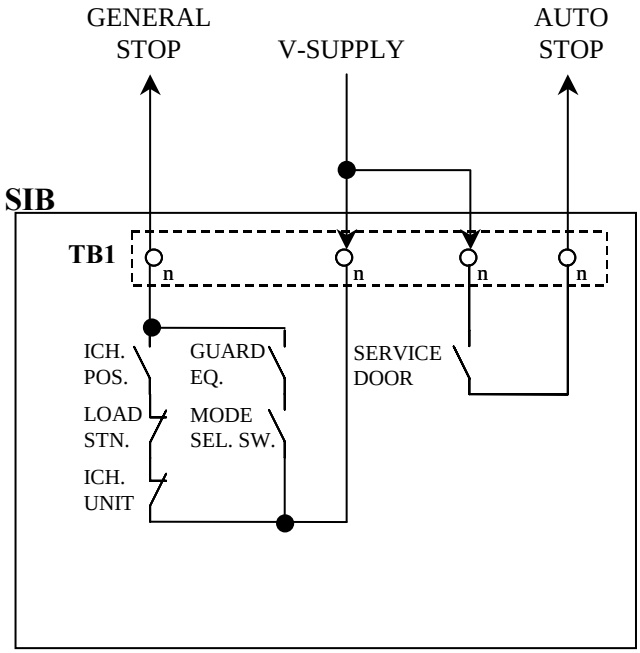


*Figure 124 The safety function's design for the safety module **SIB-V type 1/2***

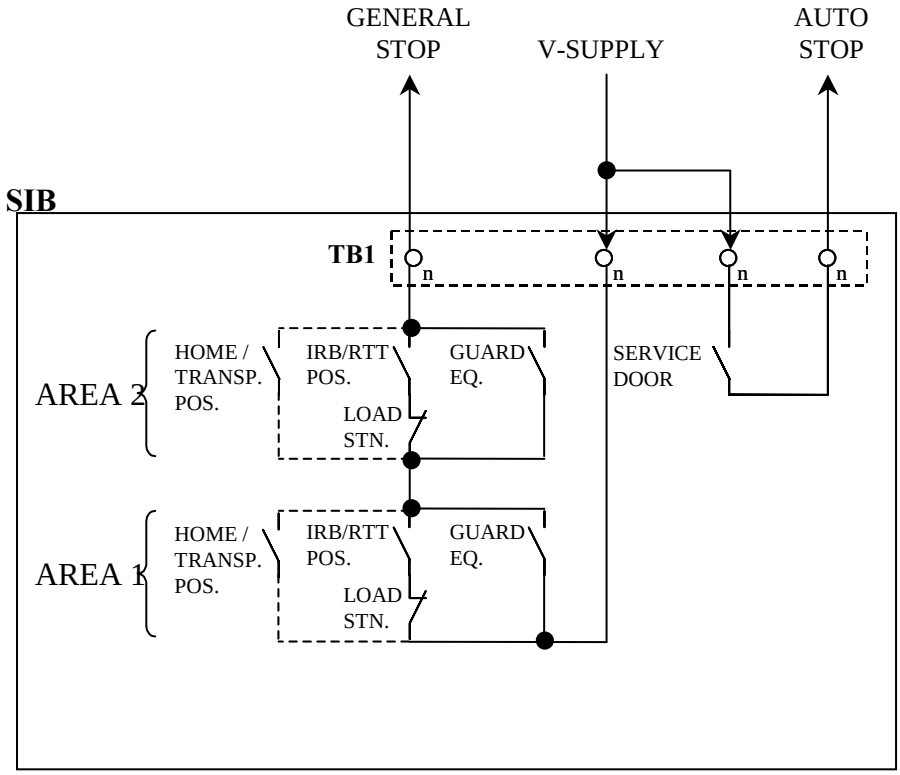


*Figure 125 The safety function's design for the safety module **SIB-V type 3***

In addition to the ***SIB V***-module's safety functions it is possible to connect further external safety functions to the break-out points in the supervision circuits. This permits the station solution to be adapted to satisfy a customer's wishes.

The connected safety function should be designed to comply with category 4 in accordance with EN 954-1.

In Figure 126 the break-out points are shown on the jackable terminals TB32 and TB34 for ***SIB V*** module type 1 /2 and some examples of how these can be used are also shown.

Note! The break-out points are normally strapped on delivery.

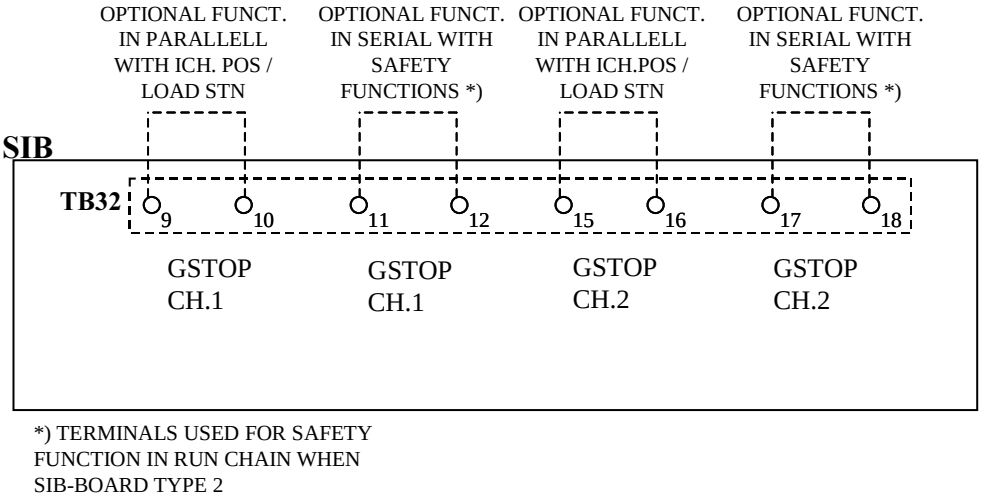


*Figure 126 The break-out points for the operating loop safety module **SIB-V type 1/2***

In Figure 127 the break-out points are shown on the jackable terminals TB32 and TB34 for ***SIB V***-module type 3 and some examples of how these can be used are also shown.

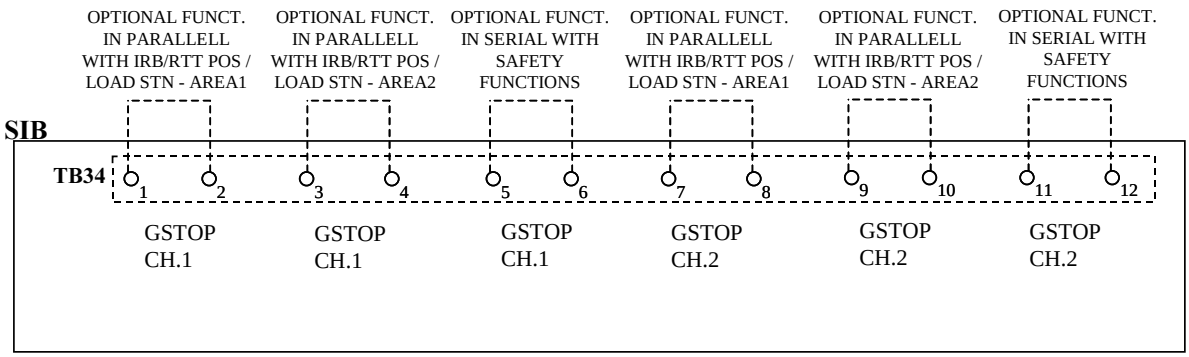


*Figure 127 The break-out points for the operating loop safety module **SIB-V type 3***

Figure 128 illustrates connection examples of the protection between the programming area, for example, inner light beam (status shown with active protection) for safety module SIB-V type 1/2.
Note! safety outputs for e.g. fixture interlocking are used!

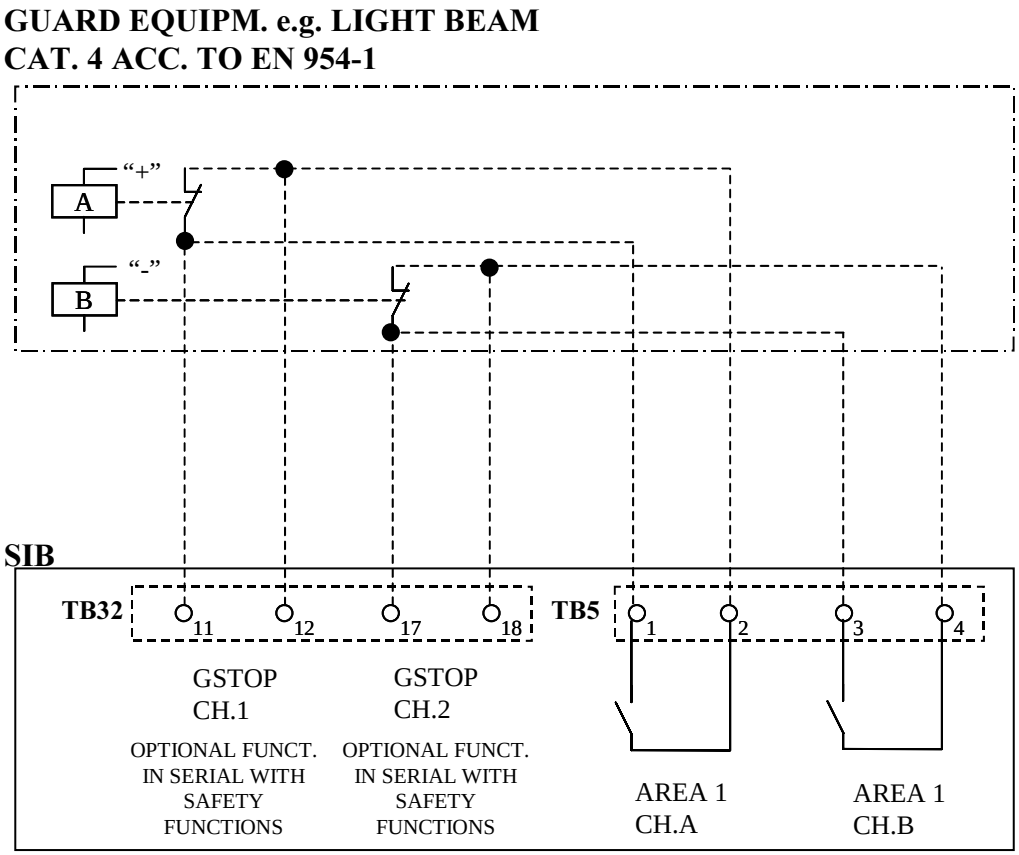


Figure 128 Examples of connecting the entry protection between the programming area.

Figure 129 illustrates connection examples of entry protection between the operator area 1 and operator area 2; the status is shown with active protection, for safety module ***SIB-V typ 3***.

Bypass passage is only permitted in operating mode MAN/ MAN FS.

Note! safety outputs for e.g. fixture interlocking are used!

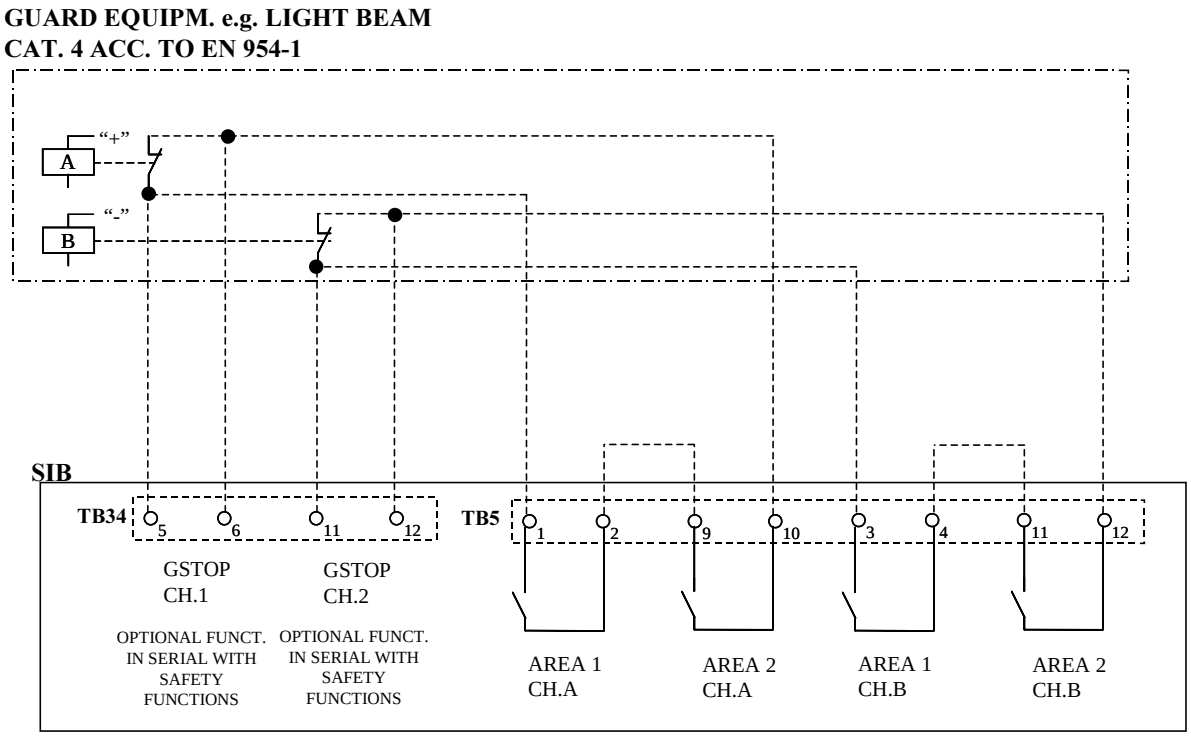


Figure 129 Examples of connecting entry protection between operator area 1 and operator area 2.

5.8.10 Safety outputs for customer connections

The SIB V module contains a number of free safety outputs that can be used to safely control and supervise your own equipment.

Jackable terminal TB4: Acknowledgement outputs activated process/resetting entry protection.

- The outputs can be utilised for signals, for example, PLC and may be loaded with max. 24V DC, **50mA(??)**.

Jackable terminal TB5: These outputs can be used, for example, in the design of safety circuits for fixture control.

- Each output can be loaded with a maximum of 24V DC, 2A.

In Figure 130 - Figure 134 some examples of how the outputs, as set out above, can be used for different station solutions are shown.

Note! Some applications demand that the signal interface is supplemented with the option ***"extended emergency stop"***.

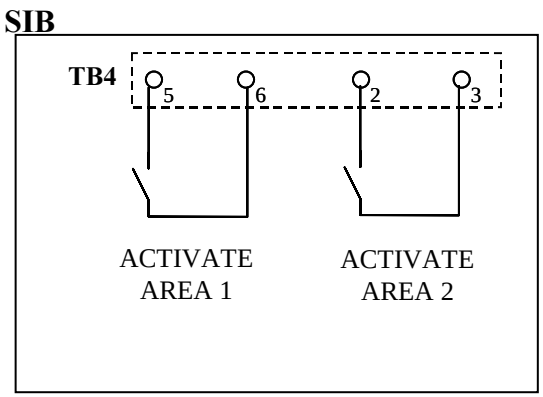


Figure 130 Safety outputs for acknowledgement of entry protection resetting, max. 50 mA

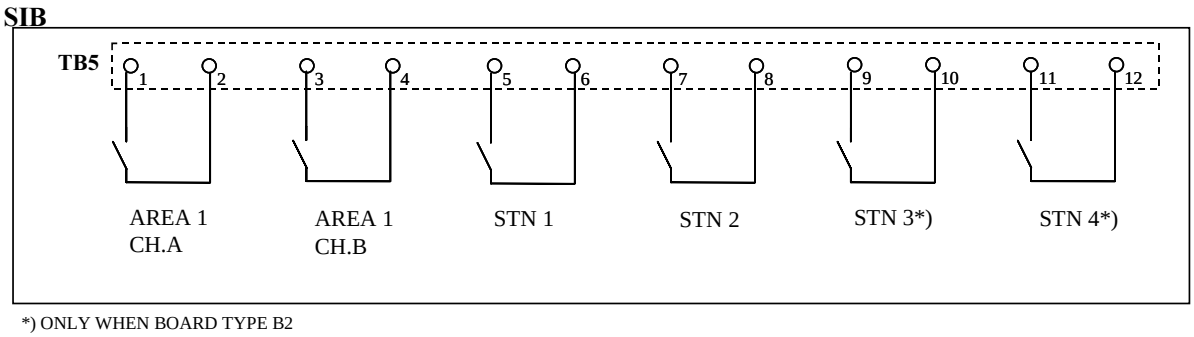


*Figure 131 Safety outputs for safety module **SIB-V type 1/2**, max. 2 A*

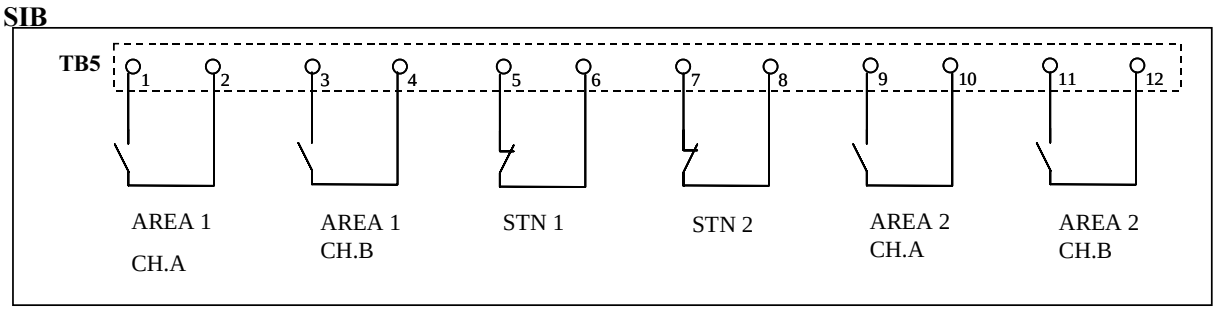


*Figure 132 Safety outputs for safety module **SIB-V type 3**, max. 2 A*

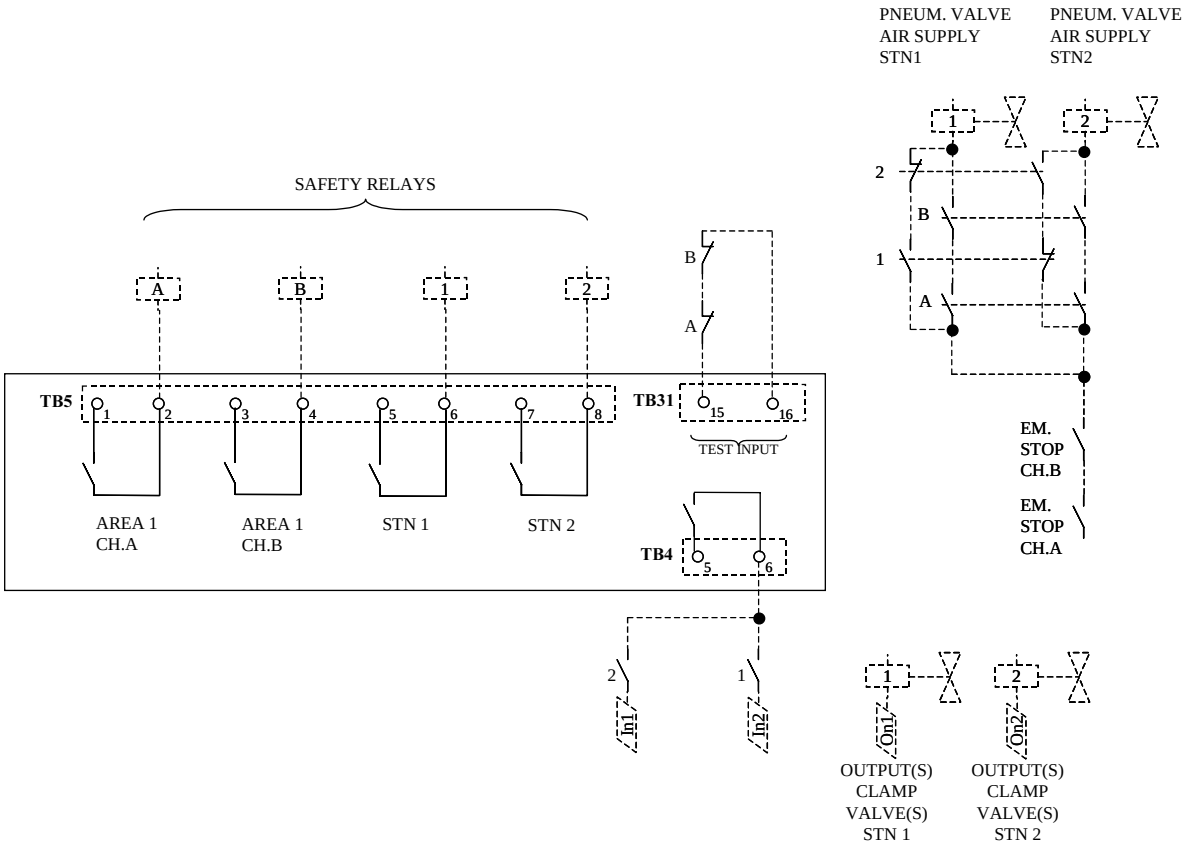


*Figure 133 Example of the fixture interlock principle with safety module **SIB-V type 1***

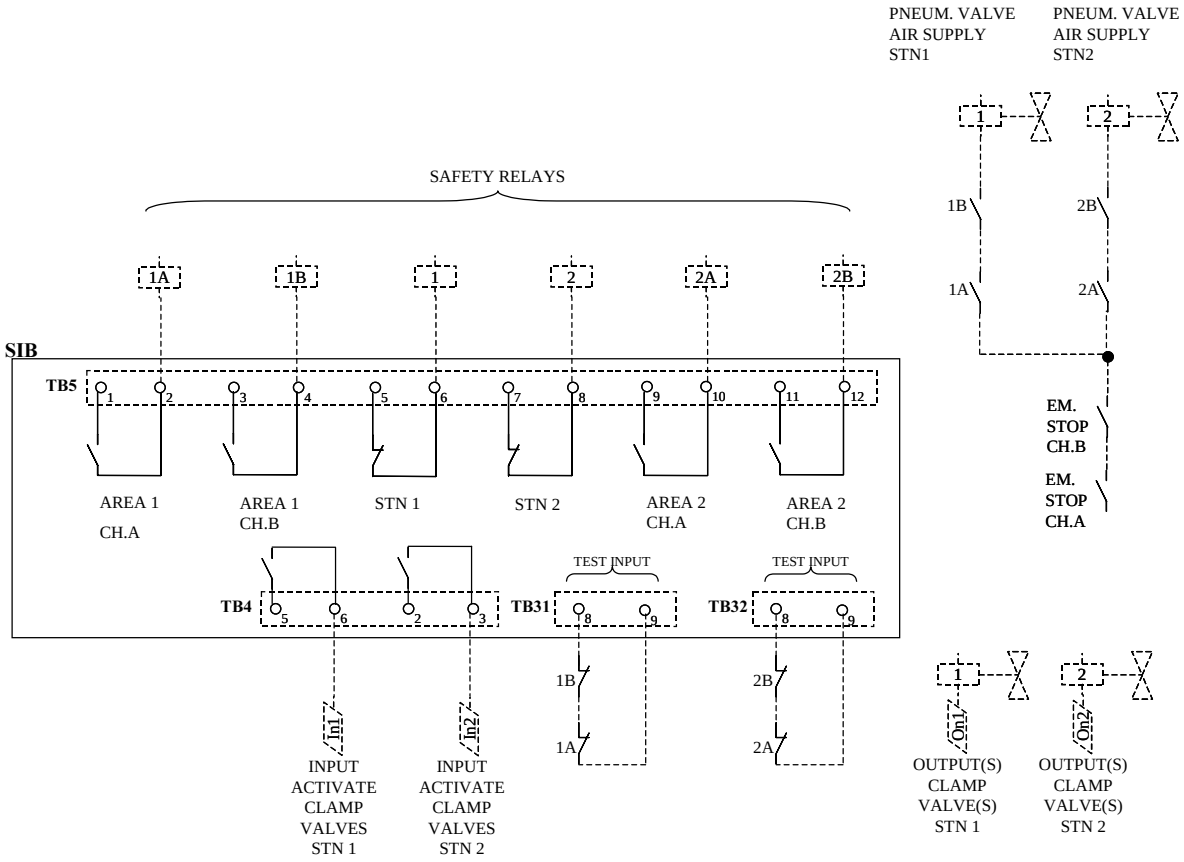


*Figure 134 Example of the fixture interlock principle with safety module **SIB-V type 3***

5.9 Spare Parts List

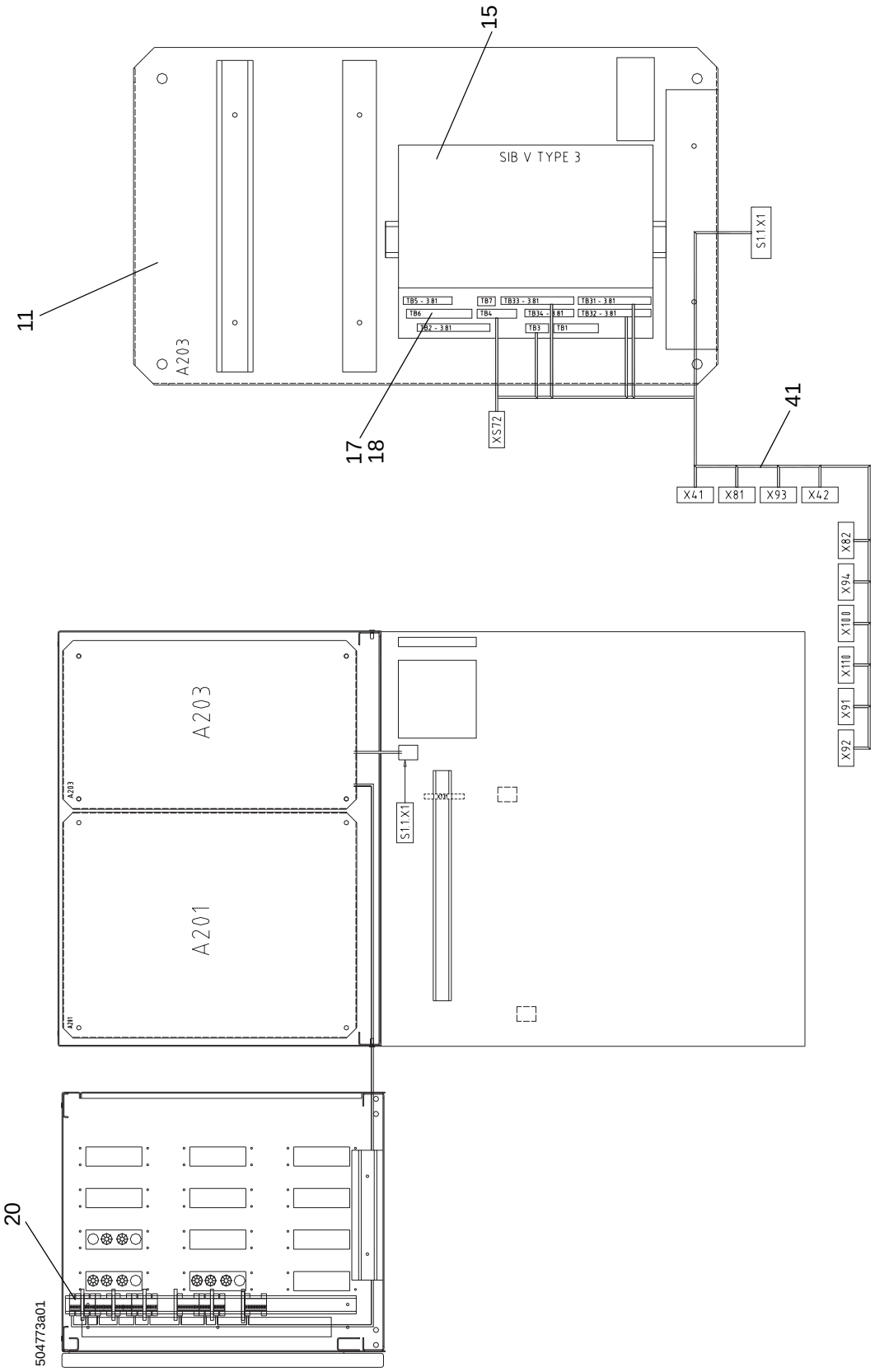
Reservdelar beställs genom ABB Automation Technology Products AB. Vid beställning var vänlig uppge typ och tillverkningsnummer samt benämningar och beställningsnummer enligt reservdelsförteckningen.

Rätt till ändring av specifikationer utan avisering förbehålles.

Spare parts are to be ordered from ABB Automation Technology Products AB. Kindly indicate type of unit, serial number, denominations and ordering number according to the spare parts list.

Rights to reserved to alter specifications without notice.

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		504 773-880	**Operatörskomm.gränssnitt**	**Operator Communication InterFace**	
11		504 949-880	Plåt, kompl.	Plate, compl.	
15		504 996-880	Säkerhetskort V, Typ 3	SafetyInterfaceBoard V, Type 3	SIB
17		489 947-469	Anslutningsdon, Combicon	Connector, Combicon	7 pol
18		500 958-001	Insticksbrygga	Bridge	7 pol
20		436 829-009	Jordklämma	Terminal	
41		502 294-880	Kabelstam	Cable harness	


15
SIB V TYPE 3
S11X1
11
A203
TB5 - 3.81
TB7
TB33 - 3.81
TB31 - 3.81
TB6
TB4
TB34 - 3.81
TB32 - 3.81
TB2 - 3.81
TB3
TB1
17
18
XS72
41
X41
X81
X93
X42
X82
X94
X100
X110
X91
X92
A203
A201
S11X1
20
504773a01

5.10 No safety equipment

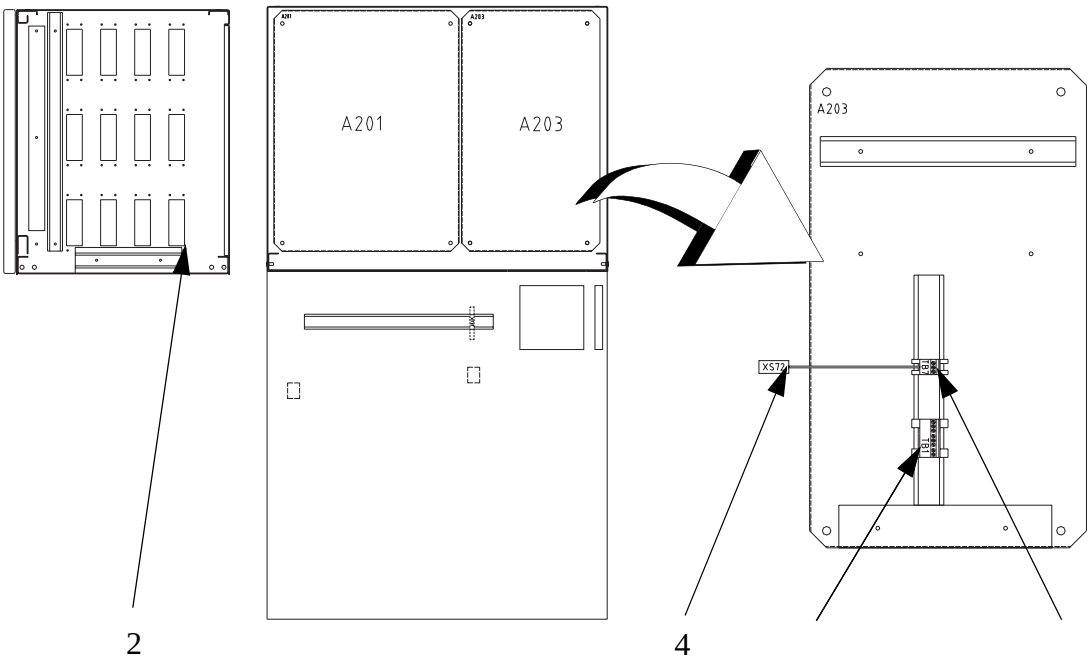
On installations without safety equipment the interface is replaced by an assembly plate for operator communications. All requisite jumper settings, etc for internal cabling included in the top cabinet are fitted on the assembly plate.

The assembly plate is fitted on the right-hand side, inside the top cabinet and can be used as spare space for other customer specific equipment.

5.10.1 Operator communication

A connection cable with an interface to operator communication is supplied. The interface is equipped the same irrespective of the type of positioner.

Free space on the assembly plate can be used, for example, to install customer specific equipment.



1 Power supply (A203-TB7)

2 Jumper device emergency stop (Fitted in socket X104 on the left of the cabinet)

3 Jumper device operating stop chain (A203-TB1)

4 Connection cabling for the Operator's panel

Power supply

The following voltages are available on the jackable terminal A203-TB7:

- 24V DC (24V I/O)

5.10.2 OPERATION and CONNECTIONS

Emergency stop

Cabinet_S4Cplus_12

1 Motors on

2 Emergency stop

3 Operating mode selector

4 Running time meter

All emergency stop buttons included in the system are as standard connected in series and directly affect the control system’s emergency stop loop.

Included on external safety equipment, available in the standard range, are:

- an emergency stop button on the operator’s panel
- an emergency stop button on the equipment cabinet for the roller door.

The "Extended emergency stop function" option gives the possibility of supplementing equipment with components for, e.g. gate interlocking via the emergency stop of fixtures.

Optional redundant auxiliary relays can then be easily connected for this purpose.

Figure 135 and Figure 136 below show the theory behind how the emergency stop loop is used to control connected equipment.

For detailed information about the design of the emergency stop loop refer to the ***"The robot's User's Manual"***

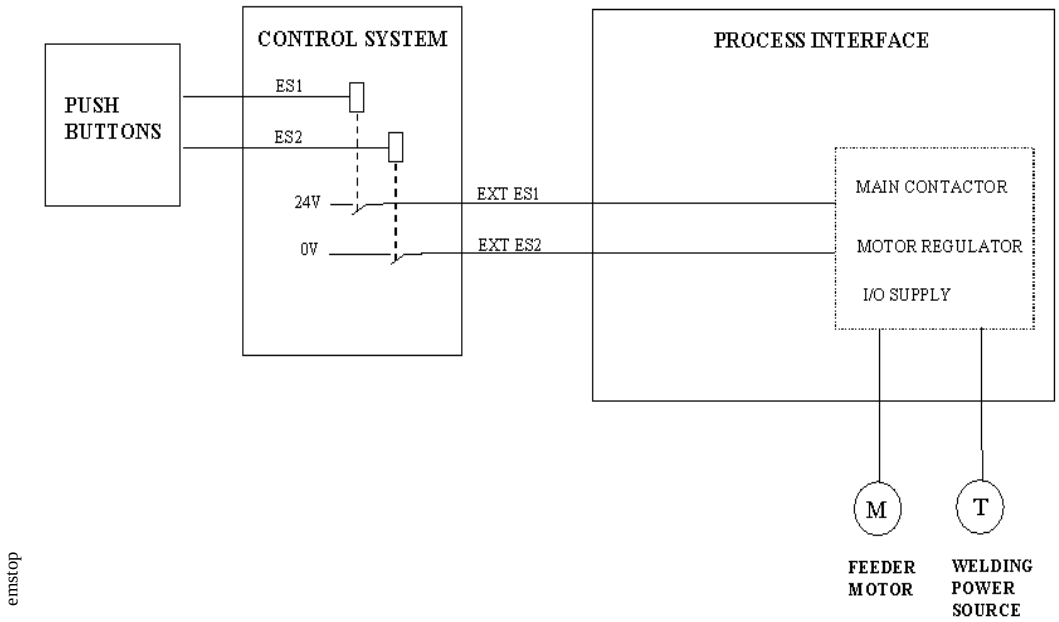


Figure 135 Emergency stop loop

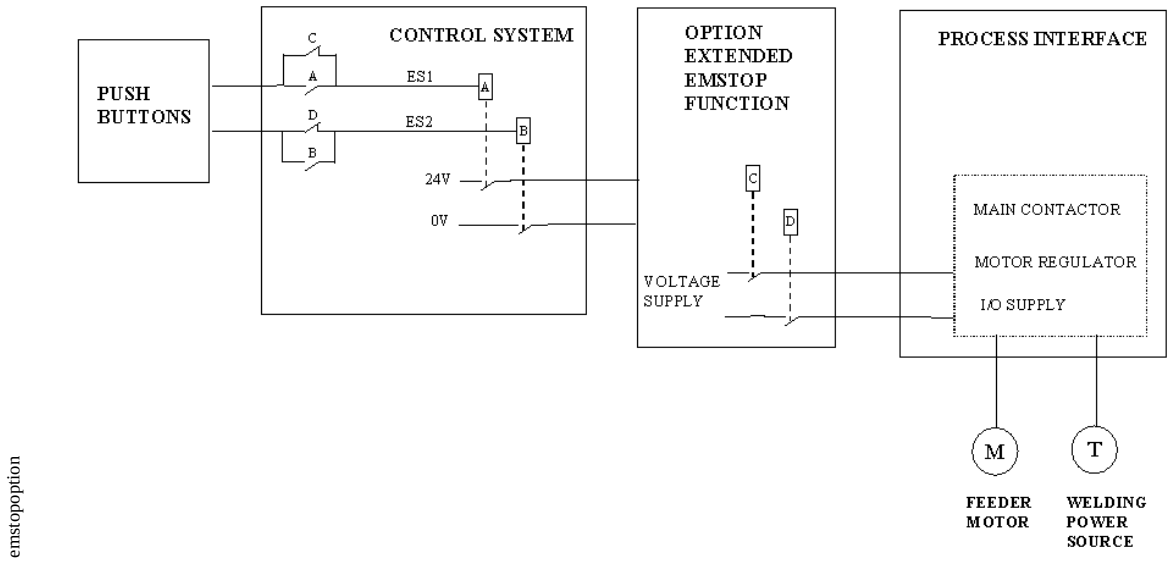


Figure 136 Emergency stop loop with the addition "Extended emergency stop function"

5.10.3 Interlocks

Operating stop loop

Figure 137 shows below the theory behind how the operating stop loop is used to control connected equipment.

For detailed information about the design of the operating stop loop refer to the ***"The robot's User's Manual"***

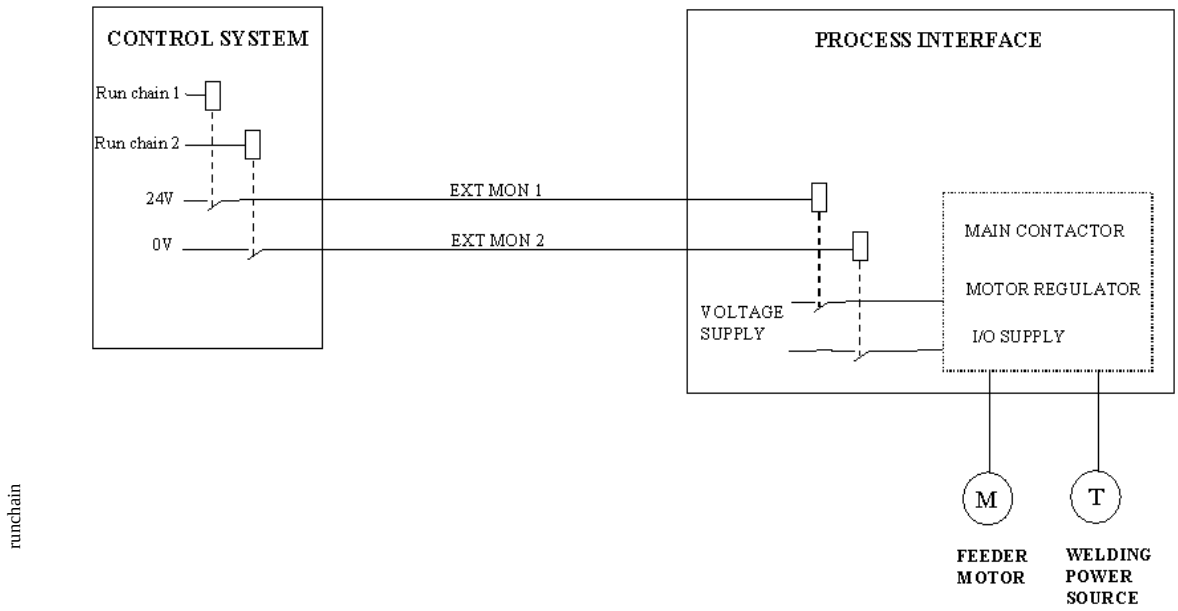


Figure 137 Operating loop

The following voltages are available on the jackable terminal A203-TB1:

- Auto stop
- General stop

5.11 Reservdelsförteckning/*Spare Parts List*

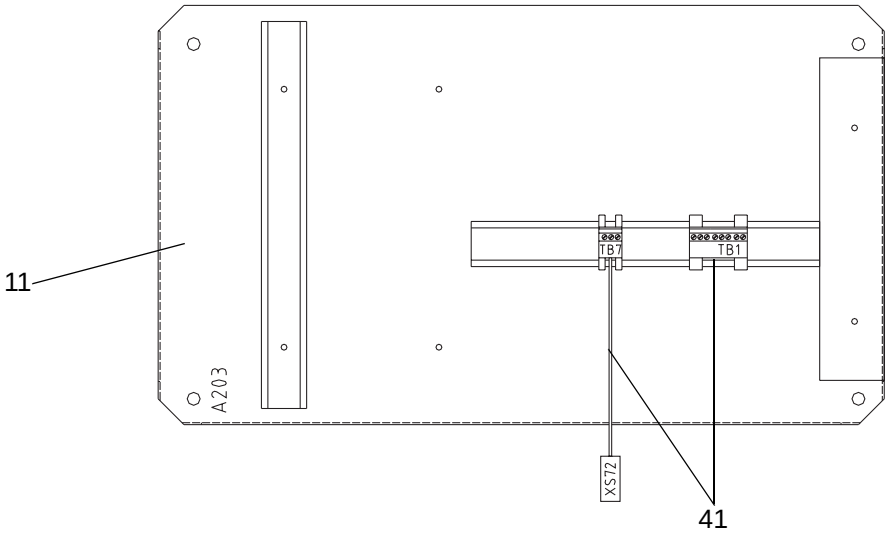
Reservdelar beställs genom ABB Automation Technology Products AB. Vid beställning var vänlig uppge typ och tillverkningsnummer samt benämningar och beställningsnummer enligt reservdelsförteckningen.

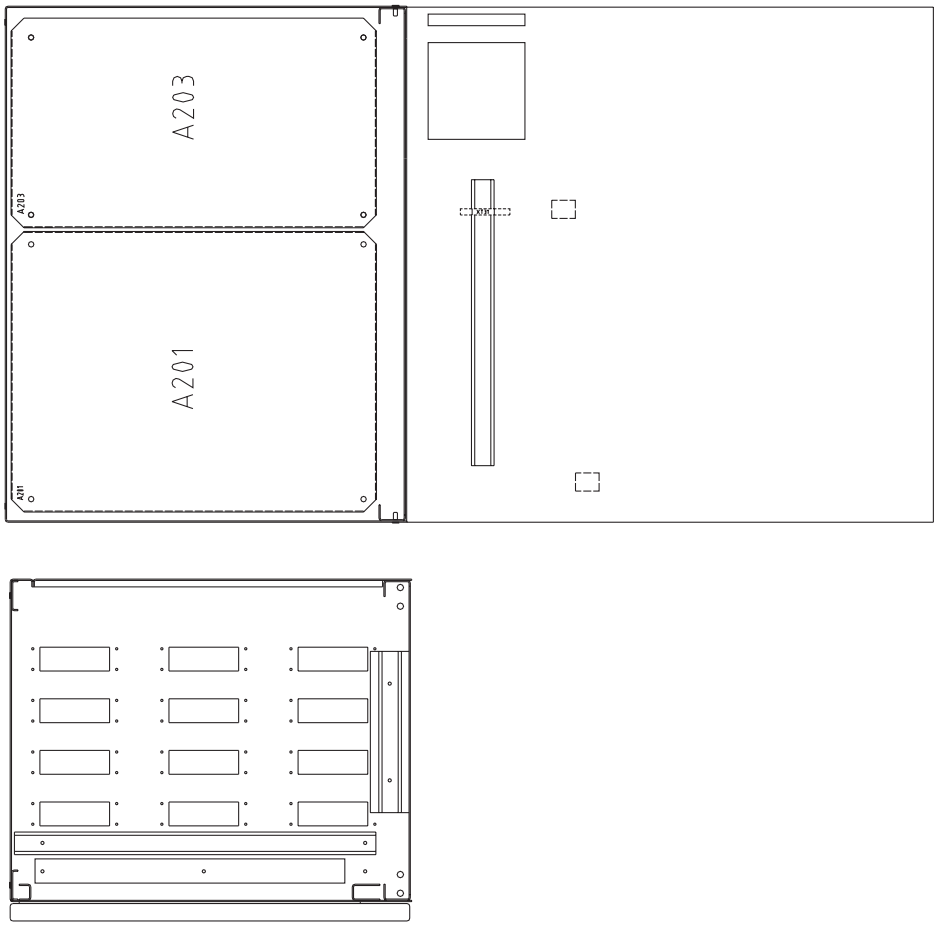
Rätt till ändring av specifikationer utan avisering förbehålles.

Spare parts are to be ordered from ABB Automation Technology Products AB. Kindly indicate type of unit, serial number, denominations and ordering number according to the spare parts list.

Rights to reserved to alter specifications without notice.

Positions-nummer ***Position number***	**Antal** ***Quantity***	**Beställningsnummer** ***Ordering number***	**Benämning**	***Denomination***	**Anmärkningar** ***Remarks***
		504 774-880	**Byglingsdon, OP.COM**	**Jumper OPCOM**	
11		504 949-880	Plåt, kompl.	Plate, compl.	
41		504 979-880	Kabelstam	Cable harness	





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6 Technical Data

Also refer to the Product Manual for the robot

Weight	280kg (without welding power source)
	380kg (with welding power source)
	Additional 20kg top cabinet 820 mm
	Additional 20kg pivot frame
	Additional 30kg welding power source with transformer

Dimensions (WxHxD), top cabinet 820mm in brackets

800x1570(1770)x623mm (without welding power source)

800x2010(2210)x623mm (with welding power source)

Environmental demands	
Transport temperature	Min –25°C
	Max +42°C
	Max +70°C
Operating temperature (ambient)	Min +5°C
	Max +45°C
Relative humidity	Max 95% at constant temperature
Electrical data (incl. control cabinet):	
Mains voltage	3x200 – 600V AC, +10%,-15%
Frequency	48.5 – 61.Hz
Fuse protection	16A slow burn (400V)

The following applies for the control cabinet with welding power source LRB400:

Nätspänning/ ***Mains voltage*** **(V)**	**Säkring (Trög) /** ***Fuse (Slow-blow)*** [2]**)** **(A)**
200	80
220	80
[1]) 400	32 (35)
440	40 (50)
475	40 (35)
500	32 (35)
525	32 (35)
600	32 (35)

[1]) 400V without power source transformer.

[2]) Fuses in brackets can be used if the recommended fuse is not available.

Rated power (without/with ext. axes)	4.5/7.8kVA without welding power source
	17.5/20.8kVA with welding power source
Protection class	IP54
	IP21 welding power source LRB400

7 Installation and set-up

This work may only be carried out by persons trained in the use of the complete equipment and who are aware of the special risks involved with these different parts.

7.1 Transport and unpacking

The safety instructions and other instructions should be studied carefully before starting transport and unpacking of the safety equipment. These can be found under a separate tab in the System manual.

- Check that the equipment is not damaged in any way.
- Report any visible transport damage immediately.

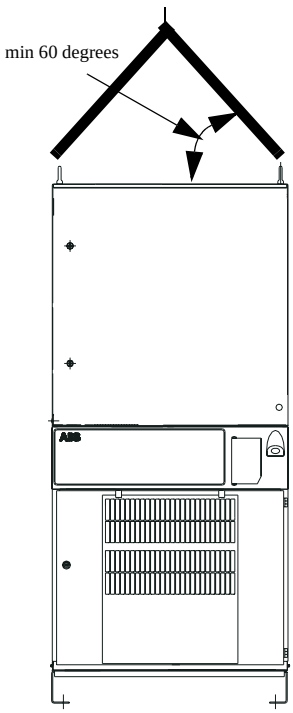
7.2 Lifting instructions

The control cabinet is fitted with lifting eyes to allow easy lifting.

Lifting of the manipulator may only:

- be carried out using equipment that corresponds with applicable lifting standards.
- be carried out by authorised personnel.

Do not walk under a suspended load!



lifting instructions

7.3 Mechanical installation

7.3.1 Function pack and FlexArc

The base of the control cabinet has fastening holes for secure mounting to the floor.

- **NOTE!** Install the control cabinet according to the instructions in the***Robot's Product Manual***.

7.4 Connections

7.4.1 Mains connection

The main connection must be carried out by qualified personnel.

Data for the supply voltage, fuse protection, etc. can be found in chapter "Technical Data" på sidan 279.

Function pack

- Install the control cabinet according to the instructions in the***Robot's Product Manual***.
- The mains voltage is connected to the control cabinet's main power switch as set out in the diagram.

Control cabinet_S4Cplus-7

FlexArc

In weld cells of the type FlexArc the connection cable is routed to a 63A IEC inlet, placed on the cell wall for easy mains connection.

7.5 Check before start up

NOTE! Keep the doors to the control cabinet and top cabinet closed to prevent dust and dirt from entering.

Before switching on the voltage check that the following has been done:

- Check that all component equipment is connected correctly.
- The main voltage is according to the identification plate on the control cabinet.
- The programming unit is connected.
- If external safety equipment is used. Check that it is installed:
- ***The operating mode selector*** on the control cabinet's control panel is in the
  - MANUAL position .

7.6 Start up

All requisite system software is installed on delivery.

- Switch on the main power switch on the control cabinet and the main power switch on the welding power source if fitted. The main power switch on the control cabinet normally controls the power supply to all component modules in the cabinet.

Note! Some power sources supply the process control card with an external reference voltage, which is why some parts of the control cabinet can be voltage fed even when the main power switch is in the "OFF" position.

- The robot makes a self-test on the hardware and software. This test takes about 1 minute.
- Wait until the message “Welcome to....” is shown on the programming unit's display.

The system is now ready for use.

8 Maintenance

The wrist strap, provided in the cabinet, must be worn when handling the circuit cards and other electronics in the control cabinet to prevent ESD damage.

- The control system is fully enclosed and the electronics are thereby protected in a normal workshop environment.
  In very dusty and powdery environments the cabinet should, however, be checked regularly internally. If necessary use a vacuum cleaner.
- Clean any filters according to the instructions in the robot's Product Manual as well as in the power source's Product Manual.
- Check that the cables/connectors are not damaged. Damaged components must be replaced immediately.

If safety equipment is included:

- this should be tested preferably at the start of each shift.