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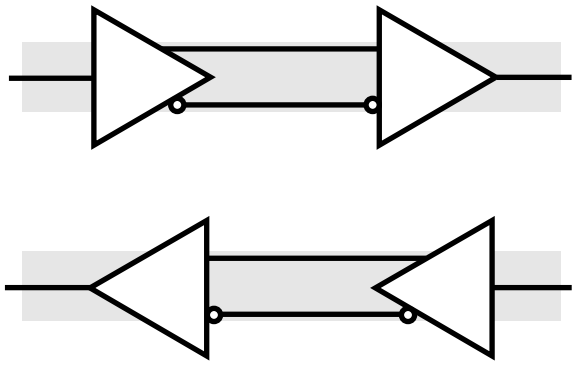
Operating Instructions and Spare Parts List

PRC 3 - RS 422 Serial Interface for the SIMATIC S5-115U Programmable Logic Controller (PLC)



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1. Serial Interface for the SIMATIC Programmable Logic Controller (PLC)

This documentation describes the characteristics of the communication between the SIMATIC S5-115U PLC, which must be fitted with a CP 530 processor, and a PRC 3 (Powder Reciprocator Control) module on the PLC. It will be possible to develop programs for the PLC from this description, of which this means of communication takes advantage.

The CP 530 communication processor must be configured as **Master** so that the Bus communication can be controlled.

The communication to the individual modules is in the form of messages. These messages must always contain an identification number (ID) so that the position addressed can understand the composition and content of the message. These identification numbers are set out in a specific configuration. The PRC 3 module addressed must be in the **STOP** and **AUTOMATIC** mode in order to receive the massage at all.

In the next two chapters the relationship of the identification numbers, the value range of the individual parameters, and the arrangement of the data blocks are shown in detail. Error messages are also dealt with at the end.

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2. PRC Module

2.1 Identification Numbers

The messages are structured in a variable length. The first Byte of the message contains an identification number (ID) as a characteristic value. This is clearly related to a function and gives information how the following data is arranged, and how it is to be interpreted.

ID	Description	L[1)]	Field
10h	Initialize System parameter	1	ID
11h	Initialize all programs	1	ID
12h	Initialize individual programs	1	ID, PN
13h	Initialize a program and all following programs	1	ID, PN
14h	Initialize programs PN1 to PN2	2	ID, PN_{n1}, PN_{n2}
20h	System parameter (without S9)	12	ID, S1, S2, S3, S4, S5,S6, S7, S8, S10, S11, S12
21h	Program data	6	ID, PN, P, V, Vr, T, F1, F2, A
30h	Link programs	2	ID, PN_{n1}, PN_{n2}
31h	Unlink programs	2	ID, PN_{n1}, PN_{n2}
32h	Partial program	3	ID, PN, P, V
33h	Numerous part programs	V[2)]	ID, PN_{n1}, PN_{n2}, P_{n1}, V_{n1},.., P_{n2}, V_{n2}
40h	Positions	V	ID, NUM, PN, P, ..
41h	Speed	V	ID, NUM, PN, V, ..
42h	Relative speed	V	ID, NUM, PN, Vr, ..
43h	Dwell time	V	ID, NUM, PN, T, ..
44h	Function output F1	V	ID, NUM, PN, F1, ..
45h	Function output F2	V	ID, NUM, PN, F2, ..
46h	Addresses	V	ID, NUM, PN, A, ..
50h	Read System Parameter	1	ID
51h	Read Program data	1	IDD, PN
52h	Read a number of programs	2	ID, PN_{n1}, PN_{n2}

1) Data block size in data words

2) Variable data blocks in data words -> *(2+(PN_{n2}-PN_{n1}+1)*2)*

2.2 Value Range

Symbol	Description	Format	Value range for PLC	Corresponds with PRC
PN	Program number	KH	01..40h	1..64
P	Position	KF	0..9999	0.000..9.999
V	Speed	KF	1..600	0.001..0.600
Vr	Relative speed	KF	-600..600	-0.600..0.600
T	Dwell time	KF	0..600	0.0..60.0
F1/F2	Function	KF	0...1999	0.000...1.999
A	Address	KH	00..40k	0..64
S1	System parameter 1 (Upper reversing point)	KF	100..9999	0.100..9.999
S2	System parameter 2 (Reference point)	KF	50..500	0.050..0.500
S3	System parameter 3 (Increment pulse generator)	KF	1..9999	1..9999
S4	System parameter 4 (Max. speed)	KF	1..600	0.001..0.600
S5	System parameter 5 (Min. speed)	KF	1..600	0.001..0.600
S6	System parameter 6 (Acceleration)	KF	1000..1500	1.000..1.500
S7	System parameter 7 (Circuit amplification)	KF	800..1500	800..1500
S8	System parameter 8 (Alarm)	KH	00..01h	0..1
S10	System parameter 10 (Sync. increment)	KF	1..9999	1..9999
S11	System parameter 11 (Sync. circuit ampl.)	KF	1..1500	1..1500
S12	System parameter 12 (Sync. conveyor sequence)	KF	5..50	5..50

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2.2.1 Influencing the program data

When system parameters are changed the program data is checked and if necessary adjusted.

System Parameter 1 (Upper reversing point)

The position values are checked in all programs. If a position value is greater than system parameter 1 then it is reset to the same value.

```
if (P(i) > SP_1) then P(i) = SP_1    for i = 1..64
```

If the default value for the position (system parameter 2 + 100) is greater than system parameter 1 this value is also reset.

```
Def_Pos = SP_2 + 100
if (Def_Pos > SP_1) then Def_Pos = SP_1
```

System Parameter 4 (Max. speed)

The speed values of all programs are checked. If the speed value is higher than System parameter 4 then it is reset to the same value.

```
if (V(i) > SP  _4) then V(i) = SP_4   for i = 1..64
```

System Parameter 5 (Min. speed)

The speed values of all programs are checked. If the speed value is lower than System parameter 5 then it is reset to the same value.

```
if (V(i) < SP  _5) then V(i) = SP_5   for i = 1..64
```

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2.3 Structure of the data blocks

2.3.1. Initialized System Parameters

DV1	:	ID		KH = 10xx

Definition :

ID	Identification number 10h (hex)

All system parameters, except SP_9 (Module address), are reset to their default values. These are :

System parameter 1 (Upper reversing point)	0.400 m
System parameter 2 (Reference point)	0.500 m
System parameter 3 (Increment pulse)	754 Pulses/dm
System parameter 4 (Max. speed)	0.600 m/s
System parameter 5 (Min. speed)	0.010 m/s
System parameter 6 (Acceleration)	1.500 m/s^2
System parameter 7 (Circuit amplification)	1000
System parameter 8 (Alarm)	0
System parameter 10 (Synch. increment.)	583
System parameter 11 (Synch. circuit ampl.)	1100
System parameter 12 (Synch. conveyor sequence)	10 mm

ATTENTION ! :

The axes are released with this command and a new Travel to reference point command must be given.

2.3.2. Initialize all Programs

DV1 :	ID		KH = 11xx

Definition :

ID	Identification number	11h

All program data in all programs are reset to their default values.
These are :

Position	Min (SP_2 + 0.0100; SP_1) m
Speed	0.050 m/s
Relative Speed	0.000 m/s
Dwell time	0.0 s
Function 1	0.000
Function 2	0.000
Address	0

2.3.3. Initialize individual programs

DV1 :	ID	PN	KH = 120A

Definition :

ID	Identification number	12h
PN	Program	10

All program data in the corresponding programs are reset to their default values.
These are :

Position	Min (SP_2 + 0.0100; SP_1) m
Speed	0.050 m/s
Relative Speed	0.000 m/s
Dwell time	0.0 s
Function 1	0.000
Function 2	0.000
Address	0

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2.3.4. Initialize a program sequence

DV1	:	ID	PN	KH = 130A

Definition :

ID	Identification number	13h
PN	Program	10

All program data in the corresponding programs are reset to their default values. These are :

Position	Min (SP_2 + 0.0100; SP_1) m
Speed	0.050 m/s
Relative speed	0.000 m/s
Dwell time	0.0 s
Function 1	0.000
Function 2	0.000
Address	0

2.3.5. Initialize programs PN1 to PN2

DV1	:	ID		KH = 14xx
DV2	:	PN_{n1}	PN_{n2}	KH = 0A14

Definition :

ID	Identification number	14h
PN_{n1}	Program number n1	10
PN_{n2}	Program number n2	20

All program data of the programs PN1 to PN2 are reset to their default values. These are :

Position	Min (SP_2 + 0.0100; SP_1) m
Speed	0.050 m/s
Relative speed	0.000 m/s
Dwell time	0.0 s
Function 1	0.000
Function 2	0.000
Address	0

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2.3.6 System Parameters

DV1	:	ID	KH = 20xx
DV2	:	S1	KF = +400
DV3	:	S2	KF = +50
DV4	:	S3	KF = +754
DV5	:	S4	KF = +600
DV6	:	S5	KF = +10
DV7	:	S6	KF = +1500
DV8	:	S7	KH = +1000
DV9	:	S8	KH = 00xx
DV10	:	S10	KF = +583
DV11	:	S11	KF = +1100
DV12	:	S12	KF = +10

Definition :

These system parameters correspond to the default values !

ID	Identification number	20h
S1	System parameter 1 (Upper reversing point)	0.400 m
S2	System parameter 2 (Reference point)	0.500 m
S3	System parameter 3 (Increment pulse)	754 pulses/dm
S4	System parameter 4 (Max. speed)	0.600 m/s
S5	System parameter 5 (Min. speed)	0.010 m/s
S6	System parameter 6 (Acceleration)	1.500 m/s^2
S7	System parameter 7 (Circuit amplification)	1000
S8	System parameter 8 (Alarm)	0
S10	System parameter 10 (Synch. increment)	583
S11	System parameter 11 (Synch. circuit ampl.)	1100
S12	System parameter 12 (Synch. conveyor sequence)	10 mm

ATTENTION ! :

The axes are released with this command and a new Travel to Reference point command must be given.

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2.3.7 Program data

DV1	:	ID	PN	KH = 210A
DV2	:	P		KF = +1050
DV3	:	V		KF = +300
DV4	:	Vr		KF = +53
DV5	:	T		KF = +20
DV6	:	F1		KF = +1010
DV7	:	F2		KF = +50
DV8	:	A		KH= 05xx

Definition :

ID	Identification number	21h
PN	Program	10
P	Position	1.050 mm
V	Speed	0.300 m/s
Vr	Relative speed	0.053 m/s
T	Dwell time	2.0 s
F1	Set Function output	0.010 m after START
F2	Reset Function output	0.050 m before Reversing point (by 1.000 m)
A	Jump to program 5	

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2.3.8 Link programs

DV1	:	ID		KH = 30xx
DV2	:	PN_{n1}	PN_{n2}	KH = 0530

Definition :

ID	Identification number	30h
PN_{n1}	Program number n1	5
PN_{n2}	Program number n2	48

All addresses of programs PN_{n1} to PN_{n2-1} are set to the following program. The addresses of programs PNn2 are set to 0 (Zero).

2.3.9 Unlink programs

DV1	:	ID		KH = 31xx
DV2	:	PN_{n1}	PN_{n2}	KH = 0540

Definition :

ID	Identification number	31h
PN_{n1}	Program number n1	5
PN_{n2}	Program number n2	64

All addresses of programs PN_{n1} to PN_{n2} are set to 0 (Zero).

2.3.10 Part program

DV1	:	ID	PN	KH = 3205
DV2	:	P		KF = +1050
DV3	:	V		KF = +300

Definition :

ID	Identification number	32h
PN	Program	5
P	Position	1.050 m
V	Speed	0.300 m/s

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2.3.11 Numerous part programs

DV1	:	ID		KH = 33xx
DV2	:	PN_{n1}	PN_{n2}	KH = 0107
DV3	:	P_{n1}		KF = +800
DV4	:	V_{n1}		KF = +300
...				
DVn-1	:	P_{n2-1}		KF = +200
DVn	:	V_{n2}		KF = +500

Definition :

ID	Identification number	33h
PN_{n1}	Program number n1	1
PN_{n2}	Program number n2	7
P_{n1}	Position program n1	0.800 m
V_{n1}	Speed program n1	0.300 m/s
...		
P_{n2}	Position program n2	0.200
V_{n2}	Speed program n2	0.500 m/s

ATTENTION :

Only a maximum of 64 Bytes in one message can be transmitted, this corresponds to 15 partial programs.

2.3.12 Positions

DV1	:	ID | Num	KH = 400A
DV2	:	PN_1	KH = 01xx
DV3	:	P_1	KF = +800
DV4	:	PN_2	KH = 05xx
DV5	:	P_2	KF = +300
...			
DVn-1	:	PN_{Num-1}	KH = 18xx
DVn	:	P_{Num}	KF = +500

Definition :

ID	Identification number	40h
Num	Number of positions	10
PN_{n1}	Program number n1	1
P_1	Position 1	0.800 m
PN_2	Program number 2	5
P_2	Position 2	0.3000 m
...		
PN_{Num}	Program number Num	24
P_{Num}	Position Num	0.500 m

ATTENTION :

Only a maximum of 64 Bytes in one message can be transmitted, this corresponds to 15 position values

2.3.13 Speeds

DV1	:	ID	Num	KH = 410A
DV2	:	PN_1		KH = 01xx
DV3	:	V_1		KF = +800
DV4	:	PN_2		KH = 05xx
DV5	:	V_2		KF = +300
...				
DVn-1	:	PN_{Num-1}		KH = 18xx
DVn	:	V_{Num}		KF = +500

Definition :

ID	Identification number	41h
Num	Number of speeds	10
PN_{n1}	Program number n1	1
V_1	Speed 1	0.800 m/s
PN_2	Program number 2	5
V2	Speed 2	0.3000 m/s
...		
PN_{Num}	Program number Num	24
V_{Num}	Speed Num	0.500 m/s

ATTENTION :

Only a maximum of 64 Bytes in one message can be transmitted, this corresponds to 15 speed values

2.3.14 Relative Speed

DV1	:	ID | Num	KH = 420A
DV2	:	PN_1	KH = 01xx
DV3	:	Vr_1	KF = +800
DV4	:	PN_2	KH = 05xx
DV5	:	Vr_2	KF = +300
...			
DVn-1	:	PN_{Num-1}	KH = 18xx
DVn	:	Vr_{Num}	KF = -500

Definition :

ID	Identification number	42h
Num	Number of relative speeds	10
PN_{n1}	Program number n1	1
Vr1	Relative speed 1	0.800 m/s
PN_2	Program number 2	5
Vr_2	Relative speed 2	-0.300 m/s
...		
PN_{Num}	Program number Num	24
Vr_{Num}	Relative speed Num	-0.500 m/s

ATTENTION :

Only a maximum of 64 Bytes in one message can be transmitted, this corresponds to 15 speed values

2.3.15 Dwell Time

DV1	:	ID	Num	KH = 430A
DV2	:	PN_1		KH = 01xx
DV3	:	T_1		KF = +800
DV4	:	PN_2		KH = 05xx
DV5	:	T_2		KF = +300
...				
DVn-1	:	PN_{Num-1}		KH = 18xx
DVn	:	T_{Num}		KF = +500

Definition :

ID	Identification number	43h
Num	Number of dwell times	10
PN_{n1}	Program number n1	1
T_1	Dwell time 1	80.0 s
PN_2	Program number 2	5
T_2	Dwell time 2	30.0 s
...		
PN_{Num}	Program number Num	24
T_{Num}	Dwell time Num	50.0 s

ATTENTION :

Only a maximum of 64 Bytes in one message can be transmitted, this corresponds to 15 dwell time values.

2.3.16 Function Outputs

Function output F1

DV1	:	ID	Num	KH = 440A
DV2	:	PN_1		KH = 01xx
DV3	:	$F1_1$		KF = +1080
DV4	:	PN_2		KH = 05xx
DV5	:	$F1_2$		KH = +1030
...				
DVn-1	:	PN_{Num}		KH = 18xx
DVn	:	$F1_{Num}$		KH = +50

Definition :

ID	Identification number	44h
Num	Number of dwell times	10
PN_1	Program number 1	1
$F1_1$	Set Function output	0.080 m after START
PN_2	Program number 2	5
$F1_2$	Set Function output	0.030 m after START
...		
PN_{Num}	Program number Num	24
$F1_{Num}$	Delete Function output	0.050 m after START

ATTENTION :

Only a maximum of 64 Bytes in one message can be transmitted, this corresponds to 15 function values.

Function Output F2

DV1	:	ID	Num	KH = 450A
DV2	:	PN_1		KH = 01xx
DV3	:	$F2_1$		KF = +80
DV4	:	PN_2		KH = 05xx
DV5	:	$F2_2$		KF = +30
...				
DVn-1	:	PN_{Num}		KH = 18xx
DVn	:	$F2_{Num}$		KF = +1050

Definition :

ID	Identification number	45h
Num	Number of dwell times	10
PN_1	Program number 1	1
$F2_1$	Delete Function output	0.080 m before Reversing point
PN_2	Program number 2	5
$F2_2$	Delete Function output	0.030 m before Reversing point
...		
PN_{Num}	Program number Num	24
$F2_{Num}$	Set Function output	0.050 m before Reversing point

ATTENTION :

Only a maximum of 64 Bytes in one message can be transmitted, this corresponds to 15 function values.

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2.3.17 Addresses

DV1	:	ID	Num	KH = 460A
DV2	:	PN_1	A_1	KH = 0110
DV3	:	PN_2	A_2	KH = 0501
DV4	:	PN_3	A_3	KH = 0805
DV5	:	PN_4	A_4	KH = 1401
...				
DVn-1	:	PN_{Num-1}	A_{Num-1}	KH = 1801
DVn	:	PN_{Num}	A_{Num}	KF = 2001

Definition :

ID	Identification number	46h
Num	Number of addresses	10
PN_1	Program number 1	1
A_1	Address 1	16
PN_2	Program number 2	5
A_2	Address 2	1
PN_3	Program number 3	8
A_3	Address 3	5
PN_4	Program number 4	20
A_4	Address 4	1
...		
PN_{Num-1}	Program number Num-1	24
A_{Num-1}	Address Num-1	1
PN_{Num}	Program number Num	32
A_{Num}	Address Num	1

ATTENTION :

Only a maximum of 64 Bytes in one message can be transmitted, this corresponds to 31 addresses.

2.4 Reading Data Blocks

2.4.1 Reading System Parameter

DV1	:	ID		KH = 50xx

Definition :

ID	Identification number	50h

Reply :

DV1	:	S1		KF = +400
DV2	:	S2		KF = +50
DV3	:	S3		KF = +754
DV4	:	S4		KF = +600
DV5	:	S5		KF = +10
DV6	:	S6		KF = +1500
DV7	:	S7		KF = +1000
DV8	:	S8	S9	KH = +0001
DV9	:	S10		KF = +583
DV10	:	S11		KF = +1100
DV 11	:	S12		KF = +10

Definition :

S1	System Parameter 1 (Upper reversing point)	0.400 m
S2	System Parameter 2 (Reference point)	0.050 m
S3	System Parameter 3 (Increm. pulse generator)	754 pulses/dm
S4	System Parameter 4 (Max. speed)	0.600 m/s
S5	System Parameter 5 (Min. speed)	0.010 m/s
S6	System Parameter 6 (Acceleration)	1500 m/s^2
S7	System Parameter 7 (Circuit amplification)	100
S8	System Parameter 8 (Alarm)	0
S9	System Parameter 9 (Module address)	1
S10	System Parameter 10 (Increm. Synch.)	583
S12	System Parameter 11 (Synch. circuit ampl.)	1000
S12	System Parameter 12 (Synch. conveyor sequence)	10 mm

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2.4.2 Reading Program data

DV1	:	ID	PN	KH = 5106

Definition :

ID	Identification number	51h
PN	Program	6

Reply :

DV1	:	PN		KH = 06xx
DV2	:	P		KF = +1050
DV3	:	V		KF = +300
DV4	:	Vr		KF = +53
DV5	:	T		KF = +20
DV6	:	F1		KF = +1020
DV7	:	F2		KF = +50
DV8	:	A		KH = 07xx

Definition :

PN	Program	6
P	Position	1050 m
V	Speed	0.300 m/s
Vr	Relative speed	0.053 m/s
T	Dwell time	2.0 s
F1	Set Function output	0.020 m after Start
F2	Delete Function output	0.020 m before End position
A	Jump to Program 7	

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2.4.3 Reading a number of programs

DV1	:	ID		KH = 52xx
DV2	:	PN_{n1}	PN_{n2}	KF = +0406

Definition :

ID	Identification	52h
PN_{n1}	Program Number n1	4
PN_{n2}	Program Number n2	6

Reply :

DV1	:	PN		KH = 04xx
DV2	:	P_4		KF = +1050
DV3	:	V_4		KF = +300
DV4	:	Vr_4		KF = +53
DV5	:	T_n		KF = +20
DV6	:	$F1_4$		KF = +1020
DV7	:	$F2_4$		KF = +20
DV8	:	A_4		KH = 07xx
DV9	:	PN		KH = 05xx
DV10	:	P_5		KF = +100
DV11	:	V_5		KF = +500
DV12	:	Vr_5		KF = +0
DV13	:	T_5		KF = +20
DV14	:	$F1_5$		KF = +1000
DV15	:	$F2_5$		KF = +0
DV16	:	A_5		KH = +06xx
DV17	:	PN		KH = +06xx
DV18	:	P_6		KF = +600
DV19	:	V_6		KF = +200
DV20	:	Vr_6		KF = +0
DV21	:	T_6		KF = +0
DV22	:	$F1_6$		KF = +1000
DV23	:	$F2_6$		KF = +0
DV24	:	A_6		KH = +07xx

(continued)

Definition :

PN	Program Number	4
P_4	Position	1050 m
V_4	Speed	0.300 m/s
Vr_4	Relative speed	0.053 m/s
T_n	Dwell time	2.0 s
$F1_4$	Set function output	0.020 m after Start
$F2_4$	Delete function output	0.020 m before End position
A_4	Jump to Program 5	
PN	Program Number	5
P_5	Position	0.100 m
V_5	Speed	0.500 m/s
Vr_5	Relative speed	0.0 m/s
T_5	Dwell time	2.0 s
$F1_5$	Set function output	0.000 m at Start
$F2_5$	Delete function output	0.000 m after Dwell time
A_5	Jump to Program 6	
PN	Program Number	6
P_6	Position	0.600 m
V_6	Speed	0.200 m/s
Vr_6	Relative speed	0.0 m/s
T_6	Dwell time	0.0 s
$F1_6$	Set function output	0.000 m at Start
$F2_6$	Delete function output	0.020 m at End position
A_6	Jump to Program 7	

ATTENTION !!

Only a maximum of 64 Bytes can be transmitted in one message, this corresponds to 4 programs.

2.5 Address Initializing

As soon as the digital input - Address Init (Reserve) is activated (High) in the STOP mode the PRC module switches to the Address Initializing mode.
The Address channels $P2^0$ to $P2^4$ are read in with the Strobe Signal. If a valid address (between 1...30) is contacted this is accepted as a Module Address and the Function Output is set.
When the digital input Address Init goes to LOW again the Function Output is deleted.

PLC	**PRC Module in Start Up Phase** (Reference point not approached)
	STOP mode
Address Init -> HIGH	
	Address Initializing mode
Contact Address on $P2^0$ to $P2^4$ Strobe	
	Read in Address on $P2^0$ to $P2^4$ Check Address If OK : Accept Addresses Function Output -> HIGH
Address Init -> LOW	
	Function Output -> LOW STOP mode / Automatic mode

2.6 Teach In Mode

As soon as the digital input - Teach In (Start Ref.), in the STOP mode in automatic operation, is activated (High), the PRC module switches to the Teach In mode. The Address channels - $P2^0$ to $P2^5$ are read in with the Strobe signal. The PRC then carries out a program switch and travels, at a minimal speed (for safety reasons), to the programmed position. When the axis has reached this position (Program Run - Low) it is maintained and the axis position can now be changed with the digital inputs - Increment Position (Stop/Start URP) and Decrement Position (Stop/Start LRP). The position value is, thereby, always monitored and stored in the PRC. Any new program can now be selected, as desired. Finally, the positions can be read through the serial interface.

PLC	PRC Module
	STOP mode (Automatic operation)
Teach In -> HIGH	
	Teach In Mode
Addresses at $P2^0$ to $P2^5$ on Strobe	
	Program switching Program run Axis travels to defined position Program run -> LOW
Increment / Decrement Position	
	Position value larger / smaller Axis travels to new position
Teach In -> LOW	
	STOP mode (Automatic operation)

3. Error Messages

For all error messages to the slaves, except the ring call messages (Broadcast), the so-called error messages are returned to the Master (PLC). This way the Master has a check on which commands have been understood and carried out by the Slaves, and which commands conflicts have arisen.

There are two categories of error message. The first are warnings, which are not real errors, but only inform the Master that unusual values have been transmitted. With a warning the values are completely accepted. With a real error, however, the transmitted values are not accepted and are eliminated.

0 - No error, everything is in order.

The error code - 0 means an error-free transmission has taken place, and the values have been interpreted and processed.

DV1 :	ECN		KH = 00xx

Description :

ECN	Error Code Number	0 - 122

3.1 Error Code

10 - Invalid Identification number (ID)

11 - Invalid length (Length Msg (Message) < 1)

12 - Invalid length (Length Msg > 64)

13 - Data block not complete (Length Msg < Data block length)

14 - Data block too long (Length Msg > Data block length)

15 - Invalid program number

16 - PN = active program
Program data cannot be written over as the program is still active.

20 - Operating condition <> STOP
The system parameters can only be changed in the operating condition - STOP.

21 - Operating condition = Error E09
Emergency Stop

22 - Operating condition = Error E10
Reference point not reached

23 - Operating condition = Error E12
System parameters not set

24 - Operating condition = Error E20
Upper reversing point over-run

25 - Operating condition = Error E21
Positioning error

26 - Operating condition = Error E22
Fault in the axis movement monitoring

27 - Operating condition = Error E23
Fault in the Dwell time monitoring

28 - Operating condition = Error E24
Fault in the incremental pulse generator monitoring

29 - Operating condition = Error E25
Fault in the incremental pulse generator monitoring

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Error Code (continued)

30 - Operating condition = Fault
Undefinable fault

31 - P < 0
Position must not be smaller than 0 (Zero)

32 - P > SP_1
Position must not be greater than the system parameter 1 (Upper reversing point)

40 - V < SP_5
The speed must not be smaller than the minimum speed (System parameter 5)

41 - V > SP_4
The speed must not be greater than the maximum speed (System parameter 4)

50 - Vr < -600
The relative speed must not be smaller than -0.600 m/s

51 - Vr > 600
The relative speed must not be greater than 0.600 m/s

60 - T < 0
The dwell time must not be smaller than 0.0 s

61 - T > 600
The dwell time must not be greater than 60.0 s

70 - F1 < 0
The function value must not be smaller than 0.000
(Delete output at START)

73 - F2 > 1999
The function value must not be greater than 1.999
(Set output 0.999 m before Reversing point)

80 A > 64
The address jump must not be greater than 64 (Max. number of programs)

100 - S1 < 100
The upper reversing point must not be smaller than 0.100 m

101 - S1 > 9999
The upper reversing point must not be greater than 9.999 m

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Error Code (continued)

102 - S2 < 50
The reference point must not be smaller than 0.050 m

103 - S2 < 500
The reference point must not be greater than 0.500 m

104 - S3 < 1
The incremental pulse must not be smaller than 1

105 - S3 > 9999
The incremental pulse must not be greater than 9999

106 - S4 < 1
The maximum speed must not be smaller than 0.001 m/s

107 - S4 > 600
The maximum speed must not be greater than 0.600 m/s

108 - S5 < 1
The minimum speed must not be smaller than 0.001 m/s

109 - S5 > 600
The minimum speed must not be greater than 0.600 m/s

110 - S4 < S5
The maximum speed must not be smaller than the minimum speed

112 - S6 < 1000
The acceleration must not be smaller than 1.000 m/s^2

113 - S6 > 1500
The acceleration must not be greater than 1.500 m/s^2

114 - S7 < 800
The circuit amplification must not be smaller than 800

115 - S7 > 1500
The circuit amplification must not be greater than 1500

116 - S8 > 1
The alarm parameter must not be greater than 1

117 - S10 < 1
The synch. increment pulse must not be smaller than 1

118 - S10 > 9999
The synch. increment pulse must not be greater than 9999

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Error Code (continued)

119 - S11 < 1
The synch. circuit amplification must not be smaller than 1

120 - S 11 > 1500
The synch. circuit amplification must not be greater than 1500

121 - S12 < 5
The conveyor sequence must not be smaller than 5 mm

122 - S12 > 50
The conveyor sequence must not be greater than 50 mm

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4. Hardware

The serial interface is based on the EIA Standard RS 422. The RS 422 is an interface with differential signal transmission through which a number of participants can communicate with one another. Each participant requires a transmitter, and a receiver cable pair. The serial interface of the PRC 3 is galvanically isolated from the rest of the circuit with an opto-coupler.
The power supply must be potential-free and fed from an external power supply together with the other internal power supplies. A terminator is switched through the transmission line, by the Jumper X21 on the Micro 3 printed circuit board, in order to avoid reflections (see the PRC 3 Operating Instructions, Appendix D). The circuit termination must only be on the last receiver in the chain otherwise the driver of the receiver will be overloaded. The Terminator Jumper J1 can be found on the Serial Data Link Board (SLB1). When the cable is over 100 m long the Jumper J1 must be connected to the position "ON".

Technical Data

Interface type :	RS 422
Number of receivers :	30
(The last receiver is terminated)	
Baud rate :	9600 baud
Maximum cable length :	1000 m
(depending on the type of cable)	

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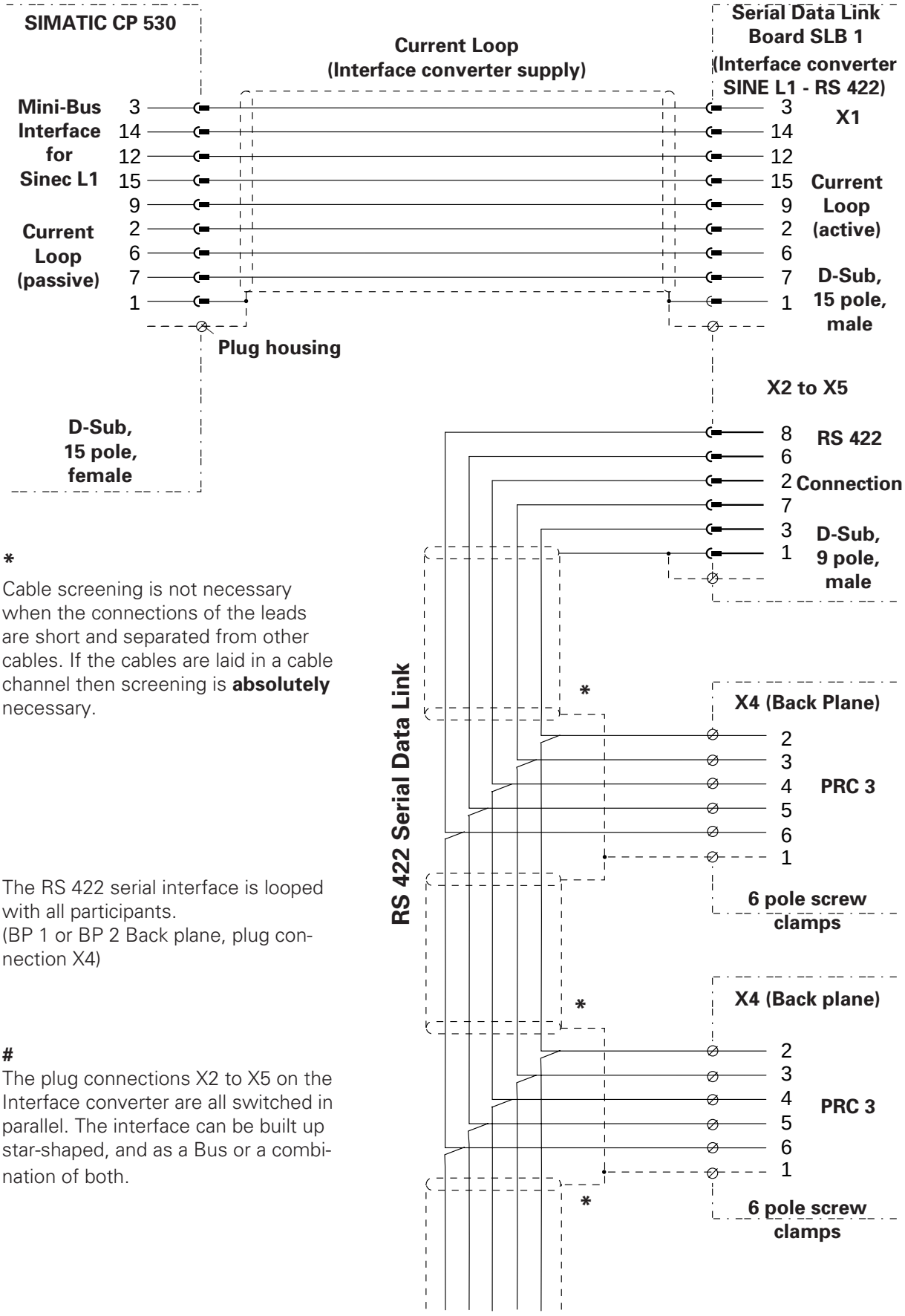
4.1 Serial Data Link for the PRC 3 Axis Control Unit



*****

Cable screening is not necessary when the connections of the leads are short and separated from other cables. If the cables are laid in a cable channel then screening is **absolutely** necessary.

The RS 422 serial interface is looped with all participants.
(BP 1 or BP 2 Back plane, plug connection X4)

#

The plug connections X2 to X5 on the Interface converter are all switched in parallel. The interface can be built up star-shaped, and as a Bus or a combination of both.

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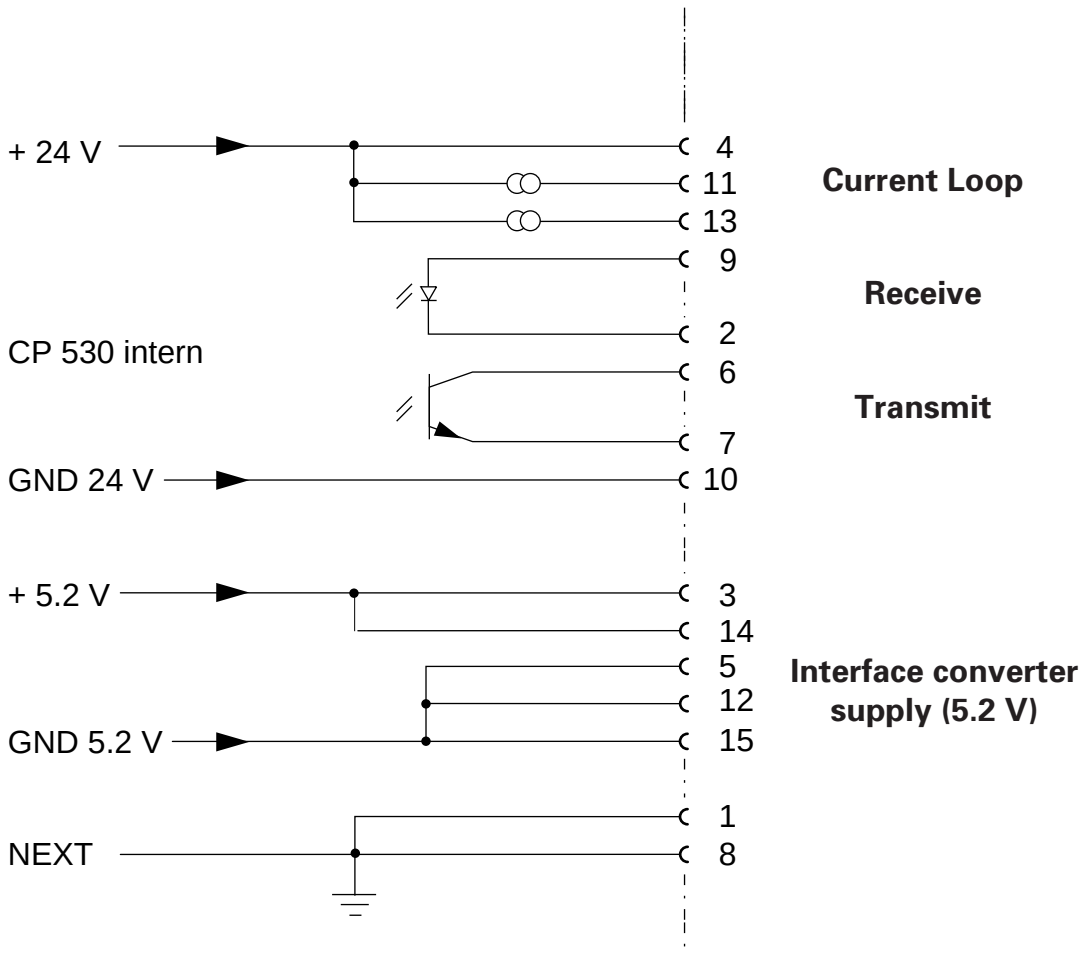
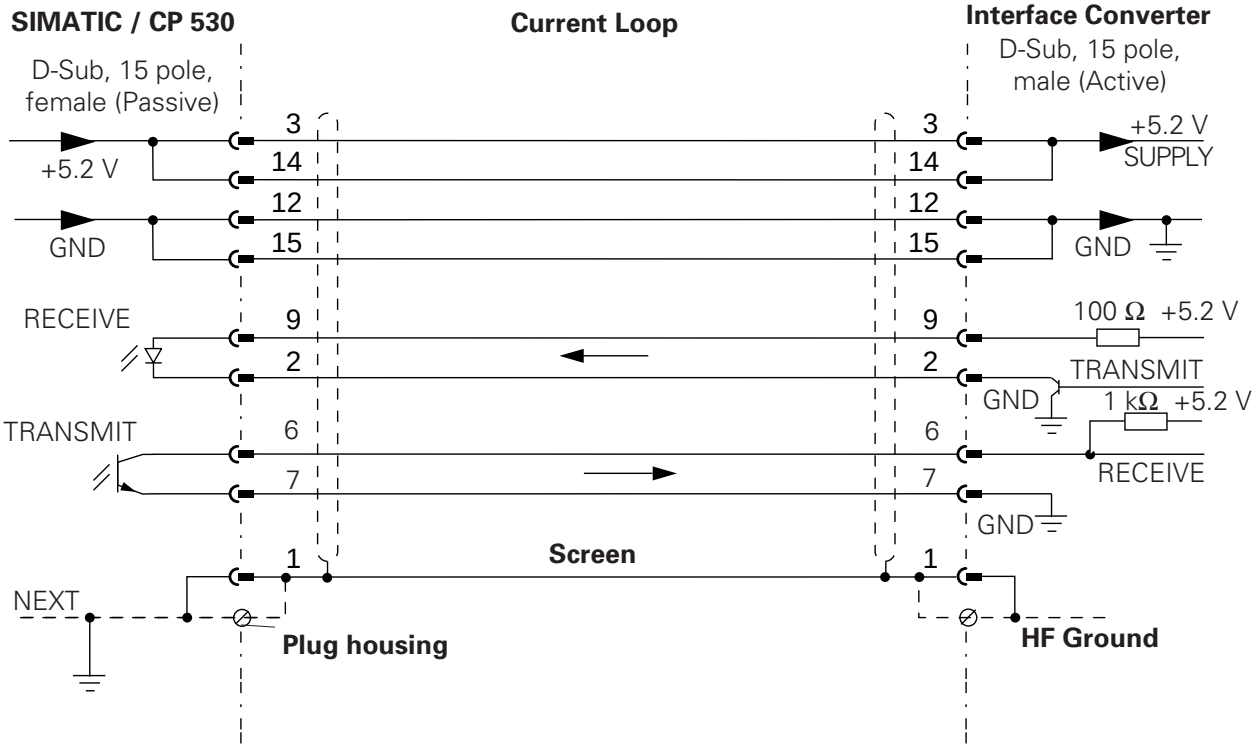
4.2 CP 530 Connection assignment

Mini-Bus Interface (Current Loop), D-Sub, 15 pole , female plug.

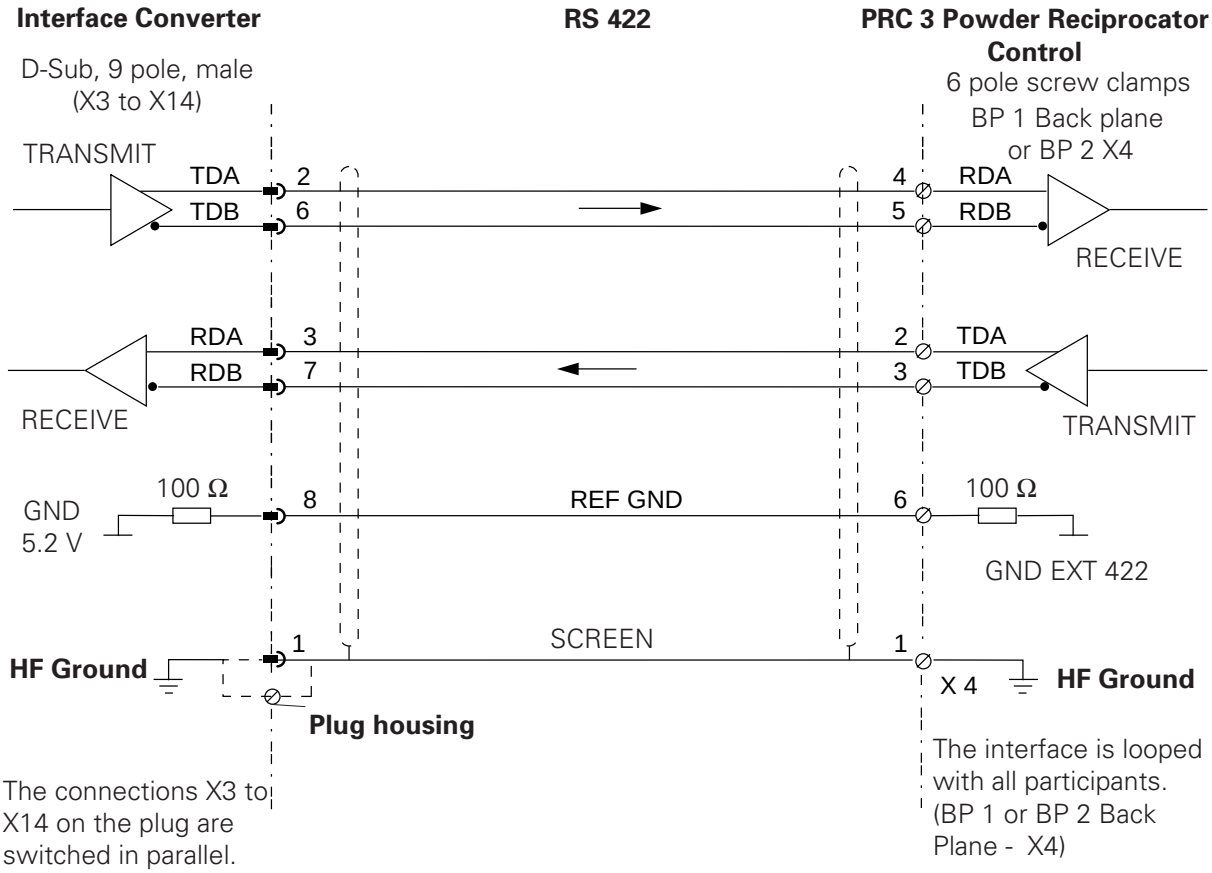
Connection	Function / Assignment
1	Next / External Ground (⏚)
2	LED cathode (Receive -)
3	+5.2 V supply output
4	(+24 V)
5	GND (for 5.2 V)
6	Collector (Transmit +)
7	Emitter (Transmit -)
8	Next / External Ground (⏚)
9	LED Anode (Receive +)
10	(GND - 24 V)
11	Power source 20 mA
12	GND (for 5.2 V)
13	Power source 20 mA
14	+5.2 V supply input
15	END (for 5.2 V)
Housing	Next / External Ground (⏚)



4.3 CP 530 Connection Cable to Interface Converter



4.4 Interface Converter Connection Cable to PRC 3



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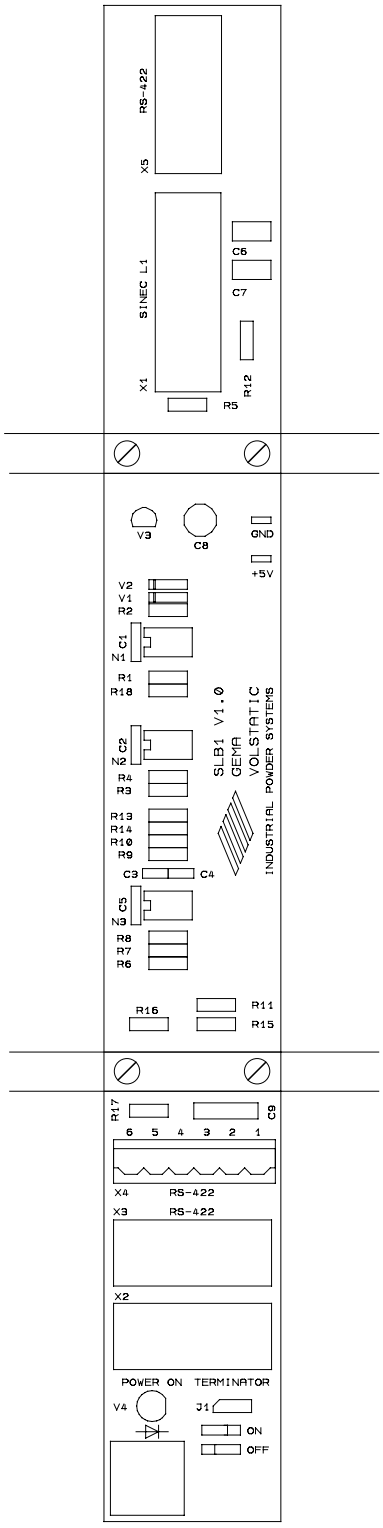
4.5 Connections on the Serial Data Link Board SLB 1

The printed circuit board is built into the cabinet vertically
(19 inch Rack /7TE, 280 mm high).

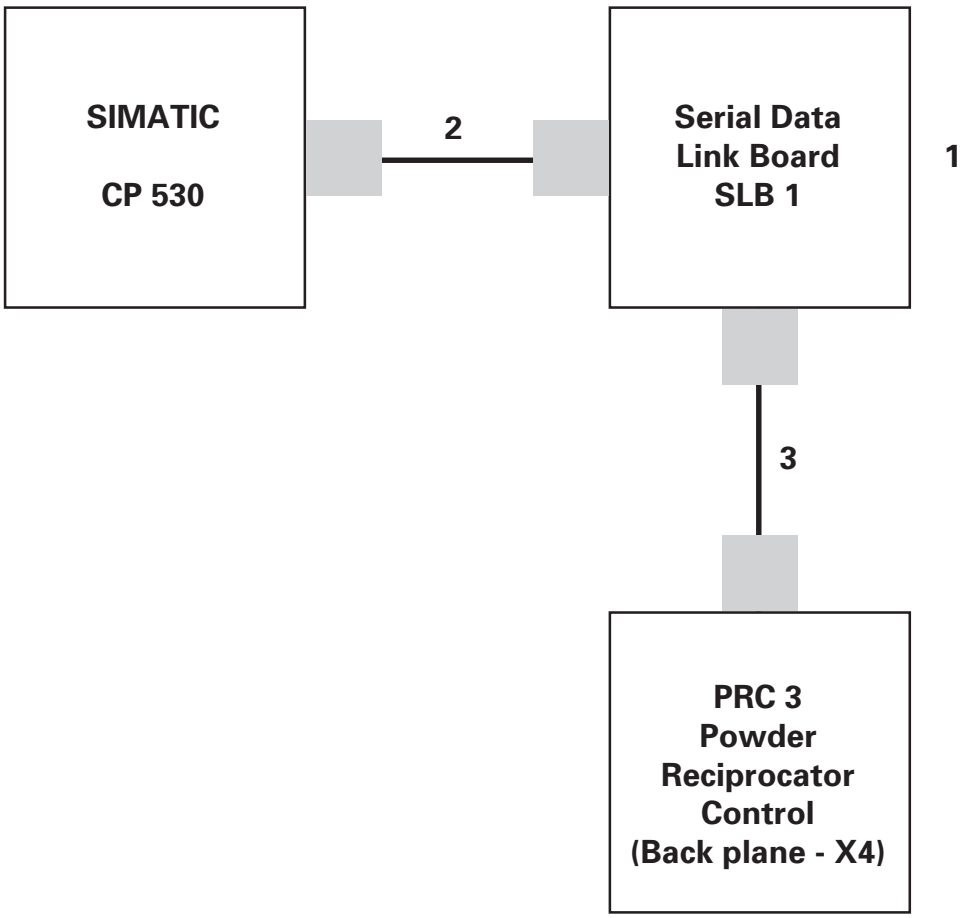


X1 : Connection for CP 530
X2 to X5 : RS 422 connection - PRC 3

PRC 3 Serial Interface RS 422

Spare Parts for PRC 3 - PLC communication

1	Serial Data Link Board SLB 1	352 926
2	CP 530 Connection cable to Serial Data Link Board SLB 1	354 180*
3	Connection cable to PRC 3	xxx xxx*



* Indicate length required

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EPROM /Software Version

Software version	Changes	Function
PRC 3.01.1		
PRC 3.02.1	February 1994	Function Output 2 (End)
PRC 3.03.1	June 1994	Read Data Blocks interface Teach In Mode

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