



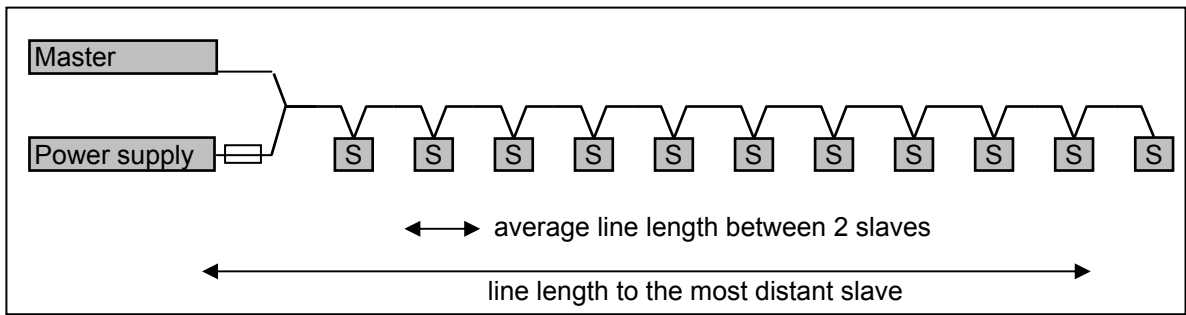
**Power Supply via Bus Cable, Calculation**

Supposed all devices are supplied externally, the supply has to feed the PDP21, PDP22 or PDQ22 connected to the bus. The supply current depends on the voltage (typical values):

Supply voltage:	19.2 V	24 V	31.2 V
Supply current typ. PDP22, PDP21	46 mA	37 mA	31 mA
Supply current typ. PDQ22	39 mA	31 mA	24 mA

To simplify the calculation the scheme below uses the highest of the currents but - on the other hand - does not regard the increased copper resistance and voltage drop for higher environment temperatures.

All slaves **even the slave most distant from the supply unit need to be supplied with min. 19.2 V DC** including ripple. That means that the power supply unit at the beginning of the line has to provide a higher voltage to compensate the voltage drops due to the line resistance.



The recommended power supply unit can be adjusted to 28 V DC:

Power Supply 24V / 5A adjustable      Order code: 1SVR423416R0100      Type: CP-24/5.0  
The power supply has always to be fused with 4A max. (M12 System Limit)

Remark:

The max. number of physical stations on one bus segment is 32, defined by the RS-485 standard. That means: For more than 31 slaves an additional segment (coupled with repeater) has to be provided that needs normally a separate supply unit.

In accordance with this fact the calculation below provides max 31 slaves + one master. Normally each repeater and RS-485 / fiber-optic converter represent also one physical station each on the RS-485 bus line.

The calculation with the scheme below takes into account:

- The most distant slave - situated at the end of the scheme - needs at least:      19,2 VDC
- Line resistance (0.5 mm<sup>2</sup>) (can be changed):      0,075 Ohm/m

Additional info:

max. output voltage of above recommended supply unit      28 V



**Power Supply via Bus Cable, Calculation (continued)**

**Calculation procedure**

- 1. Define number of slaves**, e.g. including 10% spare slaves: 31  
Example: 25 slaves ---> Master at the row of the 26th slave.
- 2. Define average length of the bus line between the slaves:** 3,0 m  
The total length appears in the row of the master, green cell.  
It is necessary to consider also the max. length of the signal lines.  
Individual length can be filled in the green cells near the slaves.
- 3. Fill in current of the slaves:** 40 mA  
The current of a slave is the calculated sum of the current consumption of a PDQ22 or a PDP21 or a PDP22 and the current consumption of the connected slaves ( please find them in the accordant technical data sheet ) .  
Example ..... PDQ22 = 30 mA  
Individual currents can be filled in in the yellow cells near the slaves.

**Result: Voltage** in the row of the master to be delivered by the power supply, total **Current** and total **Bus Length**.  
This supply voltage must not exceed 31,2 volts !

**Result: Sum Current**  
The calculated sum of all currents in a bus line must not exceed 4000 mA (System Limit)!

Number of Slaves	Single Lengths (can be fixed individually)	Sum Bus Length	Single Current (can be fixed individually)	Sum Current	Voltage on the Slave
	V	V	V	V	V
<b>Master</b>	1 Slave	93,0 m	40 mA	1280 mA	23,66 V
	3,0 m				
31	1 Slave	90,0 m	40 mA	1240 mA	23,39 V
	3,0 m				
30	1 Slave	87,0 m	40 mA	1200 mA	23,12 V
	3,0 m				
29	1 Slave	84,0 m	40 mA	1160 mA	22,85 V
	3,0 m				
28	1 Slave	81,0 m	40 mA	1120 mA	22,60 V
	3,0 m				
27	1 Slave	78,0 m	40 mA	1080 mA	22,36 V
	3,0 m				
26	1 Slave	75,0 m	40 mA	1040 mA	22,13 V
	3,0 m				
25	1 Slave	72,0 m	40 mA	1000 mA	21,90 V
	3,0 m				
24	1 Slave	69,0 m	40 mA	960 mA	21,68 V
	3,0 m				
23	1 Slave	66,0 m	40 mA	920 mA	21,48 V
	3,0 m				

some lines are hidden / "Format", "unhide"



22	1 Slave		63,0 m	40 mA	880 mA	21,28 V
		3,0 m				
21	1 Slave		60,0 m	40 mA	840 mA	21,09 V
		3,0 m				
20	1 Slave		57,0 m	40 mA	800 mA	20,91 V
		3,0 m				
19	1 Slave		54,0 m	40 mA	760 mA	20,74 V
		3,0 m				
18	1 Slave		51,0 m	40 mA	720 mA	20,58 V
		3,0 m				
17	1 Slave		48,0 m	40 mA	680 mA	20,42 V
		3,0 m				
16	1 Slave		45,0 m	40 mA	640 mA	20,28 V
		3,0 m				
15	1 Slave		42,0 m	40 mA	600 mA	20,15 V
		3,0 m				
14	1 Slave		39,0 m	40 mA	560 mA	20,02 V
		3,0 m				
13	1 Slave		36,0 m	40 mA	520 mA	19,90 V
		3,0 m				
12	1 Slave		33,0 m	40 mA	480 mA	19,79 V
		3,0 m				
11	1 Slave		30,0 m	40 mA	440 mA	19,70 V
		3,0 m				
10	1 Slave		27,0 m	40 mA	400 mA	19,61 V
		3,0 m				
9	1 Slave		24,0 m	40 mA	360 mA	19,52 V
		3,0 m				
8	1 Slave		21,0 m	40 mA	320 mA	19,45 V
		3,0 m				
7	1 Slave		18,0 m	40 mA	280 mA	19,39 V
		3,0 m				
6	1 Slave		15,0 m	40 mA	240 mA	19,34 V
		3,0 m				
5	1 Slave		12,0 m	40 mA	200 mA	19,29 V
		3,0 m				
4	1 Slave		9,0 m	40 mA	160 mA	19,25 V
		3,0 m				
3	1 Slave		6,0 m	40 mA	120 mA	19,23 V
		3,0 m				
2	1 Slave		3,0 m	40 mA	80 mA	19,21 V
		3,0 m				
1	1 Slave		0,0 m	40 mA	40 mA min	19,20 V

Results - The power supply unit has to deliver min. 23.7 V incl. ripple and tolerances  
of this - The power supply unit has to deliver min. 1280 mA  
example - The bus length is < 100 m. Note: **Consider length and baud rate.**