Using Plixus Power calculator

1. Introduction

This application note explains how to use the Plixus power calculator

The Plixus power calculator is an important tool to determine :

- how much units can be connected per branch , depending on type of units , section of cables , length of cables
- what total max power of the installation will be
- Detect were potential problems of overcurrent or power loss may occur

2. Calculator overview no F/MM

In example below a screenshot of the calculator tool

Plixus power calculator - no F/MM << VALID FROM 01/02/2017 UNTIL 01/01/2018 >>

Legend
user may enter any value
user must select a predefined value
user may not alter this value
calculated result
very important calculated result
result outside limits

CALCULATE RESULTS
(to be done after each change)

Power supply voltage	48	[V]
Number of network extenders used	2	

Power supply power	238,35	[W]
Power supply current	4,97	[A]

Network extender Power cabling				Branch		Device			Cabling NE to first device Plixus cabling			Cabling between devices Plixus cabling			Calculated results						
Index	Cable	Length	Port	Name	Voltage	Type	Power	Number of	Length	AWG	Ohm/m	Length	AWG	Ohm/m	#iter	P device(s)	P branch	I start	U first device	U last device	Cable loss
[-]	[mm²]	[m]	[-]		[V]	[-]	[W]	[-]	[m]	[-]	[Ohm]	[m]	[-]	[Ohm]	[-]	[W]	[W]	[A]	[V]	[V]	[W]
1	1,5	20	1	no name	45,78	F-DM	3,0	5	10	24 STANDARD	0,0842	2	24 STANDARD	0,0842	45,00	15,00	15,11	0,33	45,50	45,40	0,11
			2	no name	45,78	F-DM	3,0	10	20	24 STANDARD	0,0842	2	24 STANDARD	0,0842		30,00	30,99	0,68	44,64	44,14	0,99
	[Ohm/m]		3	no name	45,78	F-DM	3,0	15	40	24 STANDARD	0,0842	2	24 STANDARD	0,0842		45,00	49,90	1,09	42,10	40,85	4,90
	0,0112		4	no name	45,78	F-DM	3,0	20	50	24 STANDARD	0,0842	2	24 STANDARD	0,0842		60,00	73,39	1,60	39,03	36,65	13,39
2	1,5	20	1	no name	45,32	F-DM	3,0	10	100	24 STANDARD	0,0842	2	24 STANDARD	0,0842		30,00	35,44	0,78	38,73	38,16	5,44
			2	no name	45,32	F-DM	3,0			24 STANDARD	0,0842		24 STANDARD	0,0842							
	[Ohm/m]		3	no name	45,32	F-DM	3,0			24 STANDARD	0,0842		24 STANDARD	0,0842							
	0,0112		4	no name	45,32	F-DM	3,0			24 STANDARD	0,0842		24 STANDARD	0,0842							
3	1,5		1	no name		F-DM	3,0			24 STANDARD	0,0842		24 STANDARD	0,0842							
			2	no name		F-DM	3,0			24 STANDARD	0,0842		24 STANDARD	0,0842							
	[Ohm/m]		3	no name		F-DM	3,0			24 STANDARD	0,0842		24 STANDARD	0,0842							
	0,0112		4	no name		F-DM	3,0			24 STANDARD	0,0842		24 STANDARD	0,0842							
4	1,5		1	no name		F-DM	3,0			24 STANDARD	0,0842		24 STANDARD	0,0842							
			2	no name		F-DM	3,0			24 STANDARD	0,0842		24 STANDARD	0,0842							
	[Ohm/m]		3	no name		F-DM	3,0			24 STANDARD	0,0842		24 STANDARD	0,0842							
	0,0112		4	no name		F-DM	3,0			24 STANDARD	0,0842		24 STANDARD	0,0842							
5	1,5		1	no name		F-DM	3,0			24 STANDARD	0,0842		24 STANDARD	0,0842							
			2	no name		F-DM	3,0			24 STANDARD	0,0842		24 STANDARD	0,0842							
	[Ohm/m]		3	no name		F-DM	3,0			24 STANDARD	0,0842		24 STANDARD	0,0842							

The calculator tool allows calculation up to 8 NE/NEXT in one branch/loop to the Plixus AE/MME

If more branches of NE/NEXT are used , the calculation must be done for all the Plixus AE/MME branches

3. Calculator tool parameters

3.1. Legend

Each parameter has a specific color , which indicates its function

Legend	user may enter any value
	user must select a predefined value
	user may not alter this value
	calculated result
	very important calculated result
	result outside limits

3.2. Amount of NE/NEXT

Enter the total amount of NE/NEXT in the branch/loop for which you want to enable the calculation

If all devices are connected directly to Plixus AE/MME , without NE/NEXT , then choose 1 , tehn the 4 NE ports represent the 4 Plixus AE/MME ports

Power supply voltage	48	[V]
Number of network extenders used	2	

Network extender Power cabling				Branch	
Index [-]	Cable [mm²]	Length [m]	Port [-]	Name	Voltage [V]
1	1,5	20	1	no name	45,78
			2	no name	45,78
	[Ohm/m]		3	no name	45,78
	0,0112		4	no name	45,78
2	1,5	20	1	no name	45,32
			2	no name	45,32
	[Ohm/m]		3	no name	45,32
	0,0112		4	no name	45,32
3	1,5		1	no name	
			2	no name	
	[Ohm/m]		3	no name	
	0,0112		4	no name	

3.3. Cable section of 48V power supply to NE/NEXT

Select the cable section (drop down menu) and cable length from power cable to first NE/NEXT in the branch. And select each cable length to the following NE/NEXT (daisy chain connection)In below example , running power cable is 20 meters and connection from NE 1 to NE 2 is 1 m. power cable has a section of 1.5mm²

Network extender Power cabling		
Index	Cable	Length
[-]	[mm²]	[m]
1	1,5	20
	1,5 2,5 4	
2		20
	[Ohm/m] 0,0112	

Network extender Power cabling			
Index	Cable	Length	Port
[-]	[mm²]	[m]	[-]
1	1,5	20	1
	[Ohm/m] 0,0112		2 3 4
2	1,5	1	1
	[Ohm/m] 0,0112		2 3 4

3.4. Branch name (optional)

Each branch name can be edited to enter cabling diagram reference for example

Branch	
Name	Voltage [V]
no name	45,78
no name	45,78
no name	45,78
no name	45,78
no name	45,32
no name	45,32
no name	45,32
no name	45,32

3.5. Start voltage

The calculated voltage at Port 1/2/3/4 of NE/NEXT

Branch	
Name	Voltage [V]
no name	45,78
no name	45,78
no name	45,78
no name	45,78
no name	45,32
no name	45,32
no name	45,32
no name	45,32

3.6. Device type selection

Via drop down menu device type selection can be made ; this will automatically result in another max power indication

Set the amount of units on this branch

If a mix of unit types is used , select the one with highest max power

Device		
Type [-]	Power [W]	Number of [-]
T-DD/T-DI	3,7	5
F-CS	5,3	10
T-DD/T-DI	11,0	15
T-DV/T-DIV	3,0	20
ID	3,0	10
	3,0	5
F-DM	3,0	2
F-DM	3,0	7

Device		
Type [-]	Power [W]	Number of [-]
T-DD/T-DI	3,7	5
F-CS	5,3	10
T-DD/T-DI	11,0	15
T-DV/T-DIV	3,0	20
ID	3,0	10
	3,0	5
F-DM	3,0	2
F-DM	3,0	7

3.7. Running datacable length and section

Enter the length of the running datacable (cable from NE/NEXT or AE/MME port to first unit in the branch). Select also the used cable section (AWG value) via the drop down menu .

The Ohm/m value will be automatically adapted depending on selected AWG value

Cabling NE to first device Plixus cabling		
Length [m]	AWG [-]	Ohm/m [Ohm]
10	24 STANDARD	0,0842
20	26 PATCH	),1339
40	25	),0842
50	26 PATCH	),0842
20	27	),0842
30	28	),0842
10		),0842
40	24 STANDARD	0,0842

Cabling NE to first device Plixus cabling		
Length [m]	AWG [-]	Ohm/m [Ohm]
10	24 STANDARD	0,0842
20	26 PATCH	1339
40	25	0842
50	26 PATCH	0842
20	27	0842
30	28	0842
10		0842
40	24 STANDARD	0842

3.8. Datacable length and section between units

Enter the average length of the datacable between devices in that branch . Select also the used cable section (AWG value) via the drop down menu .

The Ohm/m value will be automatically adapted depending on selected AWG value

Cabling between devices Plixus cabling		
Length [m]	AWG [-]	Ohm/m [Ohm]
2	24 STANDARD	0,0842
2	24 STANDARD	0,0842
2	24 STANDARD	),0842
2	24 STANDARD	),0842
2	25	),0842
3	26 PATCH	),0842
3	27	),0842
3	28	),0842

Cabling between devices Plixus cabling		
Length [m]	AWG [-]	Ohm/m [Ohm]
2	24 STANDARD	0,0842
2	24 STANDARD	0,0842
2	24 STANDARD	),0842
2	24 STANDARD	),0842
2	25	),0842
3	26 PATCH	),0842
3	27	),0842
3	28	),0842

3.9. Calculation

Press the calculate button to check the results

CALCULATE RESULTS
(to be done after each change)

3.9.1. Result can not be calculated

If a result can not be calculated due to some settings that are very far out of accepatable limits , an "invalid" message appears for all branches

Calculated results

#iter	P device(s)	P branch	I start	U first device	U last device	Cable loss
[-]	[W]	[W]	[A]	[V]	[V]	[W]
5001,00	invalid	invalid	invalid	invalid	invalid	invalid
	invalid	invalid	invalid	invalid	invalid	invalid
	invalid	invalid	invalid	invalid	invalid	invalid
	invalid	invalid	invalid	invalid	invalid	invalid
	invalid	invalid	invalid	invalid	invalid	invalid
	invalid	invalid	invalid	invalid	invalid	invalid
	invalid	invalid	invalid	invalid	invalid	invalid
	invalid	invalid	invalid	invalid	invalid	invalid

3.9.2. Result out can be calculated but result is out of specs

Non allowed end results are marked in red : check what parameters can be changed to obtain a better result (other cable section , less units per branch…)

Max current may not exceed 2A

Voltage at end of line may not be less the 36V

Calculated results

#iter	P device(s)	P branch	I start	U first device	U last device	Cable loss
[-]	[W]	[W]	[A]	[V]	[V]	[W]
50,00	18,50	18,68	0,42	44,22	44,10	0,18
	79,50	95,22	2,14	38,85	36,36	15,72
	55,00	61,88	1,39	39,90	39,48	6,88
	60,00	74,63	1,67	37,53	35,03	14,63
	30,00	31,05	0,70	43,36	42,85	1,05
	15,00	15,33	0,34	43,67	43,51	0,33
	6,00	6,02	0,14	44,42	44,42	0,02
	21,00	21,93	0,49	42,88	42,53	0,93

3.9.3. Results all within allowed limits

No red markings , so results acceptable

Calculated results

#iter	P device(s)	P branch	I start	U first device	U last device	Cable loss
[-]	[W]	[W]	[A]	[V]	[V]	[W]
25,00	18,50	18,68	0,41	45,08	44,96	0,18
	53,00	58,16	1,28	42,00	41,08	5,16
	55,00	61,55	1,35	40,86	40,46	6,55
	30,00	32,36	0,71	42,43	41,94	2,36
	30,00	30,99	0,68	44,24	43,77	0,99
	15,00	15,32	0,34	44,54	44,39	0,32
	6,00	6,02	0,13	45,28	45,28	0,02
	21,00	21,88	0,48	43,77	43,46	0,88

3.10. Total power use for all no F/MM devices

If total power is less then 400 W , internal power supply of Plixsu AE/MME is sufficient

If total power exceeds 400 W , external or additional power supply is needed

Power supply power	275,80	[W]
Power supply current	5,75	[A]

Power supply power	770,23	[W]
Power supply current	16,05	[A]

If total power exceeds 1000W or max current exceeds 16A , result is marked in red

16 A is max current limit that is allowed on the NE/NEXT power connectors

4. Calculator tool F/MM

Plixus power calculator F/MM << VALID FROM 01/02/2017 UNTIL 01/01/2018 >>

Legend	
	user may enter any value
	user must select a predefined value
	user may not alter this value
	calculated result
	very important calculated result
	result outside limits

CALCULATE RESULTS
(to be done after each change)

Power supply voltage	48	[V]
Number of power branches	2	

Power supply power	443,01	[W]
Power supply current	9,23	[A]

PS5500 Power cabling	Power branch		Device			Cabling PS5500 to first device Power cabling			Cabling between devices Power cabling			Calculated results						
Port [-]	Name	Voltage [V]	Type [-]	Power [W]	Number of [-]	Length [m]	Cable [-]	Ohm/m [Ohm]	Length [m]	Section (mm²) [-]	Ohm/m [Ohm]	#iter [-]	P device(s) [W]	P branch [W]	I start [A]	U first device [V]	U last device [V]	Cable loss [W]
1	no name	48,00	F/MM 10"	20,0	10	50	1,5	0,0112	2	1,5	0,0112	20,00	200,00	228,02	4,75	42,68	41,77	28,02
2	no name	48,00	F/MM 7"	15,0	10	50	2,5	0,0067	2	2,5	0,0067		200,00	215,00	4,48	44,99	44,46	15,00
3	no name	48,00	F/MM 7"	15,0			1,5	0,0112		1,5	0,0112							
4	no name	48,00	F/MM 7"	15,0			1,5	0,0112		1,5	0,0112							
5	no name	48,00	F/MM 7"	15,0			1,5	0,0112		1,5	0,0112							
6	no name	48,00	F/MM 7"	15,0			1,5	0,0112		1,5	0,0112							

4.1. Amount of used power branches

Set amount of power branches and optionally enter branch name

Power supply voltage	48	[V]
Number of power branches	2	

PS5500 Power cabling	Power branch	
Port [-]	Name	Voltage [V]
1	no name	48,00
2	no name	48,00
3	no name	48,00
4	no name	48,00
5	no name	48,00
6	no name	48,00

4.2. Device type and amount

Set type of F/MM and amount

Device		
Type [-]	Power [W]	Number of [-]
F/MM 10"	20,0	10
F/MM 7"	15,0	10
F/MM 7"	15,0	
F/MM 7"	15,0	
F/MM 7"	15,0	
F/MM 7"	15,0	

4.3. Running power cable length and section

Enter length and wiresection of the power cable from power supply to first unit

Cabling PS5500 to first device Power cabling		
Length [m]	Cable [-]	Ohm/m [Ohm]
50	1,5	0,0112
50	2,5	),0067
	0,75	),0112
	1	),0112
	1,5	),0112
	2,5	),0112
	4	

4.4. Power cable between units

Enter length and wiresection of the power cable between F/MMs (power connection between F/MMs is done via daisy change

Cabling between devices Power cabling		
Length [m]	Section (mm²) [-]	Ohm/m [Ohm]
2	1,5	0,0112
2	0,75	),0224
	0,75	),0112
	1	),0112
	1,5	),0112
	2,5	),0112
	4	

4.5. Calculate result

CALCULATE RESULTS
(to be done after each change)

4.5.1. Result can not be calculated

If a result can not be calculated due to some settings that are very far out of accepatable limits , an “invalid” message appears for all branches

Calculated results						
#iter [-]	P device(s) [W]	**P branch [W]**	**I start [A]**	U first device [V]	**U last device [V]**	Cable loss [W]
5001,00	invalid	**invalid**	**invalid**	invalid	**invalid**	**invalid**
	invalid	**invalid**	**invalid**	invalid	**invalid**	**invalid**

4.5.2. Result out can be calculated but result is out of specs

Non allowed end results are marked in red : check what parameters can be changed to obtain a better result (other cable section , less units per branch…)

Max current may not exceed 16A

Voltage at end of line may not be less the 36V

Calculated results						
#iter [-]	P device(s) [W]	**P branch [W]**	**I start [A]**	U first device [V]	**U last device [V]**	Cable loss [W]
57,00	640,00	**780,01**	**16,25**	47,32	**35,73**	**140,01**
	375,00	**442,56**	**9,22**	47,61	**37,29**	**67,56**

4.5.3. Results all within allowed limits

No red markings , so results acceptable

Calculated results						
#iter [-]	P device(s) [W]	**P branch [W]**	**I start [A]**	U first device [V]	**U last device [V]**	Cable loss [W]
20,00	200,00	**228,02**	**4,75**	42,68	**41,77**	**28,02**
	200,00	**215,00**	**4,48**	44,99	**44,46**	**15,00**

4.6. Total power use for all F/MM devices

Total power indication will be marked red if max power exceeds 1000W or max current exceeds 21A

Power supply power	1041,08	[W]
Power supply current	21,69	[A]

5. Total power use for all units

For total power requirement , calculate sum of result in 4.6 and 3.10