Honeywell

Vplex Polling System Application Note

The maximum Vplex device load current, in *milliampers (ma),* that can be connected to the control panel's polling loop output terminals without the use of the 4297 extender module, is 128 ma. This maximum load can be distributed over more than one polling loop branch connecting to the same polling loop output terminals. However, the sum of all of the polling loop branches must not exceed 12,000 ft. for *unshielded* cable, or 6,000 ft. for *shielded* cable. Tables 1and 2 may be used to determine the maximum cable length of each polling loop branch based on the *total load current* of all of the devices, *type* of cable (shielded or unshielded), and *size* of the wire (wire gauge) used on that loop.

Procedure for Determining the Maximum Wire Length per Polling Loop

1. Use table 1A for *unshielded* cable and table 1B for *shielded* cable.

2. Determine the maximum device loading on the polling loop branch by adding the load currents *per device* determined from Table 2. Example: One 4190SN requires 2.0 ma. One 4208U requires 27.3 ma. The total load for *one* 4208U plus *five* 4190SNs *on the same loop* would be (27.3+ 10.0) = **37.3 ma.**

3. Locate the row in the table selected in step 1 corresponding to the total device load current determined in step 2. Example: A total load current of 37.3 ma, corresponds to the *row of **(33-40) ma.***

4. The maximum cable length can now be determined from the size, or gauge, of the wire used in the cable. Example: The maximum cable length of *No. 20 gauge wire* for a total device load of 37.3 *ma* is **4,680 ft** if either *unshielded* (table 1A) cable or *shielded* (table 1B) cable is used. If No. 18 gauge wire were used instead, the maximum allowable cable length would be **7,410 ft** for *unshielded* cable and **6,000 ft** for *shielded* cable.

Table 1A: *Unshielded* (or non-metal conduit)

Total Load (ma @ 11.5) Vdc	22 ga	20 ga	18 ga	16 ga
1-4	**12,000**	**12,000**	**12,000**	**12,000**
5-8	**12,000**	**12,000**	**12,000**	**12,000**
9-16	7,270	11,710	**12,000**	**12,000**
17-24	4,850	7,810	**12,000**	**12,000**
25-32	3,640	5,850	9,260	**12,000**
33-40	2,910	4,680	**7,410**	11,760
41-48	2,420	3,900	6,170	9,800
49-56	2,080	3,350	5,290	8,400
57-64	1,820	2,930	4,630	7,350
65-72	1,620	2,600	4,110	6,540
73-80	1,450	2,340	3,700	5,880
81-88	1,320	2,130	3,370	5,350
89-96	1,210	1,950	3,090	4,900
197-104	1,120	1,800	2,850	4,520
105-112	1,040	1,670	2,650	4,200
113-120	970	1,560	2,470	3,920
121-128	910	1,460	2,310	3,680

Table 1B: *Shielded* (or metal conduit)

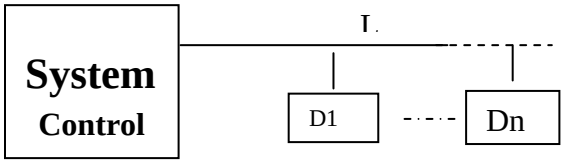
Total Load (ma @ 11.5) Vdc	22 ga	20 ga	18 ga	16 ga
1-4	**6,000**	**6,000**	**6,000**	**6,000**
5-8	**6,000**	**6,000**	**6,000**	**6,000**
9-16	**6,000**	**6,000**	**6,000**	**6,000**
17-24	4,850	**6,000**	**6,000**	**6,000**
25-32	3,640	5,850	**6,000**	**6,000**
33-40	2,910	4,680	**6,000**	**6,000**
41-48	2,420	3,900	**6,000**	**6,000**
49-56	2,080	3,350	5,290	**6,000**
57-64	1,820	2,930	4,630	**6,000**
65-72	1,620	2,600	4,110	**6,000**
73-80	1,450	2,340	3,700	5,880
81-88	1,320	2,130	3,370	5,350
89-96	1,210	1,950	3,090	4,900
197-104	1,120	1,800	2,850	4,520
105-112	1,040	1,670	2,650	4,200
113-120	970	1,560	2,470	3,920
121-128	910	1,460	2,310	3,680

Table 2: Vplex Product Polling Loop Load Current

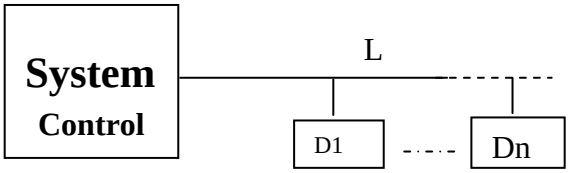
Product	Description	Load (ma)	Comment
4275EX	PIR, Mirror, Dual,1 Tamper, DS	1.0 w/o LED 6.0 w/ LED	
4275EX-SN	PIR, Mirror, Dual,1 Tamper, S/N	1.4 w/o LED 8.0 w/ LED	
4278EX-SN	PIR, Mirror, Quad,1 Tamper, S/N	1.0 w/o LED 9.0 w/ LED	
Quest 2260SN	Dual Tech Motion Detector, S/N	8.0 Alarm w/ LED 6.0 w/o LED normal mode	3.0 mA in Conditional Microwave mode, no alarm.
4208SNF	2 Class B + 2 Class A Inputs, S/N	33.6	Polling loop power = 33.6 ma or 0.6 ma if 33 ma PS is used. All inputs assumed used.
998MX	PIR, Fresnel, Quad,1 Tamper, S/N	1.0 w/0 LED 3.0 w/ LED	
4101SN	1-RLY out+1 Sup In, + Tamper, S/N	7.0	Maximum duty cycle assumed
4190SN	1 Sup In, 1 Unsup In, 1 Tamper, S/N	2.0	
4190WH	1 Sup In, 1 Unsup In,1 Tamper, DS	2.0 high current 1.0 low current	
4191SN-WH	Contact, Recessed, S/N	1.0	
4192CP	Smoke Detector, ION, S/N	320 micro amps standby 400 micro amps alarm	Control determines if LED is on continuously.
4193SN	SIM, 1 Sup In, 1 Unsup In, S/N	1.5	
4208SN	8 Sup Ins, 1 Tamper, 1 Out, S/N	33.6	Polling loop power = 33.6 ma or 0.6 ma if 33 ma PS is used. All inputs assumed used.
4208U	8 Sup Ins, 1 Tamper, 1 Out, DS or S/N	27.3	Polling loop power = 27.3 ma or 0.6 ma if 28 ma PS is used. All inputs assumed used.
4209U	4 Sup Group ins, DS or S/N	15.5	110 ma max from switched power source
4293SN	SIM, Mini, 1 Unsup In, S/N	1.0	
4297	Polling Loop Extender Module	50 ma + extension loop drain (128mA max)	350 ma when extension loop shorted.
4939SN-WH	Contact, Surface, S/N	1.0	
4944SN-WH	Contact, Recessed, Mini, S/N	1.0	
4945SN-WH	Contact, Surface, Mini, S/N	1.0	
4959SN	Contact, Door, Overhead, S/N	1.0	
5192SD	Smoke Detector, Photo, S/N	1.2 ma w/o LED 2.8 w/ LED	Control determines if LED is on continuously. Use 1.5ma for typical application.
5192SDT	Smoke Detector, Photo, Heat Sensor, S/N	1.2 ma w/o LED 2.8 w/ LED	Control determines if LED is on continuously. Use 1.5ma for typical application.
FG1625SN	Glassbreak Detector	1 mA 5mA in test mode	

Figure 1: Sample Configurations Utilizing Tables 1 & 2

NOTE: The sum of the individual lengths of all of the polling loop branches must not exceed **12,000 ft.** for *unshielded* cable or **6,000 ft.** for *shielded* cable.

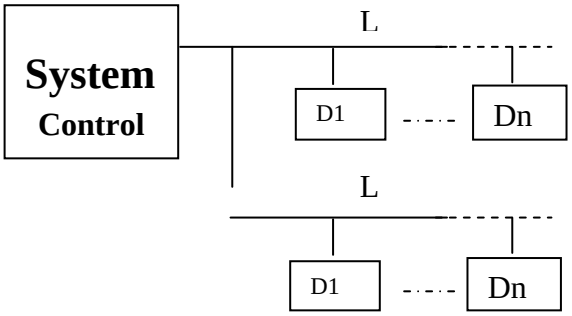


Sample Configuration 1:
For Total D (1-n) = **128 ma;**
L= **1,460 ft.** max, with **# 20 wire** (shielded or unshielded)
L= **3,680 ft.** max, with **# 16 wire** (shielded or unshielded)



Sample Configuration 2:

For Total D (1-n) = **64 ma ;**
L= **2,930** ft. max, with **# 20 wire** (shielded or unshielded)
= **7,350 ft.** max, with **# 16 wire** (unshielded)
= **6,000 ft**. max, with **# 16 wire** (shielded)



Sample Configuration 3:

For Total D (1-n) = **32 ma** per L1&L2 loop branches;
L1or L2= **5,850 ft** max. with **# 20 wire** per branch, (shielded or unshielded). *However, the limit of 6,000 ft. for shielded cable restricts each branch to* **3,000 ft.**
= **12,000 ft** max. for either branch with **# 16 wire** (unshielded)
However, the maximum of 12,000 ft limits each branch to **6,000ft.**
= **6,000 ft** max. for *either* branch with **# 16 wire** (shielded)
However, the limit of 6,000 ft. for shielded cable restricts each branch to **3,000 ft.**

Example: A Vplex system , using *unshielded* #18 gauge wire, requires devices totaling 30 ma on one branch that is 8,000 ft long, and 50 ma on a second branch that is 5,000 ft long. The total load of 50+30 = 80 ma is within the allowable 128 ma and the required length of cable for each branch is also permitted by Table 2. However, the *sum of the cable lengths* required is 8,000+5,000 = 13,000 ft which *exceeds* the maximum limit of 12,000 ft.

1. From Table 1A, the maximum wire length is 9,260 ft. for the 30 ma branch and 5,290 ft. for the 50 ma branch, using *unshielded* #18 gauge wire. The 50 ma branch can use its required 5,000 ft. of cable leaving (12,000-5,000)= 7,000 ft. for the 30 ma branch which is insufficient for this branch since the application requires 8,000 ft. of cable. To solve this application, two 4297 extenders must be used provided the wire length between the control and the 4297 extenders is insignificant (less than 100 ft).

2. The total wire length considered when using a 4297 extender is *the sum of the cable lengths on its input and output*. By keeping the wire length below 100 ft. from the control to their inputs, the maximum wire length permitted on each of the extended loops will be the maximum of (12,000-100) =11,900 ft. This will allow the required 8,000 ft of cable for the 30 ma branch and 5,000 ft of cable for the 50 ma branch to be used without exceeding the 12,000 ft cable limit. The use of the two 4297 extender modules is thus seen to effectively isolate the output cable lengths from each other.

Using the 4297 Module

The 4297 Vplex extender module may be used to:

A) increase the number of Vplex polling loop loading in a given system;
B) extend the total cable length of a specific application;
C) provide short circuit isolation from one loop branch to another.

A) **The maximum number of Vplex device loading** that can be placed on one or more polling loops with a single supporting control panel is 128 ma. If a given control panel can support a total number of devices requiring more than 128 ma, a 4297 module may be used in the manner demonstrated in Figure 2, below. Each 4297 module can individually support up to 128 *ma*.

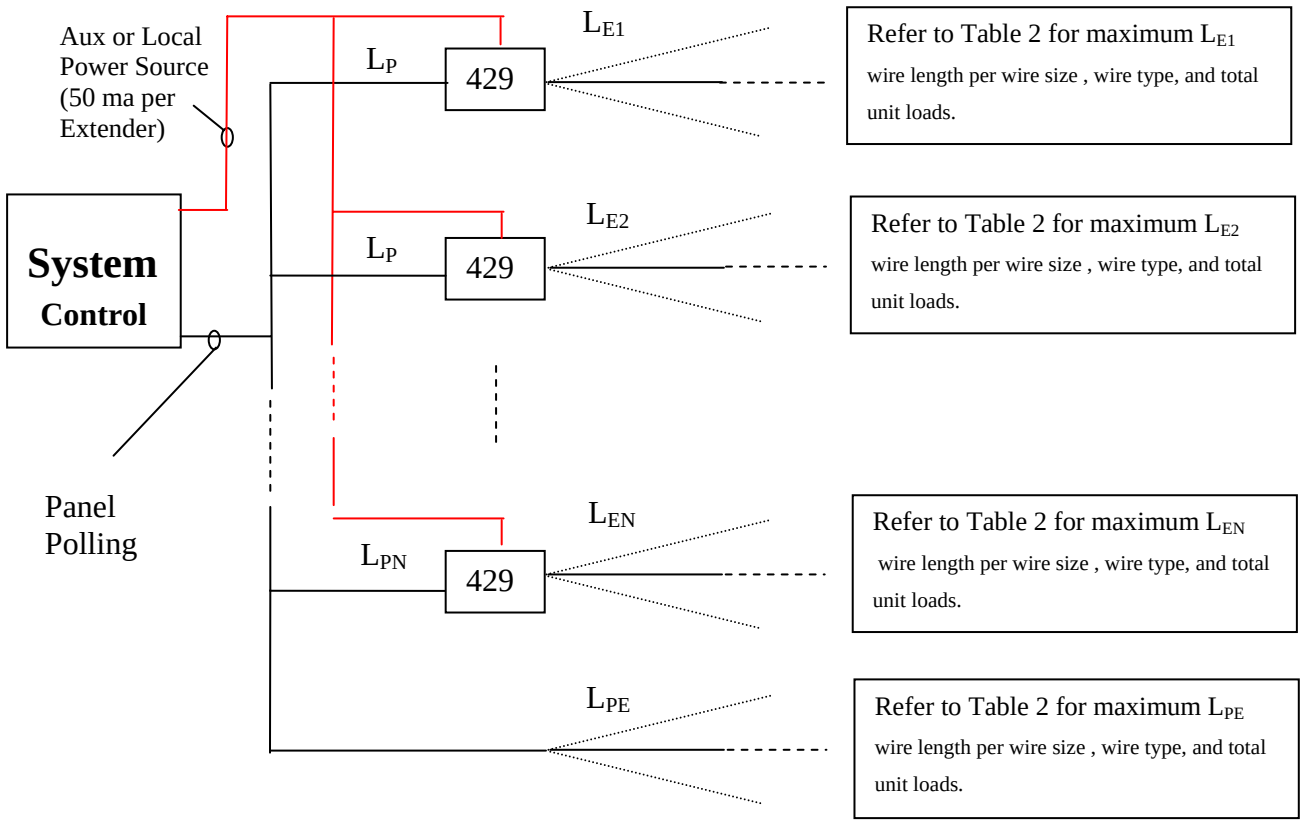
The maximum number of 4297 modules which can be configured as shown in Figure 2 is limited by the need for a DC power supply to furnish 50ma @ 12 Vdc per module. For example, up to 512 ma can be supported using 512/128 = 4 modules. Since the control panel can separately support 128 ma, only 3 4297 modules would be required, provided the maximum wire length requirements are met. If 4 modules are used, they would require an additional DC supply current of (50)(4) = 200 ma., which may be derived from the control panel's Aux Power output, if available, or from a separate DC power supply.

The total wire length allowed at the output of a 4297 module, as well as for the control panel's Vplex output, is limited using Tables 1 and 2 and the procedures described above. In addition, the sum of the wire lengths of both the input and output of a single 4297, is also limited by 12,000 ft. of unshielded wire and 6,000 ft. of shielded wire, as indicated in Figure 2.

B) **Figure 3 illustrates how a single 4297** can be configured to extend the cable length of a given polling loop branch. The same limitations described above apply to both the input and output sides of the 4297. Once again, the sum of the allowable lengths of the input and output sides of the 4297 is limited to 12,000 ft. for unshielded wire or 6,000 ft. for shielded wire. Only one 4297 can be used per extended loop branch. Never connect two or more 4297s in tandem on a given loop.

C) **The 4297 automatically isolates a short** occurring on its output from appearing on its input. For example a short circuit occurring on any one or more of the L_{E1} - L_{EN} output branches in Figure 2, will not appear on the control panel's polling loop output, L_{P1} – L_{PN} and $L_{PE.}$ Thus, if a short circuit occurs anywhere on the output branch of, say, L_{E1} , its 4297 extender will prevent that short circuit from disabling any of the other branches. Only devices on the L_{E1} branches will fail to communicate with the control due to the short circuit.

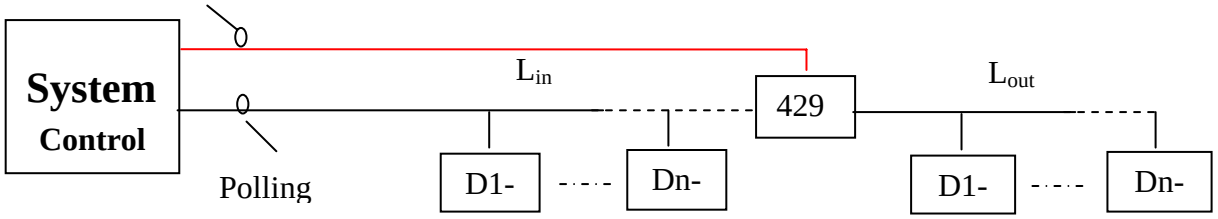
Figure 2: Using Multiple 4297 Polling Loop Extenders



L_E = Total wire length on output side of each 4297.
L_P = Total wire length on input side of each 4297.
$L_{E1} + (L_{P1} + L_{P2} + \ldots L_{PN} + L_{PE}) \leq$ 12,000 ft., unshielded; $\leq$ 6,000 ft., shielded
$L_{E2} + (L_{P1} + L_{P2} + \ldots L_{PN} + L_{PE}) \leq$ 12,000 ft., unshielded; $\leq$ 6,000 ft., shielded
$L_{En} + (L_{P1} + L_{P2} + \ldots L_{PN} + L_{PE}) \leq$ 12,000 ft., unshielded; $\leq$ 6,000 ft., shielded

NOTE: The maximum number of 4297 modules which can be connected *in parallel* to a single system control is limited by the maximum wire lengths specified above and the need for the Aux or Local power source to supply 50 ma per 4297. For example, if five 4297 modules are used, the Aux or Local power source must supply (5)(50) = 250 ma and the total system load current would be (5)(128)+128 = 768 ma, max. Also, from the above relations;
If $(L_{P1} + L_{P2} + \ldots L_{PN} + L_{PE}) = 1000$ ft., then $L_{E1} = L_{E2} = \ldots L_{En} \leq$ 11,000 ft., unshielded
$\leq$ 5,000 ft., shielded.

Figure 3: Single 4297 to Extend Polling Loop



D1-i + … Dn-i = 128 max, or per Tables 1 & 2, above.
D1-o + … Dn -o = 128 max, or per Tables 1 & 2, above.
$L_{in} + L_{out} \leq$ 12,000 ft., unshielded, or per Tables 1 & 2, above, whichever is smaller.
$\leq$ 6,000 ft., shielded, or per Tables 1 & 2, above, whichever is smaller.