News on FTK rack infrastructure

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Which kind of fans for the final custom units?

- They should work at 48VDC. Main reasons are:
  - Currents are ½ with respect to the 24V versions
  - They can offer better performance in terms of air flow in case we will need it
  - Commercial PS at 48V are easily to find and their cost is mitigated by the minor current required
- We have selected two fans good for our purposes, both produced by Sanyo Denki. The first, 9GV1248P1J01, has the same performance of the 24VCD fan we are using now in the two custom fan units, the second, 9HV1248P1H001, has superior performance but a quite huge current consumption and a higher cost.

Questions:

- How much the cost of a 48V AC/DC scales with the current?
- The foreseen lifetime is 70k hrs at 40 °C, which correspond to about 8 years of continuous work. Is this enough to prefer the less expensive model?

Model No.	Rated Voltage [V]	Operating Voltage Range [V]	PWM duty cycle※ [%]	Rated Current [A]	Rated Input [W]	Rated Speed [min⁻¹]	Max. Airflow [m³/min]	[CFM]	Max. Static Pressure [Pa]	[inchH₂O]	SPL [dB(A)]	Operating Temperature [°C]	Expected Life [h]
9GV1212P1J01	12	10.2 to 13.2	100	3.00	36.00	6,400	6.35	224.0	360.0	1.45	64	−20 to +70	
			0	0.19	2.28	1,500	1.49	52.6	19.8	0.08	33		
9GV1212P1G01			100	2.1	25.2	5,500	5.45	192.6	265	1.06	60	−10 to +70	
			0	0.19	2.28	1,500	1.49	52.6	19.8	0.08	33		
9GV1224P1J01 Note)	24	20.4 to 27.6	100	1.5	36.00	6,400	6.35	224.0	360	1.45	64	−20 to +70	40,000
9GV1224P1H01 Note)			100	0.8	19.2	5,200	5.16	182.3	237	0.95	58		
9GV1248P1J01	48	40.8 to 55.2	100	0.75	36.00	6,400	6.35	224.0	360.0	1.45	64	−20 to +70	
			0	0.06	2.88	1,500	1.49	52.6	26.1	0.106	33		
9GV1248P1B10 Note)			100	0.43	20.64	5,250	5.2	183.7	242	0.97	59		

Note: Fan does not rotate when PWM duty cycle is 0%.

※PWM Frequency : 25kHz
9GV1248P1B10 only: 1.4 kHz

Some models can also be equipped without sensors or with pulse sensors (no PWM control functions) as an option. Please refer to the index (pp. 417 to 437).

Model No.	Rated Voltage [V]	Operating Voltage Range [V]	PWM Duty Cycle [%] Note1	Rated Current [A]	Rated Input [W]	Rated Speed [min⁻¹]	Max. Air Flow [m³/min]	[CFM]	Max. Static Pressure [Pa]	[inchH₂O]	SPL [dB(A)]	Operating Temperature [°C]	Expected Life Note2 [h]
9HV1248P1G001	48	36 to 60	100	2.0	96	11,500	8.3	293	1,300	5.22	75	−10 to +70	40,000(60°C) (70,000(40°C))
			0	0.23	11	3,800	2.7	95	161	0.65	46		
9HV1248P1H001	48	36 to 60	100	1.4	67	10,000	7.2	254	1,050	4.22	72		
			0	0.23	11	3,800	2.7	95	161	0.65	46		

Note1 : PWM Frequency : 25kHz
Note2 : Expected life at 40 degreeC ambient is just reference value.

About choosing the final fans

- The fan 9GV1248P1J01 has the same specifications of the presently used fans. The only difference is the consumption current, 0.75 A against 1.5 A. **The cost for 100 units is 31.04 euros (VAT excluded).**

- The other fan, 9HV1248P1G001, has superior performance (and acustic noise), reaching 10,000 rpm instead of 6,400, and the consumption current is 1.4 A. **The cost for 60 units or more is 49.13 euros (VAT excluded).**

- The use of 48V fans implies a modification of the CAEN power supply. The possibility of replacing the service DC/DC, 24V@35A with a DC/DC 48V@35A without a cost increase is under investigation, while the replacement with a DC/DC 48V@18A is cost-effective.

- On the other hand, using the more performant fan will allow us to use it at a 60% speed, lowering current and noise at the present level, but with the possibility to increase the speed in case of need, compensating for the higher cost. This feature can also be automatically controlled by the DCS.

Equipping the fan units with Ethernet

We will equip the fan units with an Ethernet interface, available in the Arduino catalog:

- some more space will be needed to host the piggy back inside the unit;
- some rework of the presently used I/O will be probably needed, we have to partially redesign the microcontroller schematics;
- the firmware must be written, but it should be partially available from Arduino and/or public sites;
- the modification of one of the available fan units should happen within next April.