

PL 1 - Electromechanical systems - Power supplies in electric circuits

Objectives: Identification of the circuit's electrical power requirements
 Characterization of the main parameters of DC power supplies
 Specification of a power supply for an electro-pneumatic circuit.

Documents available: PL classes

- 1) SMC-SYJ_5PT.pdf
- 2) Power supplies for industrial use_ rail mounting_ABLM1A24025.pdf
- 3) Power supplies for industrial use_ rail mounting_ABL8FEQ24020.pdf
- 4) TEK 1KW-60035-3_Power_Supply_Selector_Guide_080922.pdf
- 5) TEK Ser2200LinPwrSupplySpecsAppNote.pdf

Web sites: <https://uk.tek.com/dc-power-supply>
<https://www.se.com/ww/en/work/products/industrial-automation-control/>
<http://pt.rs-online.com/web/>

1. Consider the electrical supply requirements for the control circuit of an electro-pneumatic system that uses SMC solenoid valves, SYJ3000 series.



a. Identify the electric power supply characteristics of these valves, by referring to the document (SMC-SYJ_5PT.pdf).

DC: _____

AC: _____

b. Interpret each of the fields of the specification code for one of these valves:

SYJ3	1	2	0		-	5	M	Z	D	-	M3	F	-	Q
	i)	ii)	iii)	iv)		v)	vi)	vii)	viii)		ix)	x)		xi)

i) _____ ii) _____ iii) _____

iv) _____ v) _____ vi) _____

vii) _____ viii) _____ ix) _____

x) _____ xi) _____

2. Based on the document (Power supplies for industrial use_ rail mounting_ABLM1A24025.pdf) corresponding to information regarding a power supply from the manufacturer Schneider-Electric, indicate:



a. Does this power supply meet the power supply requirements of the SMC-SYJ3000 solenoid valves? _____

b. How many of these valves can be included in a circuit that is powered by this source? _____

Analyse and indicate other characteristics of this power supply that can be identified from the available document:

- Basic principle and working mode: _____

- Stability with temperature variation: _____

- Influence of load variations: _____

- Influence of variations in power supply input power: _____

- Stability of output signal: _____

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- Power supplies association: _____
- Size dimensions and weight: _____
- Power supply costs: _____
- Field of application: _____

3. Other manufacturers, Legrand, also offers several alternatives for DC sources. The document (Legrand047022-ProductSheet.pdf) contains information regarding one of these alternatives.

a. Analyse some of the features you consider most relevant compared to the previous power supply (Ex.2):


b. Does this power supply also meet the power requirements of the solenoid valves mentioned above? Justify: _____

4. The DC power supplies analysed previously can be included in the category for general application, but that also can satisfy specific objectives of control circuits in automation systems. The documents (TEK 1KW-60035-3_Power_Supply_Selector_Guide_080922.pdf, TEK Ser2200LinPwrSupplySpecsAppNote.pdf) contain information regarding other more sophisticated DC power supplies alternatives available from the manufacturer Keithley-Tektronix. Based on the analysis of these documents, indicate some of the characteristics that allow you to differentiate these PS compared to the PS analysed previously:

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5. The figure below corresponds to the power supply of the modular CNC that controls a YX positioning table. Several connectors with different functions can be identified in the PS source. Making a correspondence between the figure and the analysis carried out in the installation of this equipment, complete the identification of the connectors indicated in the figure.

Modular power supply, Fagor PS-25B4



A

B

C


D

E

F

G

H



Technical characteristics		
Power supply (V mains, 3 phase, 56/60 Hz)	[V AC]	400-15% to 460+10%
Mains power consumption (400 V AC)	[A _{rms}]	38
Power bus voltage (nominal)	[V DC]	567.5-650
Rated output current	[A]	45
Peak output current (1 s)	[A]	135
Rated output power	[kW]	25
Peak output power (1 s)	[kW]	75
Approx. mass	[kg]	6
Size (width x height x depth)	[mm]	77 x 348 x 255

A	(X2):
B	(X3):
C	(X1): Connector bus for communication between DDS modules
D, E, F, G	Auxiliary power supply (24 V DC) connectors for control of the circuit and other modules
H	Protection cover cap

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6. Consider the image shown below, relative to the control cabinet of the cartesian manipulator in the Robotics lab.

Identify the following power supplies in the figure:

- A. Power supply, 24 V DC, 2A (control circuit, relays, limit switches)
- B. Power supply, +/- 15 V DC, 200 mA (accelerometer signal processing circuit)
- C. Power supply, +5 V DC, 1000 mA (accelerometer signal processing circuit)
- D. Power supply, 24V AC, 100 VA (control circuit, contactors, relays)

