Operation Readiness Clearance (ORC)
of
SpinQuest (E1039) Fridge Valve Controlling system

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Contents

1 The tasks of the Microwave motor controlling system

- Supply power and the control signals to the two stepper motors of Run valve and Bypass valve
- Two RS232 interface for the motor controllers
- Supply 5V voltage for Run and Bypass potentiometers
- USB interface for the 16-bit ADC

2 The components of the system

Table 1 : The components of the system

Qty	Item	Model
2	Motor Controller	ST5-S, AppliedMotion
1	5 V power Supply	RS-15-5, MEAN WELL USA
1	16-Bit ADC	Measurement Computing (USB-202)
1	Motor Power supply	EDR-150-24, MEAN WELL USA

The first four items of the above table are placed in a rack mountable metallic box. The motor power supply will be placed on the din railing of the slow control rack

3 The Front panel of the box

- ON/OFF Switch
- Red LED : 110 V indicator
- Orange LED : 24 V indicator
- Green LED : 5 V indicator

Figure 1: Front panel of the box

4 Back panel of the box

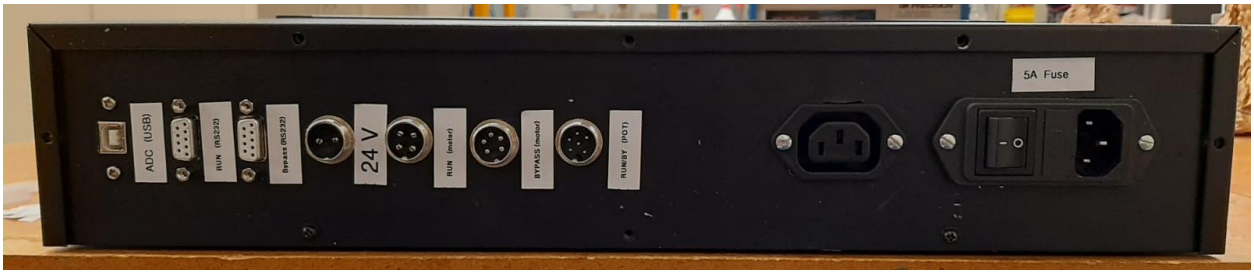

Figure 2 : Back panel of the box

5 Inside the box

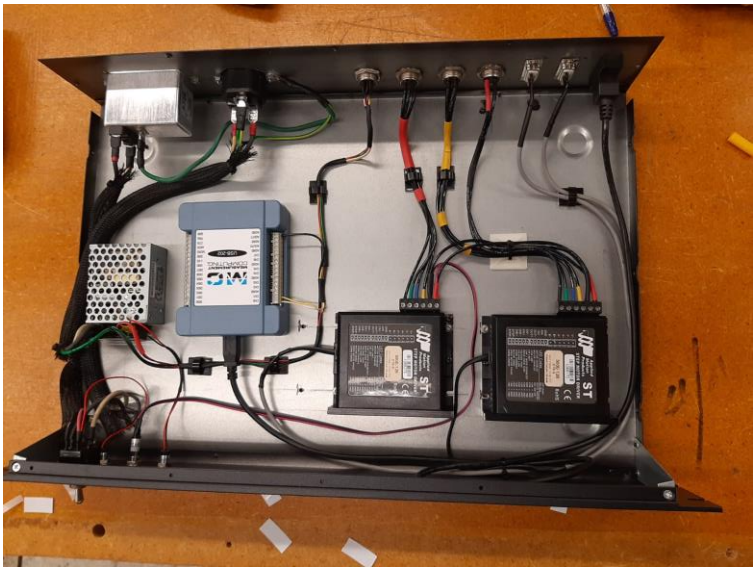

Figure 3 : components inside the box

6 Included safety features

- 110 V ON/OFF switch
- 110V/5A glass fuse
- All the high voltage wires (110V) and terminals are properly covered
- All the connecting points, cables and the LED indicators are properly labeled

7 Wiring diagram of the box

The complete wiring diagram of the box is attached separately

8 Specifications

8.1 Motor controller

Model Number: ST5-S, AppliedMotions

Table 2 : Specifications of the Motor controller

ST5/10-S Hardware manual

920-0027 Rev. D
2/7/14

CONTROLLER: **S Models**

NON-VOLATILE STORAGE	Configurations are saved in FLASH memory on-board the DSP.
MODE OF OPERATION	Step & Direction, CW/CCW, A/B Quadrature, Oscillator, Joystick, SCL, Hub.
STEP AND DIRECTION INPUTS	Optically Isolated, Differential, 5 Volt. Minimum pulse width = 250 ns. Maximum pulse frequency = 2 MHz Function: Step & Direction, CW/CCW Step, A/B Quadrature, Run/Stop & Direction, Jog CW & CCW or CW & CCW Limits / Adjustable bandwidth digital noise rejection filter.
ENABLE INPUT	Optically Isolated, 5-12 Volt Function: Motor Enable, Alarm Reset or Speed Select (Oscillator Mode).
OUTPUT	Optically Isolated, 24V, 10mA MAX. Function: Fault, Motion, Tach.
ANALOG INPUT	0 to 5VDC, 83k ohms input impedance
ANALOG INPUT RESOLUTION	12 bits
COMMUNICATION INTERFACE	RS-232

8.2 5 V Power Supply

Model Number: RS-15-5, MEAN WELL USA

Table 3 : Specifications of the 5 V power supply

MODEL		RS-15-3.3	RS-15-5	RS-15-12	RS-15-15	RS-15-24	RS-15-48
OUTPUT	DC VOLTAGE	3.3V	5V	12V	15V	24V	48V
	RATED CURRENT	3A	3A	1.3A	1A	0.625A	0.313A
	CURRENT RANGE	0 ~ 3A	0 ~ 3A	0 ~ 1.3A	0 ~ 1A	0 ~ 0.625A	0 ~ 0.313A
	RATED POWER	9.9W	15W	15.6W	15W	15W	15.024W
	RIPPLE & NOISE (max.) Note.2	80mVp-p	80mVp-p	120mVp-p	120mVp-p	200mVp-p	200mVp-p
	VOLTAGE ADJ. RANGE	2.9 ~ 3.6V	4.75 ~ 5.5V	10.8 ~ 13.2V	13.5 ~ 16.5V	22 ~ 27.6V	43.2 ~ 52.8V
	VOLTAGE TOLERANCE Note.3	±3.0%	±2.0%	±1.0%	±1.0%	±1.0%	±1.0%
	LINE REGULATION Note.4	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
	LOAD REGULATION Note.5	±2.0%	±1.5%	±0.5%	±0.5%	±0.5%	±0.5%
	SETUP, RISE TIME	1000ms, 30ms/230VAC 1000ms, 30ms/115VAC at full load					
	HOLD UP TIME (Typ.)	70ms/230VAC 12ms/115VAC at full load					
INPUT	VOLTAGE RANGE	85 ~ 264VAC 120 ~ 370VDC					
	FREQUENCY RANGE	47 ~ 63Hz					
	EFFICIENCY (Typ.)	72%	77%	81%	81%	82%	82%
	AC CURRENT (Typ.)	0.35A/115VAC 0.25A/230VAC					
	INRUSH CURRENT (Typ.)	COLD START 65A / 230VAC					
	LEAKAGE CURRENT	<2mA / 240VAC					
PROTECTION	OVERLOAD	Above 105% rated output power					
		Protection type : Hiccup mode, recovers automatically after fault condition is removed					
	OVER VOLTAGE	3.8 ~ 4.45V	5.75 ~ 6.75V	13.8 ~ 16.2V	17.25 ~ 20.25V	28.4 ~ 32.4V	55.2 ~ 64.8V
		Protection type : Shut off o/p voltage, clamping by zener diode					
	OVER TEMPERATURE	Shut down o/p voltage, recovers automatically after temperature goes down					
ENVIRONMENT	WORKING TEMP.	-20 ~ +70°C (Refer to "Derating Curve")					
	WORKING HUMIDITY	20 ~ 90% RH non-condensing					
	STORAGE TEMP., HUMIDITY	-40 ~ +85°C, 10 ~ 95% RH					
	TEMP. COEFFICIENT	±0.03%/°C (0 ~ 50°C)					
	VIBRATION	10 ~ 500Hz, 5G 10min./1cycle, period for 60min. each along X, Y, Z axes					
SAFETY & EMC (Note 6)	SAFETY STANDARDS	UL62368-1, TUV BS EN/EN62368-1 , AS/NZS 62368.1, EAC TP TC 004, CCC GB4943.1, BSMI CNS14336-1, BIS IS13252(Part1):2010/IEC 60950-1: 2005 approved					
	WITHSTAND VOLTAGE	I/P-O/P:3KVAC I/P-FG:2KVAC O/P-FG:0.5KVAC					
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG, O/P-FG:100M Ohms / 500VDC / 25°C/ 70% RH					
	EMC EMISSION	Compliance to BS EN/EN55032 (CISPR32) Class B, BS EN/EN61000-3-2,-3,GB9254 class B,GB17625.1, EAC TP TC 020, CNS13438 Class B					
	EMC IMMUNITY	Compliance to BS EN/EN61000-4-2, 3, 4, 5, 6, 8, 11, BS EN/EN55024, BS EN/EN61000-6-1, light industry level, criteria A, EAC TP TC 020					
OTHERS	MTBF	1608.8Khrs min. MIL-HDBK-217F (25°C)					
	DIMENSION	62.5*51*28mm (L*W*H)					
	PACKING	0.13Kg; 108pcs/15Kg/0.8CUFT					

8.3 Motor Power supply

Figure 4 : Stepper motor power supply

Table 4 : Specifications of the motor power supply

MODEL		PS150D24
OUTPUT	DC VOLTAGE	24V
	RATED CURRENT	6.5A / 230VAC 5.2A / 115VAC
	CURRENT RANGE	0 ~ 6.5A / 230VAC 0 ~ 5.2A / 115VAC
	RATED POWER	156W / 230VAC 125W / 115VAC
	RIPPLE & NOISE (max.) Note.2	150mVp-p
	VOLTAGE ADJ. RANGE	24 ~ 28V
	VOLTAGE TOLERANCE Note.3	± 1.0%
	LINE REGULATION	± 0.5%
	LOAD REGULATION	± 1.0%
	SETUP, RISE TIME	1500ms, 60ms/230VAC 3000ms, 60ms/115VAC at full load
	HOLD UP TIME (Typ.)	16ms/230VAC 10ms/115VAC at full load
INPUT	VOLTAGE RANGE Note.6	90 ~ 264VAC 127 ~ 370VDC [DC input operation possible by connecting AC/L(+), AC/N(-)]
	FREQUENCY RANGE	47 ~ 63Hz
	EFFICIENCY (Typ.)	87%
	AC CURRENT (Typ.)	2.6A/115VAC 1.7A/230VAC
	INRUSH CURRENT (Typ.)	20A/115VAC 35A/230VAC
	LEAKAGE CURRENT	<1mA / 240VAC
PROTECTION	OVERLOAD Note.7	105 ~ 130% rated output power Protection type : Constant current limiting, recovers automatically after fault condition is removed / 230VAC
		105 ~ 150% rated output power Protection type : Constant current limiting, recovers automatically after fault condition is removed / 115VAC
	OVER VOLTAGE	29 ~ 33V
		Protection type : Shut down o/p voltage, re-power on to recover
	OVER TEMPERATURE	Shut down o/p voltage, re-power on to recover

END