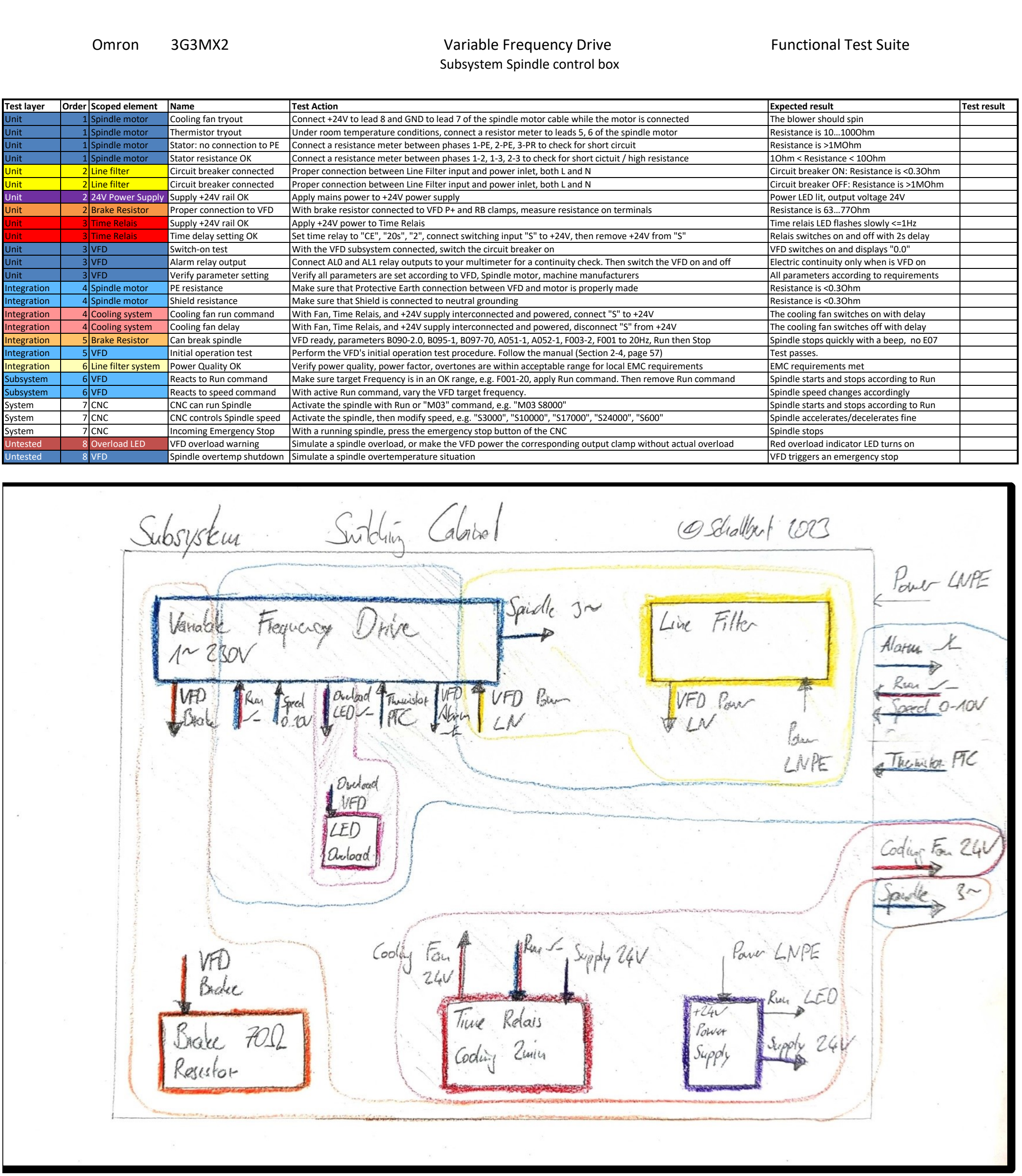
Omron 3G3MX2 Variable Frequency Drive Functional Test Suite

Subsystem Spindle control box

Test layer	Order	Scoped element	Name	Test Action	Expected result	Test result
Unit	1	Spindle motor	Cooling fan tryout	Connect +24V to lead 8 and GND to lead 7 of the spindle motor cable while the motor is connected	The blower should spin	
Unit	1	Spindle motor	Thermistor tryout	Under room temperature conditions, connect a resistor meter to leads 5, 6 of the spindle motor	Resistance is 10…100Ohm	
Unit	1	Spindle motor	Stator: no connection to PE	Connect a resistance meter between phases 1-PE, 2-PE, 3-PR to check for short circuit	Resistance is >1MOhm	
Unit	1	Spindle motor	Stator resistance OK	Connect a resistance meter between phases 1-2, 1-3, 2-3 to check for short cictuit / high resistance	1Ohm < Resistance < 10Ohm	
Unit	2	Line filter	Circuit breaker connected	Proper connection between Line Filter input and power inlet, both L and N	Circuit breaker ON: Resistance is <0.3Ohm	
Unit	2	Line filter	Circuit breaker connected	Proper connection between Line Filter input and power inlet, both L and N	Circuit breaker OFF: Resistance is >1MOhm	
Unit	2	24V Power Supply	Supply +24V rail OK	Apply mains power to +24V power supply	Power LED lit, output voltage 24V	
Unit	2	Brake Resistor	Proper connection to VFD	With brake resistor connected to VFD P+ and RB clamps, measure resistance on terminals	Resistance is 63…77Ohm	
Unit	3	Time Relais	Supply +24V rail OK	Apply +24V power to Time Relais	Time relais LED flashes slowly <=1Hz	
Unit	3	Time Relais	Time delay setting OK	Set time relay to "CE", "20s", "2", connect switching input "S" to +24V, then remove +24V from "S"	Relais switches on and off with 2s delay	
Unit	3	VFD	Switch-on test	With the VFD subsystem connected, switch the circuit breaker on	VFD switches on and displays "0.0"	
Unit	3	VFD	Alarm relay output	Connect AL0 and AL1 relay outputs to your multimeter for a continuity check. Then switch the VFD on and off	Electric continuity only when is VFD on	
Unit	3	VFD	Verify parameter setting	Verify all parameters are set according to VFD, Spindle motor, machine manufacturers	All parameters according to requirements	
Integration	4	Spindle motor	PE resistance	Make sure that Protective Earth connection between VFD and motor is properly made	Resistance is <0.3Ohm	
Integration	4	Spindle motor	Shield resistance	Make sure that Shield is connected to neutral grounding	Resistance is <0.3Ohm	
Integration	4	Cooling system	Cooling fan run command	With Fan, Time Relais, and +24V supply interconnected and powered, connect "S" to +24V	The cooling fan switches on with delay	
Integration	4	Cooling system	Cooling fan delay	With Fan, Time Relais, and +24V supply interconnected and powered, disconnect "S" from +24V	The cooling fan switches off with delay	
Integration	5	Brake Resistor	Can break spindle	VFD ready, parameters B090-2.0, B095-1, B097-70, A051-1, A052-1, F003-2, F001 to 20Hz, Run then Stop	Spindle stops quickly with a beep, no E07	
Integration	5	VFD	Initial operation test	Perform the VFD's initial operation test procedure. Follow the manual (Section 2-4, page 57)	Test passes.	
Integration	6	Line filter system	Power Quality OK	Verify power quality, power factor, overtones are within acceptable range for local EMC requirements	EMC requirements met	
Subsystem	6	VFD	Reacts to Run command	Make sure target Frequency is in an OK range, e.g. F001-20, apply Run command. Then remove Run command	Spindle starts and stops according to Run	
Subsystem	6	VFD	Reacts to speed command	With active Run command, vary the VFD target frequency.	Spindle speed changes accordingly	
System	7	CNC	CNC can run Spindle	Activate the spindle with Run or "M03" command, e.g. "M03 S8000"	Spindle starts and stops according to Run	
System	7	CNC	CNC controls Spindle speed	Activate the spindle, then modify speed, e.g. "S3000", "S10000", "S17000", "S24000", "S600"	Spindle accelerates/decelerates fine	
System	7	CNC	Incoming Emergency Stop	With a running spindle, press the emergency stop button of the CNC	Spindle stops	
Untested	8	Overload LED	VFD overload warning	Simulate a spindle overload, or make the VFD power the corresponding output clamp without actual overload	Red overload indicator LED turns on	
Untested	8	VFD	Spindle overtemp shutdown	Simulate a spindle overtemperature situation	VFD triggers an emergency stop	



Disclaimer: This test suite does not raise any claim for completeness or correctness. Any tests you perform are under your own risk. Make sure you read and understood relevant documentation, manuals, and warning notices. Also make sure you have the right skills to be able to perform these tests. Never work on a live system, and after disconnecting, always wait the required 10minutes for the capacitors to discharge before opening the VFD's enclosure. I do not take any liability for harm caused while following this document.