Logosol Supervisor I/O Controller CNC-SK-2310g2

Doc # 710231005 / Rev. D, 03/05/2020

Features

- **LS-231 compatible Safety Bus interface**
- **Safety Interlock functions – 100% relay contact based**
- **Dual mechanical Relay based Power Supply control interface with safety line**
- **Spindle control interface with safety Enable/Stop mechanical Relay output**
- **Five connectors with dual line Emergency Stop Button control**
- **Control interface for two dual contact Work Zone Covers with Lock/Unlock**
- **Dual line NC/NO Safe Zone Sensor interface**
- **"Zero Speed" Automation Grade Safety mode**
- **Three analog inputs**
- **Eight Short protected digital outputs**
- **Seven Universal digital inputs**
- **Five status/diagnostic LED's**
- **18 to 32VDC power supply voltage range**
- **Communication 19.2Kbps ÷ 1.25Mbps**

Description

CNC-SK-2310g2 is applicable in motion control systems for CNC machines. It is an I/O controller with specialized interface for supervising of motor power supply, spindle, safe zone sensor, work zone covers, tool changer, etc.
CNC-SK-2310g2 is designed as a member of Logosol Distributed Control Network (LDCN).
Zero Speed Automation Grade safety mode provides flexibility in applications without strict safety requirements.

TECHNICAL SPECIFICATIONS rated at 25˚C

POWER SUPPLY +24V Power Supply Current requirement	18Vdc to 36Vdc 0.5A Minimum (CNC-SK-2310g2 only)
+24V Max. Load Current	Short Protected +24V source 0.5A for all outputs combined
DIGITAL OUTPUTS Source driver Output0, Output1, Output3, Output4, Output5, Output6, Output7, Output8, Output13 Open collector Cover Unlock Enable	 Short protected. Output clamp diode. Imax=0.08A Short protected. Output clamp diode. Imax=0.15A
LAMPS Power Lamp, Test Mode, Safe Zone	 24Vdc, Imax=0.08A
POWER CONTROL Power A, Power B, Power Enable, Spindle ON, Power ON, No Power	 24Vdc, Imax=0.15A
ANALOG OUTPUT	0 - 10V
DIGITAL INPUTS Spindle Stopped (Input2) Input0, Input1 Input3, Input4, Input5, Input6, Input7	 LO=2.4V, Hi(Spindle Stopped)=17V, Imax=33mA LOmin=-0.5V<LO<6.5V, 15V<HI<Himax=36V; Imax=1mA LOmin=-0.5V<LO<6.5V, 15V<HI<Himax=36V; Imax=8mA
CONTACT INPUTS All External Relay contacts and Switches Contact Rating	 40Vdc, 0.5A
ANALOG INPUTS ADC – 1 ADC – 2 ADC – 3	 0 – 10V, 25K to Analog GND 0 – 5V 0 – 5V
SERIAL BAUD RATE	19.2Kb/sec to 1.25Mb/sec
MATING CONNECTORS SPINDLE I/O Connector 1 HOME Cover 1 Cover 2 STOP LAMPS ACKNOWLEDGE AND COVER UNLOCK I/O Connector 2 MODE AND POWER ON POWER CONTROL ANALOG INPUTS Covers CLOSED MOTOR POWER STATE 24V COVER LOCK/UNLOCK	 Molex 22-01-3117 hosing with 08-50-0114 pins (11 pcs.) Molex 22-01-3147 hosing with 08-50-0114 pins (14 pcs.) Molex 22-01-3047 hosing with 08-50-0114 pins (4 pcs.) Molex 22-01-3067 hosing with 08-50-0114 pins (6 pcs.) Molex 22-01-3067 hosing with 08-50-0114 pins (6 pcs.) Molex 22-01-3047 hosing with 08-50-0114 pins (4 pcs.) Molex 22-01-3077 hosing with 08-50-0114 pins (7 pcs.) Molex 22-01-3127 hosing with 08-50-0114 pins (12 pcs.) Molex 22-01-3087 hosing with 08-50-0114 pins (8 pcs.) Molex 22-01-3137 hosing with 08-50-0114 pins (13 pcs.) Molex 22-01-3107 hosing with 08-50-0114 pins (10 pcs.) Molex 22-01-3047 hosing with 08-50-0114 pins (4 pcs.) Molex 22-01-3027 hosing with 08-50-0114 pins (2 pcs.) Molex 22-01-3037 hosing with 08-50-0114 pins (3 pcs.) Molex 22-01-3027 hosing with 08-50-0114 pins (2 pcs.) Molex 22-01-3057 hosing with 08-50-0114 pins (5 pcs.)

Distribution Board DB-2310g2-I/O

INPUTS	3 inputs with LED with and 6K8 to 8K2 resistor, parallel to CNC-SK-2310g2 input
OUTPUTS	5 Relays 16A/250VAC or 16A/30VDC.
MECHANICAL Size Weight	 L=3.875”, H=1.875” 0.25 lb. (0.12kg)
MATING CONNECTORS INPUTS I/O Connector	 Molex 22-01-3037 housing (3 pcs.) with 08-50-0114 pins (9 pcs.) Molex 22-01-3147 hosing with 08-50-0114 pins (14 pcs.)

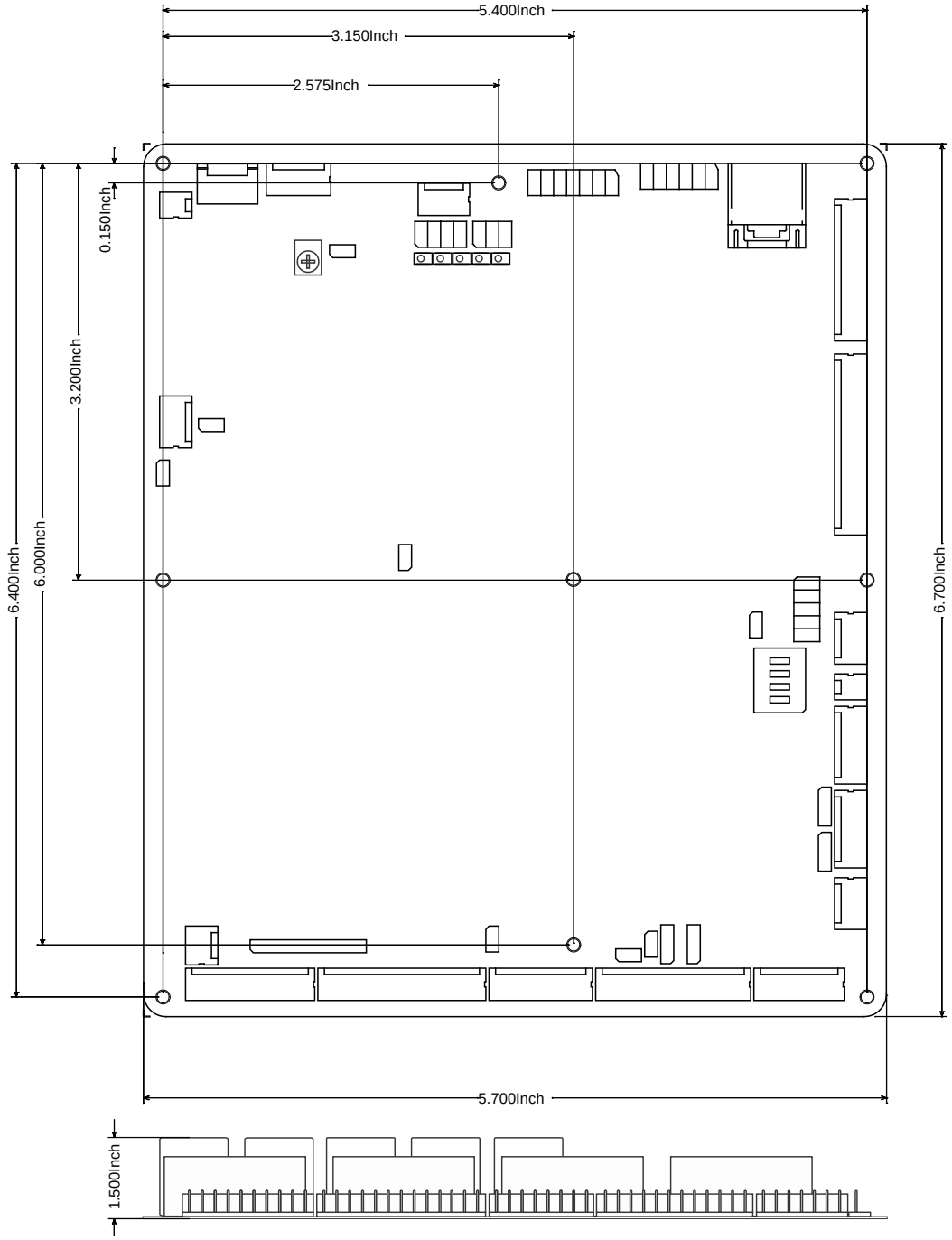
Distribution Board DB-2310g2-LAMPS

OUTPUTS	4 Relays 16A/250VAC or 16A/30VDC.
MECHANICAL Size Weight	 L=3.875”, H=1.875” 0.2 lb. (0.09kg)
MATING CONNECTORS Lamps	 Molex 22-01-3077 housing with 08-50-0114 pins (7 pcs.)

ORDERING GUIDE

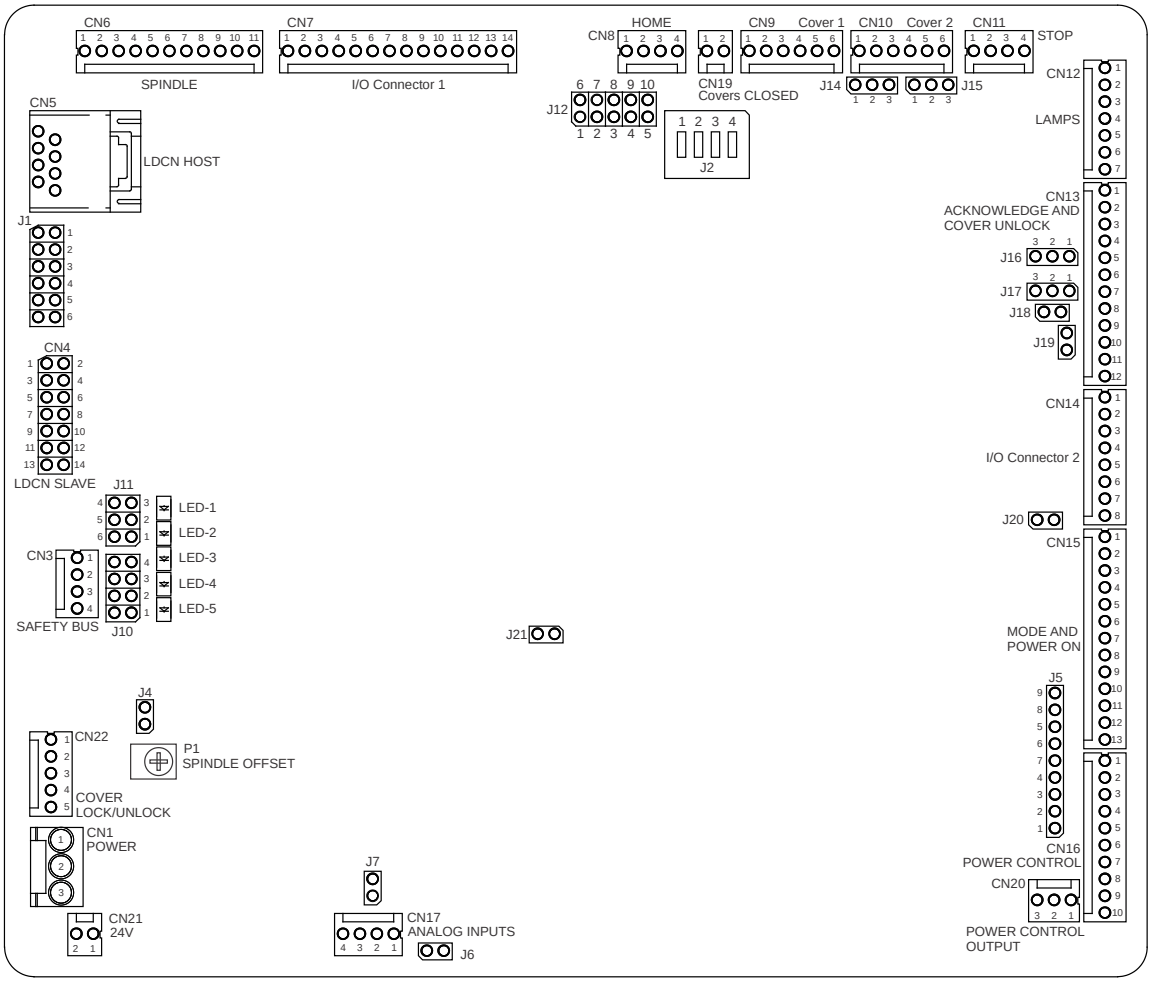
PART NUMBER	MODEL	DESCRIPTION
9202310012	CNC-SK-2310g2	Logosol Supervisor I/O controller
920231002	DB-2310-I/O	I/O Connector 1 distribution board
920231003	DB-2310-LAMPS	Lamps distribution board
230601085	CNC-SK-2310g2-CN	Mating connector kit for CNC-SK-2310g2
230601064	DB-2310-I/O-CN	Mating connector kit for DB-2310-I/O
230601065	DB-2310-LAMPS-CN	Mating connector kit for DB-2310-LAMPS

DIMENSIONAL DRAWING



CONNECTORS AND PINOUT

CNC-SK-2310g2 CONNECTORS



J1

#	NAME	DESCRIPTION
1	Tx	Transmit line terminator
2	Rx	Receive line terminator
3	A	Reserved must be OPEN
4	B	Reserved **must be OPEN**
5	C	LDCN mode, Watchdog OFF
6	D	LDCN mode, Watchdog ON

J2

	DESCRIPTION
1	Power OFF delay – 1sec
2	Power OFF delay – 2sec
3	Power OFF delay – 4sec
4	ON – Motor Power is not monitored, OFF – Motor Power is monitored

J4

	DESCRIPTION
OPEN	CN4 pin6 – Not connected
SHORT	CN4 pin6 – Power connected to **+24V**

J5

CN16-POWER CONTROL Pin 3		CN16-POWER CONTROL Pin 7	
Open (default)	Not connected	Open (default)	Not connected
8-9 SHORT	CN16 pin 10 - Spindle ON	1-2 SHORT	CN16 pin4 - Power Control B
7-8 SHORT	CN16 pin 7	2-3 SHORT	CN16 pin 3
6-7 SHORT	CN16 pin 8 - Power Enable	3-4 SHORT	GND
5-6 SHORT	GND	N.A.	

J6

DESCRIPTION	
OPEN	CN17 pin4 – 100 Ohm protective resistor connected to **+5V**
SHORT	CN17 pin4 – connected to **+5V**

J7

DESCRIPTION	
OPEN	CN17 pin1 – 100 Ohm protective resistor connected to **GND.**
SHORT	CN17 pin1 – connected to **GND.**

J10

DESCRIPTION	
1 and 4	See Sample Applications CNC-SK-2310g2.
2 – SHORT	Cover Lock / Unlock using separate Cover Lock and Cover Unlock buttons connected to CN22.
3 – SHORT	Spindle operation is enabled in Test Mode.

J11

DESCRIPTION	
All	See Sample Applications CNC-SK-2310g2.

J12

DESCRIPTION	
All	See Sample Applications CNC-SK-2310g2.

J14 AND J15

DESCRIPTION	
1-2 SHORT	CN10 (Door 2) Lock output pins are powered when Door is unlocked.
2-3 SHORT	CN10 (Door 2) Lock output pins are powered when Door is locked.

J16

DESCRIPTION	
1-2 SHORT	Spindle ON output is enabled in Test Mode with Acknowledge when Covers are open.
2-3 SHORT	Spindle ON output is disabled when Covers are open.

J17

DESCRIPTION	
1-2 SHORT	CN13 pin 7 connected to GND
2-3 SHORT	CN13 pin 7 connected to Unlock Enable output (Recommended)

J18

DESCRIPTION	
OPEN	Reserved must be OPEN

J19

DESCRIPTION	
OPEN	Cover Lock / Unlock outputs are controlled by Unlock switch connected to CN13 pin 5 and pin 6 and Unlock Enable Output
SHORT	Cover Lock / Unlock outputs are controlled by Unlock Enable output. To use the mode J10 -2 must be installed (short). Covers LOCK / UNLOCK buttons have to be connected to CN22 or Output14 could be used control the covers.

J20

DESCRIPTION	
OPEN	Covers can be unlocked/open Test Mode with Acknowledge when Spindle is stopped
SHORT	Covers can be unlocked/open in Test Mode with Acknowledge

J21

DESCRIPTION	
OPEN	Power ON button only
SHORT	Power ON button or Power ON at Byte1/Bit7 “1” to “0” transition when Power is OFF.

CN1 - POWER

PIN	SIGNAL	DESCRIPTION
1	GND	Power ground
2	24V	Power supply input
3	UM	Motor Power supply input

CN3 – SAFETY BUS

PIN	SIGNAL	DESCRIPTION
1	Safety Link OUT	Safety Bus source Output. HIGH: **When:** Covers are closed; **Or:** Safe Zone *and* Spindle Stopped; **Or:** Test Mode *and* Acknowledge.
2	Safety Link IN	Safety Bus return Input. HIGH=OK. OPEN (LOW) - all Power Supply controls *and* Spindle will be turned OFF
3	Enable/$\overline{\text{Stop}}$	System Enable/Stop line source. HIGH if Power is ON. OPEN by any stop reason
4	$\overline{\text{ServoFAULT}}$	Inputs / Byte1 / Bit2. Typically used for Servo Drives FAULT monitoring

CN4 – LDCN SLAVE

PIN	SIGNAL	DESCRIPTION
1	MPG	Input - Manual Pulse Generator Acknowledge signal
2	GND	Ground
3	+Rx	(+) Receive line
4	-Rx	(-) Receive line
5	-Tx	(-) Transmit line
6	+Tx	(+) Transmit line
7	+A out	(+) Address output
8	-A out	(-) Address output
9	GND	Ground
10	Power	+5V or +24V depending on J4
11	EMG A1	Input - Emergency Stop line A contact pin1
12	EMG B1	Input - Emergency Stop line B contact pin1
13	EMG A2	Input - Emergency Stop line A contact pin2
14	EMG B2	Input - Emergency Stop line B contact pin2

CN5 – LDCN HOST

PIN	SIGNAL	DESCRIPTION
1	+5V	RS-232 adapter power supply
2	Gnd	Interface ground
3	+Tx	(+) Transmit data
4	-Tx	(-) Transmit data
5	-Rx	(-) Receive data
6	+Rx	(+) Receive data
7	-A in	(-) Address input
8	+A in	(+) Address input

CN6 – SPINDLE

PIN	SIGNAL	DESCRIPTION
1	GND	Ground
2	Spindle Stopped	OPEN(LOW)=Spindle is running, HIGH=Spindle is stopped
3	Input 3	Input / Byte0 / Bit3 - General purpose input. Typically connected to Spindle FAULT signal
4	Input 4	Input / Byte0 / Bit4 - General purpose input. Typically connected to Spindle AT SPEED signal
5	Spindle ON Wired to CN16pin10	Spindle ENABLE Output . HIGH: **When:** **J16 2-3 short:** Outputs / Byte0 / Bit2=1 *and* Outputs / Byte1 / Bit4 (Safety Link Bridge)=0 *and* Power ON *and* Covers closed; **J16 1-2 short**: Outputs / Byte0 / Bit2=1 *and* Outputs / Byte1 / Bit4 (Safety Link Bridge) =0 *and* Power ON *and* Covers closed, **or** Outputs / Byte0 / Bit2=1 *and* Outputs / Byte1 / Bit4 (Safety Link Bridge) =0 *and* Power ON *and* Test mode *with* Acknowledge
6	Output 3	Outputs / Byte0 / Bit3 - General purpose output. Typically connected to Spindle REVERSE signal
7	Output 4	General purpose output. Outpu4=Outputs / Byte0 / Bit3 **When:** PWM2=0 **or:** Output4=$\overline{\text{PWM2}}$ **When:** PWM2#0 *and* Outputs / Byte0 / Bit3=1
8	+24V	Short protected 24V source
9	Analog GND	Analog ground
10	ADC	Analog input 0 - 10V. Typically connected to Spindle F/V (Actual SPEED) analog output
11	DAC	Analog output 0 - 10V. Spindle SPEED control output

CN7 – I/O Connector

PIN	SIGNAL	DESCRIPTION
1	Input 5	Inputs / Byte0 / Bit5 - General purpose input
2	+24V	Short protected 24V source
3	Input 6	Inputs / Byte0 / Bit6 - General purpose input
4	+24V	Short protected 24V source
5	Input 7	Inputs / Byte0 / Bit7 - General purpose input
6	Output13	Outputs / Byte1 / Bit5 – General purpose **inverted** output **High if bit is cleared to 0**
7	Output 5	Outputs / Byte0 / Bit5 - General purpose output. HIGH if bit is set to 1
8	GND	Signal ground
9	Output 6	Outputs / Byte0 / Bit6 - General purpose output. HIGH if bit is set to 1
10	GND	Signal ground
11	Output 7	Outputs / Byte0 / Bit7 - General purpose output. HIGH if bit is set to 1
12	GND	Signal ground
13	Output 8	Outputs / Byte1 / Bit0 - General purpose output. HIGH if bit is set to 1
14	GND	Signal ground

CN8 – HOME (SAFETY ZONE SENSOR)

PIN	SIGNAL	DESCRIPTION
1	Home A1	Input - Home sensor contact. Closed in Safety Zone Time for transfer from Contact A=OPEN to Contact B=CLOSED should be less than 100msec
2	Home A2	
3	Home B1	Input - Home sensor contact. Open in Safety Zone Time for transfer from Contact A=OPEN to Contact B=CLOSED should be less than 100msec
4	Home B2	

CN9 – Cover 1

PIN	SIGNAL	DESCRIPTION
1	Cover1 A1	Input - Cover1 A contact. Closed when Cover is closed
2	Cover1 A2	
3	Cover1 Unlock (+)	Cover unlock output. Unlock solenoid will be energized when Cover Unlock is ON *and* Outputs/Byte1/Bit1=0 and: - Spindle is stopped *and* Power is OFF; - **Or** Spindle is stopped *and* Safety Zone, - **Or** in Test Mode *and* Acknowledge (J20-short); - **Or** in Test Mode *and* Acknowledge *and* Spindle is stopped (J20-open).
4	Cover1 Unlock (-)	
5	Cover1 B1	Input - Cover1 B contact. Closed when Cover is closed
6	Cover1 B2	

CN10 – Cover 2

PIN	SIGNAL	DESCRIPTION
1	Cover2 A1	Input – Cover2 A contact. Closed when Cover is closed
2	Cover2 A2	
3	Cover2 Unlock (+)	Cover unlock output. J14 1-2 SHORT *and* J15 1-2 SHORT: Unlock will be energized when Cover Unlock is ON *and* Outputs / Byte1 / Bit1=0 **and:** - Spindle is stopped *and* Power is OFF; - **Or** Spindle is stopped *and* Safety Zone, - **Or** in Test Mode *and* Acknowledge (J20-short); - **Or** in Test Mode *and* Acknowledge *and* Spindle is stopped (J20-open). J14 2-3 SHORT *and* J15 2-3 SHORT: Unlock output will be OFF when Cover Unlock is ON *and* Outputs / Byte1 / Bit2=0 **and:** - Spindle is stopped *and* Power is OFF; - **Or** Spindle is stopped *and* Safety Zone, - **Or** in Test Mode *and* Acknowledge (J20-short); - **Or** in Test Mode *and* Acknowledge *and* Spindle is stopped (J20-open).
4	Cover2 Unlock (-)	
5	Cover2 B1	Input – Cover2 B contact. Closed when Cover is closed
6	Cover2 B2	

CN11 - STOP

PIN	SIGNAL	DESCRIPTION
1	EMG B1	Input - Emergency Stop line B. OPEN=Stop
2	EMG B2	
3	EMG A1	Input - Emergency Stop line A. OPEN=Stop
4	EMG A2	

CN12 – LAMPS

PIN	SIGNAL	DESCRIPTION
1	Safe Zone	HIGH when the system is in Safety Zone
2	GND	Ground
3	Test Mode	HIGH when the system is in Test Mode
4	GND	Ground
5	Output 0	Outputs / Byte0 / Bit0 - General purpose output. HIGH if bit is set to 1 (wired to CN14pin7)
6	GND	Ground
7	Cover Open	HIGH when Cover 1 or Cover 2 or Both are open

CN13 – ACKNOWLEDGE AND COVER UNLOCK

PIN	SIGNAL	DESCRIPTION
1	EMG B1	Input - Emergency Stop line B. OPEN=Stop
2	EMG B2	
3	EMG A1	Input - Emergency Stop line A. OPEN=Stop
4	EMG A2	
5	Unlock Enable (+)	Cover Unlock positive enable output. HIGH **When:** - Spindle is stopped *and* Power is OFF; - **Or** Spindle is stopped *and* machine is in Safety Zone; - **Or** Test Mode *and* Acknowledge (J20-short)**;** - **Or** Test Mode *and* Acknowledge *and* Spindle is stopped (J20-open).
6	Unlock Input	Input for Cover Unlock Button (Button between CN13pin5 and CN13pin6)
7	Unlock Enable (-)	Cover Unlock negative enable output. LOW when Outputs / Byte1 / Bit1=0 **and:** - Spindle is stopped *and* Power is OFF; - **Or** Spindle is stopped *and* machine is in Safety Zone - **Or** Test Mode *and* Acknowledge
8	GND	Ground
9	ACKN A1	Input - Acknowledge Switch contact A. Acknowledge Lamp can be wired between CN13pin10 and CN13pin11
10	ACKN A2	
11	ACKN B1	Input - Acknowledge Switch contact B.
12	ACKN B2	

CN14 – I/O Connector

PIN	SIGNAL	DESCRIPTION
1	+24V	Short protected 24V source
2	Input 1	Inputs / Byte0 / Bit1 - General purpose input (wired to CN14pin5).
3	Output 1	Output / Byte0 / Bit1 - General purpose output. HIGH if bit is set to 1
4	GND	Ground
5	Input 1	Inputs / Byte0 / Bit1 - General purpose input (wired to CN14pin2)
6	Input 0	Inputs / Byte0 / Bit0 - General purpose input
7	Output 0	Outputs / Byte0 / Bit0 - General purpose output. HIGH if bit is set to 1 (wired to CN12pin5)
8	GND	Ground

CN15 – MODE AND POWER ON

PIN	SIGNAL	DESCRIPTION
1	EMG B1	Input – Emergency Stop line B. OPEN=Stop
2	EMG B2	
3	EMG A1	Input - Emergency Stop line A. OPEN=Stop
4	EMG A2	
5	POW 1	Input - Power ON Button
6	POW 2	
7	POW Lamp 1	Output for Power Lamp
8	GND	Ground
9	Test Lamp 1	Output for Test Mode Lamp
10	GND	Ground
11	Test Mode A	Input – HIGH =Test Mode Request Test Mode will be accepted if the time for change from pin13=HIGH *and* pin11=OPEN to pin13=OPEN *and* pin11=HIGH is less than 100msec and Outputs / Byte1 *and* Bit3 is cleared to 0
12	+24V	Short protected 24V source
13	Test mode B	Input – OPEN =Test Mode Request Test Mode will be accepted if the time for change from pin13=HIGH and pin11=OPEN to pin13=OPEN *and* pin11=HIGH is less than 100msec and Outputs / Byte1 / Bit3 is cleared to 0

CN16 – POWER CONTROL

PIN	SIGNAL	DESCRIPTION
1	GND	Ground
2	Power Control A	Relay contact output line A. HIGH -> Power ON
3	Pin 3	Multifunction pin Open (default) – Not connected J5 5-6 short – GND J5 6-7 short – CN16 pin 8 - Power Enable J5 7-8 short – CN16 pin 7 J5 8-9 short – CN16 pin10 - Spindle ON
4	Power Control B	Relay contact output line B. HIGH -> Power ON
5	Monitor Loop Input	Input - Part of Relay Contact Monitor Loop. (-27V)
6	Monitor Loop Output	Output - Part of Relay Contact Monitor Loop. (-27V)
7	Pin 7	Multifunction pin Open (default) – Not connected J5 1-2 short – CN16 pin4 Power Control B J5 2-3 short – CN16 pin 3 J5 3-4 short – GND
8	Power Enable	System Enable/Stop Output
9	GND	Ground
10	Spindle ON Wired to CN6pin5	Spindle Enable Output is HIGH: **When:** **J16 2-3 short:** Outputs / Byte0 / Bit2=1 *and* Outputs / Byte1 / Bit4 (Safety Link Bridge)=0 *and* Power ON *and* Covers closed; **J16 1-2 short**: Outputs / Byte0 / Bit2=1 *and* Outputs / Byte1 / Bit4 (Safety Link Bridge) =0 *and* Power ON *and* Covers closed, **or** Outputs / Byte0 / Bit2=1 *and* Outputs / Byte1 / Bit4 (Safety Link Bridge) =0 *and* Power ON *and* Test mode *with* Acknowledge

CN17 – ANALOG INPUTS

PIN	SIGNAL	DESCRIPTION
1	POT (-)	J7 = open - 100 Ohm protective resistor connected to GND J7 = closed - GND
2	ADC 3	Analog input 0 to 5V
3	ADC 2	Analog input 0 to 5V
4	POT (+)	J6 = open - 100 Ohm protective resistor connected to +5V J6 = closed - +5V

CN19 – Covers CLOSED

PIN	SIGNAL	DESCRIPTION
1	Covers CLOSED Output	High (+24V) when all Covers contacts are closed.
2	GND	Ground

CN20 – POWER CONTROL OUTPUT

PIN	SIGNAL	DESCRIPTION
1	GND	Ground
2	POWER ON	High (+24V) when UM is ON
3	NO POWER	High (+24V) when UM is OFF

CN21 – 24V

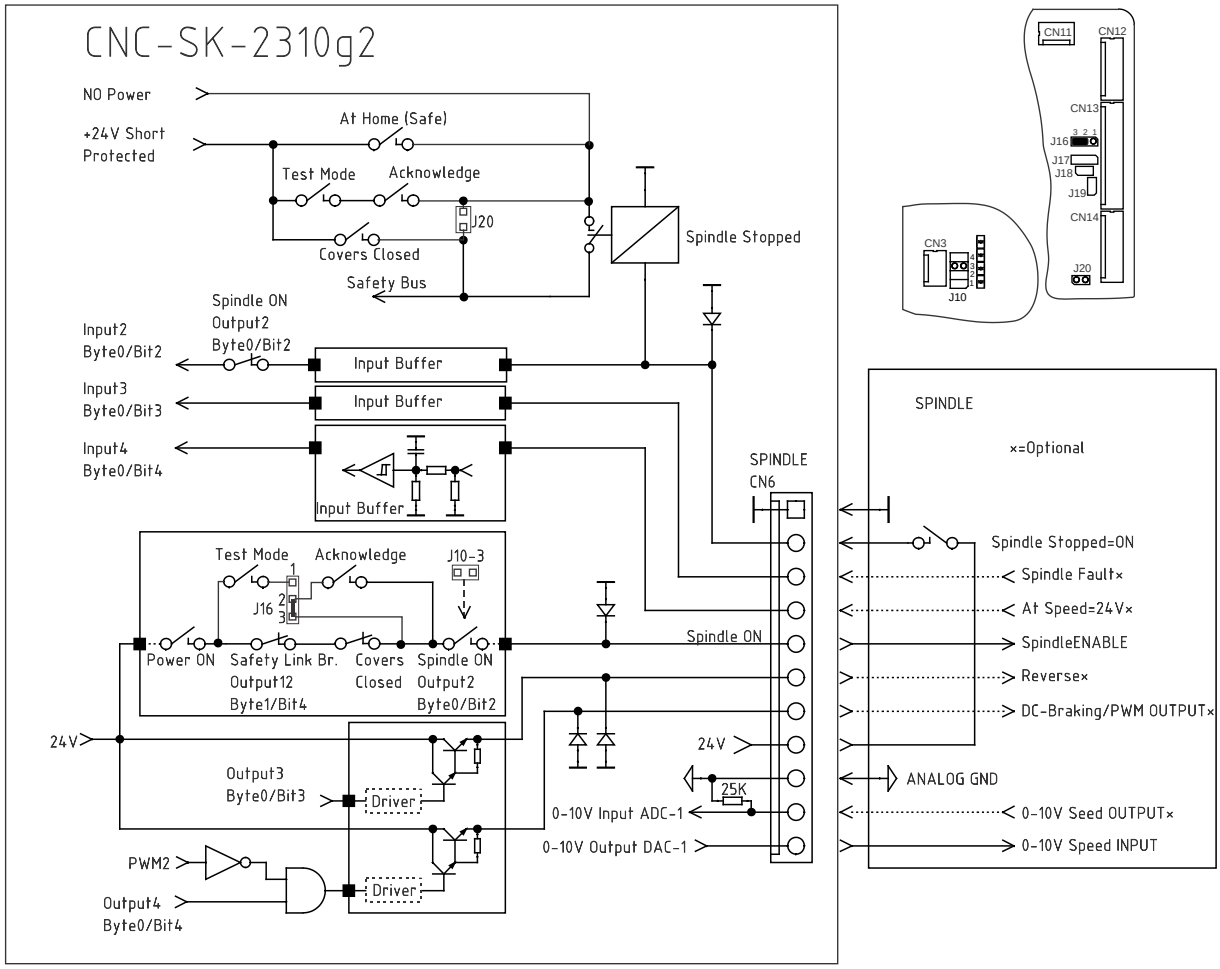
PIN	SIGNAL	DESCRIPTION
1	GND	Ground
2	24F	24V/ 3A fuse protected power supply output, including CNC-SK-2310g2, all external sensors and relays.

CN22 – COVER LOCK/UNLOCK

PIN	SIGNAL	DESCRIPTION
1	+24V	Short protected 24V source
2	Cover UNLOCK	Optional Cover Unlock / Open input
3	GND	Ground
4	Cover LOCK	Optional Cover Lock / Close input
5	+24V	Short protected 24V source

CNC-SK-2310g2 wiring diagrams

Sample application – Spindle control Option 1.



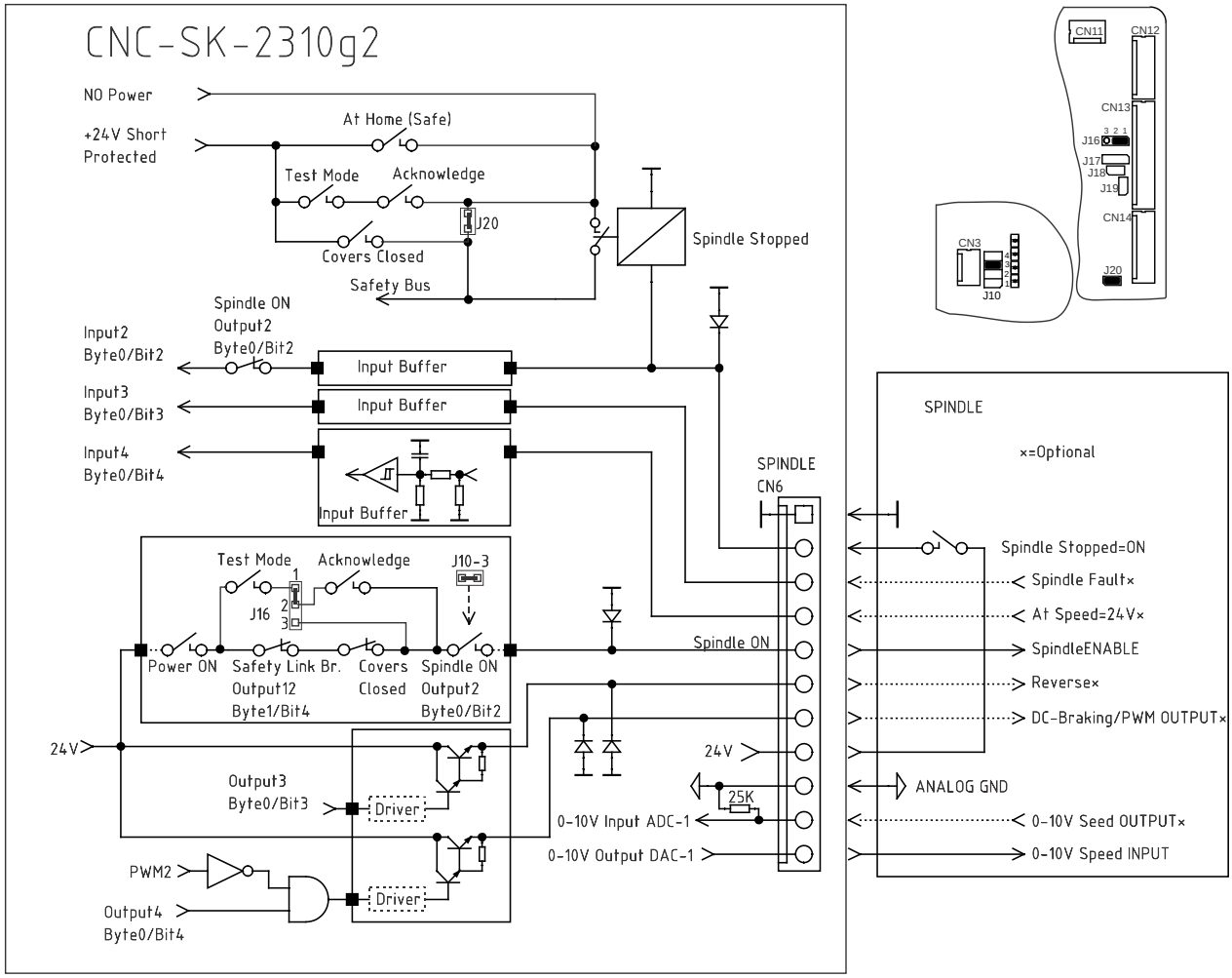
J16 2-3 – short and J10-3 open

- **Spindle ON** output is disabled when **Covers** are open**.**
- **Spindle Enable** output cannot be turned **ON** in **Test Mode.**
- If **Spindle** is enabled (**ON**) - activating **Test Mode** does not affect the current **Spindle ON** output state.

J20 open

- To open the **Covers** in **Test Mode** with **Acknowledge** - **Spindle Stopped** must be ON.

Sample application – Spindle control Option 2



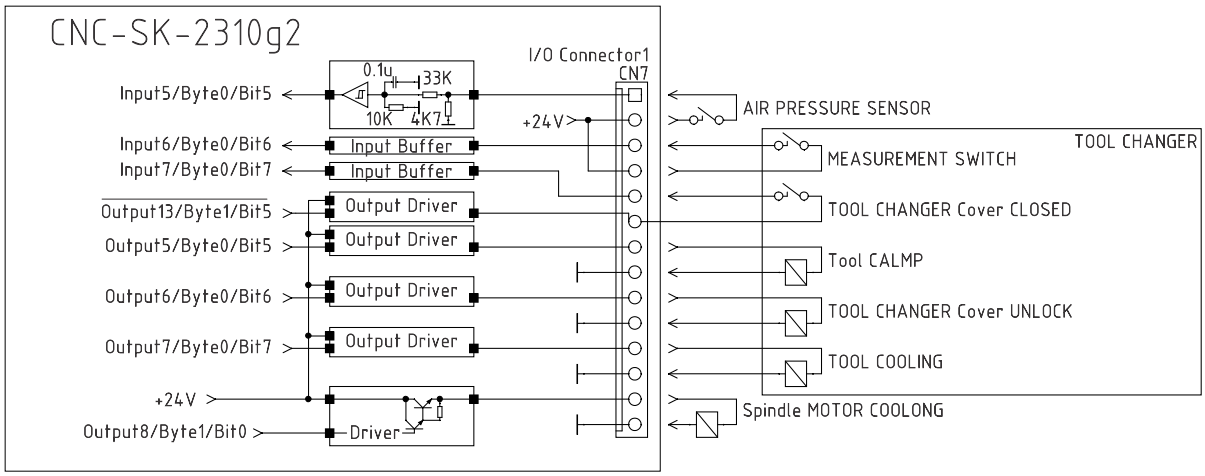
J16 1-2 short and J10-3 short

- **Spindle ON** output is enabled in **Test Mode** with **Acknowledge.**

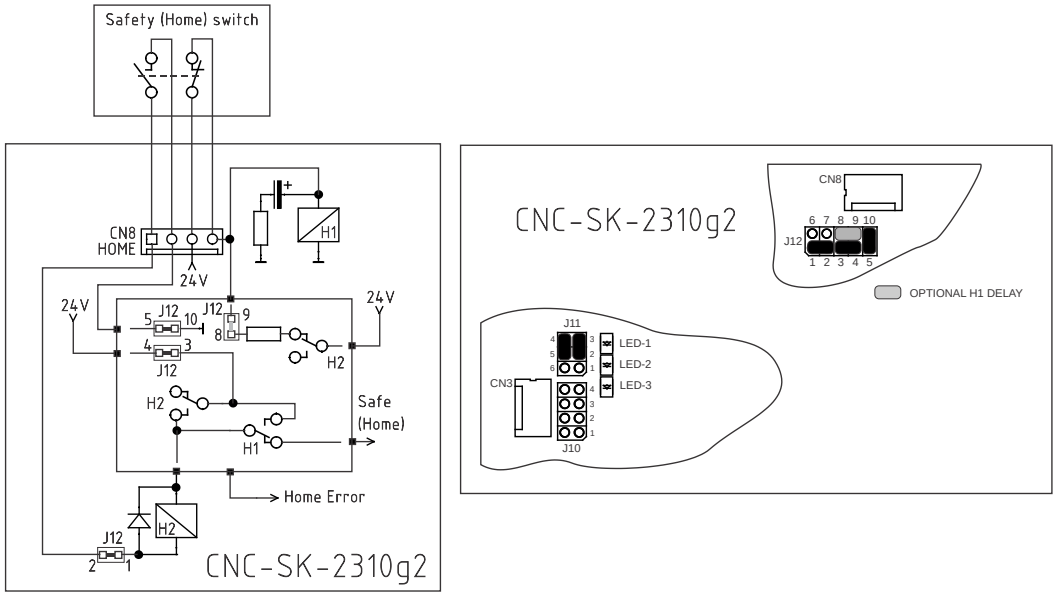
J20 short

- **Covers** can be open in **Test Mode** with **Acknowledge**.

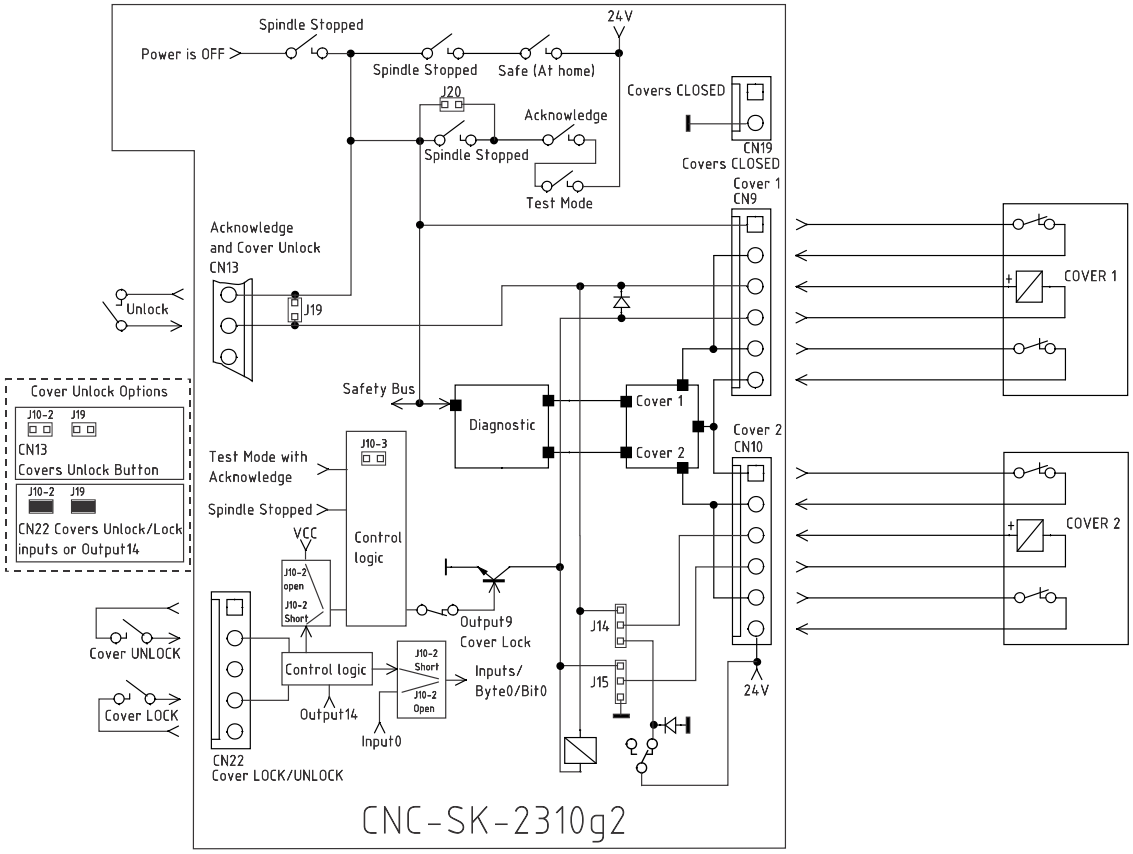
Sample application – I/O connector (Tool Changer)



Sample application – Home sensor wiring



Sample application – Covers wiring



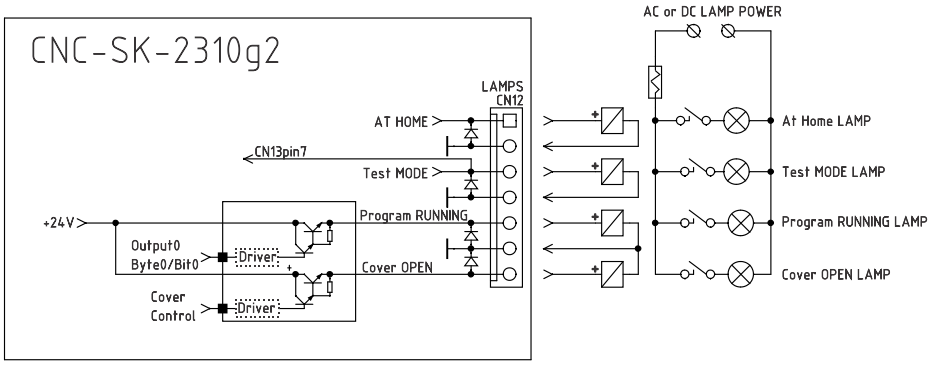
J10-3 open

- **Covers** can be unlocked / open in **Test Mode with Acknowledge** when **Spindle is stopped**.
- If all other requirements met - the **Covers** are unlocked / open automatically after the **Spindle is stopped**.

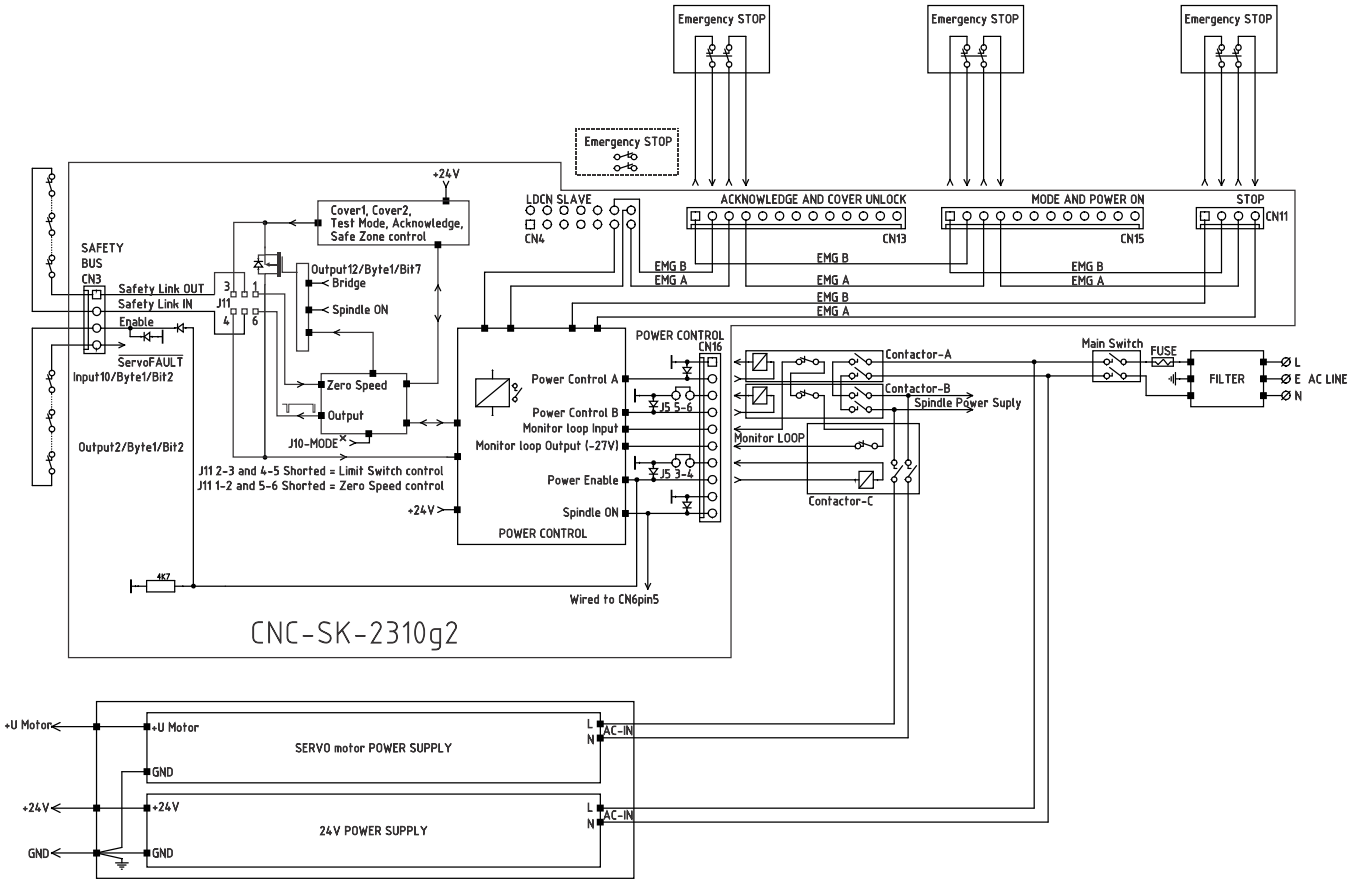
J10-3 short

- **Covers** can be unlocked / open in **Test Mode with Acknowledge**.

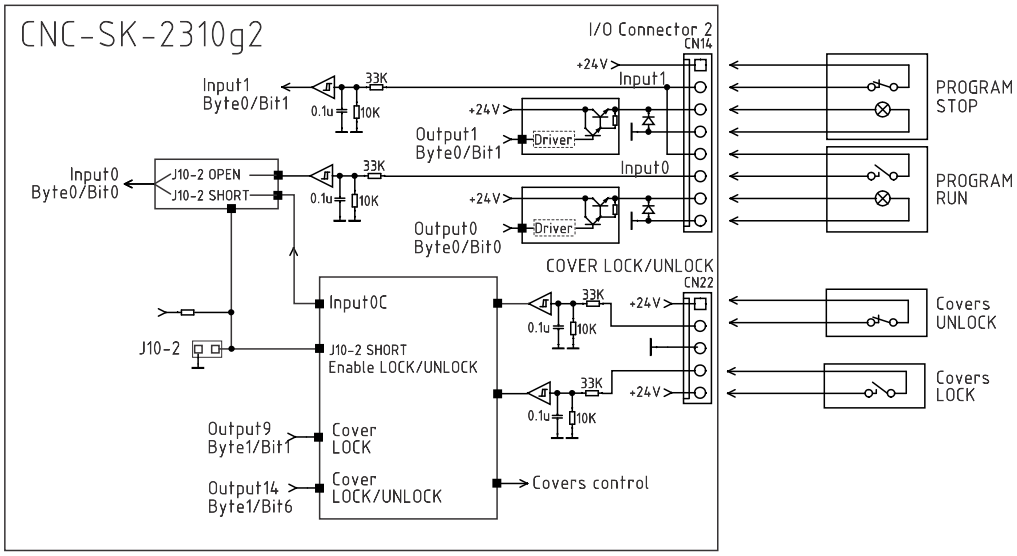
Sample application – Lamps



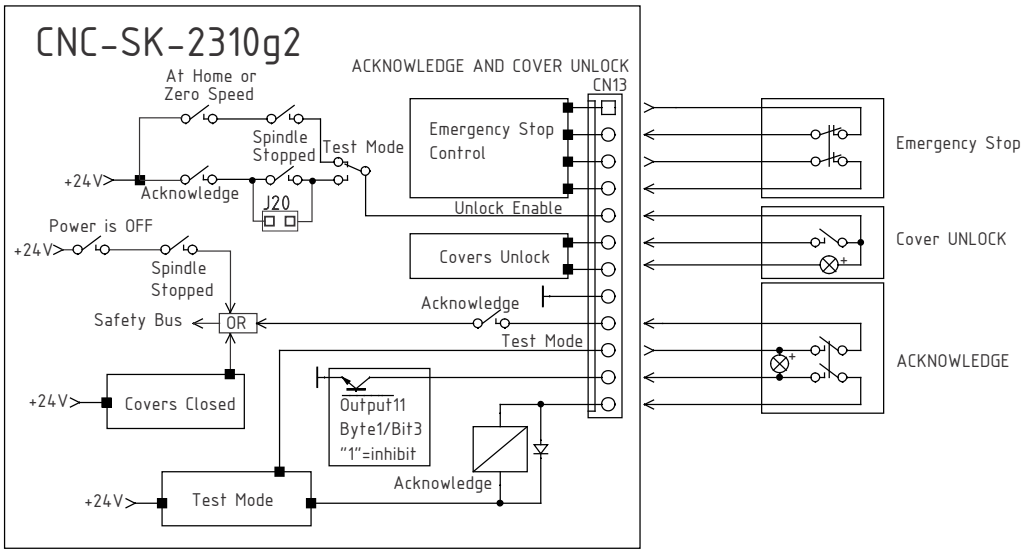
Sample application – Emergency Stop



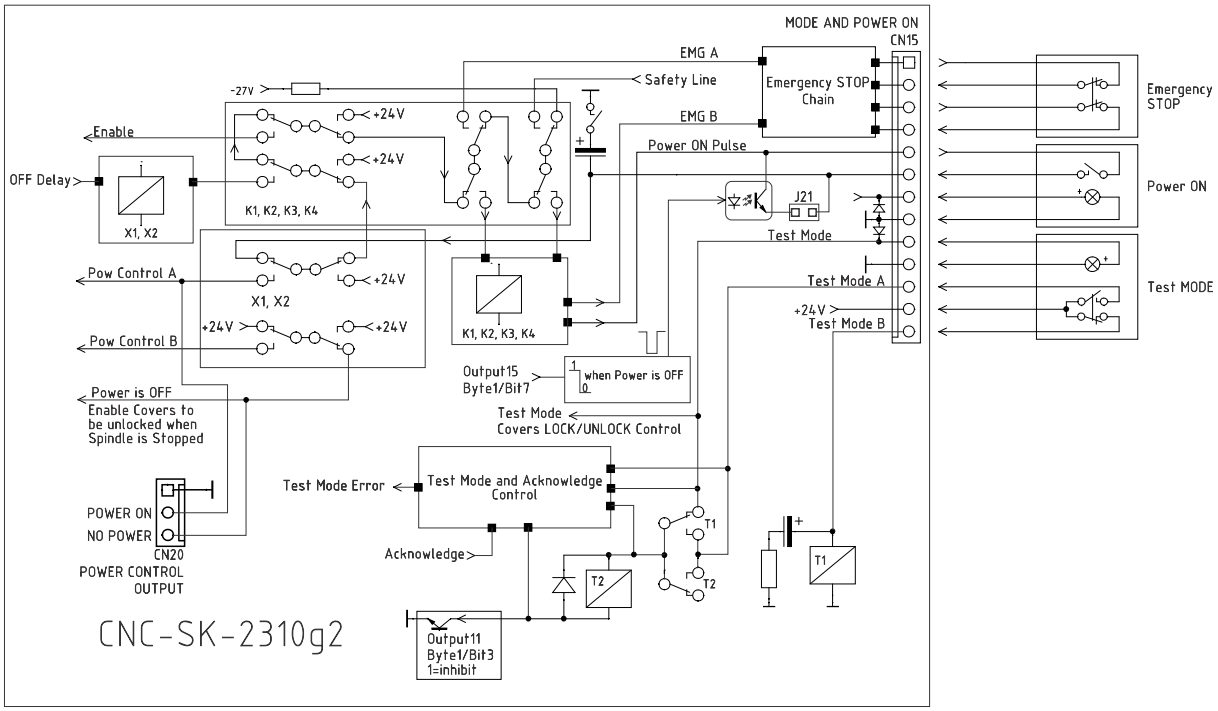
Sample application – I/O Connector 2



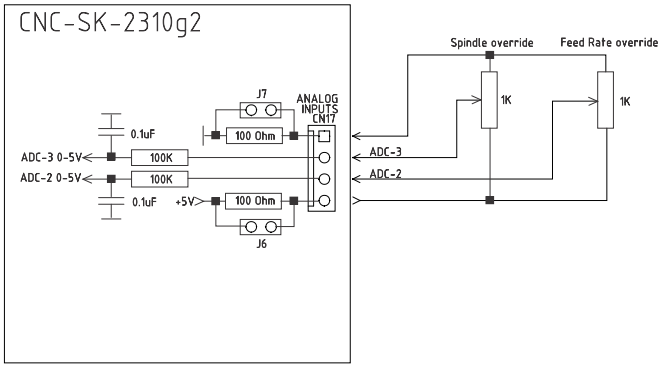
Sample application – Acknowledge and Cover Unlock



Sample application – Test Mode and Power ON



Sample application – Analog Inputs



Note: Recommended potentiometers - **RV4NAYSD102A** (Precision Electronic Components INC).

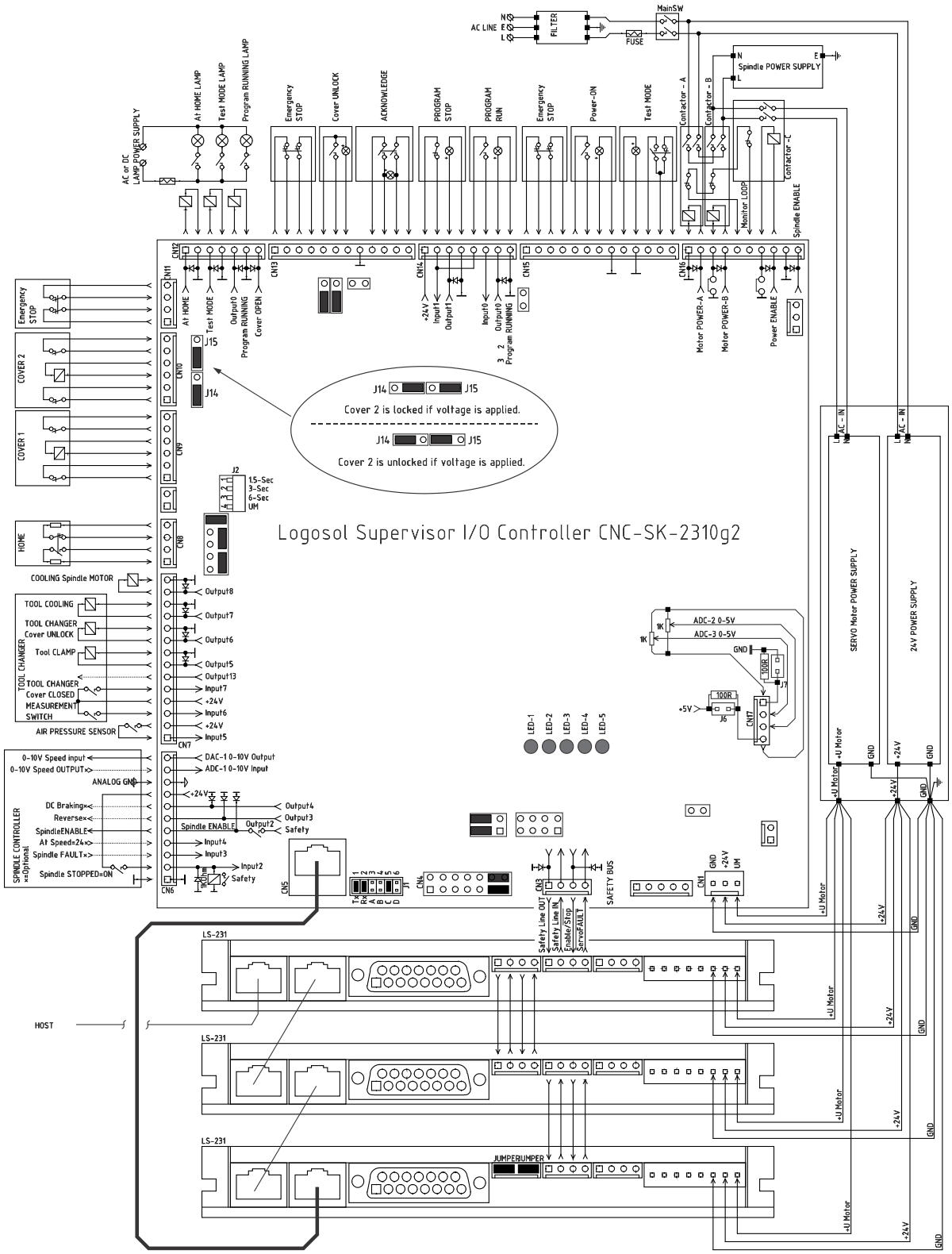
Single potentiometer 1K:

- Input voltage - min=0.42V to max=4.58V (ADC min=22 to ADC max=233);
- Recommended error margins (if controlled by the software installed) ADC<15 and ADC >245.

Two potentiometers 1K:

- Input voltage - min=0.72V to max=4.28V (ADC min=37 to ADC max=218);
- Recommended error margins (if controlled by the software installed) ADC<30 and ADC > 225

SAMPLE APPLICATION CNC-SK-2310g2 wiring



Digital Inputs

Byte0	Input	Function	Connector	Application	Alternative Application
Bit 0	Input 0	Non Dedicated	CN14 - I/O Connector	Program run	General purpose
Bit 1	Input 1	Non Dedicated	CN14 - I/O Connector	Program stop	General purpose
Bit 2	Input 2	**Spindle OFF** *Note 1*	CN6 - Spindle	**Spindle OFF**	N.A.
Bit 3	Input 3	Non Dedicated	CN6 - Spindle	Spindle fault	General purpose
Bit 4	Input 4	Non Dedicated	CN6 - Spindle	Spindle at speed	General purpose
Bit 5	Input 5	Non Dedicated	CN7 - I/O Connector	Air pressure	General purpose
Bit 6	Input 6	Non Dedicated	CN7 - I/O Connector	Measure switch	General purpose
Bit 7	Input 7	Non Dedicated	CN7 - I/O Connector	Tool changer closed	General purpose

Byte1	Input	Function	Connector	Application	Alternative Application
Bit 0	Input 8	**At Home** *Note 2*	N.A.	**At Home**	N.A
Bit 1	Input 9	**Test Mode**	N.A.	**Test Mode**	N.A.
Bit 2	Input 10	**Servo Fault**	CN3 - Safety BUS	**Servo Fault**	N.A.
Bit 3	Input 11	**Status 0**	N.A.	LED1	N.A.
Bit 4	Input 12	**Status 1**	N.A.	LED2	N.A
Bit 5	Input 13	**Status 2**	N.A.	LED3	N.A.
Bit 6	Input 14	**Status 3**	N.A.	LED4	N.A.
Bit 7	Input 15	**Status 4**	N.A.	LED5	N.A.

Digital Outputs

Byte0	Output	Function	Connector	Application	Alternative Application
Bit 0	Output 0	Non Dedicated	CN14 - I/O Connector	Program running Lamp	General purpose
Bit 1	Output 1	Non Dedicated	CN14 - I/O Connector	Program stopped Lamp	General purpose
Bit 2	Output 2	**Spindle ON** *Note 3, 4*	CN6 - Spindle	**Spindle ON**	N.A.
Bit 3	Output 3	Non Dedicated	CN6 - Spindle	Spindle direction	General purpose
Bit 4	Output 4	Non Dedicated	CN6 - Spindle	Spindle DC-braking or	General purpose
Bit 5	Output 5	Non Dedicated	CN7 - I/O Connector	Tool clamp	General purpose
Bit 6	Output 6	Non Dedicated	CN7 - I/O Connector	Spindle Motor cooling	General purpose
Bit 7	Output 7	Non Dedicated	CN7 - I/O Connector	Tool cooling	General purpose

Byte1	Output	Function	Connector	Application	Alternative Application
Bit 0	Output 8	Non Dedicated	CN7 - I/O Connector	Tool changer unlock	General purpose
Bit 1	Output 9	**Cover Lock**	CN9, CN10 - Cover 1,2	**Cover 1, 2 Lock**	N.A
Bit 2	Output 10	See Automation modes	N.A.	N.A.	Home Enable
Bit 3	Output 11	**Test Mode Inhibit**	N.A.	**Test Mode Inhibit**	N.A.
Bit 4	Output 12	**Safety Link Bridge**	CN3 - Safety Bus	**Safety Link Bridge**	N.A.
Bit 5	Output 13	Non Dedicated, Inverted	CN7 - I/O Connector	N.A.	N.A.
Bit 6	Output 14	Reserved. Set to 0	N.A.	Reserved. Set to 0	Covers Lock/Unlock *Note 5*
Bit 7	Output 15	**System Lock**	N.A.	**System Lock**	Power ON/OFF *Note 6*

Notes:

Note 1: ***Spindle OFF =1*** *when:* ***Spindle ON*** *(Outputs/Byte0/Bit2)* ***=0*** *and* ***Spindle Stopped*** *(CN6 pin2)* ***=HIGH****.*

Note 2: ***At Home is set 0*** *when Test Mode with Acknowledge is active.*

Note 3: ***Spindle ON*** *and* ***Safety Link Bridge*** *cannot be used simultaneously.*
If one of them is ***turned on*** *(set to 1) the other one* ***should not be activated****.*
To activate any of these two outputs the other one should be ***turned off*** *(set to 0)* ***first.***

Note 4: ***See*** *"Sample application – Spindle Option 1" Sample application – Spindle Option 2" for details.*

Note 5: ***J10-2 and J19*** *must be installed (short).*

Note 6: ***J21*** *must be installed (short)****.***

SK-2310g2 diagnostic

	Byte1 Bit #							Power Enable	Power A & B	LED #				
	7	6	5	4	3					5	4	3	2	1
01	0	0	0	0	1	Initializing		Off	Off	●	●	●	●	☼
02	0	0	0	1	0	Control voltage shorted		Off	Off	●	●	●	○	●
03	0	0	0	1	1	Output shorted		Off	Off	●	●	●	○	○
04	0	0	1	0	0	Control voltage LOW (less than 18V)		Off	Off	●	●	○	●	●
05	0	0	1	0	1	Home switch malfunction (both contacts are ON)		**Prior**	**Prior**	●	●	○	●	○
						Test mode switch malfunction (both contacts are ON)		Off	Off					
06	0	0	1	1	0	Power UP Home error		Off	Off	●	●	○	○	●
07	0	0	1	1	1	Power UP Test Mode error		Off	Off	●	●	○	○	○
08	0	1	0	0	0	System LOCKED		Off	Off	●	○	●	●	●
09	0	1	0	0	1	Watchdog Stop		Off	Off	●	○	●	●	○
0A	0	1	0	1	0	Safety Link Error		Off	Off	●	○	●	○	●
0B	0	1	0	1	1	Cover Open Stop – Cover Open and Spindle is not stopped	Contacts OK	Off	Off	●	○	●	○	○
							One or more contact malfunction			●	☼	●	☼	☼
0C	0	1	1	0	0	Cover Open Stop – Cover Open and machine is not at Home	Contacts OK	Off	Off	●	○	○	●	●
							One or more contact malfunction			●	☼	☼	●	●
0D	0	1	1	0	1	Cover Open Stop – Cover Open in Test Mode NO Acknowledge	Contacts OK	Off	Off	●	○	○	●	○
							One or more contact malfunction			●	☼	☼	●	☼
0E	0	1	1	1	0	Cover contact Fault (one or more cover contact malfunction)		**Prior**	**Prior**	●	☼	☼	☼	●
0F	0	1	1	1	1	Limit Switch Stop		Off	Off	●	○	○	○	○
10	1	0	0	0	0	Emergency Stop		Off	Off	○	●	●	●	●
11	1	0	0	0	1	Emergency Stop contact malfunction (only one contact open) or Monitor Loop Open after Emergency Stop		Off	Off	○	●	●	●	○
12	1	0	0	1	0	Busy - 6 seconds, more than 6 sec - Power ON button short or Monitor Loop Open (safety relay contact malfunction)		Off	Off	○	●	●	○	●
13	1	0	0	1	1	Motor Power Supply under-voltage		**On**	**On**	○	●	●	○	○
14	1	0	1	0	0	Cover-1 Open; Cover-2 Open (ready to power)		Off	Off	○	●	○	●	●
15	1	0	1	0	1	Cover-1 Closed; Cover-2 Open (ready to power)		Off	Off	○	●	○	●	○
16	1	0	1	1	0	Cover-1 Open; Cover-2 Closed (ready to power)		Off	Off	○	●	○	○	●
17	1	0	1	1	1	Cover-1 Closed; Cover-2 Closed (ready to power)		Off	Off	○	●	○	○	○
18	1	1	0	0	0	Cover-1 Open; Cover-2 Open; Test Mode		**On**	**On**	○	○	●	●	●
19	1	1	0	0	1	Cover-1 Closed; Cover-2 Open; Test Mode		**On**	**On**	○	○	●	●	○
1A	1	1	0	1	0	Cover-1 Open; Cover-2 Closed; Test Mode		**On**	**On**	○	○	●	○	●
1B	1	1	0	1	1	Cover-1 Closed; Cover-2 Closed; Test Mode		**On**	**On**	○	○	●	○	○
1C	1	1	1	0	0	Cover-1 Open; Cover-2 Open; At Home; Spindle stopped		**On**	**On**	○	○	○	●	●
1D	1	1	1	0	1	Cover-1 Closed; Cover-2 Open; At Home; Spindle stopped		**On**	**On**	○	○	○	●	○
1E	1	1	1	1	0	Cover-1 Open; Cover-2 Closed; At Home; Spindle stopped		**On**	**On**	○	○	○	○	●
1F	1	1	1	1	1	Cover-1 Closed; Cover-2 Closed		**On**	**On**	○	○	○	○	○
00	0	0	0	0	0	Power OFF delay in progress		Off	**On**	☼	☼	☼	☼	☼

● = OFF
○ = ON
☼= BLINK

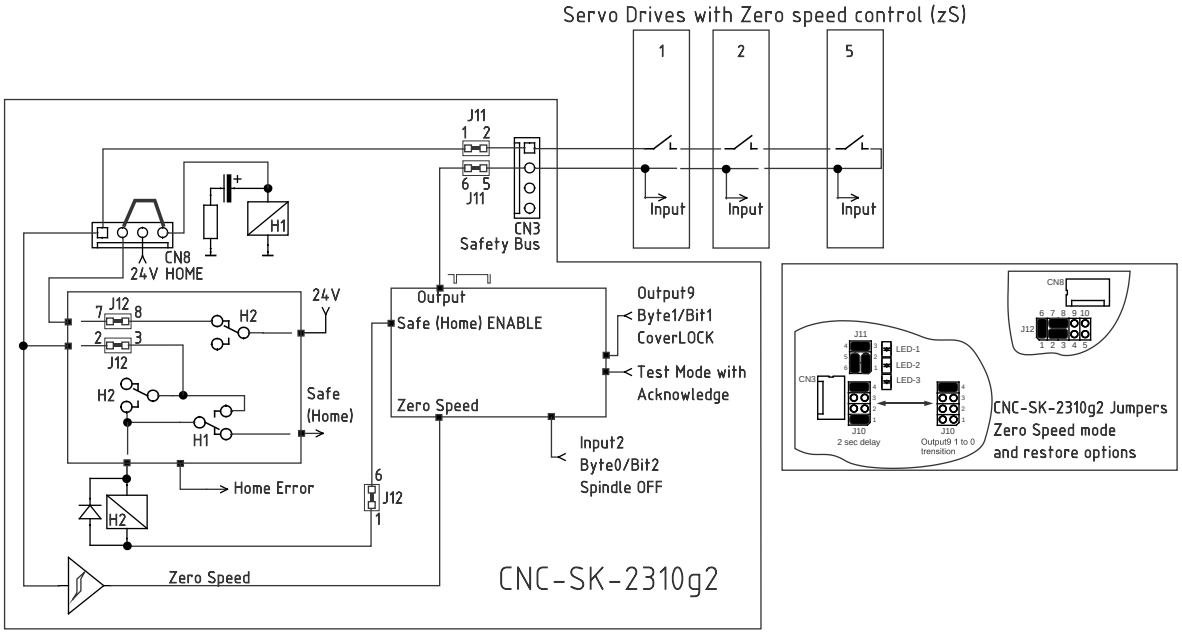
ZERO SPEED Automation Grade Safety.

"Zero Speed" safety can be used in machines, or automated systems, that don't require "Safe Zone sensor" based safety. Instead of "Safe Zone sensor" (Home switch) drives "Zero speed" signal is used. "Zero Speed" signal is generated by the servo drives and is active only if all motors are in standstill state for more than 2sec. Drives Zero Speed" signal, combined with Cover Lock (Output9/Byte1/Bit1) output, and Spindle Stopped (Input2/Byte0/Bit2) input are used to control system "At Home" state.
System is safe or "At Home" (Input8/Byte1/Bit0 =1) when: "Zero Speed" signal is ON and Input2/Byte0/bit2 =1 (Spindle is stopped), and Output9/Byte1/Bit1=0 (Covers are not locked).
When system is safe ("At Home" =1) - covers could be unlocked and open. Any motion when Covers are open will turn OFF the Motor Power.
"At Home" (Input8/Byte1/Bit0 =0) is cleared when: drive is moving ("Zero Speed" is OFF), or Input2/Byte0/Bit2 =0 (Spindle is running), or software controlled Output9/Byte1/Bit1 =1 (Covers are locked).
Jumper controlled options:

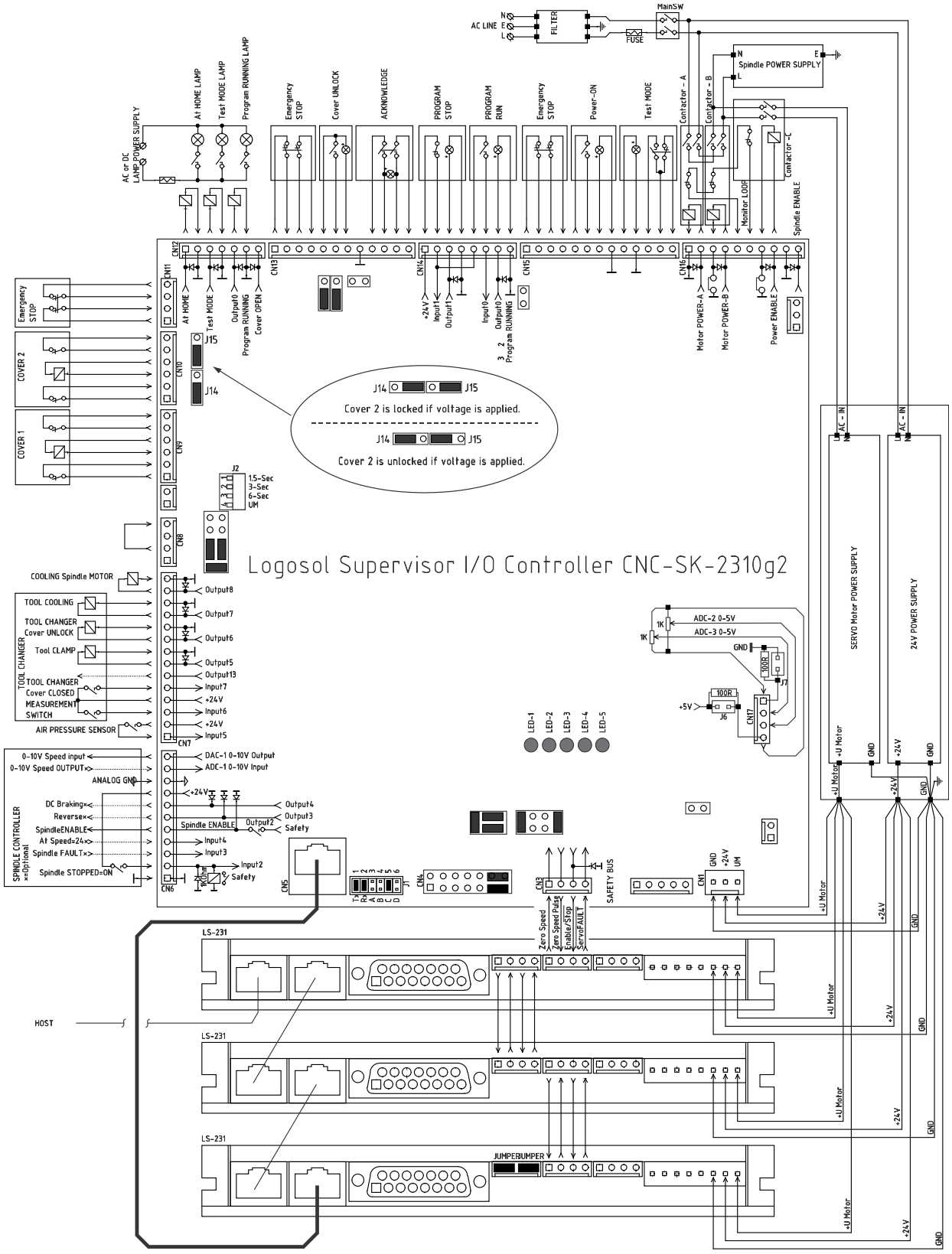
- J10-1 and J10-4 are short – System is safe or "At Home" when: "Zero Speed" signal is ON and Spindle is stopped, and Output9 =0;
- J10-1 open and J10-4 short – System is safe or "At Home" when: "Zero Speed" signal is ON and Spindle is stopped and after Output9 1 to 0 transition.

Note 1: "Zero Speed" mode is available only for drives marked with "zS". All the drives should be set in "Zero Speed" mode, or Limit Switch safety. When "Zero Speed" mode is used Limit Switch Hardware Power control is disabled.

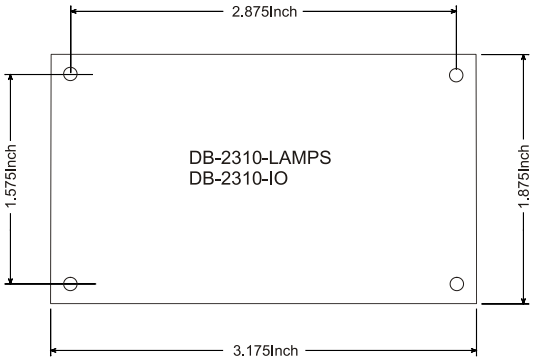
SAMPLE APPLICATION - Zero Speed mode



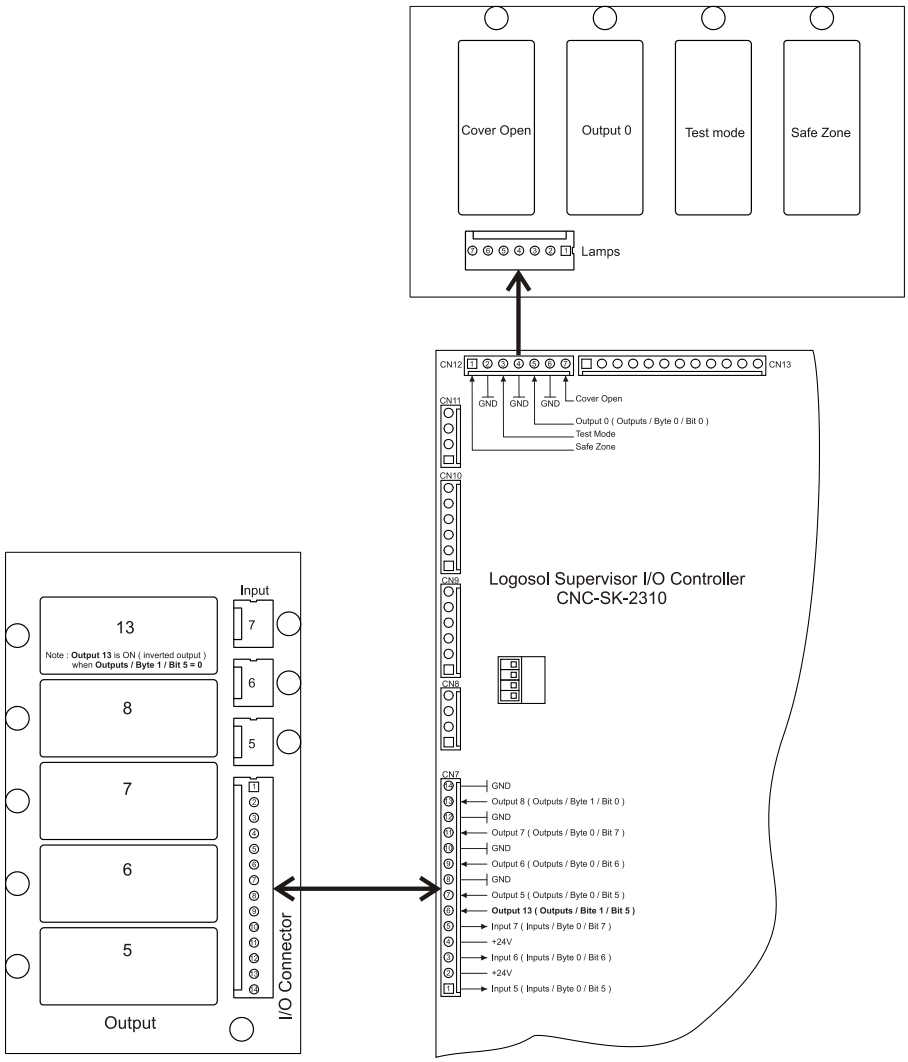
SAMPLE APPLICATION Zero speed Automation mode CNC-SK-2310g2 wiring



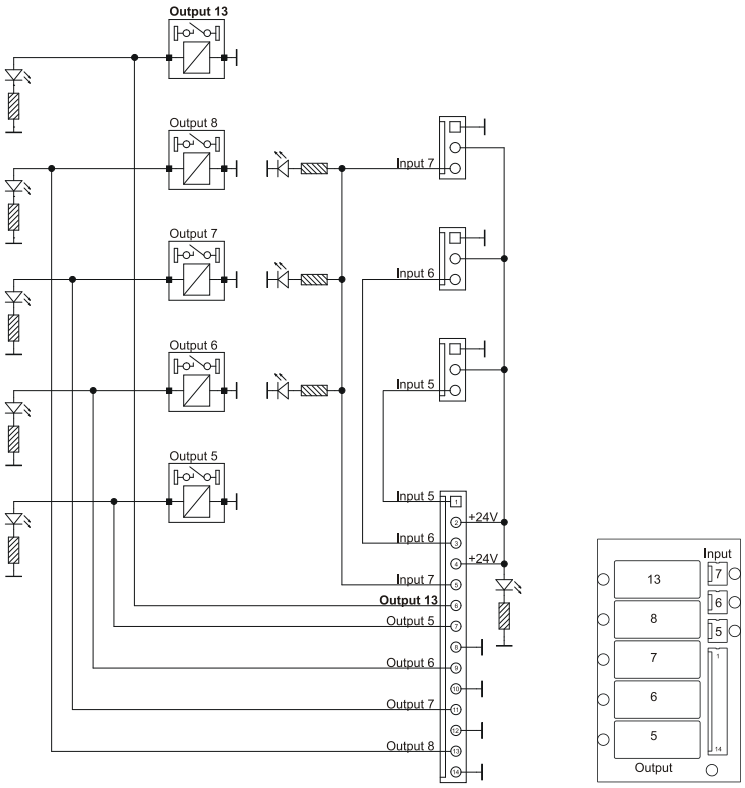
DISTRIBUTION BOARDS



Dimensional Drawing

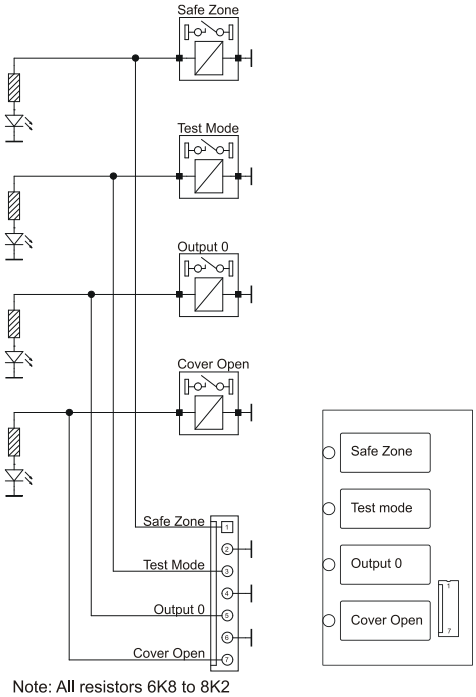


Sample Application



Note: 1. **Output 13** is ON (inverted output) when **Outputs / Byte 1/ Bit 5=0**
2. All resistors: 6K8 to 8K2

DB-2310-I/O



Note: All resistors 6K8 to 8K2

DB-2310-LAMPS