

# PLC Build Sheet

PLC Build Sheet No.

Attention Dealers, OEM's, & Service Representatives:

We want to supply exactly what you ordered. If you have any questions, please call and we will help you complete this form.

With each order you must either:

- a) Submit a new PLC build sheet and we will assign it a unique "PLC Build Sheet Number".
- b) On your purchase order refer to an existing "PLC Build Sheet Number" that you previously used.

We cannot start to build your control without a completed PLC build sheet.

If you discover any changes after your PLC build sheet has been submitted, contact us immediately! Any changes to a control after construction has begun will be chargeable on a time and material basis.

Dealer Name: \_\_\_\_\_

Dealer Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Machine brand and model number: \_\_\_\_\_

Quote # \_\_\_\_\_

## Introduction and Overview

The PLC Build Sheet document is designed to assist you in providing us with an accurate description of the PLC requirements for your machine. This document consists of 6 sections:

### **1. Introduction and Overview**

### **2. Definition of Terms**

Definitions of the terms and conventions used throughout this document.

### **3. Jog Panel Definitions**

Fill in the blanks style table used to help you define your Jog Panel functions. The Jog Panel offers 9 definable keys for custom auxiliary functions and includes keys for handling pre-defined functions used for cycle start and cycle cancel, axis jogging (incremental and continuous), spindle and coolant operation, tool check, single block mode and feed hold.

### **4. Input Definitions**

Fill in the blanks style table(s) used to help you define and assign the Inputs required for your machine. Please note that there is a different Input Definition table for each type of PLC. Please be sure that the Input Definition table that you fill out corresponds to the hardware you have ordered.

### **5. Output Definitions**

Fill in the blanks style table(s) used to help you define and assign the Outputs required for your machine. Please note that there is a different Output Definition table for each type of PLC. Please be sure that the Output Definition table that you fill out corresponds to the hardware you have ordered.

### **6. Definitions of Functions and Macros**

This section is used to help define the functions, sequences and macros required for your machine.

# PLC Build Sheet

## Definition of Terms

- D** **Dedicated** Indicates that this type can not be changed.
- INT** **Internal** types are reserved for internal operations.
- Function** This should be an exhaustive definition of a required control and or PLC response to a specified event. The trigger event may be the transition of an input, the expiration of a timer, an output being set or any other event visible to the PLC Also, when labeling the “Function” sections in the input or output tables, make sure the label you use matches the title of a Function in the “Definitions of Functions, Sequences and Macros” section.
- Input State** **N/C** - Normally Closed or **N/O** – Normally Open. This is typically the state that the device will transition *from* to indicate an event has occurred and a PLC action is to take place. For example: For fail safe reasons, limit switches are wired in a “Normally Closed” (N/C) configuration. The transition of a limit switch input from its “closed” state to an “open” state signals that a fault has occurred and the defined action or function(s) should be executed.
- Input Type** **SI - Sinking** inputs are considered “closed” when a specified voltage is detected on the input. That voltage is typically provided through a switch but PNP or NPN devices may also be used.
- SR - Sourcing** inputs provide an internally supplied voltage and are considered “closed” when an external device pulls that voltage level to ground. The device used is typically a switch but PNP or NPN devices may also be used.
- INT – Internal** input are dedicated inputs which can not be re-assigned.
- CFG – Configurable** inputs may be designated either **SI** or **SR** and configured for 5,12 or 24VDC
- VDC** 5, 12 or 24VDC
- Out. Type** **OC** Open Collector outputs are low power outputs. **OC** type outputs should only be used to drive digital devices or small “ice cube” style relays, they should NOT be used to drive contactors or solenoids. **OC** type outputs are rated for 5VDC @90ma. If your device has higher power requirements, an intermediate relay must be used.
- SPST** An output defined as **SPST** will be wired to supply the specified voltage for that output when it is turned on.
- SPDT** Only available on designated outputs, an **SPDT** output is wired to supply the specified voltage for that output to the N/C terminal when off and to the N/O terminal when the output is on. The SPDT output type is especially useful for forward/reverse motor control (such as a spindle or carousel motor) because the design of the relay prevents both output terminals from being powered simultaneously. The **SPDT** output type can also be used as an **SPST** type output if needed.
- Analog** outputs typically supply 0 to +10 VDC and are used almost exclusively to supply a reference voltage to a frequency inverter.

## PLC Build Sheet

### Input Definitions DC3IO

The inputs listed below are intended to help determine the number and the type of the inputs that your system requires. The inputs which have been pre-assigned below are intended as a reference only. The physical inputs used, input types, states, voltages and/or functional descriptions may vary depending on your system. Inputs are grouped by the connection header that they reside on. Inputs that share a connection header must be of the same **Type** and **VDC**.

<b>PLC Input</b>	<b>Label</b>	<b>Function</b>	<b>Header</b>	<b>State</b>	<b>Type</b>	<b>VDC</b>
1	X- Limit	Limit Switch Tripped -D	H13	N/C -D	SR -D	5 -D
2	X+ Limit	Limit Switch Tripped -D	H13	N/C -D	SR -D	5 -D
3	Y- Limit	Limit Switch Tripped -D	H13	N/C -D	SR -D	5 -D
4	Y+ Limit	Limit Switch Tripped -D	H13	N/C -D	SR -D	5 -D
5	Z- Limit	Limit Switch Tripped -D	H13	N/C -D	SR -D	5 -D
6	Z+ Limit	Limit Switch Tripped -D	H13	N/C -D	SR -D	5 -D
7	W- Limit		H9	N/C	CFG	CFG
8	W+ Limit		H9	N/C	CFG	CFG
9	Spin_Range	Spindle Range Input	H14	N/O	SR -D	5 -D
10	5th+ Limit		H9	N/C	CFG	CFG
11	E_Stop	Emergency Stop	H13	N/C	SR -D	5 -D
12	Servo_Fault	Servo Drive Fault -D	N/A	N/A	INT	N/A
13	TT1	TT1	H13	N/O	SR -D	5 -D
14	Probe	Probe	H14	N/O	SR -D	5 -D
15	Probe Detect	Probe Detected	H14	N/O	SR -D	5 -D
16	PLC_OK	PLC Integrity -D	N/A	N/A	INT	N/A
17	Door Interlock	Door Interlock	H9	N/C	CFG	CFG
18	Low Lube	Low Lube	H14	N/C	SR -D	5 -D
19	Zero Speed	Spindle Zero Speed	H9	N/O	CFG	CFG
20	At Speed	Spindle At Speed	H12	N/O	CFG	CFG
21	Orient Complete	Orient Complete	H12	N/O	CFG	CFG
22	Tool Clamped	Tool Clamped	H12	N/O	CFG	CFG
23	N/A	N/A	N/A	N/A	N/A	N/A
24	Tool Release	Tool Release Switch	H14	N/O	SR -D	5 -D
25	Spindle_ok	Spindle Drive Fault	H14	N/C	SR -D	5 -D
26	Tool Counter	Tool Counter*	H12	N/O	CFG	CFG
27	Carousel_Out	Carousel Out Input	H12	N/O	CFG	CFG
28	Carousel_In	Carousel In Input	H12	N/O	CFG	CFG
29	N/A	N/A	N/A	N/A	N/A	N/A
30	Rotary_Home	Rotary Home	H14	N/O	SR -D	5 -D
31	Rotary_Clamp	Rotary Clamped	H14	N/O	SR-D	5 -D
32	Air_Low	Air Pressure Low	H9	N/C	CFG	CFG

## PLC Build Sheet

### Input Definitions RTK3

The inputs listed below are intended to help determine the number and the type of the inputs that your system requires. The inputs which have been pre-assigned below are intended as a reference only. The physical inputs used, input types, states, voltages and/or functional descriptions may vary depending on your system. Inputs that share a connection header must be of the same **Type** and **VDC**.

PLC Input	Label	Function	Header	State	Type	VDC
1	X- Limit	Limit Switch Tripped	H17	N/C	SR-D	24 -D
2	X+ Limit	Limit Switch Tripped	H17	N/C	SR-D	24 -D
3	Y- Limit	Limit Switch Tripped	H17	N/C	SR-D	24 -D
4	Y+ Limit	Limit Switch Tripped	H17	N/C	SR-D	24 -D
5	Z- Limit	Limit Switch Tripped	H19	N/C	SR-D	24 -D
6	Z+ Limit	Limit Switch Tripped	H19	N/C	SR-D	24 -D
7	W- Limit	Limit Switch Tripped	H18	N/C	SR-D	24 -D
8	W+ Limit	Limit Switch Tripped	H18	N/C	SR-D	24 -D
9	5th- Limit	Limit Switch Tripped	H18	N/C	SR-D	24 -D
10	5th+ Limit	Limit Switch Tripped	H18	N/C	SR-D	24 -D
11	E_Stop	Emergency Stop	H20	N/C	SR-D	24 -D
12	Servo Fault	Servo Drive Fault	H4	N/C	SR-D	24 -D
13	TT1	TT1	H8	N/O	SR-D	24 -D
14	Probe	Probe	H9	N/O	SR-D	24 -D
15	Probe Detect	Probe Detected	H9	N/O	SR-D	24 -D
16	PLC_ok	PLC Integrity -D	N/A	N/A	INT	N/A
17	Door Interlock	Door Interlock	H11	N/C	SR-D	24 -D
18	Low Lube	Low Lube	H4mid	N/C	SR-D	24 -D
19	Zero Speed	Spindle Zero Speed	H10	N/O	SR-D	24 -D
20	At Speed	Spindle At Speed	H10	N/O	SR-D	24 -D
21	Orient Complete	Orient Complete	H10	N/O	SR-D	24 -D
22	Tool Clamped	Tool Clamped	H15	N/O	SR-D	24 -D
23	Tool Unclamped	Tool Unclamped	H15	N/C	SR-D	24 -D
24	Tool Release	Tool Release Switch	H15	N/O	SR-D	24 -D
25	Spindle Fault	Spindle Drive Fault	H10	N/C	SR-D	24 -D
26	Tool Counter *	Tool Counter*	H13	N/O	SI-D	24 -D
27	Carousel Out	Carousel Out Input	H13	N/O	SI-D	24 -D
28	Carousel In	Carousel In Input	H13	N/O	SI-D	24 -D
29	Auxiliary 1		H13	N/O	SI-D	24 -D
30	Rotary Home	Rotary Home	H7	N/O	SR-D	24 -D
31	Rotary Clamped	Rotary Clamped	H7	N/O	SR-D	24 -D
32	Air Low	Air Pressure Low	H12	N/C	SR-D	24 -D
59	Arm Clamp	Arm Clamp	H16	N/O	SI-D	24 -D
60	Arm Stop	Arm Stop	H16	N/O	SI-D	24 -D
61	Arm Home	Arm Home	H16	N/O	SI-D	24 -D
62	Chiller	Chiller	H16	N/C	SI-D	24 -D

## PLC Build Sheet

### Input Definitions PLCIO2

The inputs listed below are intended to help determine the number and the type of the inputs that your system requires. The inputs which have been pre-assigned below are intended as a reference only. The physical inputs used, input types, states, voltages and/or functional descriptions may vary depending on your system. Inputs are grouped by a shared input common. Input that share a common must be of the same **Type** and **VDC**.

PLC In	Label	Function	Header	Com	State	Type	VDC
1	X- Limit	Limit Switch Tripped -D	H4	Com1	N/C -D	CFG	CFG
2	X+ Limit	Limit Switch Tripped -D	H4	Com1	N/C -D	CFG	CFG
3	Y- Limit	Limit Switch Tripped -D	H4	Com1	N/C -D	CFG	CFG
4	Y+ Limit	Limit Switch Tripped -D	H4	Com1	N/C -D	CFG	CFG
5	Z- Limit	Limit Switch Tripped -D	H4	Com2	N/C -D	CFG	CFG
6	Z+ Limit	Limit Switch Tripped -D	H4	Com2	N/C -D	CFG	CFG
7	W- Limit		H4	Com2	N/C	CFG	CFG
8	W+ Limit		H4	Com2	N/C	CFG	CFG
9	Spin_Range	Spindle Range Input	H4	Com3	N/O	CFG	CFG
10	5th+ Limit		H4	Com3	N/C	CFG	CFG
11	E_Stop	Emergency Stop -D	H4	Com3	N/C -D	CFG	CFG
12	Servo_Fault	Servo Drive Fault -D	N4	Com3	N/A	CFG	CFG
13	TT1	TT1	H4	Com4	N/O	CFG	CFG
14	Probe	Probe	H4	Com4	N/O	CFG	CFG
15	Probe Detect	Probe Detected	H4	Com4	N/O	CFG	CFG
16	PLC_OK	PLC Integrity -D	N/A	N/A	N/A	INT	N/A
17	Door Interlock	Door Interlock	H4	Com4	N/C	CFG	CFG
18	Low Lube	Low Lube	H3	Com5	N/C	CFG	CFG
19	Zero Speed	Spindle Zero Speed	H3	Com5	N/O	CFG	CFG
20	At Speed	Spindle At Speed	H3	Com5	N/O	CFG	CFG
21	Orient Complete	Orient Complete	H3	Com5	N/O	CFG	CFG
22	Tool Clamped	Tool Clamped	H3	Com6	N/O	CFG	CFG
23	N/A	N/A	H3	Com6	N/A	CFG	CFG
24	Tool Release	Tool Release Switch	H3	Com6	N/O	CFG	CFG
25	Spindle_ok	Spindle Drive Fault	H3	Com6	N/C	CFG	CFG
26	Tool Counter	Tool Counter*	H3	Com7	N/O	CFG	CFG
27	Carousel_Out	Carousel Out Input	H3	Com7	N/O	CFG	CFG
28	Carousel_In	Carousel In Input	H3	Com7	N/O	CFG	CFG
29	N/A	N/A	H3	Com7	N/A	CFG	CFG
30	Rotary_Home	Rotary Home	H3	Com8	N/O	CFG	CFG
31	Rotary_Clamp	Rotary Clamped	H3	Com8	N/O	CFG	CFG
32	Air_Low	Air Pressure Low	H3	Com8	N/C	CFG	CFG
59	Arm Clamp	Arm Clamp	H3	Com9	SI-D	CFG	CFG
60	Arm Stop	Arm Stop	H3	Com9	SI-D	CFG	CFG
61	Arm Home	Arm Home	H3	Com9	SI-D	CFG	CFG
62	Chiller	Chiller	H3	Com9	SI-D	CFG	CFG

## PLC Build Sheet

### Output Definitions DC3IO

The outputs listed below are intended to help determine the number and the type of the outputs that your system requires. The outputs which have been pre-assigned below are intended as a reference only. The physical outputs used, output types and voltages and/or functional descriptions may vary depending on your system

<b>PLC Out</b>	<b>Label</b>	<b>Purpose or Function</b>	<b>Type*</b>	<b>Voltage</b>
<b>1</b>	<b>E_Stop</b>	<b>Emergency Stop</b>	<b>OC</b>	<b>5VDC -D</b>
<b>2</b>	<b>Lube</b>	<b>Lube Pump</b>	<b>SPST</b>	<b>110VAC</b>
<b>3</b>	<b>Flood</b>	<b>Flood Pump</b>	<b>SPST</b>	<b>110VAC</b>
<b>4</b>	<b>Mist</b>	<b>Mist Solenoid</b>	<b>SPST</b>	<b>110VAC</b>
<b>5</b>	<b>Car_Dir</b>	<b>Chg Carousel Direction</b>	<b>OC</b>	<b>5VDC -D</b>
<b>6</b>	<b>Car_Out</b>	<b>Carousel Out Solenoid</b>	<b>OC</b>	<b>5VDC -D</b>
<b>7</b>	<b>Tool Clamp</b>	<b>Tool Clamp Solenoid</b>	<b>OC</b>	<b>5VDC -D</b>
<b>8</b>	<b>Air Blow</b>	<b>Chip Air Blow</b>	<b>OC</b>	<b>5VDC -D</b>
<b>9</b>	<b>Car_In</b>	<b>Carousel In Solenoid</b>	<b>OC</b>	<b>5VDC -D</b>
<b>10</b>	<b>Orient</b>	<b>Orient Spindle</b>	<b>OC</b>	<b>5VDC -D</b>
<b>11</b>	<b>Chiller</b>	<b>Spindle Chiller</b>	<b>OC</b>	<b>5VDC -D</b>
<b>12</b>	<b>Spin_Fan</b>	<b>Spindle Cooling Fan</b>	<b>OC</b>	<b>5VDC -D</b>
<b>13</b>	<b>Spin_Dir</b>	<b>Spindle Direction</b>	<b>SPDT</b>	<b>Inv Com</b>
<b>14</b>	<b>Spin_En</b>	<b>Spindle Enable</b>	<b>SPDT</b>	<b>Inv Com</b>
<b>15</b>	<b>Inv_Reset</b>	<b>Inverter Reset</b>	<b>SPST</b>	<b>Inv Com</b>
<b>16</b>	<b>PLC Fault</b>	<b>PLC Fault</b>	<b>INT</b>	<b>N/A</b>
<b>29</b>	<b>Gear_Chge</b>	<b>Gear Change</b>	<b>OC</b>	<b>5VDC -D</b>
<b>30</b>	<b>Rot_Clamp</b>	<b>Rotary Clamp</b>	<b>SPST</b>	<b>5VDC -D</b>
<b>31</b>	<b>Car_En*</b>	<b>Carousel Enable</b>	<b>OC</b>	<b>5VDC -D</b>
<b>32</b>	<b>Red Light</b>	<b>Red Light</b>	<b>OC</b>	<b>5VDC -D</b>
<b>33</b>	<b>Grn Light</b>	<b>Green Light</b>	<b>OC</b>	<b>5VDC -D</b>
<b>34</b>	<b>Yel Light</b>	<b>Yellow Light</b>	<b>OC</b>	<b>5VDC -D</b>
<b>35</b>	<b>Worklight</b>	<b>Worklight</b>	<b>OC</b>	<b>5VDC -D</b>
<b>36</b>	<b>Auxiliary 1</b>	<b>Auxiliary 1</b>	<b>OC</b>	<b>5VDC -D</b>
<b>37</b>	<b>Auxiliary 2</b>	<b>Auxiliary 2</b>	<b>OC</b>	<b>5VDC -D</b>
<b>38</b>	<b>Auxiliary 3</b>	<b>Auxiliary 3</b>	<b>OC</b>	<b>5VDC -D</b>
<b>39</b>	<b>Auxiliary 4</b>	<b>Auxiliary 4</b>	<b>OC</b>	<b>5VDC -D</b>
<b>59</b>	<b>Auxiliary 5</b>	<b>Auxiliary 5</b>	<b>OC</b>	<b>5VDC -D</b>
<b>60</b>	<b>Auxiliary 6</b>	<b>Auxiliary 6</b>	<b>OC</b>	<b>5VDC -D</b>
<b>61</b>	<b>Auxiliary 7</b>	<b>Auxiliary 7</b>	<b>OC</b>	<b>5VDC -D</b>
<b>62</b>	<b>Auxiliary 8</b>	<b>Auxiliary 8</b>	<b>OC</b>	<b>5VDC -D</b>
<b>Analog</b>	<b>Spin out</b>	<b>Inverter Ref Voltage</b>	<b>Analog</b>	<b>0-10VDC</b>

## PLC Build Sheet

### Output Definitions RTK3

The outputs listed below are intended to help determine the number and the type of the outputs that your system requires. The outputs which have been pre-assigned below are intended as a reference only. The physical outputs used, output types and voltages and/or functional descriptions may vary depending on your system

<b>PLC Out</b>	<b>Label</b>	<b>Purpose or Function</b>	<b>Type*</b>	<b>Voltage</b>
1	E_Stop	Emergency Stop	SPST	24VAC
2	Lube	Lube Pump	DPST	110VAC
3	Flood	Flood Pump	SPST	3 Phase
4	Mist	Mist Solenoid	SPST	110VAC
5	Car_Dir	Chg Carousel Direction	SPDT	110VAC
6	Car_Out	Carousel Out Solenoid	SPST	Internal
7	Tool Clamp	Tool Clamp Solenoid	SPST	110VAC
8	Air Blow	Chip Air Blow	SPST	110VAC
9	Car_In	Carousel In Solenoid	SPST	110VAC
10	Orient	Orient Spindle	SPST	110VAC
11	Chiller	Spindle Chiller	SPST	Relay
12	Spin_Fan	Spindle Cooling Fan	SPST	Relay
13	Spin_Dir	Spindle Direction	SPDT	Relay
14	Spin_En	Spindle Enable	SPST	Relay
15	Spin_En	Inverter Reset	SPST	Relay
16	PLC Fault	PLC Fault	INT	INT
29	Gear Chge	Gear Change	OC	Relay
30	Rot Clamp	Rotary Clamp	SPST	110VAC
31	Car_En*	Carousel Enable	Relay	3 PHASE
32	Red Light	Red Light	SPST	110VAC
33	Grn Light	Green Light	SPST	110VAC
34	Yel Light	Yellow Light	SPST	110VAC
35	Worklight	Worklight	SPST	110VAC
36	Auxiliary 1	Auxiliary 1	SPST	Relay
37	Auxiliary 2	Auxiliary 2	SPST	CFG
38	Auxiliary 3	Auxiliary 3	OC	5VDC-D
39	Auxiliary 4	Auxiliary 4	OC	5VDC-D
40	Fast_I/O_En	Fast I/O Enable	N/A	N/A
59	Auxiliary 5	Auxiliary 5	OC	5VDC -D
60	Auxiliary 6	Auxiliary 6	OC	5VDC -D
61	Auxiliary 7	Auxiliary 7	OC	5VDC -D
62	Auxiliary 8	Auxiliary 8	OC	5VDC -D
Analog	Spin out	Inverter Ref Voltage	Analog	0-10VDC

### Output Definitions PLCIO2

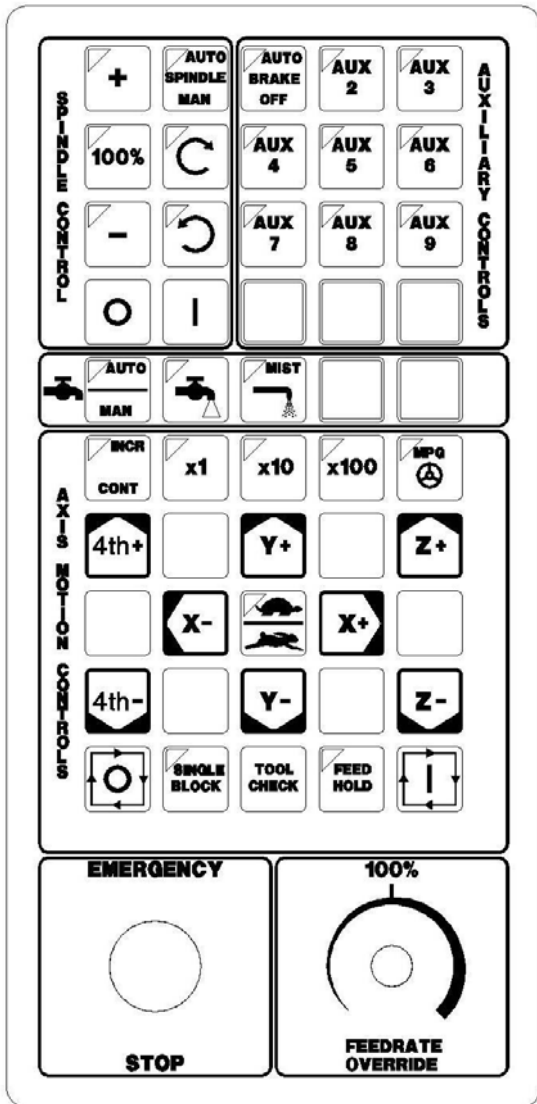
The outputs listed below are intended to help determine the number and the type of the outputs that your system requires. The outputs which have been pre-assigned below are intended as a reference only. The physical outputs used, output types and voltages and/or functional descriptions may vary depending on your system

<b>PLC Out</b>	<b>Label</b>	<b>Purpose or Function</b>	<b>Type*</b>	<b>Voltage</b>
1	E_Stop	Emergency Stop	SPST	CFG
2	Lube	Lube Pump	SPST	CFG
3	Flood	Flood Pump	SPST	CFG
4	Mist	Mist Solenoid	SPST	CFG
5	Car_Dir	Chg Carousel Direction	SPST	CFG
6	Car_Out	Carousel Out Solenoid	SPST	CFG
7	Tool Clamp	Tool Clamp Solenoid	SPST	CFG
8	Air Blow	Chip Air Blow	SPST	CFG
9	Car_In	Carousel In Solenoid	SPST	CFG
10	Orient	Orient Spindle	SPST	CFG
11	Chiller	Spindle Chiller	SPST	CFG
12	Spin_Fan	Spindle Cooling Fan	SPST	CFG
13	Spin_Dir	Spindle Direction	SPST	CFG
14	Spin_En	Spindle Enable	SPST	CFG
15	Spin_En	Inverter Reset	SPDT	CFG
16	PLC Fault	PLC Fault	INT	CFG
29	Gear Chge	Gear Change	SPST	CFG
30	Rot Clamp	Rotary Clamp	SPST	CFG
31	Car_En*	Carousel Enable	SPST	CFG
32	Red Light	Red Light	SPST	CFG
33	Grn Light	Green Light	SPST	CFG
34	Yel Light	Yellow Light	SPST	CFG
35	Worklight	Worklight	SPST	CFG
36	Auxiliary 1	Auxiliary 1	OC	5VDC-D
37	Auxiliary 2	Auxiliary 2	OC	5VDC-D
38	Auxiliary 3	Auxiliary 3	OC	5VDC-D
39	Auxiliary 4	Auxiliary 4	OC	5VDC-D
40	Fast I/O_En	Fast I/O Enable	N/A	CFG
41	Auxiliary 5	Auxiliary 5	OC	5VDC-D
42	Auxiliary 6	Auxiliary 6	OC	5VDC-D
43	Auxiliary 7	Auxiliary 7	OC	5VDC-D
44	Auxiliary 8	Auxiliary 8	OC	5VDC-D
45	Auxiliary 9	Auxiliary 9	OC	5VDC-D
46	Auxiliary 10	Auxiliary 10	OC	5VDC-D
47	Auxiliary 11	Auxiliary 11	OC	5VDC-D
48	Auxiliary 12	Auxiliary 12	OC	5VDC-D
59	Auxiliary 13	Auxiliary 13	OC	5VDC-D
60	Auxiliary 14	Auxiliary 14	OC	5VDC-D
61	Auxiliary 15	Auxiliary 15	OC	5VDC-D
62	Auxiliary 16	Auxiliary 16	OC	5VDC-D
Analog	Analog	Inveter Reference	0-10VDC	CFG

## PLC Build Sheet

### Jog Panel Definitions

The Jog Panel offers 9 definable keys for custom auxiliary functions and includes keys for handling pre-defined functions used for cycle start and cycle cancel, axis jogging (incremental and continuous), spindle and coolant operation, tool check, single block mode and feed hold.



#	Label	Function or Macro
1		
2		
3		
4		
5		
6		
7		
8		
9		

In the example above, auxiliary key #1 is assigned to toggle the spindle brake mode between auto and off. If auto brake mode is active the spindle brake is typically programmed to automatically turn on if the spindle is commanded to stop and to turn off when the spindle is commanded to start. This is a loose definition and is intended as an example only as several variations of “auto brake mode” may exist.

Some functions you may want to consider assigning an aux key to include:

Turning on a Work light, Indexing a tool carousel, Set part zero, Clamp on/off etc, Auger on/off etc. . . .

# PLC Build Sheet

## Definitions of Functions and Macros

Centroid wants to supply exactly what you ordered. To do so, it is very important that you provide accurate and complete definitions for all your requested functions and macros. If you have any questions, please call and we will help you complete this form. It is your responsibility to insure that the Function and Macro definitions you provide are exactly as you require them. If you discover changes are necessary after your PLC build sheet has been submitted, contact us immediately. Changes after programming has begun are \$75/hr, \$250 minimum.

### **Function and Macro definitions must include the following:**

1. Title
2. The trigger event.
3. A list of Inputs and Outputs traversed in the function.
4. A list of all requested fault conditions associated with this function and their respective triggers.
5. A timeout specification (if applicable). This timeout should be the amount of time in which the function can reasonably be expected to successfully complete. If the timeout period is exceeded, the appropriate fault condition should be declared and the function terminated.
6. The sequence of events. The sequence of events must include:
  - a) The order of events, beginning with the trigger.
  - b) Initial states for all I/O.
  - c) All state changes, in the order that they should occur.
  - d) Required dwell times (if any) such as a dwell needed to wait for the spindle to stop

### **Function and Macro definitions must use the following format:**

**Function or Macro Title:**

**Physical I/O traversed in this function:**

**Inputs:**

**Outputs:**

**Fault Conditions:**

**Function or Macro timeout:**

**Trigger:**

**Initial I/O states :**

**Outputs- On = X.**

**Inputs- Closed = X**

**Sequence of Events:**

1. Trigger
- 2.
- 3.
- 4.
- 5.....

## Function or Macro Definition

### Title – Automatic Tool Change

Physical I/O traversed in this function and initial states: Outputs- On = X.

Inputs- Closed = X

#### Inputs:

Zero Speed	Orient Complete	Tool Clamped	Car Out Input	Car In Input	Tool Counter
		X	X		X

#### Outputs:

Car Dir	Car Enable	Car Out	Car In	Air Blow	Tool Unclamp	

**Fault Conditions:** None defined

**Timeout:** 40 seconds

**Trigger:** M6

#### Sequence of Events

1. Trigger- M6
2. Command spindle to stop
3. Move Z axis to carousel position
4. Wait For Zero Speed to close
5. Turn on Orient Output
6. Wait for Orient Complete Input
7. Turn on Carousel In Solenoid
8. Carousel Out Input opens
9. Carousel In Input closes
10. Turn on Tool Unclamp Output, Turn on Air Blow Output
11. Wait for Tool Clamped input to open
12. Raise Z axis to clearance position
13. Turn on Car En Out, (Turn on Car\_Dir depending on direction)
14. Tool Counter Input toggles as carousel indexes carousel to next tool position
15. Turn off Car\_En Out, Turn off Car\_Dir
16. Move Z to carousel position
17. Turn off Tool Unclamp Output, Turn off Air Blow Output
18. Wait for Tool Clamped Input to close.
19. Turn off Carousel In Solenoid
20. Turn on Carousel Out Solenoid
21. Carousel In input opens
22. Wait for Carousel Out Input to close
23. Turn off Carousel Out Output
24. Function Complete

#### Additional considerations and fault conditions/timeouts you may want to add to the above function:

1. Turn all or some of the outputs on only momentarily. Either until specified event occurs, for a specific period of time or a combination of both. This can help to prevent motors and solenoids from burning up.
2. Add fault conditions/timeouts between some or all the events in the sequence to insure that if an operation fails to complete in a reasonable period of time, a fault condition can be declared and appropriate error message displayed. Ex. For Events 7-9, a timer could be so that if the Carousel IN input does not close within .5 seconds of the Carousel In Output being turned on, a fault is declared and the message “Error: Carousel In Input sensor did not close after Carousel In Ouput was turned on”