

REELEX W101 Drive Tune Up Procedure

Revision A



WARNING: After installing a new drive or replacing an old one, ALWAYS tune the drive on the machine following these procedures.

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REELEX Drive Tune

Purpose of this manual is to help guide personnel in properly tuning a Reelex W101 Motor Drive that is used in most Reelex equipment. This manual applies only to Reelex W101 Motor Drives.



WARNING: W101 Drives are Supplied with 230VAC. Only qualified personnel should perform any maintenance or adjustments. Whenever tuning drives while powered, NEVER come in physical contact with the base or W101 board, and always remember to wear proper protective equipment and comply with safety standards. Failure to do so can result in injury or death.

The following tuning instructions of Reelex W101 motor drives applies to Generation 1, 2 and 3 equipment. Please read before proceeding:

Procedure and Important Notes

- Voltage measurements are always taken relative to the W101 Motor Drive's DC voltage common (wire No. 500), unless otherwise stated. Refer to images in this manual for different types of W101 boards and locations of measurement points and local DC common.
- All motor drive voltage references in tables 1 and 2 input to Connection 5 pin 4.
- Whenever connecting and/or disconnecting any wires or connectors in the machine, always ENSURE POWER IS OFF.
- If using a W101 Test Board (W101-TB), connect to CON5 and CON4, removing and replacing the present connectors. Set switches to D2000 and SPEED [NORMAL/**D2000**] [CURRENT/**SPEED**], Regardless of machine. Ensure the test board is also set to Disable [ENABLE/**DISABLE**] when connecting to the W101 board. Enabling the drive is not necessary for general tuning, but can be used with a low voltage reference to the drive to ensure proper direction of rotation, operation and/or troubleshooting.
- If a W101-TB is not available, a 5K ohm potentiometer can be used to provide a voltage reference to the drive. First, ensure any present voltage reference wires are disconnected from connections 5 or 4. Next, connect one end of the potentiometer to +12VDC (CON5.9), the other end to -12VDC (CON5.8), and the wiper to VRef (CON5.4). Refer to images in this manual for locations of connections.
- Values for Gain, Forward and Reverse current limits listed in tables 1 and 2 will work for a majority of applications. However, depending on specific machine, product and/or line layout, these values may require additional adjustments.
- All adjustment potentiometers on the W101 board are 20-turn POTs.
- **For Generation 1 Equipment (Machines built before 2013):**
 - GAIN is only applicable for the traverse and is adjusted on a single spindle W90 board's CAM GAIN POT P7 or dual spindle W900 board's POS POT P6. However, to ensure proper current limit settings and if enabling the drive with the W101 test board, the gain on the W101 drive will need to be set properly.
 - SPEED POT P4 setting on the Traverse W101 board is influenced by the W90 board's VELOCITY POT P6 or W900 board's VEL POT P5 setting. These POTs are Essentially in series and adjustments can be made from either location. To ensure a proper range,

you can set the SPEED POT P4 on the W101 halfway (10 turns from either end) and make speed adjustments on the W90/W900 board for the traverse drive.

- Regarding an input reference to **CON5.4**, a positive [+] reference will rotate backwards and a negative [-] reference will rotate forward. Alternatively, if referring to the machine's input reference to **CON4.5**, a positive [+] reference will rotate forward and a negative [-] reference will rotate backwards.
- The maximum speed of the D-750/D-1500 is 750 RPMs at the spindle shaft or 1125 RPMs at the spindle motor. The maximum speed of the D-510 is 500 RPMs at the spindle shaft or 1500 RPMs at the motor. Speed can be measured with frequency of the encoder pulses between S1 and Common on the W600 board. If the encoder is a 240 PPR, maximum frequency at speed 10 should be set no higher than 4.5K Hz for the D-750 and 3.0K Hz for the D-510. If the encoder is a 2400 PPR, maximum frequency at speed 10 should be no higher than 45 kHz for the D-750 and 30 kHz for the D510. adjustment is done with SPEED POT P4.
- Correct operation of the machine also relies on properly tuned W90/W900 board and 801 board (speed selector). After tuning each W101 motor drive, ensure W90/W900 and 801 boards are tuned/adjusted properly. Refer to your applicable manual.

- **For Generation 2 (PC-controlled Machines):**

- A voltage reference can be sent to the drive using troubleshooting program instead of using a W101 test board or 5K potentiometer. When in troubleshooting, you can go to MOTOR CONTROL and select the drive you want to tune. A reference is sent with a digital value ranging from 0 to 4095, where 0 = -10V, 2048 = 0V, 2248 = +1V, and 4095 = +10V. The drives do not need to be enabled to send a reference to them.

- **For Generation 2 and Generation 3 (PCB-controlled Machines):**

- With an input reference to CON5.4, a positive [+] reference will rotate forward and a negative [-] reference will rotate backwards.
- The last step in the process is to adjust SPEED POT P4. This step is done after all other adjustments are set. For this to be done properly, the machine needs to be in MODE 1 (Constant RPM) and all PID values set to 0 if applicable (take images of settings first to re-enter!). Enter zero (0) for Upper Ratio, Lower Ratio, Density, Shift and Taper. Enter 90 into Hole Size. Set SPEED POT P4 halfway initially if position is unknown (10 turns from either direction). Reset machine, tie off wire (dry run) and select speed 1. START machine and adjust SPEED POT P4 for 75 RPM (50 RPM for D-510). Once finished, re-enter coil and PID parameters. Refer to Table 3 for general PID values. Adjust traverse SPEED POT P4 while running at normal speed to center bar graphs to fine tune while running.

Figure 1A: W101 Through-Hole Component Board

NOTE: Refer to figure 1B for measurement locations.

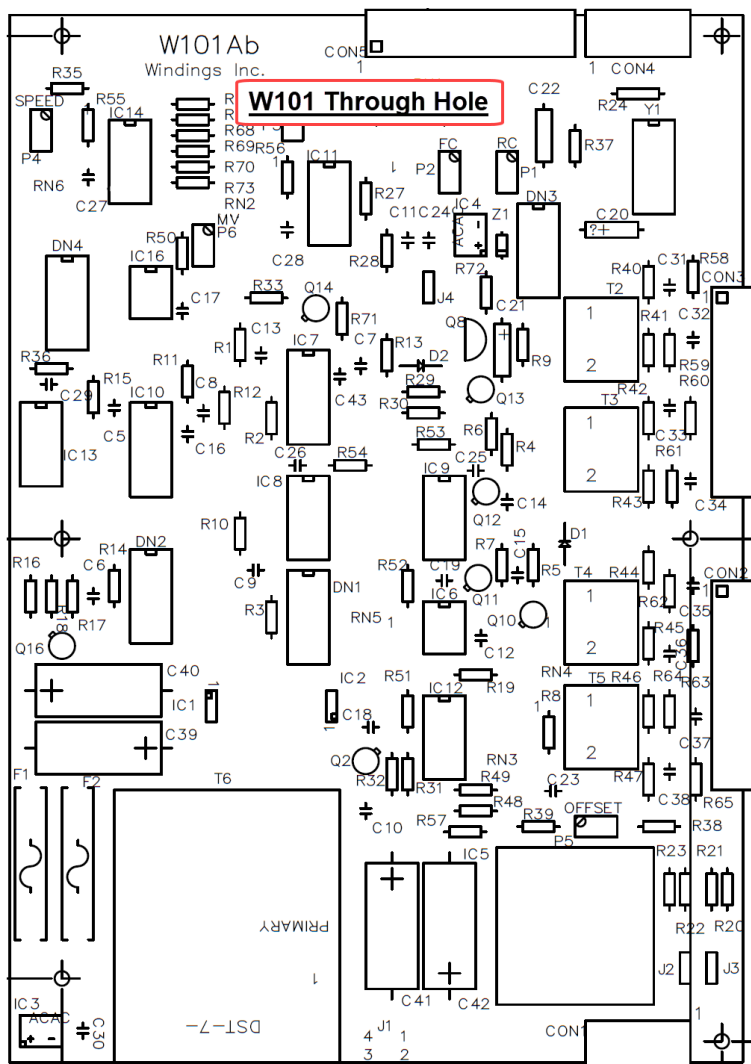


Table 1: W101 Through-Hole Component Adjustment Values

Step No. / Name	Input Voltage Ref to CON5.4 / Speed [Vref] (V)	Measurement Location Test Point	Adjusted Voltage (V)		Adjustment Potentiometer No.
			Spindle	Traverse	
1. Offset	N/A	R28 (Bottom)	0.0	0.0	P5
2. Gain	+1.0	IC11 Pin 1	-1.0	-2.0	P3
3. Forward Current	+10.0	R27 (Top)	+2.5	+2.0	P1
4. Reverse Current	-10.0	R27 (Top)	-2.5	-2.0	P2
5. Motor Voltage	N/A	IC 14 Pin 10	+2.95	+2.95	P6
6. Speed	N/A	Speed potentiometer P4 adjustment done while running to achieve desired RPM. At speed 1 adjust for 75 RPM at the spindle shaft (50 RPM for D-510).			P4

Figure 1B: W101 Through-Hole Component Board Measurement Locations and Adjustments

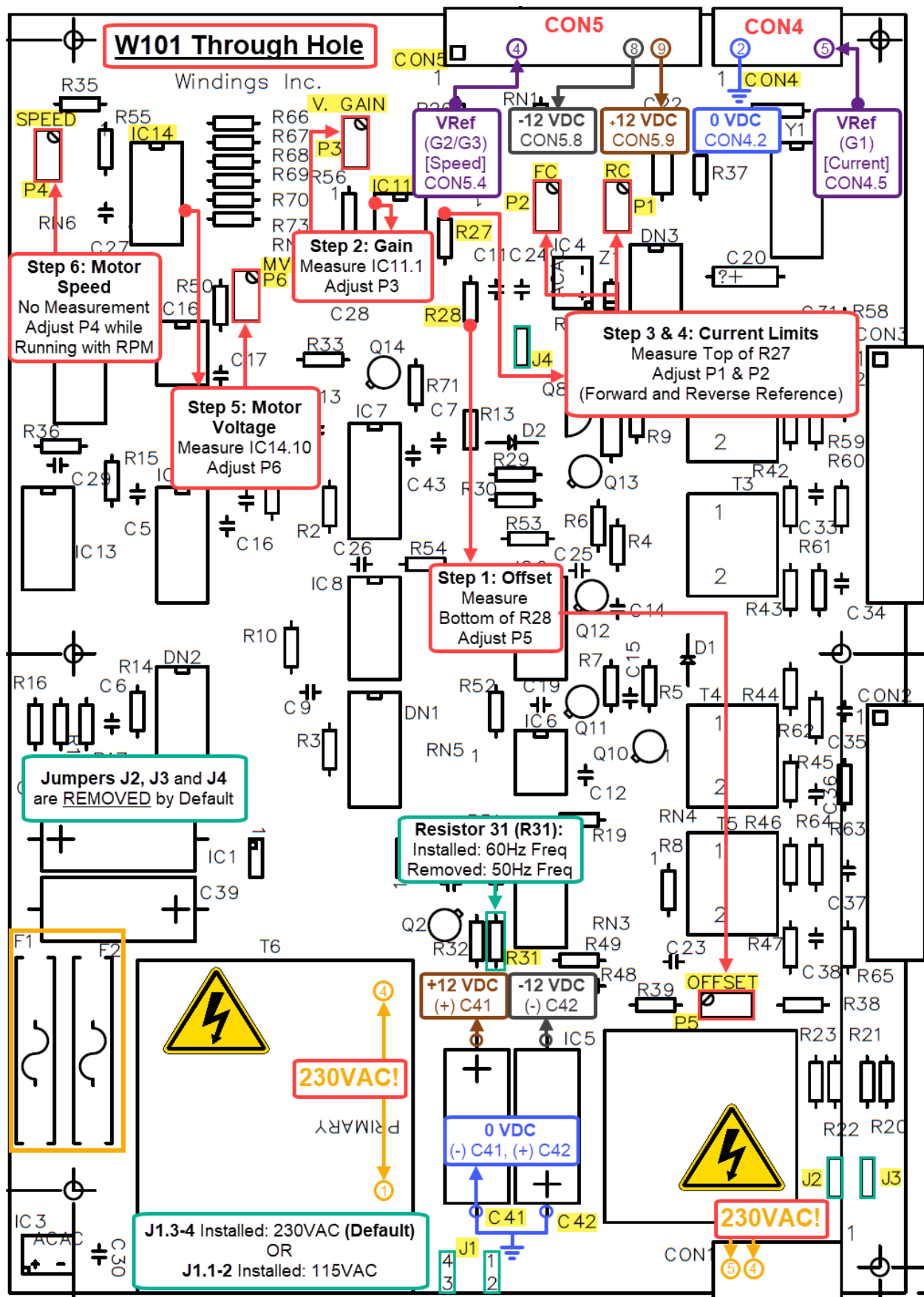


Figure 2A: W101 Surface-Mount Component Board

NOTE: Refer to figure 2B for measurement locations.

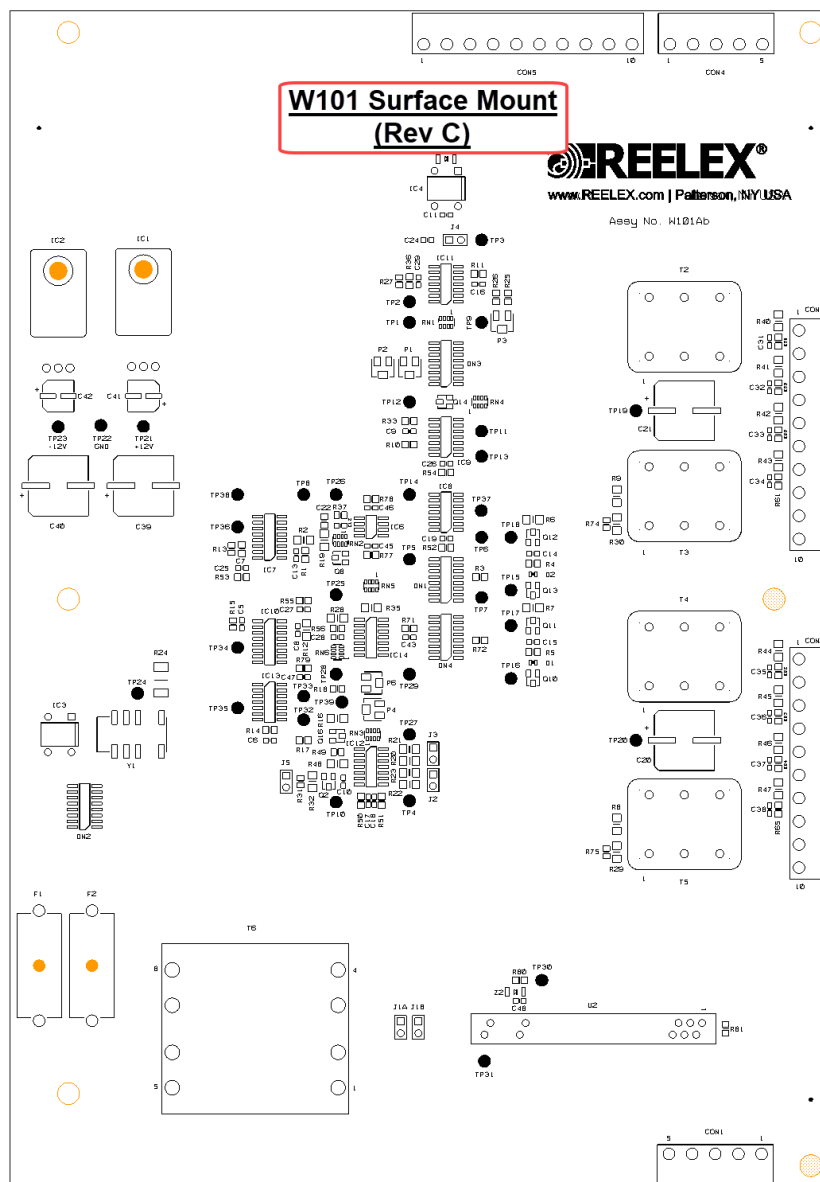


Table 2: W101 Surface-Mount Component Board Adjustment Values

Step No. / Name	Input Voltage Ref to CON5.4 / Speed [Vref] (V)	Measurement Location Test Point	Adjusted Voltage (V)		Adjustment Potentiometer No.
			Spindle	Traverse	
1. Gain	+1.0	IC11 Pin 1	-1.2	-2.0	P3
2. Forward Current	+10.0	R27 (Top)	+2.2	+2.2	P1
3. Reverse Current	-10.0	R27 (Top)	-2.2	-2.2	P2
4. Motor Voltage	N/A	IC 14 Pin 10	+2.95	+2.95	P6
5. Speed	N/A	Speed potentiometer P4 adjustment done while running to achieve desired RPM. At speed 1 adjust for 75 RPM at the spindle shaft (50 RPM for D-510).			P4

Figure 2B: W101 Surface-Mount Component Board Measurement Locations and Adjustments

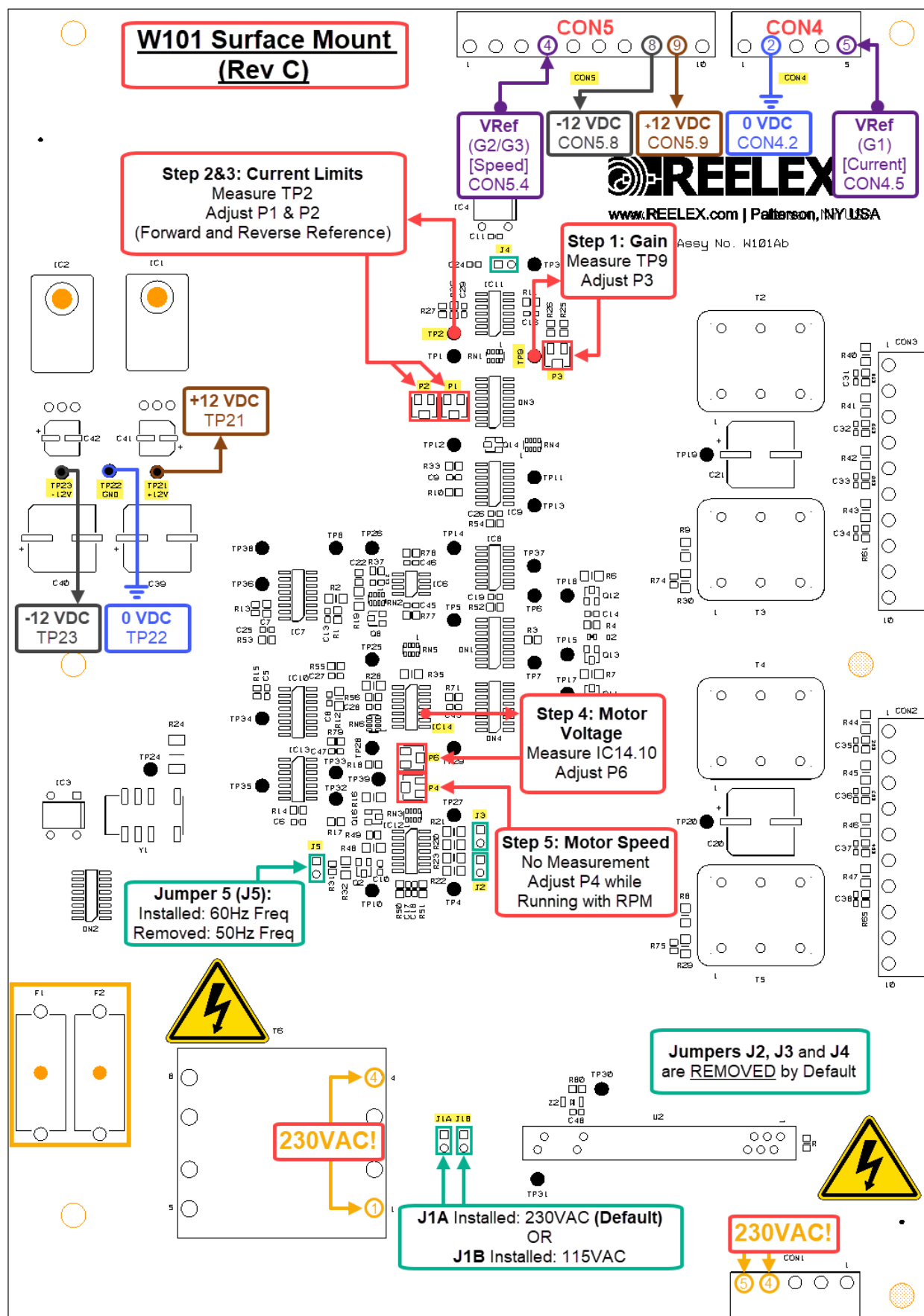


Table 3: General PID Settings

Below are general PID settings for G2 and G3 machines. It is recommended to record current values of your specific machine PID parameters and keep them the same. In the event that a drive is replaced with a different style, below gives a range of PID values that have been used in multiple different machines. After tuning drives, set parameters between specified range and adjust as required to optimize machine performance for running and positioning.

Generation 2 (G2) Through-Hole or Surface-Mount Component W101 Range				
SPINDLE VEL	1-3	100-250	100-250	1-3
SPINDLE POS	1-3	2000-15000	100-250	5-30
TRAVERSE VEL	1-2	0	0	0
TRAVERSE POS	1-4	150-400	150-300	1-4
Generation 3 (G3) Surface-Mount W101				
Parameter	PROPORTIONAL	I-TIME	I-MAX	DIFFERENTIAL
TRAVERSE	4	200	200	2
SPINDLE	6	2000	100	18