



# Web Guide Controller GC300

In accordance with Nexen's established policy of constant product improvement, the specifications contained in this manual are subject to change without notice. Technical data listed in this manual are based on the latest information available at the time of printing and are also subject to change without notice.

Technical Support: 800-843-7445  
(651) 484-5900

[www.nexengroup.com](http://www.nexengroup.com)



# DANGER

**Read this manual carefully before installation and operation.**

**Follow Nexen's instructions and integrate this unit into your system with care.**

**This unit should be installed, operated and maintained by qualified personnel ONLY.**

**Improper installation can damage your system or cause injury or death.**

**Comply with all applicable codes.**

Nexen Group, Inc.  
560 Oak Grove Parkway  
Vadnais Heights, Minnesota 55127

**ISO 9001 Certified**

Copyright 2007 Nexen Group, Inc.

# Table of Contents

INTRODUCTION-----	4
Edge Position Control-----	4
Center Position Control-----	4
INSTALLATION-----	5
GC300 Dimensions -----	5
Main Control Board-----	6
ELECTRICAL CONNECTIONS-----	7
Wiring Installation Guidelines-----	7
Sensors-----	8
Remote Offset Pot (Optional)-----	9
Web Position Signal-----	10
Automatic Centering -----	10
End-of-Travel Indications -----	10
Power Supply, Limit Switches, and Actuator-----	11
FRONT PANEL DESCRIPTION-----	12
CONFIGURATION-----	13
POWER UP, RESET, AND FACTORY RESET-----	14
Power Up-----	14
Reset-----	14
Factory Reset-----	14
OPERATION MODES-----	15
Manual-----	15
Automatic -----	15
Automatic Center-----	15
Remote Operation -----	16
SENSOR CALIBRATION AND ALIGNMENT-----	17
Automatic Sensor Calibration-----	17
Sensor Alignment-----	19
Manual Adjustment -- Gain-----	19
Manual Adjustment -- Offset-----	20
Remote Offset Control-----	21
Manual Adjustment -- Deadband -----	21
Speed Offset-----	22
INITIAL TEST RUN-----	22
TROUBLESHOOTING-----	23
SPECIFICATIONS-----	24
WARRANTY-----	25

## INTRODUCTION

Nexen's GC300 Web Guide Controller receives web edge position signals from position sensors and sends out control signals to drive an actuator motor to correct the web position. On opaque webs, the web position signals can be provided by the PH16, PH21 or AWL280 infrared edge sensors. On transparent webs and photographic film, the UH21 and UH01 ultrasonic edge sensors are generally used. For line-following applications, a Second Sensor board is added to the GC300 and an LH100 line or pattern edge-following sensor is used.

**NOTE: The Nexen PH, UH, AWL and LH type sensors are the standard sensors for the GC300. If sensors of other manufacturers are used, check the sensor specifications for compatibility with the GC300 or contact Nexen.**

### EDGE POSITION CONTROL

For Edge Position Control (EPC), a single sensor is mounted on one side of the web, with its measuring center aligned with the desired position of the web. The primary purpose for EPC is to maintain the edge of the web at the measuring center of the sensor (See Figure 1). When one PH or UH sensor is the only sensor connected to the GC300, that sensor can be selected to be either the left or right sensor using the sensor selection key on the front panel of the unit.

In EPC mode, it is acceptable to connect two different sensors to the GC300. Each sensor is set up independent of the other and connected to be either the left or right sensor. In EPC mode, only one sensor at a time can be used to sense web position.

### CENTER POSITION CONTROL

For Center Position Control (CPC), any two sensors of the same type (except LH100) can be mounted on opposite sides of the web and connected to a GC300 equipped with a Second Sensor board. In this application, the two sensors are mounted equally spaced from the center-line of the machine and are used to maintain alignment of the web center-line to the center-line of the machine (See Figure 2).

**NOTE: To determine which sensor is right and which sensor is left, view the web machine with the web moving away from the viewer. The sensor on the viewer's left is the left sensor and the sensor on the viewer's right is the right sensor (See Figure 3).**

For each sensor there are three parameters that can be set automatically or manually. The maximum values of these parameters are determined by their types:

**GAIN** is the parameter which determines the proportion of control output to the sensor error signal.

To print 1" from web edge:  
Align centerline of sensor 1"  
outside of printed impression.

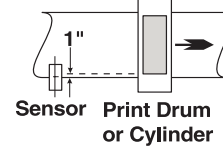


FIGURE 1

To maintain the centerline of the web  
coincident with machine centerline:  
 $A=B$

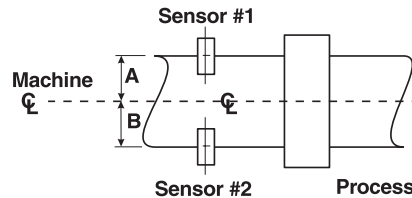


FIGURE 2

To determine which sensor is right and which sensor is left,  
view the web machine with the web moving away from the viewer.

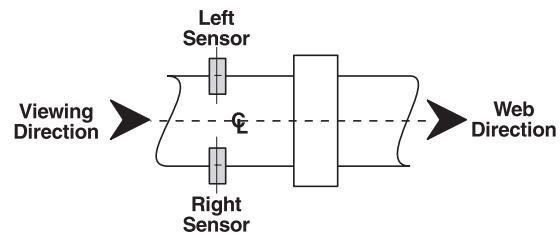


FIGURE 3

**OFFSET** is the fine adjustment of the web edge from the center-line of the sensor.

**DEADBAND** is the dead zone of the web position signal. If the web position error is less than this value, the controller will ignore the error.

An auto-sensor calibration will calibrate the sensors and automatically set up the parameters: Gain, Offset, and Deadband. During operation, the parameters of each sensor can be manually adjusted and stored in the memory.

When using CPC mode, each sensor should be calibrated separately.

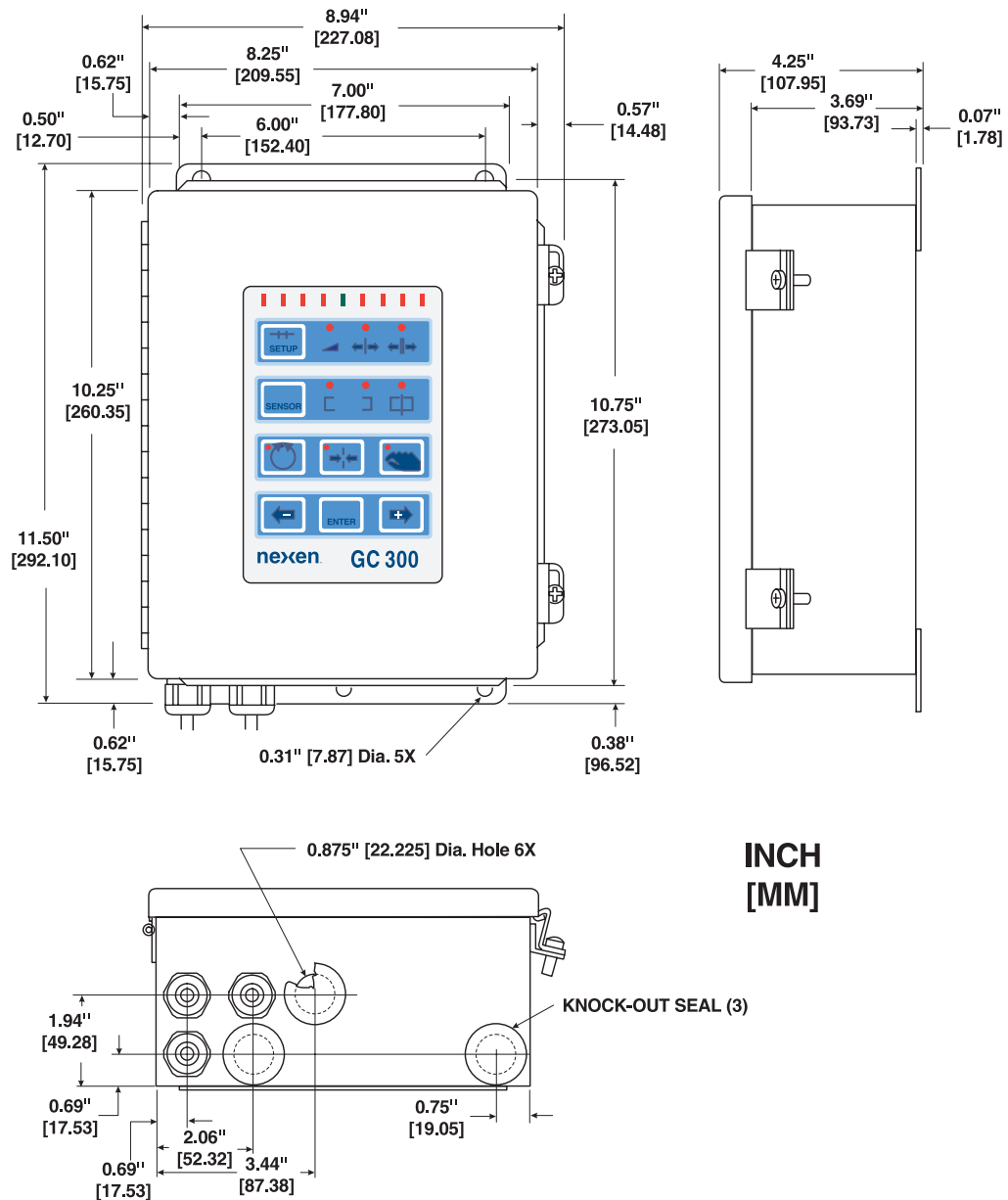
## INSTALLATION

**NOTE:** The GC300 is an electronic component and should be mounted in a shock, vibration, and moisture free area, which has an ambient temperature greater than 32°F [0°C] and less than 122°F [50°C]. Excessive temperatures will cause the GC300 to stop normal function and give an error signal (See TROUBLESHOOTING).



### WARNING

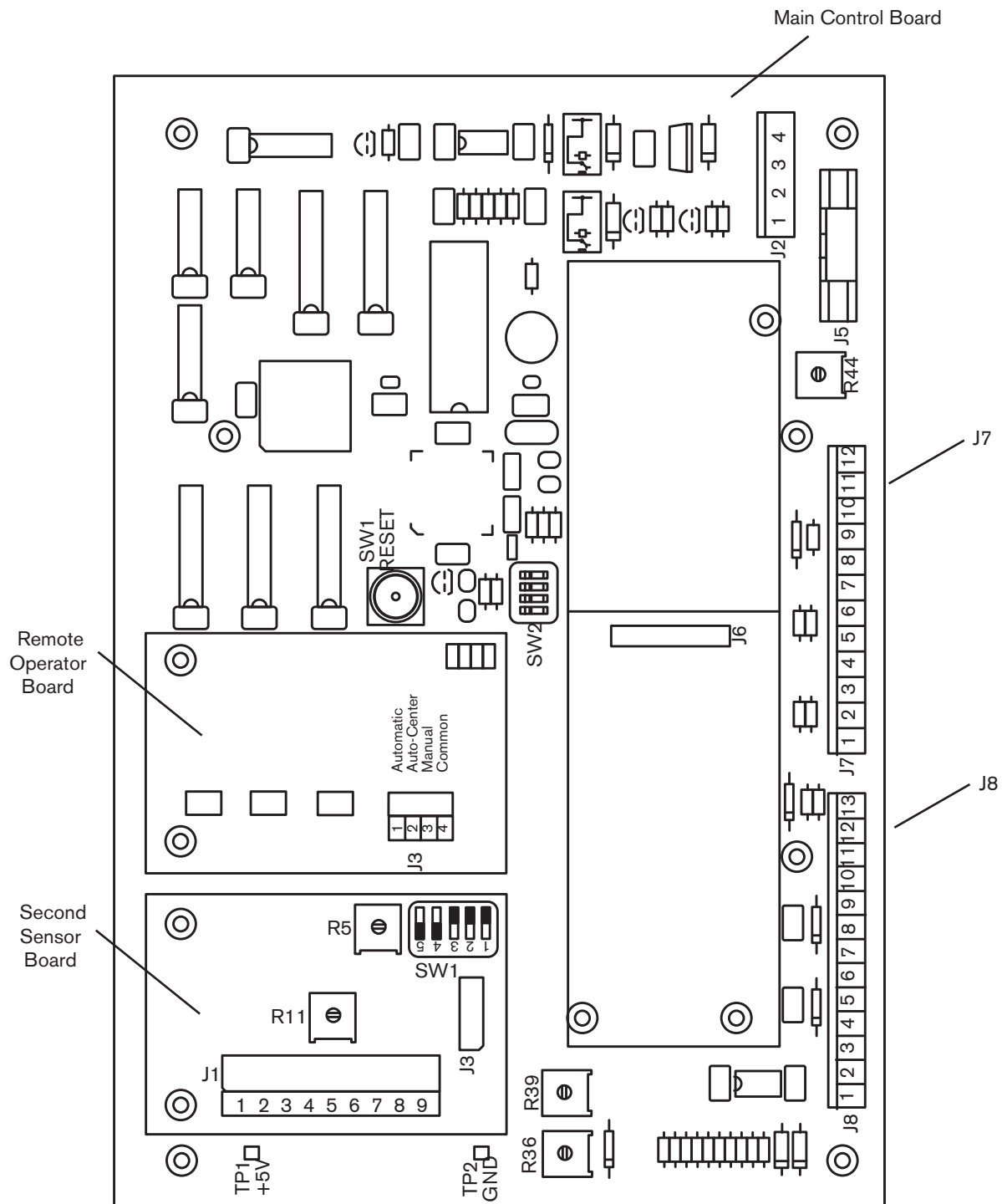
An AC power method of disconnect must be wired externally as there is no power ON/OFF switch on the GC300. Prior to connecting any wires, selecting internal switch settings or opening the controller cover be sure the AC power is turned off and locked and proper warning notices are applied according to safety regulations.



**INCH  
[MM]**

**FIGURE 4a  
MOUNTING DIMENSIONS**

The Main Control Board is mounted on the inside of the front cover of the GC300, oriented as shown in Figure 4b.



**FIGURE 4b**  
**ELECTRICAL CONNECTIONS**

### WIRING INSTALLATION GUIDELINES

This product is designed to minimize the effects of ElectroMagnetic Interference (EMI) on its operation, but as with any electronic device, proper installation and wiring methods are necessary to ensure proper operation. By doing so, the interference from external effects such as electrical line spikes, electrical noise, static electricity, etc. will be minimized. The following methods outline wiring installation guidelines to protect your system:

- All input and output signal and sensor cables must be shielded with the shields tied to earth ground at one end. In case of very high frequency (MHz range) electrical noise, both ends of the shield need to be tied to earth ground.
- Keep cable length as short as possible. Think of them as antennae for noise.
- Use power line filters to suppress interference on the AC voltage lines that power the unit.
- Place a resistor-capacitor network (snubber) across inductive coils such as relays and solenoids in order to stop electrical interference at the source (See Figure 5).
- Isolate signal and sensor cables from cables carrying AC voltages, power for high current loads or relays and solenoids. Either relocate the signal and sensor cables away from other cables or use grounded metal conduits to shield them. This will reduce the potential for noise interference between the signal and sensor cables and the other noisy cables.

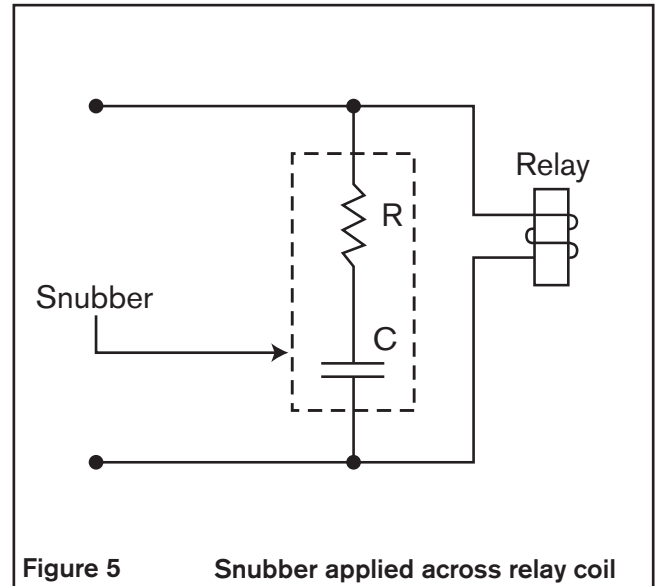


Figure 5 Snubber applied across relay coil

For environments that experience high levels of static electricity follow these additional guidelines:

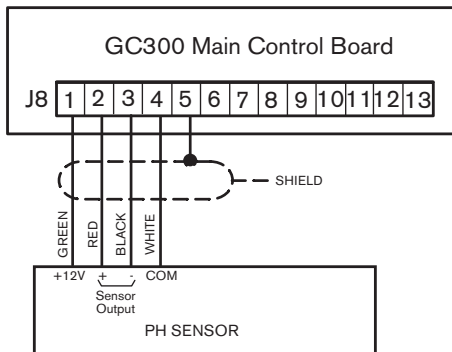
- Remove the static charge from material carrying it. In the case of webs that carry static charges, there are static charge removal products available such as static bars and ionized blowers.
- Ensure that sensors and machine frames are grounded to earth through a low impedance path.
- Wrap grounding tinsel around sensors and cables that are close to the source of the static electricity and ground the tinsel to earth.
- Tie all signal and sensor cable shields directly to earth ground without passing through the electronic device. This will help prevent high voltage interference from coupling into other circuits within the device.



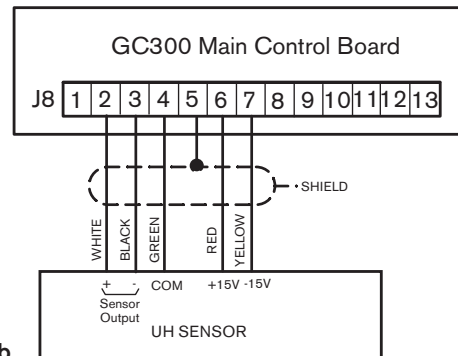
## WARNING

An AC power disconnect must be wired externally as there is no power ON/OFF switch on the GC300. Prior to connecting any wires, selecting internal switch settings or opening the controller cover be sure the AC power is turned off and locked and proper warning notices are applied according to safety regulations.

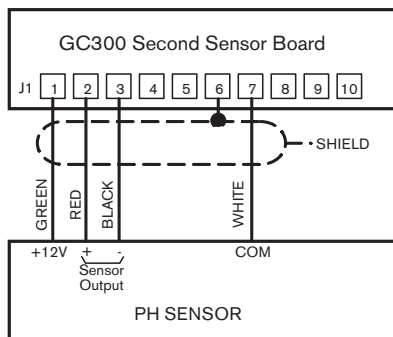
1. For Edge Position Control (EPC), only one sensor is required. Connect this sensor as shown in Figure 6.
2. For systems using two sensors in EPC mode, connect the "left" sensor to connector J8 on the GC300 Main Control Board and the "right" sensor to J1 of the Second Sensor Board (See Figures 7 and 8).
3. For Center Position Control (CPC), two Sensors of the same type are required. Connect the first Sensor as described in Step 1 and the second Sensor to the Second Sensor Board (See Figures 7, 8 and 9).
4. The LH100 Sensor can only be connected to the Second Sensor Board (See Figure 10).



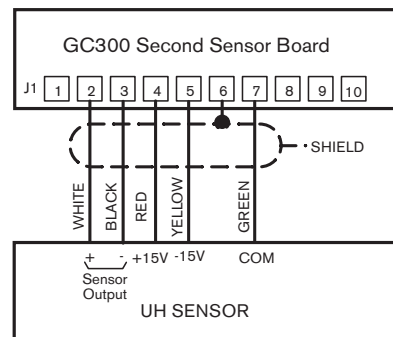
**FIGURE 6a**  
**PH SENSOR CONNECTIONS**



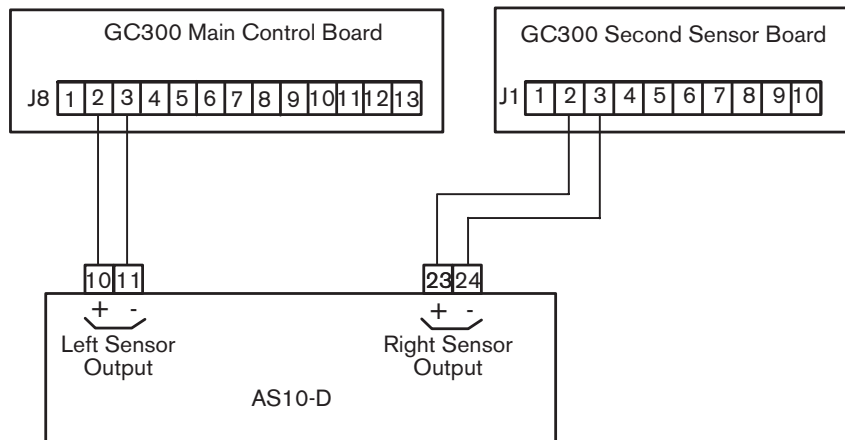
**FIGURE 6b**  
**UH SENSOR CONNECTIONS**



**FIGURE 7**

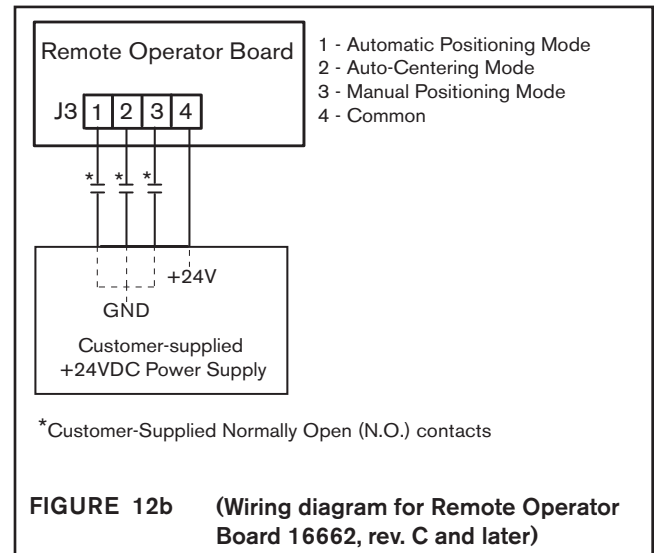
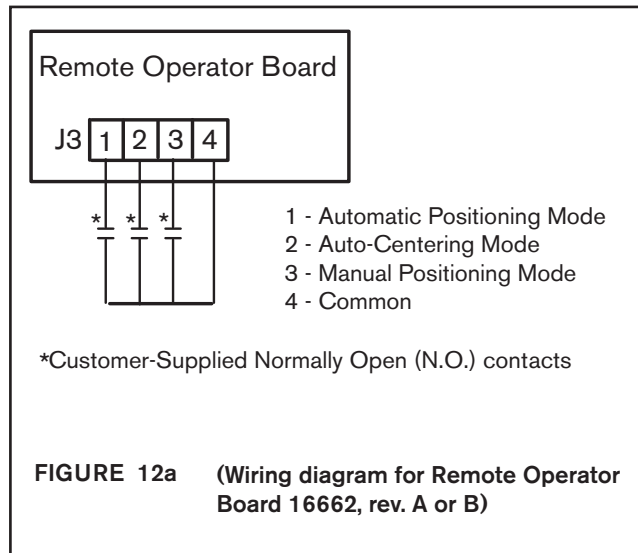
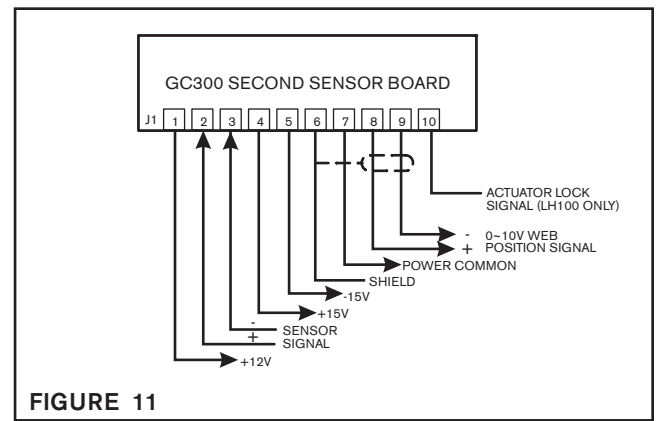
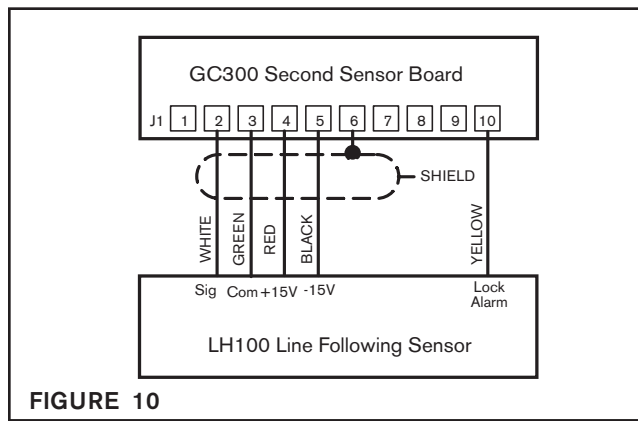


**FIGURE 8**



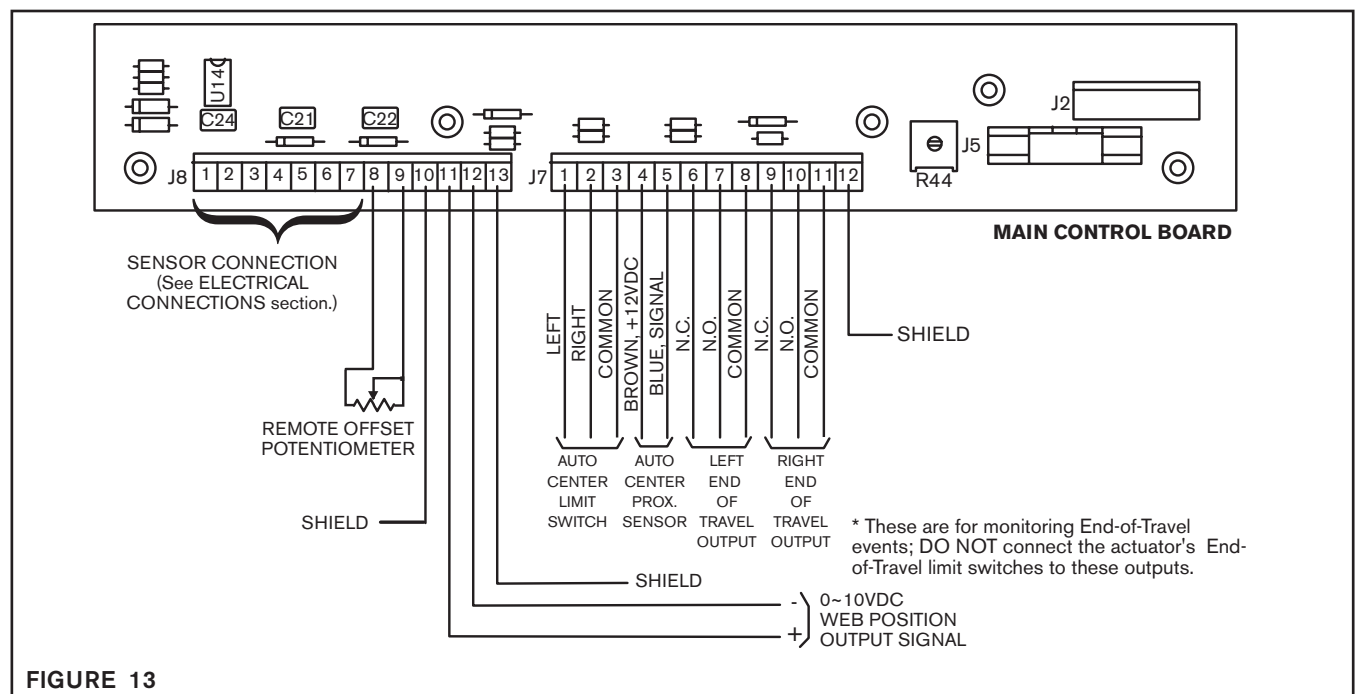
**FIGURE 9**





## REMOTE OFFSET POT (OPTIONAL)

1. Connect a customer-supplied, 2000-ohm potentiometer to J8-8 and J8-9 (See Figure 13 and page 16).



## WEB POSITION SIGNAL

The Web Position Signal is the actual signal from the web edge sensor that has been converted to a 0~10V range. This signal, available at J8-11 and J8-12 on the Main Control Board (See Figure 13), can be used to remotely display the web edge position or for a statistical process control (SPC) application. On two-sensor systems, the Web Position Signal for the second sensor is available at J1-8 and J1-9 on the Second Sensor Board (See Figure 11).

**NOTE: Because different sensors have different output levels, the Web Position Signal may need to be adjusted to achieve a true 0 - 10 VDC span.**

**One-sensor system:** Monitor the voltage at connector J8 (See Figure 13), pin 11 (+) and pin 12 (-) on the Main Control

Board (See Figure 4b). First, with the sensor unblocked adjust potentiometer R39 (See Figure 4b) on the Main Control Board until the voltage measures 10 VDC. Next, block the sensor and adjust R36 on the Main Control Board until the voltage measures 0 VDC. Recheck the voltage by unblocking and blocking the sensor and repeat the procedure if necessary.

**Two-sensor system:** Perform the steps for a One Sensor system, then perform the following. Monitor the voltage at connector J1 (See Figure 11), pin 8 (+) and pin 9 (-) on the Second Sensor Board (See Figure 4b). First, with the second sensor unblocked, adjust potentiometer R5 (See Figure 4b) on the Second Sensor Board until the voltage measures 10 VDC. Next, block the sensor and adjust R11 on the Second Sensor Board until the voltage measures 0 VDC. Recheck the voltage by unblocking and blocking the sensor and repeat the procedure if necessary.

---

## AUTOMATIC CENTERING

**NOTE: There are two methods for Automatic Centering sensing: proximity sensor or limit switches. Examine the web guide to determine which type of Automatic Centering sensing is used. If both types of Automatic Centering methods are connected, only the Automatic Centering limit switches will be engaged.**

1. Terminal J7-3 is Common for both Left and Right Limit switches (See Figure 13).
2. Terminal J7-1 is the Left Limit switch for left of center (See Figure 13).

3. Terminal J7-2 is the Right Limit switch for right of center (See Figure 13).
4. Terminal J7-4 is the +12 VDC supply voltage for the proximity sensor (See Figure 13).
5. Terminal J7-5 is the signal from the proximity sensor (See Figure 13).

---

## END-OF-TRAVEL INDICATIONS

**NOTE: The GC300 provides both local and remote indications of web guide end-of-travel situations. Two SPDT (single-pole, double-throw) outputs are available to switch small DC loads (see Specifications section for ratings) for remote indications. The Bar Graph indicators on the front panel (See Figure 15) will blink providing a local indication.**

**NOTE: If the web guide reaches the left end-of-travel, then the contact at J7-7 is CLOSED and the contact at J7-6 is OPEN, with J7-8 being the common for both (See Figure 13).**

**NOTE: If the web guide reaches the right end-of-travel, then the contact at J7-10 is CLOSED and the contact at J7-9 is OPEN, with J7-11 being the common for both (See Figure 13).**

1. Terminals J2-1 and J2-2 provide the power to drive the Linear Actuator (See Figure 14).
2. Connect the web guide end-of-travel limit switches as shown in Figure 14.

## POWER SUPPLY, LIMIT SWITCHES, AND ACTUATOR

**NOTE:** If the web guide does not have end of travel limit switches for its actuator, connect the following terminals together: J2-3 to J2-4 and J2-5 to J2-6 in order for the GC300 to operate normally (See Figure 14).

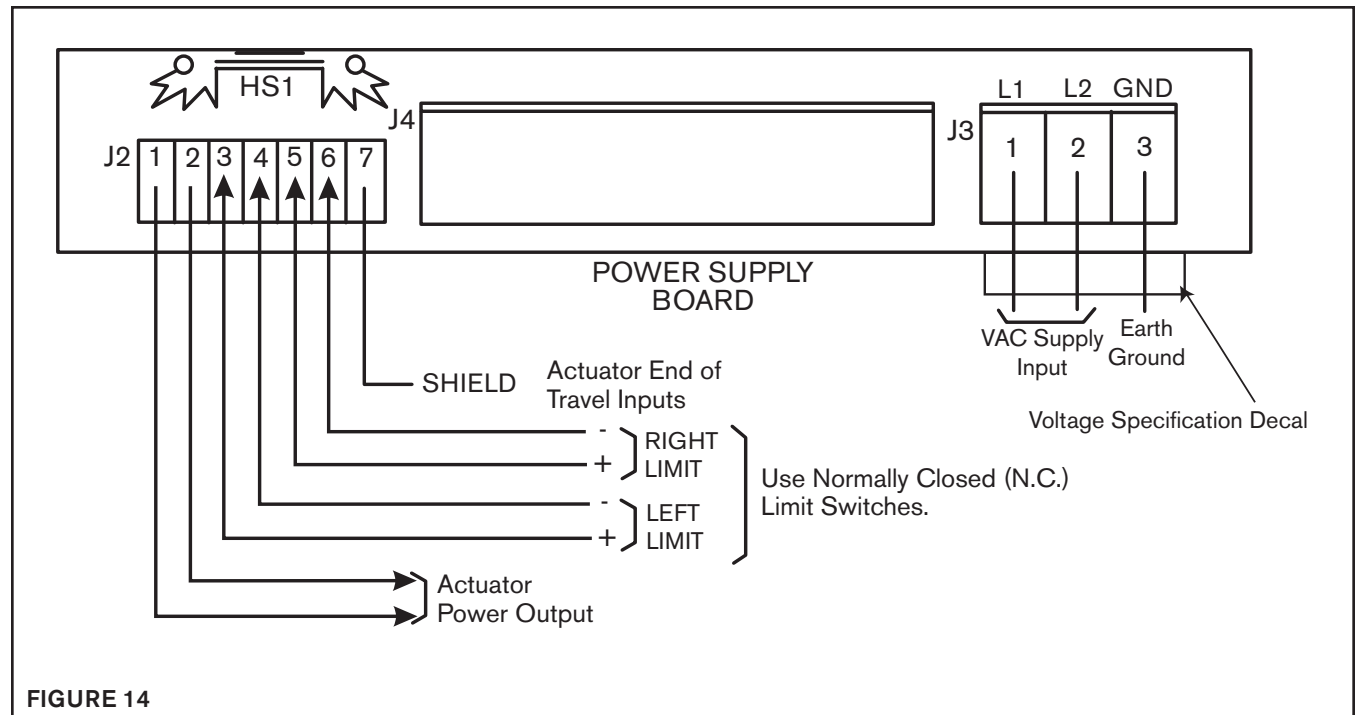
1. Terminals J2-1 and J2-2 provide the power to drive the Linear Actuator (See Figure 14).
2. Connect the web guide end-of travel limit switches as shown in Figure 14.

**NOTE:** Do not connect the AC supply voltage until you have verified that the supply voltage is the same as listed on the Voltage Specification decal (See Figure 14) located inside the GC300 enclosure.

For the 120 VAC model, connect J3-1 to the line conductor, J3-2 to the neutral conductor, and J3-3 to the earth ground conductor.

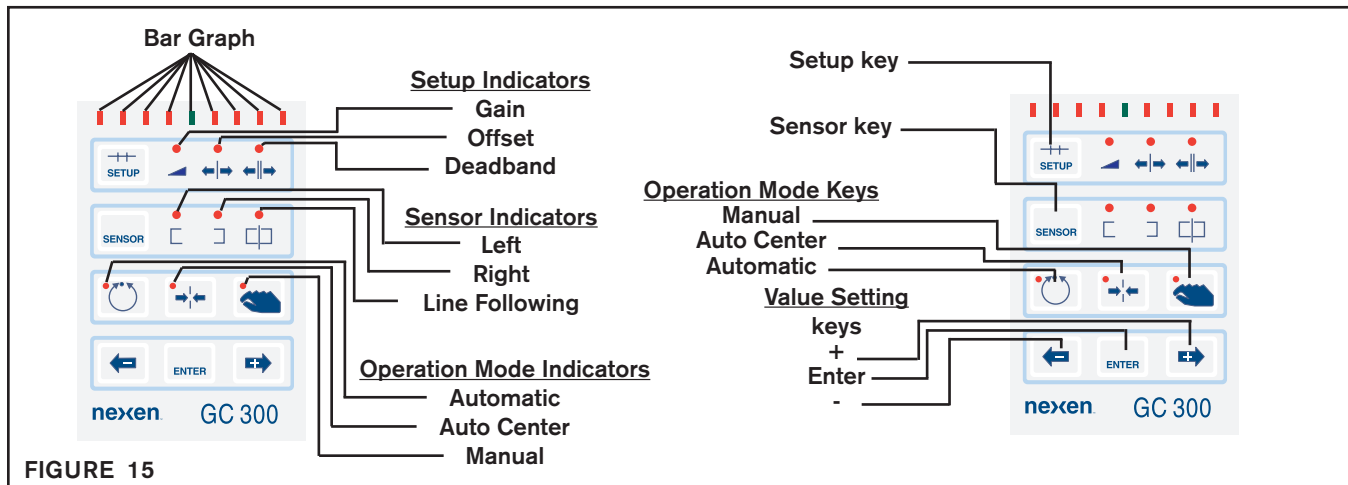
For the 240 VAC model, connect J3-1 to L1, J3-2 to L2, and J3-3 to the earth ground conductor.

3. Make AC Power connections at Terminals J3-1, J3-2, and J3-3 (See Note above and Figure 14).



**FIGURE 14**

## FRONT PANEL DESCRIPTION



### BAR GRAPH INDICATORS

These indicators display web position error, indicate faults, and display the values for Gain, Offset, and Deadband during setup. During operation, the Red indicators represent web position error and the center Green indicator represents web at center, no error.

### SETUP INDICATORS

During normal operation, all three indicators should be off. If one of them is lit, it indicates that this value is being set, and the Bar Graph indicator shows its value. During Auto Sensor calibration all three indicators will be lit at the same time.

### SENSOR INDICATORS

These three indicators stand for Left Sensor, Right Sensor, and Line Follower Sensor. When any of these indicators is lit, it indicates this sensor's position signal is being used as input. The GC300 is in EPC mode when only one indicator is lit and is in CPC mode when both the left and right sensor indicators are lit at the same time.

### OPERATION MODE INDICATORS

These three indicators stand for Automatic, Auto Center, and Manual. When any one of these indicators is lit, it indicates that this operation mode is selected. The default mode after power up is Manual. Only one of these indicators should be lit at any time.

### SETUP KEY

The Setup Key has three functions during Automatic and Manual Mode:

Press and release this button the first time and the Gain indicator lights up. When it is pressed and released the second time the Offset indicator lights up. When it is pressed and released the third time the Deadband indicator lights up, and when it is pressed and released the fourth time, all three indicators go off.

When the Setup and Sensor keys are pressed at the same time, the unit enters the Auto Sensor Calibration mode (See SENSOR CALIBRATION AND ALIGNMENT ).

When the Setup key and the Reset push-button (located on the circuit board) (See Figure 4b) are pressed at the same time, the unit calls for a Factory Reset .

### SENSOR KEY

Repeatedly pressing this key enables the user to select the right or left sensor or line-follower sensor (if present).

### OPERATION MODE KEYS

When each of these keys is pressed, its respective indicator will light, indicating the operating mode. Only one indicator will be lit for each button pushed. When any of the Setup indicators are lit, the unit will not respond to these keys.

### -, ENTER, + KEYS

The + and - keys are used to change the setup values. After changing the setup values, press the Enter key to store the new values into memory.

Also, the + and - keys are also used to move the web right or left while in Manual Mode.

## CONFIGURATION

**NOTE:** The GC300 checks DIP switch settings only during power up. If any DIP Switch settings are changed, the GC300 must go through a power-up cycle in order to recognize the changes.

1. SW2-1 and SW2-2 indicates the Sensor Type connected at Terminal J8 (See Figure 16).
2. SW2-3 is not used and should be set to OFF.
3. SW2-4 is a Lock-Out for the Setup Key and the Sensor Key; when, it is set to ON these two keys are enabled. If it is set to OFF the Setup Key and the Sensor Key will not respond when pressed (See Figure 16).
4. SW1-1, -2, -3 determine the sensor type connected to J1 on the Second Sensor Board (See Figure 16).
5. SW1-4 enables and disables the LH100 Actuator Lock Function. ON = enable / OFF = disable
6. SW1-5 adjusts gain range of Second Sensor Board. ON = for LH100 / OFF = for all other sensor types.

**NOTE:** For EPC (single-sensor systems): the sensor is connected to J8 on the Main Control Board (refer to the Electrical Connections section), and SW2 is used to select the sensor type (See Figure 16).

For CPC (dual-sensor systems): the left sensor is connected to J8 on the Main Control Board (refer to the Electrical Connections section), SW2 is used to select the left sensor type (See Figure 16), the right sensor is connected to J1 on the Second Sensor Board (refer to the Electrical Connections section), and SW1 is used to select the right sensor type (See Figure 16). The same sensor types must be selected with SW1 and SW2 in order to use CPC mode.

For line-following applications: the LH100 must be connected to J1 on the Second Sensor Board (refer to the Electrical Connections section), and SW1 is used to select the sensor type (See Figure 16).

Mixed sensor type applications (e.g., PH16 and UH21, or PH21 and LH100) are allowed and follow the same rules as in the CPC application described earlier. However, the GC300 will not allow the user to select CPC mode when two different sensors are selected with SW1 and SW2. The user can select only left sensor, right sensor, or line-follower mode.

Changes made to DIP Switches SW1 and SW2 are recognized by the GC300 only during power up or after pressing RESET (See Figure 18) with the exception of SW1-4 & SW1-5 which are recognized immediately.

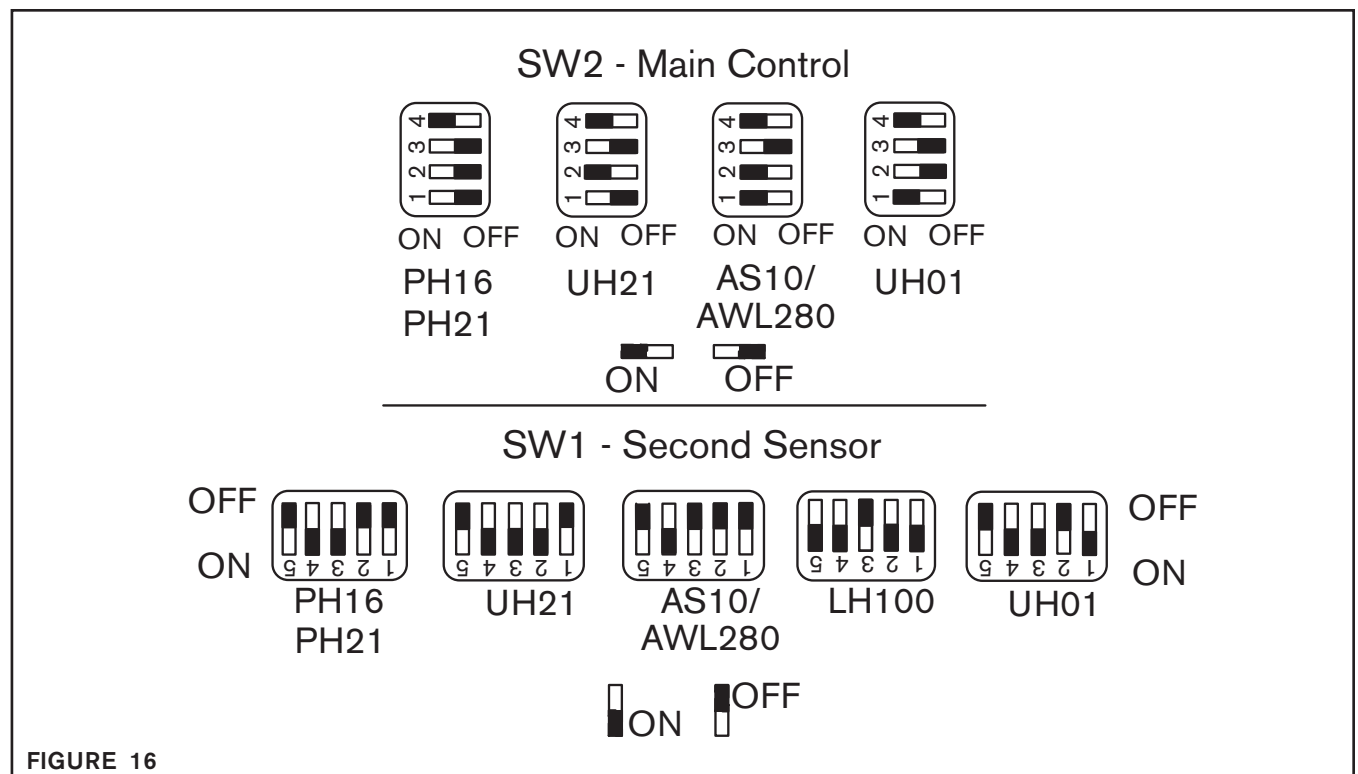


FIGURE 16

## POWER UP

**NOTE:** Prior to power up, check all electrical connections, making sure that the AC power supply is properly connected.

At power up, all the indicators on the Control Panel will flash on and off once; then, the GC300 will enter the Auto, Auto-Center, or Manual Mode that it was in prior to the previous shutdown. The GC300 will automatically reload the last settings made to sensor selection, gain, offset, and deadband (See Figure 17).

**NOTE:** If all the indicators continue flashing on and off after power up, there may be a wiring problem with the actuator's motor (Refer to TROUBLESHOOTING).

If a sensor has been changed during the power down period, a factory reset should be performed after power up.

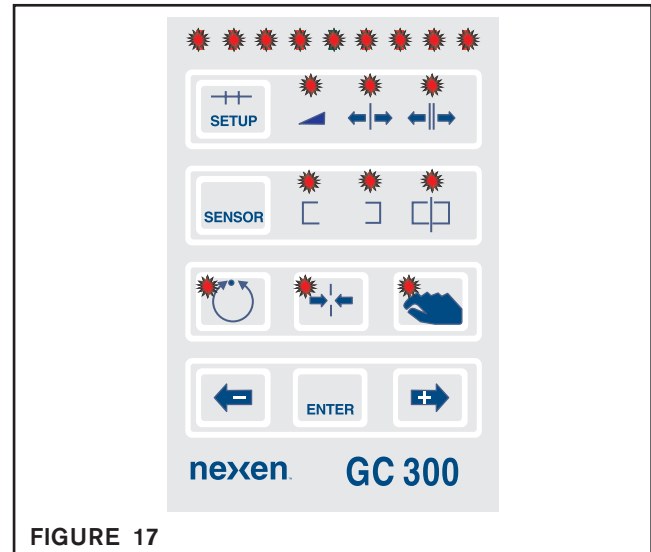


FIGURE 17

## RESET

Reset will reload the Gain, Offset, and Deadband values stored in memory for each sensor.

Press the Reset Push-button (located on the Main Circuit Board) and then release it. All the indicators will flash **ON** and **OFF** once (See Figures 17 and 18).

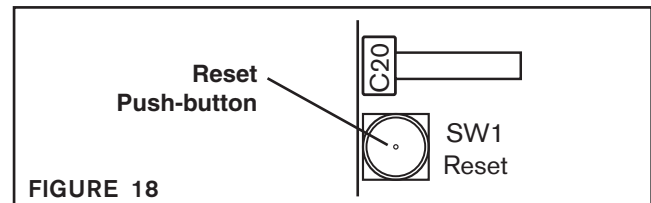


FIGURE 18

## FACTORY RESET

Factory Reset will reload the factory default Gain, Offset, and Deadband values for each sensor into memory. After a Factory Reset, the default values will be used until they are changed either manually or by an automatic sensor calibration.

**NOTE:** Factory Reset can be entered two ways: by either holding the Setup Key during power up, or by holding the Setup Key during Reset. When using the latter method, press and hold the Setup Key first; then, press and release the Reset Push-button. After the indicators flash, release the Setup Key (See Figures 19 and 20).

**NOTE:** Whenever a Factory Reset is performed, the sensors will have to be calibrated.

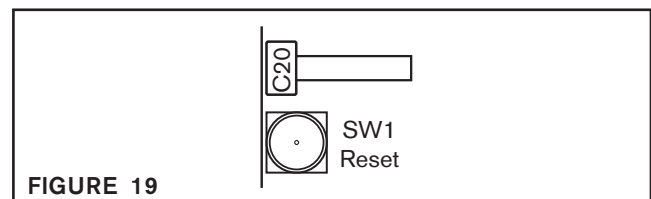


FIGURE 19

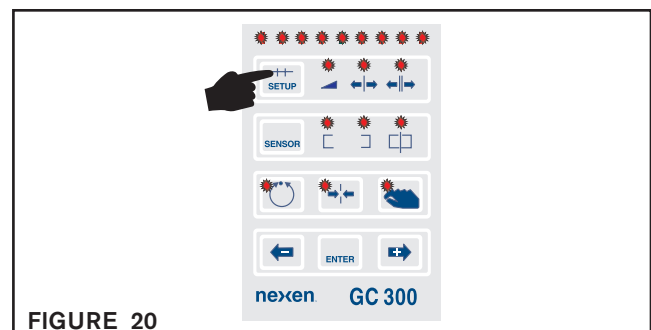


FIGURE 20

## OPERATION MODES

### MANUAL

**NOTE:** After power-up, the GC400 will restore the operating mode it was in prior to shutting down.

Press the Manual Key (Figure 21) to place the GC300 in Manual Mode.

In Manual Mode, the Bar Graph indicators show the web position within the Sensor. Pressing the + or - key will move the web in the same direction as the key that is pressed.

In Manual Mode, the GC300 takes no action to correct for web position errors; however, this mode is useful to verify that the motor wiring is correct.

Manual Mode is used for running a roll of irregular width material through the machine. In Automatic Mode, the controller may be constantly correcting and still be unable to keep up unless machine speed is drastically reduced.

Manual Mode can also be used for process alignment.

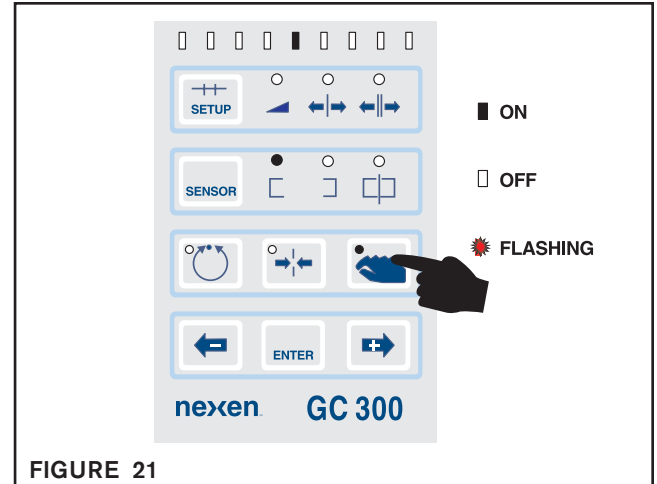


FIGURE 21

### AUTOMATIC

Press the Automatic Key (Figure 22) to place the GC300 in Automatic Mode.

This is the normal operating mode for the GC300. While in Automatic Mode, the GC300 senses the web position signal from the sensors. The edge of the web must be in the center of the sensor zone. If the web moves off center, the GC300 will issue a corrective signal to the linear actuator, which will move the roll stand or guide roll mechanism to bring the web back to center.

The Bar Graph indicators on the front panel show the position of the web edge within the sensor. If the Bar Graph indicators flash rapidly from side to side, the system is overcorrecting or hunting. This can be corrected by decreasing the Gain setting. A slow variation from side to side indicates the system is not reacting quickly enough and is corrected by increasing the Gain setting.

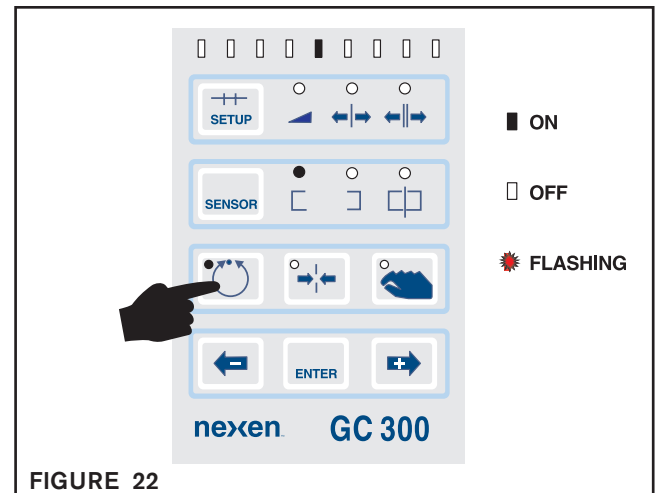


FIGURE 22

### AUTOMATIC CENTER

Press the Auto Center Key (Figure 23) to place the GC300 in Automatic Centering Mode.

The Automatic Centering Mode is used to lock up the position of the roll stand or guide roll mechanism while threading a new web into the machine or at any time Automatic or Manual control is not desired. Automatic centering can be controlled with either a Proximity Sensor or Limit Switches.

In this mode the GC300 will direct the web guide or roll stand's Linear Actuator to maintain the web guide or roll stand in its center or neutral position as determined by the Automatic Centering Sensor or Switches. This position will be maintained without regard for the actual web's position.

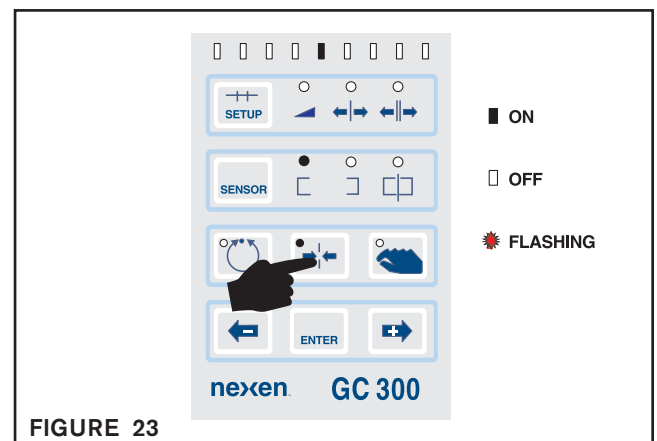


FIGURE 23

The GC300 will issue an output signal to the Linear Actuator to maintain the Automatic Centering Switch in its center or null position at all times while in the Automatic Centering Mode.

**NOTE: Refer to your Nexen web guide manual to determine if adjustment is necessary for the Auto Centering Limit Switches or Proximity Sensor.**

The speed at which the actuator moves the web guide during Automatic Centering can be decreased to prevent any hunting around the guide's center position. This is accomplished by placing the GC300 in Automatic Centering mode and then pressing the Setup key. Next, press the Plus (+) key to increase the actuator speed or press the minus (-) key to decrease the actuator speed. When satisfied with the actuator speed, press the Enter key to save the setting.

**NOTE: Actuator speed settings for Automatic Centering do not affect the actuator speed for web guiding in Automatic mode.**

---

## REMOTE OPERATION

A GC300 equipped with a Remote Operator board enables the AUTOMATIC, AUTO-CENTER, and MANUAL modes to be selected externally.

The GC300 operation mode can be changed by closing customer-supplied, normally-open, dry contacts. The wiring required depends on the revision level printed on the Remote Operator Board.

### For 16662, rev. A or B:

Select operation modes remotely by momentarily closing a contact connecting the appropriate terminal (J3-1, -2 or -3) to COMMON (J3-4). (Refer to figures 12a and 24.)

### For 16662, rev. C or later:

Select operation modes by connecting the (+) side of a customer-supplied 24VDC power supply to J3-4 and momentarily closing a contact connecting the appropriate terminal (J3-1, -2 or -3) to the GND (-) side of the power supply. (Refer to figures 12b and 24).

**NOTE: Keeping the contact closed would LOCK the GC300 in the selected operation mode. The GC300 will enter that mode after powering up, and you will not be able to change the operation mode using the front panel Operation Mode keys.**

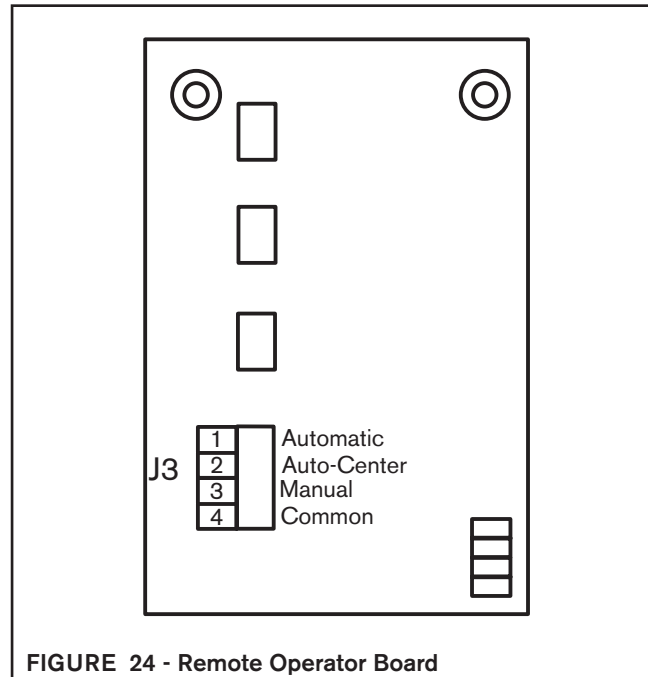


FIGURE 24 - Remote Operator Board



## AUTOMATIC SENSOR CALIBRATION Edge Guide Sensors:

**NOTE:** Before performing Automatic Sensor Calibration, verify that only the Sensor selection indicator of the sensor being calibrated is lit (See Figure 25).

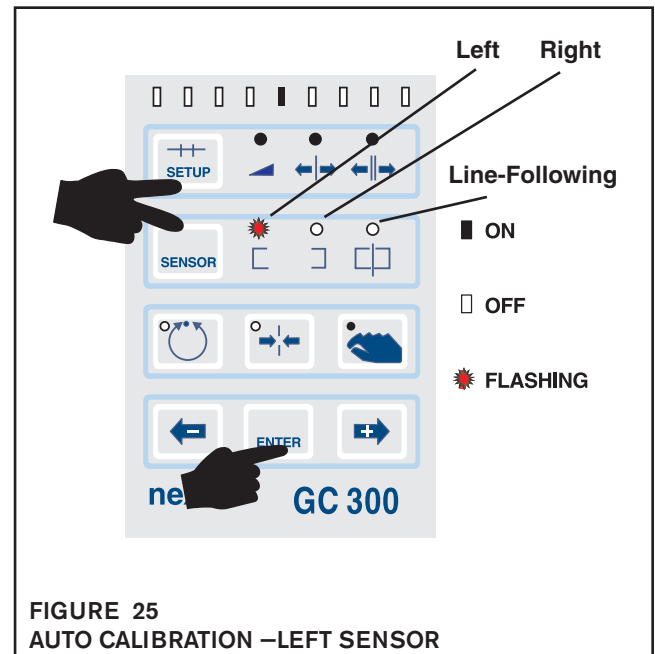
**NOTE:** When performing Auto-Sensor Calibration, always press and hold the SETUP key first; then, press and hold the SENSOR key; then, release both Keys at the same time (See Figure 25).

Use the following steps for all Sensors except LH100:

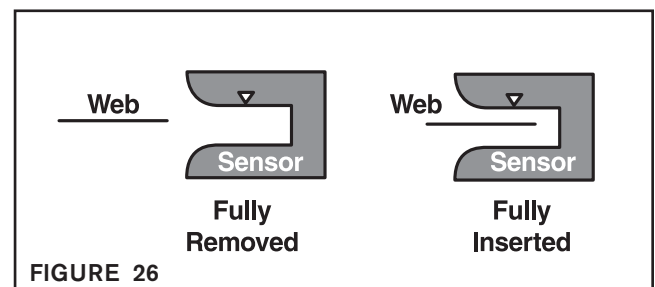
1. Press and release the SENSOR key until the indicator for the first sensor to be calibrated is lit.
2. Press and hold the SETUP Key; then, press and hold the SENSOR Key (See Figure 25).
3. Simultaneously release both the SETUP Key and the SENSOR Key. The three Setup indicators will light and one Sensor indicator will light, indicating that the Sensor is being calibrated (See Figure 25).
4. Insert the web which the GC300 will guide to block the light path to the sensor; then, completely remove the web (See Figure 26).
5. Press the ENTER Key to save the sensor calibration and cause the GC300 to set the Gain at the minimum value, Offset at 0, and Deadband at an optimum value (See Figure 25).
6. If using two sensors, select the second sensor with the SENSOR Key and repeat steps 1 through 4.

**NOTE:** After the sensors are calibrated, the Gain may be too low to move the web guide or actuator at the desired speed. (See Manual Adjustment - Gain).

**NOTE:** If the SETUP Key is pressed instead of the ENTER Key, the GC300 will exit the Calibration mode and return to the Normal Operation mode without calculating Gain, Deadband, or zeroing the Offset (See Figure 25).



**FIGURE 25**  
**AUTO CALIBRATION -LEFT SENSOR**



**FIGURE 26**

## AUTOMATIC SENSOR CALIBRATION - CONTINUED

### LH100 Line Following Sensor Only:

**NOTE:** Before proceeding with LH100 calibration into the system, familiarize yourself with the LH100 sensor and determine the appropriate positions for LH100 selector switches by reading the manual (20334).

1. Select the LH100 Sensor by repeatedly pressing the GC300 Sensor Key until the Line-Following Sensor indicator is illuminated (See Figure 27A).
2. Set the LH100's Field-of-View Selector Switch to "10" as shown in Figure 27B.
3. Move the LH100 slowly in the direction of the arrow shown in Figure 27C until the web or line edge has fully passed through the LH100's field-of-view.
  - The Focal Display Indicator will turn on when the target edge enters the LH100 field-of-view.
  - The Center Display Indicator will turn on when the target edge is centered within the field-of-view. This indicator will turn off when the target edge is no longer centered.
  - The Focal Display Indicator will turn off as the target edge leaves the field of view.
4. Position the LH100 with its field-of-view right next to the target edge, so that when the LH100 moves in the direction of the arrow, the target edge will enter its field-of-view (make sure the Focal Display Indicator and Center Display Indicator lights are off at this point).
5. Press and hold the GC300's SETUP key; then, press and hold the SENSOR key. Release both keys at the same time. This will cause the three Setup indicators to turn on, and the selected Sensor indicator will blink, indicating that the LH100 is ready to calibrate.
6. Move the LH100 slowly in the direction of the arrow until the web or line edge has fully passed through the LH100's field-of-view.
7. Press the ENTER Key to complete the calibration process.

**NOTE:** Changing the Field-of-View Selector Switch setting does not require a re-calibration, but may require a Gain adjustment.

**NOTE:** If the SETUP Key is pressed instead of the ENTER Key, the GC300 will exit the Calibration mode and return to the Normal Operation mode without zeroing the Offset or calculating Gain or Deadband (See Figure 25).

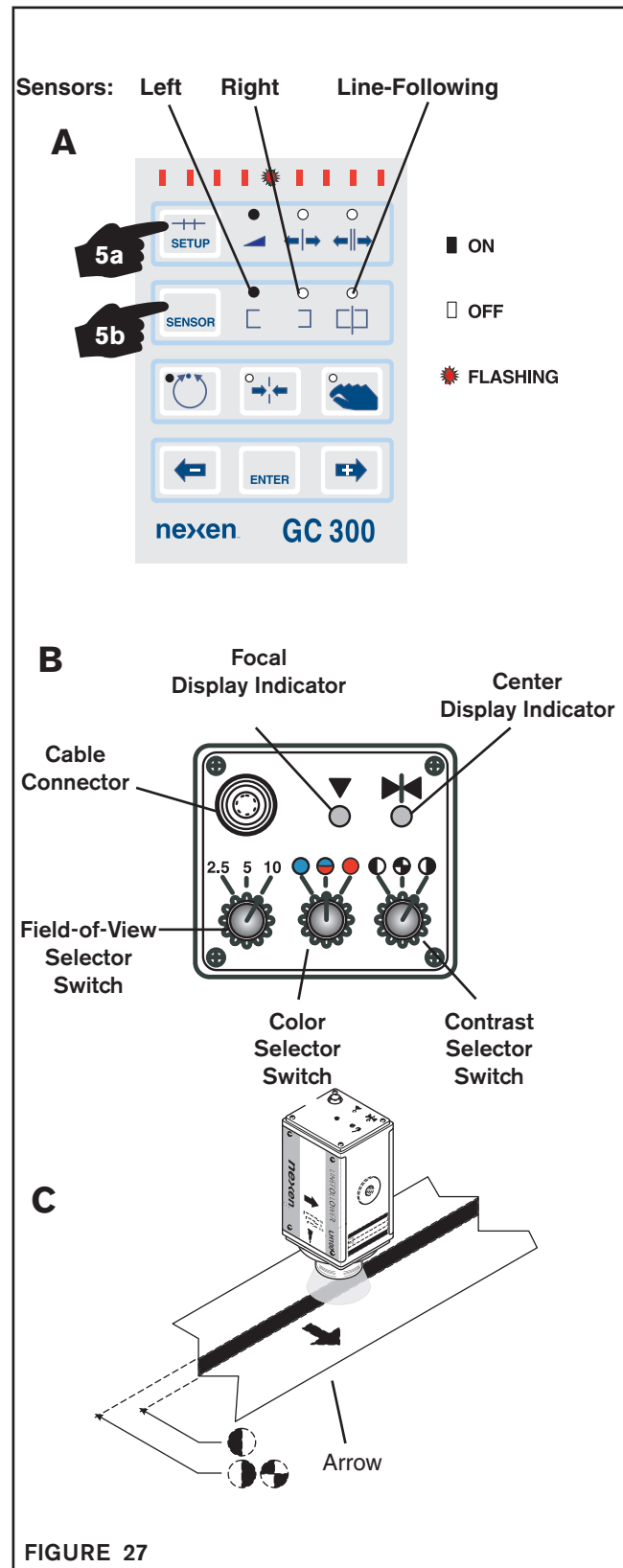


FIGURE 27

## SENSOR ALIGNMENT

**NOTE:** The performance of the GC300 is influenced by the Sensor input. Locate the Sensor at an appropriate position prior to any adjustments or operation.

1. Install the Sensor according to the Installation Instructions provided.
2. Thread the web through the web machine (See Figure 28).
3. Power up the GC300; then, set the GC300 to Auto Centering Mode (See Figure 29), or manually move the web guide mechanism to the center position.
4. After the web guide moves to the center position, switch the GC300 to Manual Mode and align the web to the desired location inside the Sensor; then, if necessary, apply tension to the web (See Figure 28).
5. Select Right or Left Sensor on the GC300 Control Panel (See Figure 29).
6. Move the Sensor on its mounting bracket until the Red Bar Graph indicators are OFF and only the Green indicator is ON (See Figures 28 and 29). The Sensor is now aligned with the center of the Sensor's detection window.
7. If CPC Mode is required for the GC300, press the SENSOR Key to select the second Sensor and repeat steps 1 through 6.

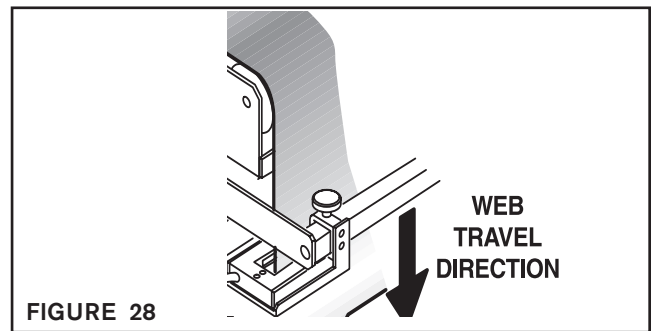


FIGURE 28

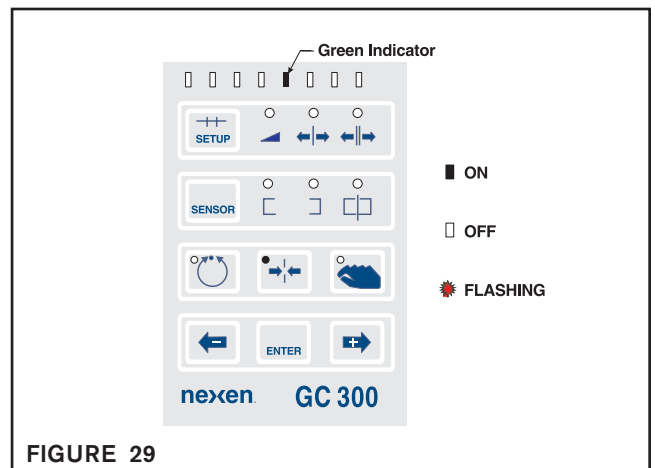


FIGURE 29

## MANUAL ADJUSTMENT – GAIN

**NOTE:** GC300 Gain is preset during the Automatic Calibration procedure and may require adjusting afterwards for optimum controller performance. For two-sensor systems operating in EPC mode, each sensor can have a different Gain and that value is used whenever that sensor is selected. For two-sensor systems operating in CPC mode, the Gain of the Left sensor is the only value used. Gain can be adjusted manually while operating in either Automatic or Manual mode.

1. Repeatedly press the SENSOR Key until the indicator of the sensor, whose gain is to be adjusted, is lit (See Figure 30).
2. Press the SETUP Key once; the indicator for Gain will light up (See Figure 30).
3. The number of red indicators on the Bar Graph that are lit indicate the current value of gain for the sensor selected, compared with its maximum value. If half the indicators are lit, the gain is at half of the maximum value (See Figure 30).

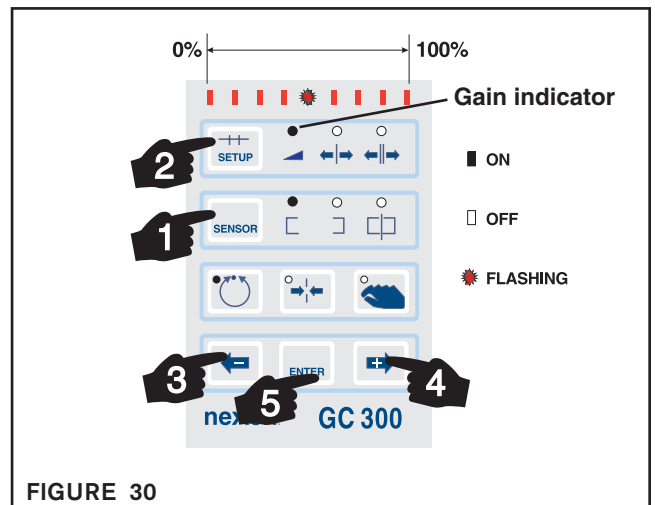


FIGURE 30

**NOTE:** Press and release the - or + key to incrementally change the value setting. Press and hold the - or + key for more than one second to ramp the value setting up or down (See Figure 30).

4. Press the - or + key to increase or decrease the value setting. The green indicator in the middle of the Bar Graph should flash while the + or - key is pressed (See Figure 30).
5. After reaching the desired value, press the ENTER Key to store the value into memory, the Gain indicator will turn off, and the GC300 will now return to normal operation mode (See Figure 30).

**NOTE:** If SETUP is pressed instead of the ENTER Key, after

the Gain is changed, no change is stored in the GC300 memory and the GC300 will return to Normal Operation mode (See Figure 30).

**NOTE:** The Gain setting is unique to each web machine, the operator must observe the performance of the web guide after changing the Gain setting. If Gain is too low, it may not react fast enough to correct the error position: If Gain is set too high, it may cause overshooting which can be seen as the Bar Graph indicator's hunting around the center green indicator.

## MANUAL ADJUSTMENT – OFFSET

### KEYPAD CONTROL

**NOTE:** The Offset adjustment enables the user to fine tune the web position without having to move the web sensor. GC300 Offset is preset during the Automatic Calibration procedure and may require adjustment afterwards for optimum web positioning. For two-sensor systems operating in EPC mode, each sensor can have a different Offset and that value is used whenever that sensor is selected. For two-sensor systems operating in CPC mode, the Offset of the Left sensor is the only value used. Offset can be adjusted manually in either Automatic or Manual mode.

1. Repeatedly press the SETUP Key until the indicator for Offset lights up (See Figure 31). The Bar Graph indicator shows the percent of offset that is used up in each direction. The amount of offset available depends on the sensor type (See Figure 31).
2. Press the + or - key to move the web edge position to the right or left. When the + or - keys are pressed, the Green indicator will keep flashing and the Red indicators will show the Offset distance (See Figure 31).
3. The web movement is updated to the Offset as the changes are made in Auto mode.
4. If the Offset exceeds the maximum value allowed by the GC300 while in Setup, the Bar Graph indicators will rotate on the side of the Offset error (See TROUBLESHOOTING).
5. Press ENTER (Figure 32) to save any changes, or press SETUP (Figure 31) to exit without saving the changes.

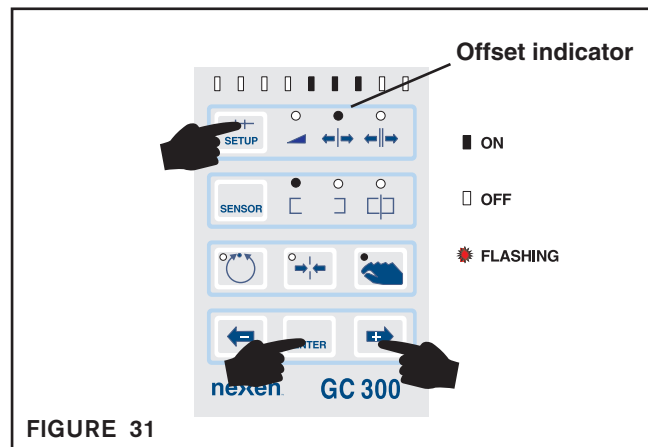


FIGURE 31

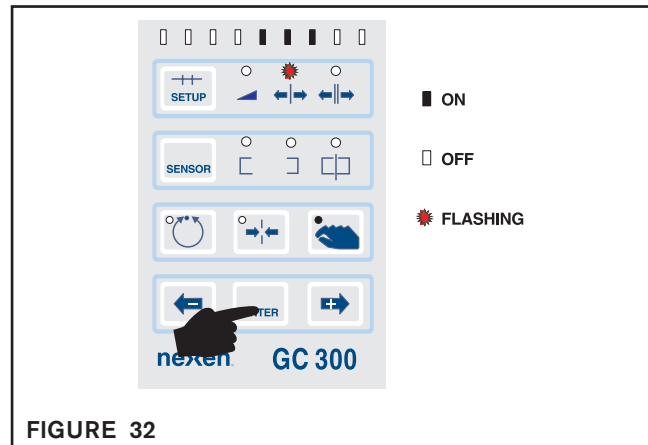


FIGURE 32

## REMOTE OFFSET CONTROL

1. Connect an external 2000-ohm potentiometer as described in the Remote Offset Potentiometer portion of the ELECTRICAL CONNECTIONS section.
2. Once the potentiometer is connected, the GC300 will respond to offset changes only from the potentiometer.
3. Manually adjust the Offset by rotating the potentiometer knob CCW (left) or CW (right) of its middle position (See Figure 33).

**NOTE:** The Offset value is zero with the potentiometer set to its middle position as shown in Figure 33.

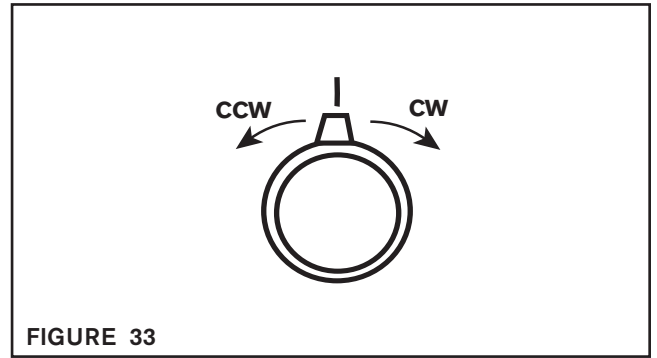


FIGURE 33

## MANUAL ADJUSTMENT—DEADBAND

**NOTE:** The Deadband adjustment enables the user to set the amount of position error the GC300 measures before it makes corrections. A larger deadband will require a larger position error before the GC300 corrects it, and vice versa. Deadband is preset during the Automatic Calibration procedure and may require adjustment afterwards for optimum performance. For two-sensor systems operating in EPC mode, each sensor can have a different Deadband and that value is used whenever that sensor is selected. For two-sensor systems operating in CPC mode, the Deadband of the Left sensor is the only one used. Deadband can be adjusted manually in either Automatic or Manual mode.

1. Repeatedly press the SETUP Key until the indicator for Deadband lights up (See Figure 34). The Bar Graph indicates the percent of deadband that is used, and the center or Green indicator flashes while changes are made (See Figure 34). The amount of deadband available depends on the sensor type and is limited to approximately 1/4 of the sensor's Sensing Window (refer to the sensor manual for sensing length specification).
2. Press the + or - key to change the deadband. In the Automatic mode, the deadband changes are effective immediately so the operator can see the effects on web positioning.
3. Press ENTER to save any changes or press SETUP to exit without saving the changes (See Figure 34).

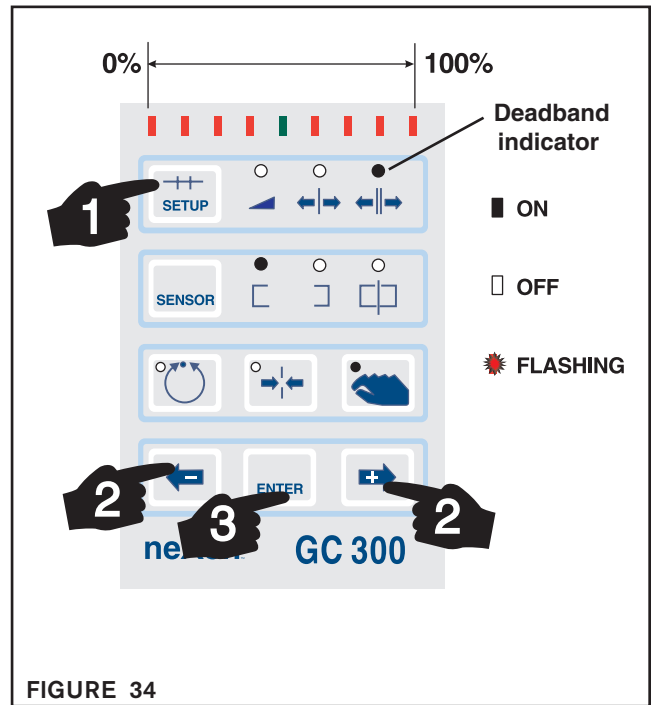


FIGURE 34

## SPEED OFFSET

**Note:** The Speed Offset adjustment allows the user to compensate for web guide actuators that have different extension and retraction speeds. With this adjustment the faster speed is slowed down to be equal to the slower speed. This allows the GC300 gain setting to be applied uniformly during times when the actuator is extending and retracting and reduce the chance of stability problems.

1. Press the Manual Mode key; Then, using the “-” and “+” keys, determine if the Linear actuator extends or retracts at different speeds. If the speeds are nearly the same, then no adjustment is necessary.
2. Press the SETUP and “-” keys simultaneously until the Setup's Offset LED begins to flash on and off. Then release the keys.
3. Press the “-” or “+” key that is associated with the fastest actuator speed and hold it down. The bar graph's green LED will blink and with each blink the Speed Offset is incrementally changed. After a short time, release the key and press the ENTER key to save the speed offset change.
4. Repeat steps 1 through 3 until the actuator's extension and retraction speeds are nearly the same. If the Speed Offset becomes too large, then use the opposite “-” or “+” key to reduce the setting.

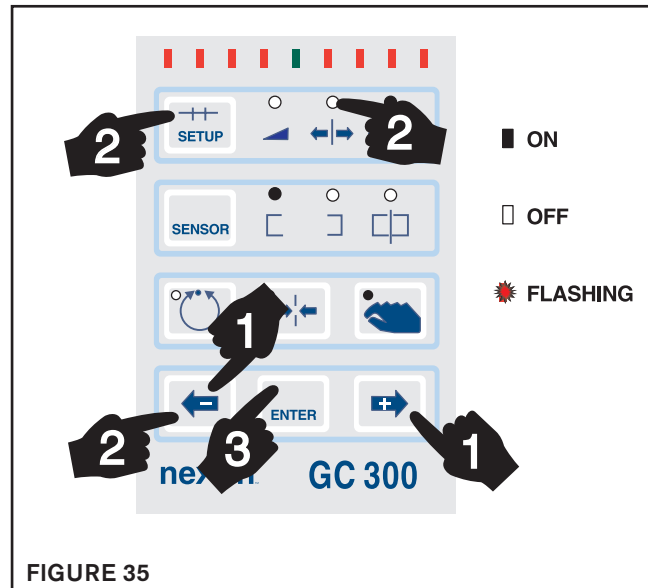


FIGURE 35

## INITIAL TEST RUN

**NOTE:** At this point, it is assumed that the Sensor(s) have been electrically connected, configured, calibrated, and mounted according to the instructions in previous sections and the user is ready to start the web machine.

1. For Edge Position Control (EPC), use the SENSOR Key to select either the left or right Sensor. For Center Position Control (CPC), continue pressing the SENSOR Key until both the left and right sensor indicators are lit.
2. Start the web machine; then, press the Automatic Key to place the GC300 into Automatic Mode.
3. Manually move the web right or left, and observe the reaction of the web guide as it attempts to correct the error caused by moving the web. If the web guide mechanism is correcting backwards, swap the motor power connections (Terminals J2-1 and J2-2) and check the limit switches to make sure they work properly (See Electrical Connections, Figure 14).
4. With the machine running at normal speed, increase the Gain until the web guide system starts hunting; then, decrease the Gain until the system stabilizes (See MANUAL ADJUSTMENT - GAIN section).

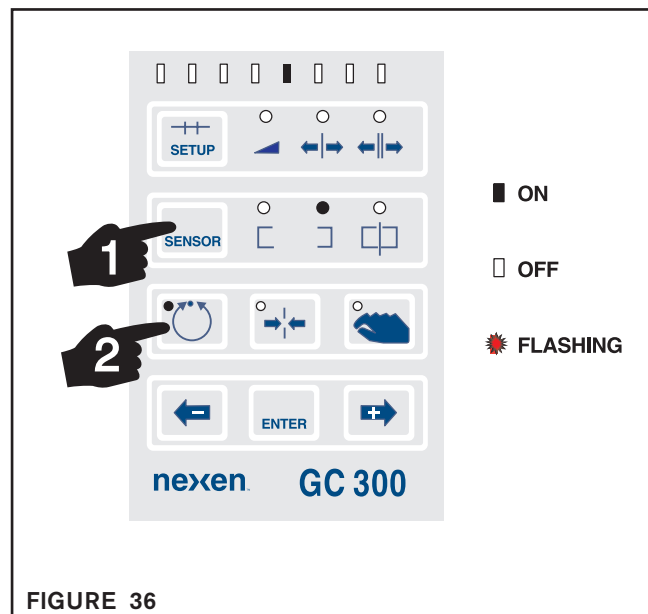


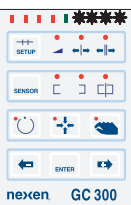
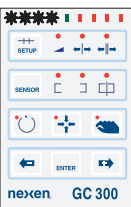
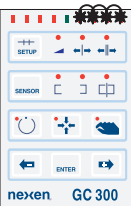
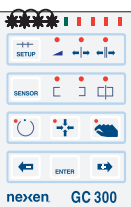
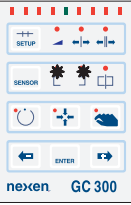
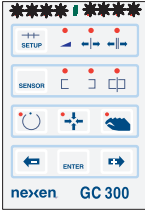


FIGURE 36

LED PATTERN	PROBLEM	PROBABLE CAUSE	SOLUTION
<p>The two outside indicators of each side of the Bar Graph flash.</p> 	Temperature fault.	Temperature goes too high.	Turn the power off, allowing the unit to cool down; then, check the system. The fault may be due to a limit switch that has failed, a motor that is jammed, or a short in the motor.
<p>The outside indicators on each side of the Bar Graph flash.</p> 	Major current fault.	The output current exceeds 6 amps.	Turn the power off, allowing the unit to cool down; then, check the system. The fault may be due to a limit switch that has failed, a motor that is jammed, or a short in the motor.
<p>The right half of the Bar Graph indicators flash.</p> 	Right Travel Limit.	The right end of travel is <b>reached or the right limit input is not connected.</b>	<p>In Auto Mode move the guide away from the end of travel.</p> <p>In Manual Mode press the + or - Key to move the guide away from the end of travel.</p> <p><b>Wire limit switch to right limit input.</b></p>
<p>The left half of the Bar Graph indicators flash.</p> 	Left Travel Limit.	The left end of travel is <b>reached or the left limit input is not connected.</b>	<p>In Auto Mode move the guide away from the end of travel.</p> <p>In Manual Mode press the + or - Key to move the guide away from the end of travel.</p> <p><b>Wire limit switch to left limit input.</b></p>
<p>The right half of the Bar Graph indicators progressively flash ON and OFF.</p> 	Right Offset Limit.	This only happens during setup while adjusting the web offset, and the offset is too great on the right side.	Press the + key to reduce offset, or exit setup by pressing Setup.
<p>The left half of the Bar Graph indicators progressively flash ON and OFF.</p> 	Left Offset Limit.	This only happens during setup while adjusting the web offset, and the offset is too great on the left side.	Press the + key to reduce offset, or exit setup by pressing Setup.
<p>The left and right sensor indicators flash momentarily during reset.</p> 	Sensor mismatch.	The right and left sensors are not the same type, and CPC Mode is selected.	Change one of the sensors or change to EPC Mode.

## TROUBLESHOOTING - CONTINUED

PROBLEM	PROBABLE CAUSE	SOLUTION
Cannot enter CPC mode by pressing the Sensor key.	The Second Sensor Board is not recognized by the GC300. This may be caused by a bad connection between the GC300 and the Second Sensor Board.	Turn off the GC300 and check all connections between the GC300 and the Second Sensor Board; then, power up the GC300 again.
The Bar Graph indicators on the GC300 front panel do not reflect the web position when using the sensor that is connected to the Second Sensor Board.	The sensor may not be correctly connected to the Second Sensor Board.	The electrical connections of the sensor on the Second Sensor Board are different from the electrical connections of the sensor on the GC300 main circuit board. Check the electrical connections between the sensor and the GC300 Main Control Board.
The Green indicator on the Main Control Board is always lit. Normally, it is always Off.	Sw 2-3 is set to On; it should always be Off (See Figure 16).	Set Sw 2-3 to Off.
All the Bar Graph indicators flash on and off. 	Limit switch problem; for example, no limit switches connected to J2 pins 3, 4 and 5, or a missing common connection to the limit switches.	Check the wiring from J2 pins 3, 4, 5 and 6 to the limit switches.

## SPECIFICATIONS

Power Supply-----Different models cover 110~130 VAC and 220~240 VAC, 50/60 Hz

Power Consumption----- 160 VA

Temperature Range ----- 32° to 122° F [0° to 50° C]

Error Signal Detection Resolution----- 0.004 In. [0.101 mm]

### Inputs

Position Sensor

PH16, PH21, UH21, UH01, AWL280/AS10, or LH100

### Voltage Range

Sensor connected at J8 ----- 0-350 mVDC max

Sensor connected at Second Sensor Board

PH, UH, AWL selected ----- 0-350 mV

LH selected----- 0-600 mV

Automatic Centering Switch-----Limit Switch or Proximity Switch

Remote Offset ----- Customer-Supplied 2000-ohm Potentiometer

Travel Limit Switches ----- Normally-Closed Limit Switches

### Output

Motor -----24VDC, 6 Amps, peak

End of Travel -----SPDT contacts, .3 A, maximum, @ 24 VDC

Web Position Signal ----- 0 to 10VDC, 0.005 Amps, with a separate output for each sensor

### Part Numbers

#### 110 VAC Models:

912717 GC300 - Single Sensor

912737 GC300 with Second Sensor Board

912745 GC300 with Remote Operator Board

912748 GC300 with Second Sensor Board and Remote Operator Board

#### 220 VAC Models:

912719 GC300 - Single Sensor

912727 GC300 with Second Sensor Board

912747 GC300 with Remote Operator Board

912749 GC300 with Second Sensor Board and Remote Operator Board

Automatic Centering Proximity Sensor, 912696

Second Sensor Board, 912736



## WARRANTY

### Warranties

Nexen warrants that the Products will be free from any defects in material or workmanship for a period of 12 months from the date of shipment. NEXEN MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND ALL IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. This warranty applies only if (a) the Product has been installed, used and maintained in accordance with any applicable Nexen installation or maintenance manual for the Product; (b) the alleged defect is not attributable to normal wear and tear; (c) the Product has not been altered, misused or used for purposes other than those for which it was intended; and (d) Buyer has given written notice of the alleged defect to Nexen, and delivered the allegedly defective Product to Nexen, within one year of the date of shipment.

### Exclusive Remedy

The exclusive remedy of the Buyer for any breach of the warranties set out above will be, at the sole discretion of Nexen, a repair or replacement with new, serviceably used or reconditioned Product, or issuance of credit in the amount of the purchase price paid to Nexen by the Buyer for the Products.

### Limitation of Nexen's Liability

TO THE EXTENT PERMITTED BY LAW NEXEN SHALL HAVE NO LIABILITY TO BUYER OR ANY OTHER PERSON FOR INCIDENTAL DAMAGES, SPECIAL DAMAGES, CONSEQUENTIAL DAMAGES OR OTHER DAMAGES OF ANY KIND OR NATURE WHATSOEVER, WHETHER ARISING OUT OF BREACH OF WARRANTY OR OTHER

BREACH OF CONTRACT, NEGLIGENCE OR OTHER TORT, OR OTHERWISE, EVEN IF NEXEN SHALL HAVE BEEN ADVISED OF THE POSSIBILITY OR LIKELIHOOD OF SUCH POTENTIAL LOSS OR DAMAGE. For all of the purposes hereof, the term "consequential damages" shall include lost profits, penalties, delay damages, liquidated damages or other damages and liabilities which Buyer shall be obligated to pay or which Buyer may incur based upon, related to or arising out of its contracts with its customers or other third parties. In no event shall Nexen be liable for any amount of damages in excess of amounts paid by Buyer for Products or services as to which a breach of contract has been determined to exist. The parties expressly agree that the price for the Products and the services was determined in consideration of the limitation on damages set forth herein and such limitation has been specifically bargained for and constitutes an agreed allocation of risk which shall survive the determination of any court of competent jurisdiction that any remedy herein fails of its essential purpose.

### Limitation of Damages

In no event shall Nexen be liable for any consequential, indirect, incidental, or special damages of any nature whatsoever, including without limitation, lost profits arising from the sale or use of the Products.

### Warranty Claim Procedures

To make a claim under this warranty, the claimant must give written notice of the alleged defect to whom the Product was purchased from and deliver the Product to same within one year of the date on which the alleged defect first

**nexen**<sup>®</sup>

Nexen Group, Inc.  
560 Oak Grove Parkway  
Vadnais Heights, MN 55127

800.843.7445  
Fax: 651.286.1099  
www.nexengroup.com

ISO 9001 Certified