



WESTLOCK
CONTROLS

DS Transmitter (Digital Signal) OPERATING MANUAL

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|--|--------------------------|--------------------------------------|--------------------------|
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WESTLOCK CONTROLS
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Revision History

Revision

XX/XX/XX

Initial release

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1 Introduction

1.1 Product Certification (Component Ratings)

| US/Canada | ATEX/IECEX |
|--|---|
| Intrinsically Safe: Zone 0, Zone 1 | Intrinsically Safe: Category 1 & 2 |
| Cl. I, Div. 1, Grps A, B, C, and D; Cl. I, Zone 0, AEx ia IIC; Cl. I Zone 1, AEx ib IIC; T4 Ta=-40°C to +85°C | II 1 G Ex ia IIC Ga -40°C ≤ Ta ≤85°C II 2 G Ex ib IIC Gb -40°C ≤ Ta ≤85°C |
| Intrinsically Safe: Zone 2 | Category 3 |
| Cl. I, Div. 2 Grps A, B, C, D; Cl. I, Zone 2, AEx ic IIC; T4 Ta= -40°C to +85°C | II 3 G Ex ic IIC Gc -40°C ≤ Ta ≤ 85°C II 3 G Ex ec IIC Gc -40°C ≤ Ta ≤85°C II 3 G Ex nA IIC Gc -40°C ≤ Ta ≤85°C |
| Increased Safety/Non-Incendive: Zone 2 | |
| Cl. I, Div. 2 Grps A, B, C, D; Cl. I, Zone 2, AEx ec IIC; Cl. I, Zone 2, AEx nA IIC; T4 Ta=-40°C to +85°C | |

1.2 Warnings

- Before using this product, please ensure that the product and its certification (Section 1.1) are suitable for the intended application.
- If the equipment is likely to be exposed to aggressive substances, it is the responsibility of the user to take suitable precautions to prevent it from adverse effects, thus ensuring that the type of protection provided by the equipment is not compromised.
- The DS transmitter should be handled with care when being installed or stored.
- Before electrical installation, please read the applicable I.D. label for the entity parameters and certificate conditions of safe use. The hazardous ratings of the unit which the DS Transmitter is installed, supersedes component ratings listed in section 1.1.
- Do not remove DS transmitter from unit and install outside of the enclosure or in a 3rd party switchboxes.
- Before commissioning, ensure control loop is not in automatic mode.

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1.3 Description

Westlock Controls' next-generation DS digital transmitter provides highly repeatable, accurate, and precise valve position via 4-20 mA feedback. DS uses state-of-the-art through-shaft potentiometer to measure position and transmit data within 20 ms. The DS transmitter is offered in conjunction with a variety end-of-travel switches and sensor options, (Mechanical, Magnetic, or Inductive). DS transmitter has integrated LCD and pushbuttons with LED indicators for quick and intuitive calibration. The DS transmitter component is globally approved with ratings as per the table shown in section 1.1, and is an option in Westlock AccuTrak™ and Quantum™ families. The DS transmitter is certified for Explosionproof, Intrinsically Safe, and Non-Incendive applications.

1.4 Principles of Operation

The DS transmitter utilizes two pushbuttons with two bi-color LEDs for calibration and changing transmitter settings. The LCD displays valve position (% Open) as well as various setting options. The through-shaft potentiometer is aligned with the shaft, allowing for mounting Westlock Beacon on the same shaft. It is directly pinned to the shaft, avoiding gears that wear and create position reading inaccuracy.

2 DS Keypad & User Interface

NOTE: The device takes about 20 seconds to start up.

2.1 Electronics

Figure 1 below represents the DS electronics module.



Figure 1: DS Module

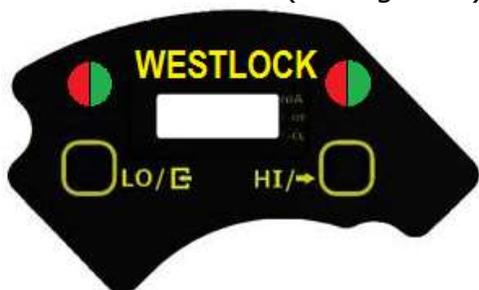
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2.2 User Interface

The User Interface (see figure 2), consists of the following features:



- 2 buttons: LO/"SELECT ICON" and HI/"NEXT ICON"
- 2 Bicolor LEDs (RED/GREEN)
- A Digital Display

Figure 2: User interface layout

The SELECT key is located on the left side of the user interface and the NEXT key is on the right side of the user interface. Refer to section 3 for the full operation of the buttons.

2.3 LED

There are two Bicolor (RED/GREEN) LEDs available. The LEDs general behavior is as follows:

- Both LEDs flashing GREEN: Operation is successful
- Both LEDs flashing RED: Operation has failed
- Left LED flashing in alternate RED and GREEN: Waiting for user confirmation
- Right LED flashing in alternate RED and GREEN: Processing selected function. User has to wait.

2.4 LCD

The DS display is a 4-digit numeric reflective LCD display module (see figure 3).

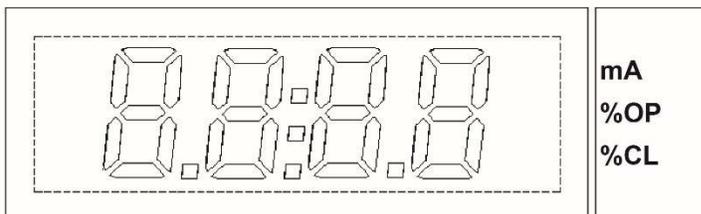


Figure 3: LCD Screen

The fourth character of the LCD display indicate engineering units used (mA, %OP or %CL). The LCD screen will in AccuTrak™ and Quantum™ products with DS transmitter options depict percentage open, %OP (see figure 4); this cannot be altered. For more display options (such as mA or percentage closed, %CL), please refer to the Digital EPIC D200 transmitter range of products.

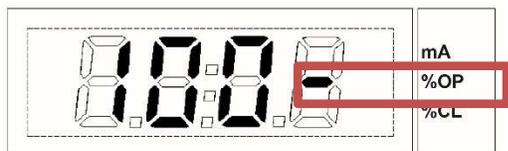


Figure 4: LCD Screen percentage Open

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3 DS Menu Tree

Navigate the local DS menu tree as follows:

- Press **and hold** LO/SELECT button for "Lo Calibration Menu" (LCAL). To confirm the action, press the LO/SELECT button again.
- Press **and hold** HI/NEXT button for "Hi Calibration Menu" (HCAL). To confirm the action, press the button again.
- Press **and hold both buttons** to access the advanced menu options.
 - Press HI/NEXT button to view other options such Calibration (CAL), Configuration (CFg), Diagnostic (dIA) and UP. Press HI/NEXT to return to the Calibration (CAL) screen.
- Review section 2.1.4 for LCD operation.

To see full menu tree of advanced menu options, please see figure 5 on page 7.

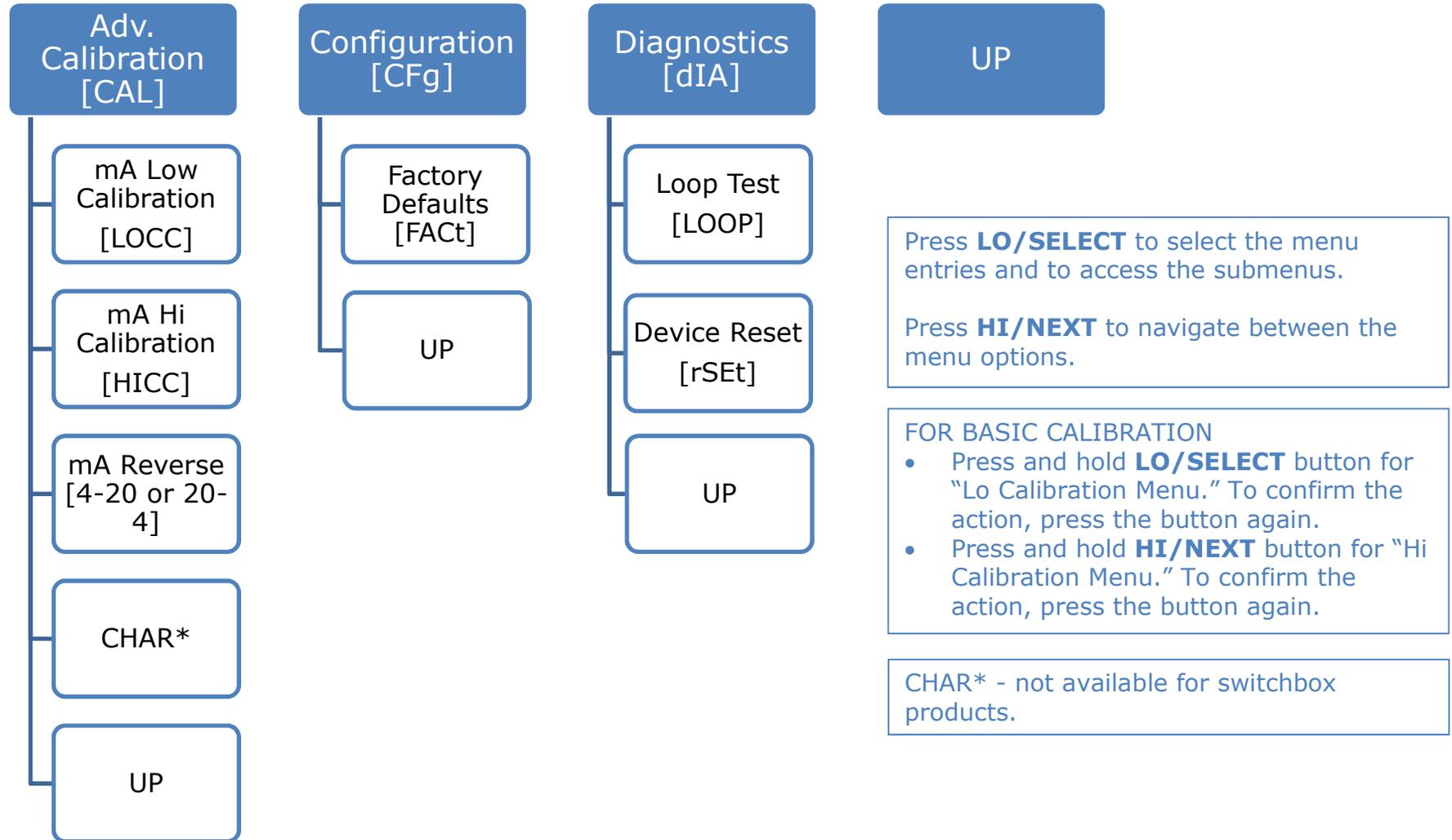
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NOTE: Basic LO and HI calibration are the two most used options. About 90% of all functions can be completed with basic LO and HI calibration.

Figure 5: Advanced DS Menu Tree



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4 Calibration

4.1 Basic Low Calibration

Move the valve to the desired low position.

1. Press **and hold** LO/SELECT to enter low calibration mode
2. Press LO/SELECT to confirm the action
3. Note: If no selection is confirmed approx. 6 min, device will time out. If this occurs, repeat the steps above.
4. Device will flash GREEN for successful calibration or RED for failure.
5. If calibration fails, consult Troubleshooting section 10 and repeat the steps above.

Figure 6 shows a visual of accessing low calibration.

NOTE: Device may report failure if current calibration value is significantly different (greater than 30°) from previous calibrated position. A failure will clear the low and high calibration data. In the event the calibration fails, run both low and high calibration again.

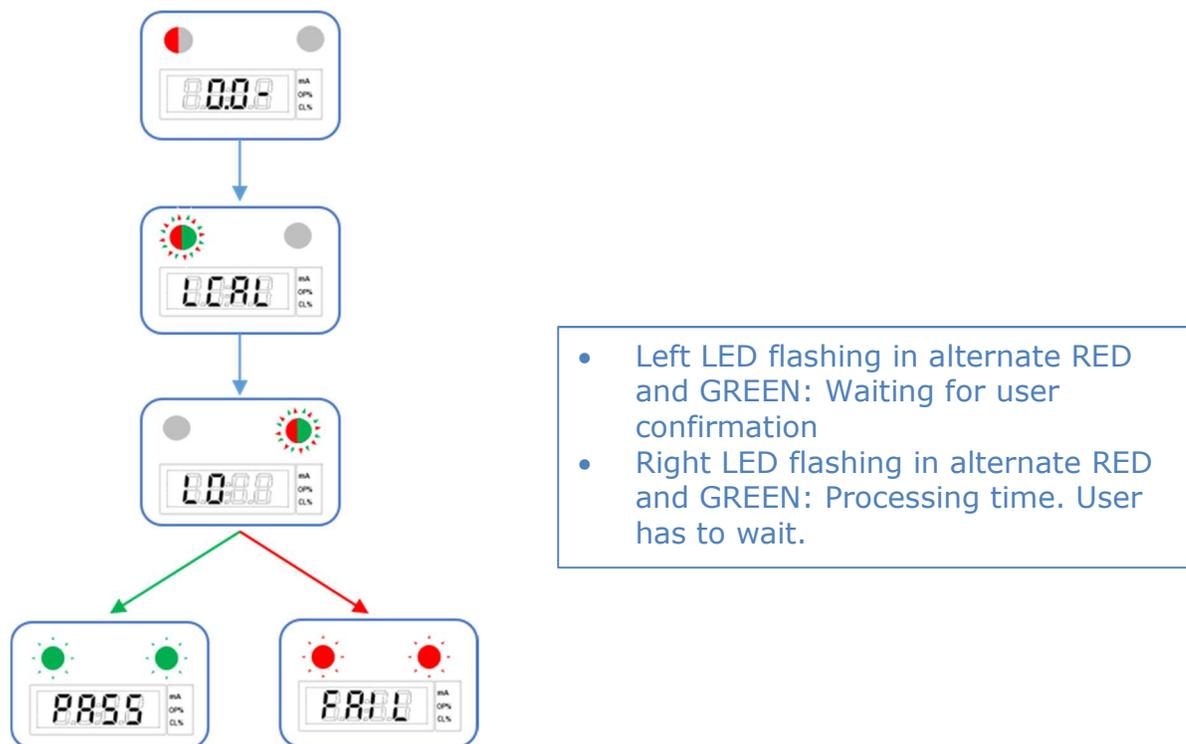


Figure 6: Basic Low Calibration

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4.2 Basic High Calibration

Move the valve to the desired high position.

1. Press **and hold** HI/NEXT to enter high calibration mode
2. Press HI/NEXT to confirm the action
3. Note: If no selection is confirmed approx. 6 min, device will time out. If this occurs, repeat the steps above.
4. Device will flash GREEN for successful calibration or RED for failure.
5. If calibration fails, consult Troubleshooting section 10 and repeat the steps above.

Figure 7 shows a visual of accessing high calibration.

NOTE: Device may report failure if current calibration value is significantly different (greater than 30°) from previous calibrated position. A failure will clear the low and high calibration data. In the event the calibration fails, run both low and high calibration again.

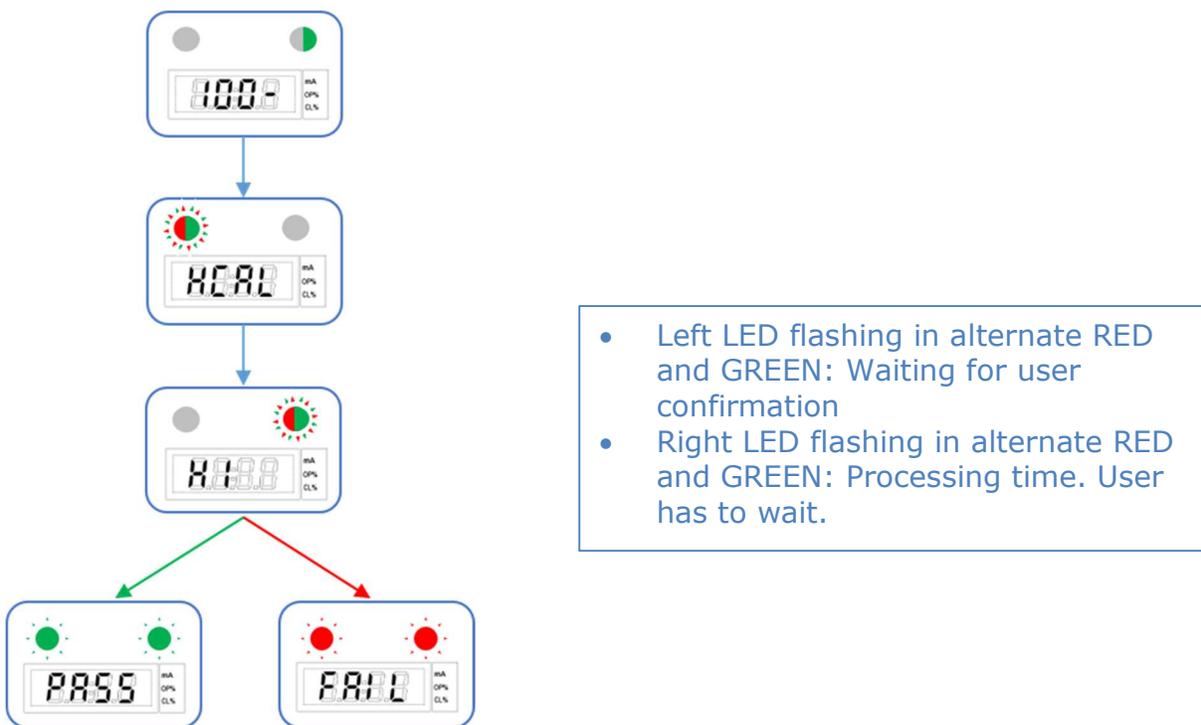


Figure 7: Basic High Calibration

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5 Advanced Calibration

Adjust (Trim) the calibrated low current value.

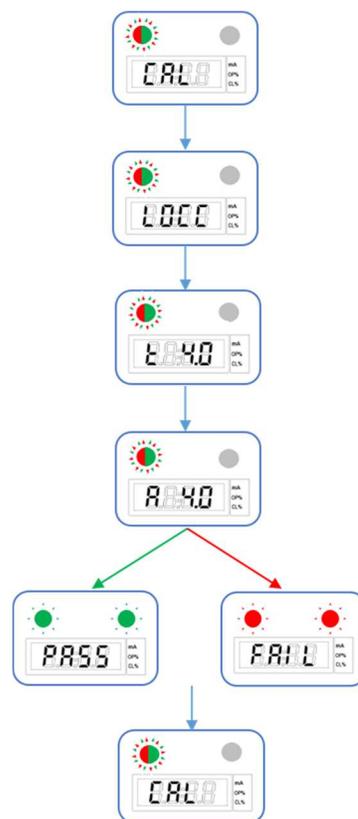
Required tools: In order to perform advanced current calibration, an external current meter or multimeter is necessary.

To enter the advanced calibration menu, press **and hold** both LO/SELECT and HI/NEXT until CAL displays. See figure 8 for low current calibration and figure 9 for high current calibration.

Note: To skip to the Configuration/Diagnostics Menu, press HI/NEXT

5.1 Advanced Low Current Calibration

1. Press LO/SELECT to enter Low Current Calibration/Low mA Calibration (LOCC).
2. Press LO/SELECT to start Low mA Calibration.
3. Press either button to increase/decrease the target (t) mA at 0 percent.
4. Press **and hold** LO/SELECT to confirm the target (t) mA calibration.
5. Adjust current meter (A) to target mA output position. Press **and hold** LO/SELECT to confirm adjustment.
6. After execution, BOTH LEDs will flash GREEN to signify a successful calibration or RED for a failure. After operation is complete, device will enter the calibration (CAL) menu. See figure 8 for a visual display of how to access low current calibration.



NOTE: If you enter this menu by mistake, press **and hold** LO/SELECT button to exit target (t) screen, then press **and hold** to exit adjust screen. You can also reset the device by cycling power.

Figure 8: Low Current Calibration

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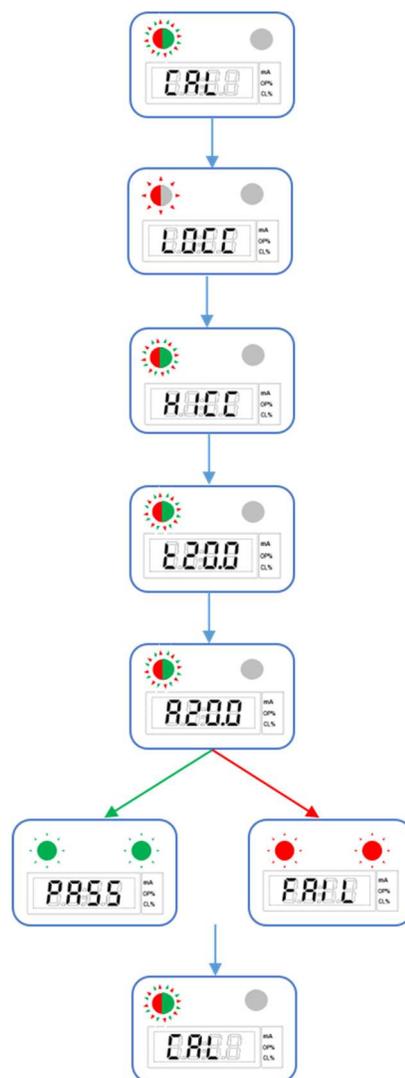
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5.2 Advanced High Current Calibration

Adjust (Trim) the calibrated high current value.

1. Press LO/SELECT to select CAL for calibration. Press HI/NEXT to display High Current Calibration/High mA Calibration (HICC).
2. Press LO/SELECT to start High mA Calibration.
3. Press either button to increase/decrease the target (t) mA at 100 percent.
4. Press **and hold** LO/SELECT to confirm High mA calibration.
5. Adjust the current meter (A) to target mA output position. Press **and hold** LO/SELECT to confirm adjustment.
7. After execution, BOTH LEDs will flash GREEN to signify a successful calibration or RED for a failure. After operation is complete, device will enter the calibration (CAL) menu. See figure 9 for a visual display of how to access high current calibration.



NOTE: If you enter this menu by mistake, press **and hold** LO/SELECT button to exit target (t) screen, then press **and hold** to exit adjust screen. You can also reset the device by cycling power.

Figure 9: High Current Calibration

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6 Reverse Current Option

Invert/reverse low and high current relevant to position.

Enter Advanced Calibration menu (see section 5).

1. Press HI/NEXT to navigate to mA reverse.
2. Press LO/SELECT to confirm mA reverse option.
3. Please wait while mA reverse operation takes place. See figure 10 for a visual display of mA reverse operation.

NOTE: After device time out or if any key is pressed, the device returns to the main screen.

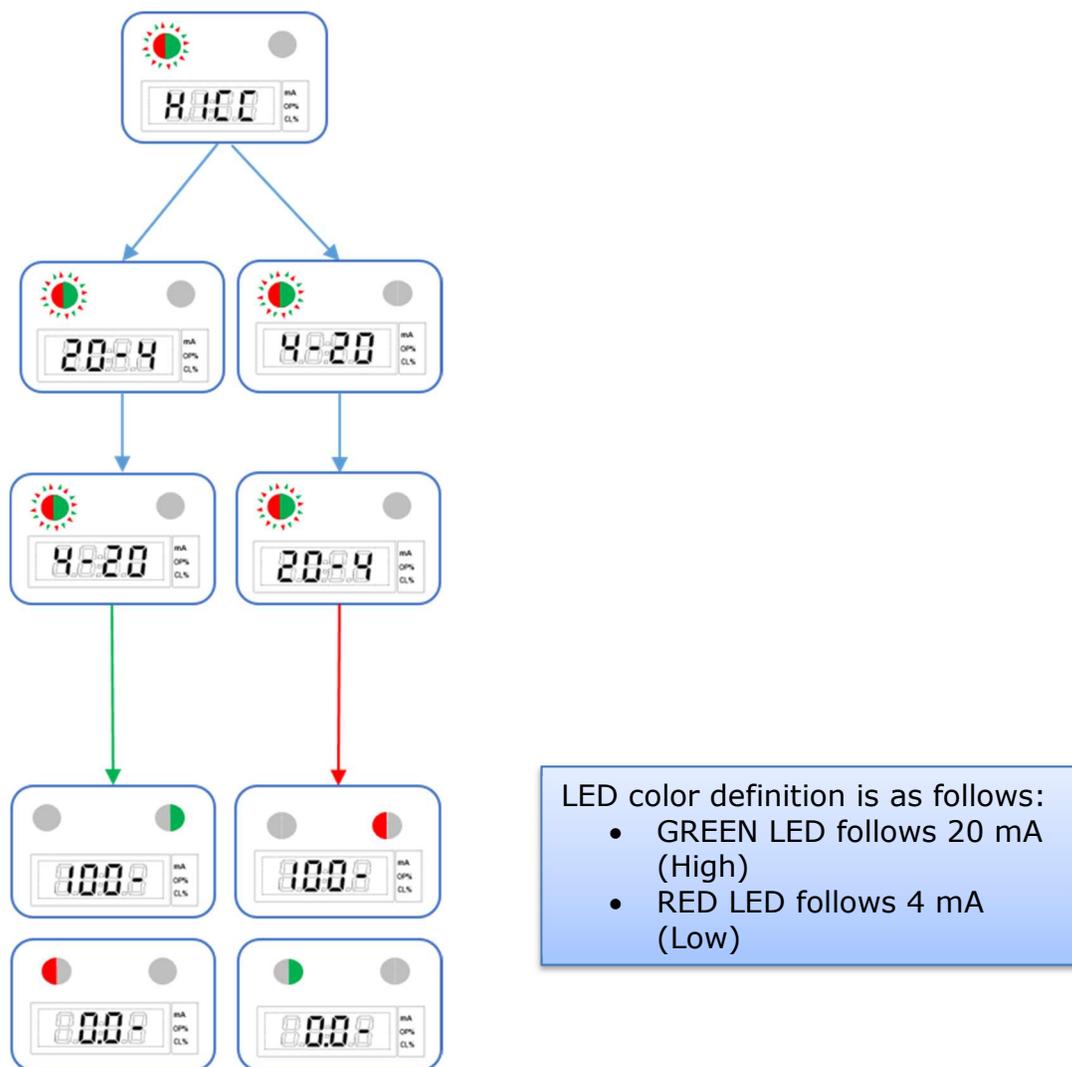


Figure 10: Reverse Current Option

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7 Loop Test Mode

To test/verify installation during commissioning.

To enter Loop Test Mode, press both LO/SELECT and HI/NEXT to enter advanced calibration. Please see figure 11 for a visual display of the Loop Test operation.

1. Press HI/NEXT to navigate to the Diagnostics menu (dIAG).
2. Press LO/SELECT to confirm entering the diagnostics menu.
3. Press HI/NEXT to navigate to LOOP (4, 12 or 20).
4. Press LO/SELECT to confirm LOOP selection. Screen will display selected output current 4, 12 or 20.

NOTE: After device time out or if any key is pressed, the device returns to the main screen

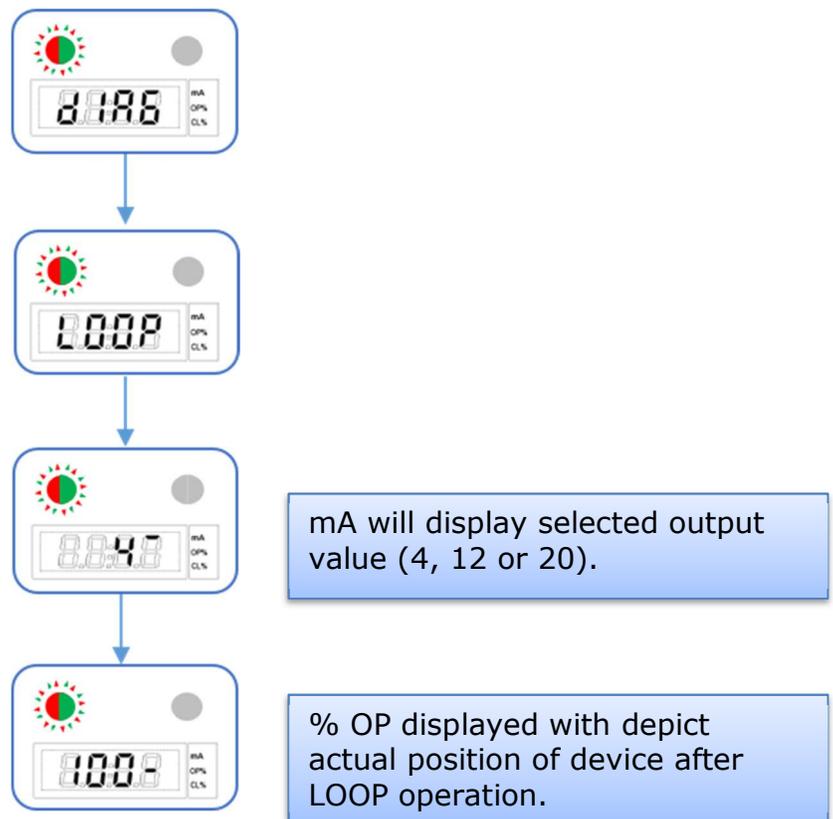


Figure 7: Loop Test

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8 Device Reset

Reset device without erasing configuration data.

Enter Advanced Calibration menu (see section 5).

1. Press HI/NEXT to navigate to Diagnostics [dIA].
2. Press LO/SELECT to confirm entering the dIA menu.
3. Press HI/NEXT to navigate until you reach Device Reset [rSEt].
4. Press LO/SELECT to confirm rSET selection.

NOTE: Device will flash RED/GREEN when resetting. After reset, device will enter the main screen. Please see figure 12 for visual display.



Figure 12: Device Reset

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9 Factory Reset

Reset device to factory settings; configuration data will be erased!

Enter Advanced Calibration menu (see section 5).

1. Press HI/NEXT to navigate to Configuration [CFg].
2. Press LO/SELECT to confirm CFg selection. The screen will display dEF.
3. Press LO/SELECT again to start factory reset. The screen will display FACT.

NOTES:

- Device will flash RED/GREEN when resetting. After reset, device will enter the main screen. Please see figure 13 for visual display.
- Device may reset 2 or 3 times during factory reset.
- Process should take approx. 5 min.
- NOTE: Once factory reset is complete, you may perform either advanced low current calibration, high current calibration or both. See section 12.1 and 12.2.



Figure 13: Factory Reset

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10 Troubleshooting

In case of calibration issues, (e.g. "FAIL" message is persistent after calibration) perform the following troubleshooting:

1. Ensure that the DS is wired correctly. Please refer to product wiring diagram.
2. Ensure that the transmitter unit is mounted such that the shaft indication mark travels within the valid operating range of the potentiometer, in accordance with the relevant Appendix diagram.
3. Ensure that the potentiometer cable is connected to the sensor board.
4. Repeat Basic Low and Basic High calibration.

In the LOCC and HICC functions, there is no way to abort. In case either function is selected, follow the instructions in section 5.1 and 5.2.

11 Maintenance and Repair

1. Inspection of this product shall be carried out periodically by suitably trained personnel in accordance with the applicable code of practice such as EN60079-17 to ensure that the DS electronics are in satisfactory condition.
2. The DS electronics are not intended to be repaired. Please contact your local Westlock Controls sales office for replacement retrofit kits.

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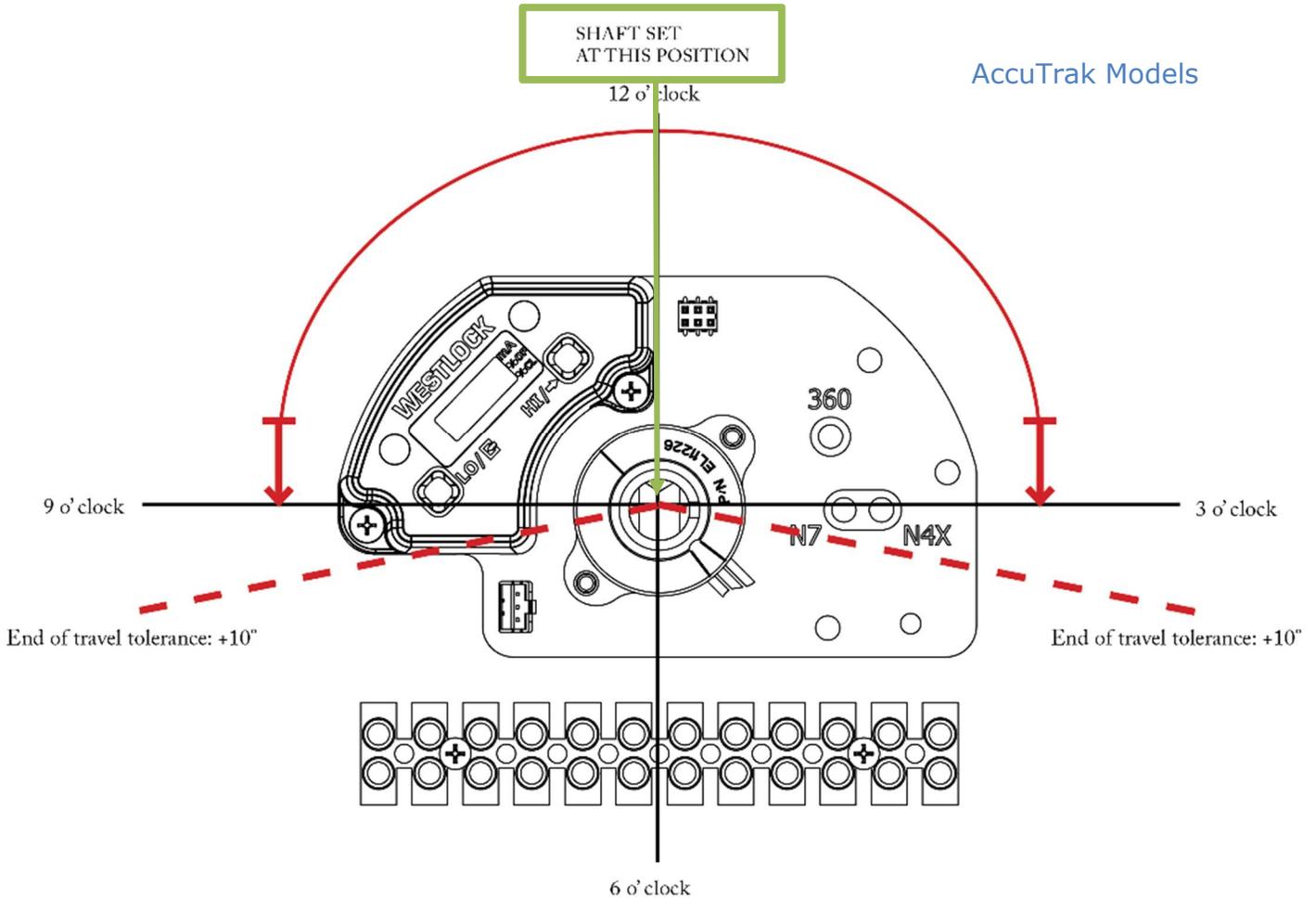
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Appendix

POTENTIOMETER

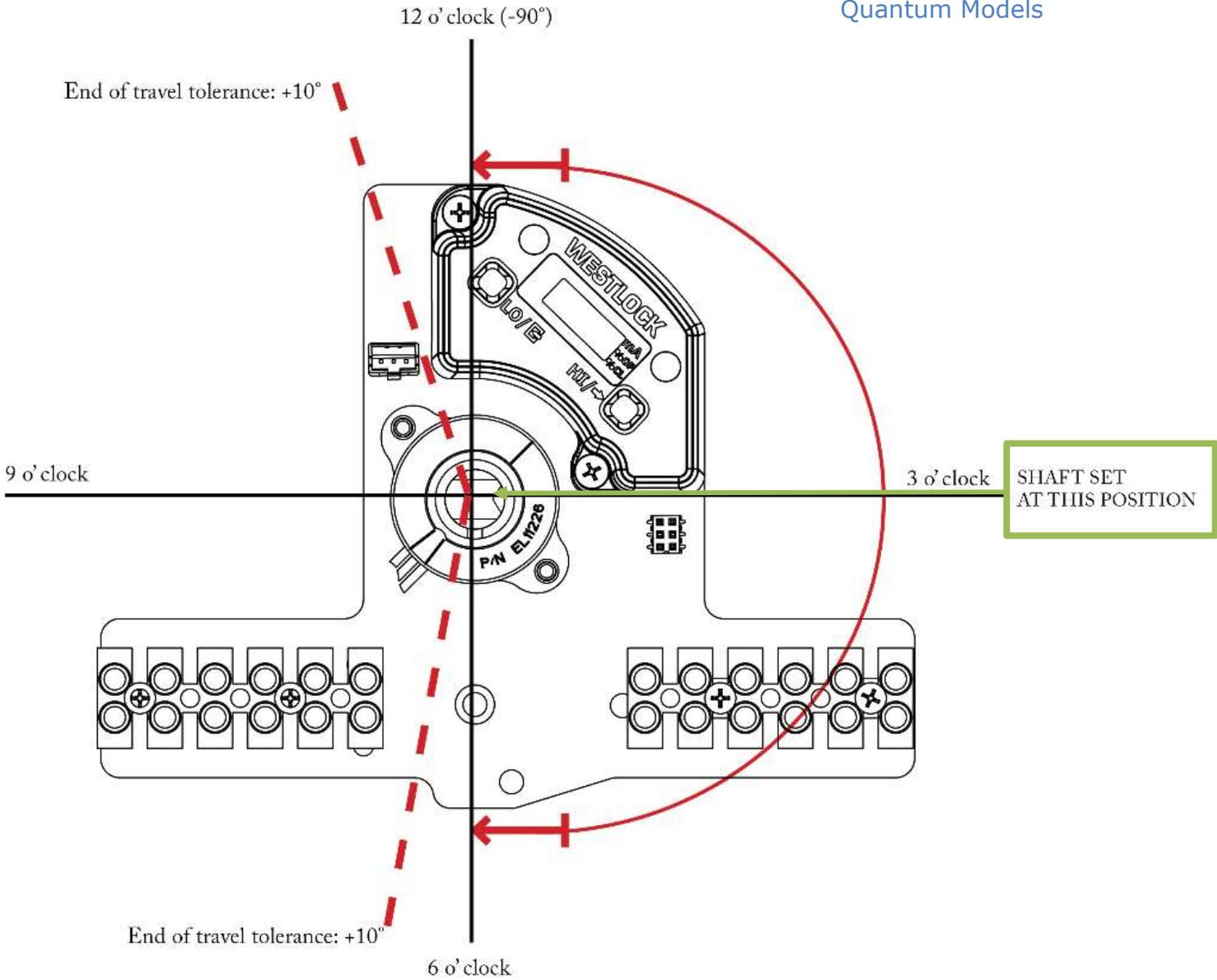
See below the stroke operation range for the Westlock Controls AccuTrak™ and Quantum™ models. End of travel tolerance is 10°. Do not to use, calibrate or operate past the red dashed lines.



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