

806434.311 X27 DSP
LRP[®] — Linear Rod Pump Software

LRP[®] Reference Sensor Troubleshooting

Notices

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If necessary, the sensor can be removed from the unit and tested manually by moving a steel screwdriver tip on and off of the sensor while observing the **reference input** value (located on the Quickstart Menu). On a Unico manufactured unit (up to 86 inch stroke), the **reference input** value should be 1 when the screwdriver is activating the sensor. On an AFCO manufactured unit (100 and 120 inch stroke), the **reference input** value should be 0 when the screwdriver is activating the sensor.

The sensor must be properly spaced. On a Unico manufactured unit, refer to the 112872 Linear Rod Pump Installation document for correct sensor spacing (located in the CD ROM, Hardware Documents folder). On an AFCO manufactured unit, refer to the AFCO LRP® Manual (located in the CD ROM, Hardware Documents folder).



Incorrect spacing can damage the sensor!

1.3 REF INPUT LOSS Fault

A “REF INPUT LOSS” fault indicates one of the following conditions:

- A reference sensor problem -- spacing, wiring, electrical resistors, or electrical noise
- A stuck or binding condition, such as a stuck pump (which in turn causes the unit to not “see” the reference switch at the correct position)
- A motor position tracking problem, caused by improper motor wiring, improper set up, or incorrect **motor base rpm** or **mtr freq** values (which affects the motor slip)

Note that a REF INPUT LOSS fault does not necessarily indicate a problem with the sensor!

The following recommendations are given in the Quick-Start Guide:

REF INPUT LOSS – The reference input was not received within the expected **ref window tol** target window identified during the last Well ID. The unit will immediately snug reference and try again. Check sensor wiring and spacing. This fault may indicate that Well ID is required (or was faulty), or that system is at torque limit. This fault will also occur if the **stroke id length** value is too small, preventing the unit from stroking up far enough to cross the sensor. This fault may also indicate a snug problem, where the unit did not extend completely down during the snug down – it may be necessary to increase the **snug torque limit**. (This is especially true of air counterbalanced units, where **snug air compensation** is used.) This fault may also indicate a feedback position tracking problem (not a reference sensor problem), caused by incorrect **base rpm** or **mtr freq** parameter values, which results in a bad **slip frequency** value – execute AC Test and double check motor base speed and frequency (might not be 60 Hz).

To assist in troubleshooting the REF INPUT LOSS, the event history contains latched diagnostic values and codes, described below.

1.4 REF INPUT LOSS Diagnostic Codes

REF INPUT LOSS events and faults are logged in the event history. Diagnostic data are latched within the log, and can be used to troubleshoot the cause of the REF INPUT LOSS. To see the diagnostic data, upload the event history and maximize the view, as shown below:

ref input loss fault	Fault	1/9/2013 4:07:17 PM
ref loss diag	21	Diagnostic Codes
referenced dwn diag	0	
referenced up diag	0	
ref rise edge diag	0	
drive fbk pos diag	17.1551 inch	
ref position up	46.126 inch	
ref position down	12.057 inch	
motor torq percent latched	38 %	

ref loss diag:

Diagnostic code indicating the nature of the fault, defined by the following values:

Code	Description
1	No initial reference input: The reference input value was 0 (rather than 1) after the snug down, indicating that the sensor is in the wrong state when the unit is in the parked (starting) position. This usually indicates bad wiring, or a bad sensor, or rack is not at the bottom. If the fault lies with the sensor spacing (unlikely), then this code indicates the sensor is too far <u>out</u> with Unico unit, or too far <u>in</u> with AFCO unit.
21	In upstroke, did not detect lower sensor: The unit was in the upstroke, and the motor position exceeded the lower reference position (plus window tol) without detecting the lower reference input.
22	In upstroke, did not detect upper sensor: The unit was in the upstroke, and the motor position exceeded the upper reference position (plus window tol) without detecting the upper reference input.
23	The unit indexed to the top position without ever detecting the upper reference input.
24	In upstroke, sensor detected too early: The unit was in the upstroke, and the upper reference input was received earlier than expected.
25	Over-stroke: The unit was in the upstroke, near the top of stroke, and the reference input was lost. This indicates that the over-stroke groove was detected. Check gear ratio, linear lead, and stroke id length.
31	In down-stroke, did not detect upper sensor: The unit was in the down-stroke, and the motor position dropped below the upper reference position (minus window tol) without detecting the upper reference input.
32	In down-stroke, did not detect lower sensor: The unit was in the down-stroke, and the motor position dropped below the lower reference position (minus window tol) without detecting the lower reference input.
33	In down-stroke, sensor detected too early: The unit was in the down-stroke, and the lower reference input was received earlier than expected.

referenced dwn diag:

This item records whether or not the “down” (lower) reference event occurred (0 = no, 1 = yes)

referenced up diag:

This item records whether or not the “up” (upper) reference event occurred (0 = no, 1 = yes)

drive fbk pos diag:

This item records the position of the motor at the time the REF INPUT LOSS fault was generated.

ref position up:

The upper reference position, as determined during the Well ID.

ref position down:

The lower reference position, as determined during the Well ID.

motor torq percent latched:

The motor torque (%) at the time the REF INPUT LOSS fault was generated. If this value is excessive, the unit might be binding.

1.5 Well ID and Reference Sensor

The **ref position up** and **ref position down** parameters are identified during the first stroke of the Well ID. These values can be viewed either on the Pumping Unit Menu (with **menu visibility** set to MAXIMIZE), or in the latched data of a REF INPUT LOSS event. These parameters represent the sensor positions as determined by the motor position feedback tracking during the Well ID.

The validity of each reference sensor position is checked during the remainder of the Well ID routine. If the input sensor position is not valid, or the sensor is occurring at the wrong time during Well ID, a REF INPUT LOSS fault will be generated, and the **well id state** will display NO REF VERIFY.

1.6 Proper Operation of Reference Sensor

When the reference sensor is functioning properly, the unit will stroke without faulting. The **reference state** parameter (on the Pumping Unit Menu) will read GOOD REF, and the **meas ref position** parameter (on the Pumping Unit Menu) will latch values close to the **ref position up** and **ref position down** parameters as the unit strokes through the up and down sensor positions, respectively.

If the **meas ref position** parameter (for a particular reference edge) varies dramatically from the expected values (**ref position up** and **ref position down** parameters), then it is likely that a motor parameter is not correct. The motor parameters should be verified, and the AC Test and Well ID routines should be re-executed.