# LS ELECTRIC H100 Variable Speed Drive User Guide

**LS ELECTRIC H100 Variable Speed Drive User Guide**

## Contents

## Introduction

This quick start reference is meant to be a supplement to the User Manual included in the VFD packaging. This reference is a continuation to the H100+ "Basic Setup" quick start. It assumes proper motor and VFD protection features have been setup.

PID is a process loop used to control a process variable froma sensor(transducer) such as pressure or temperature. This reference guides the installer through the wiring and programming needed for a PID loop.

⚠️ **CAUTION!**
**Improper wiring and operation may result in serious personal injury or death.**

Follow the recommended wiring practices suggested in this document as well as the User Manual. The minimum size of the protective earth (ground) conductor shall comply with local safety regulations and applicable codes.

Please review all H100+ relateddocuments included with the product before proceeding with any installation and wiring.

## Step 1 – Transducer Identification and Wiring

Most transducers utilize a 4-20mA output and require a DC power source to work. Identify the specs on the transducers label or spec sheet to proceed. This is also important for verifying the range of the transducer.
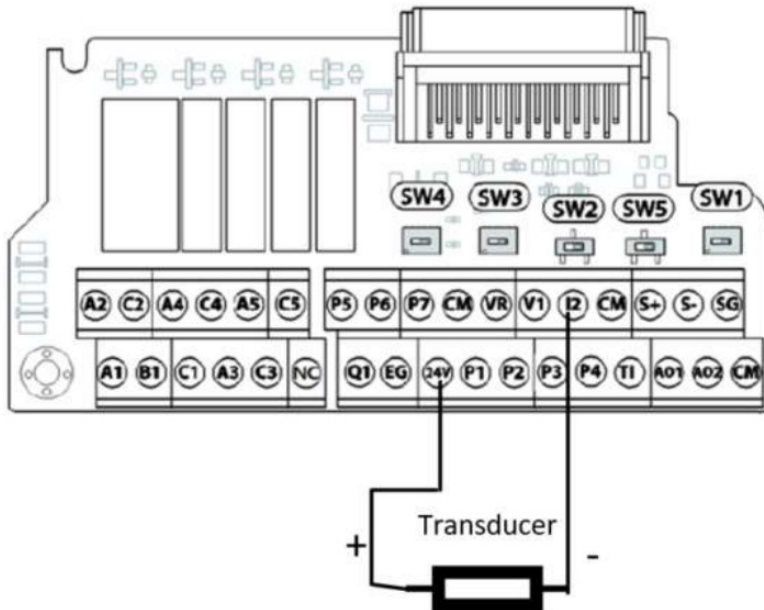


**Wiring**

**2 wire transducers (4-20mA)**
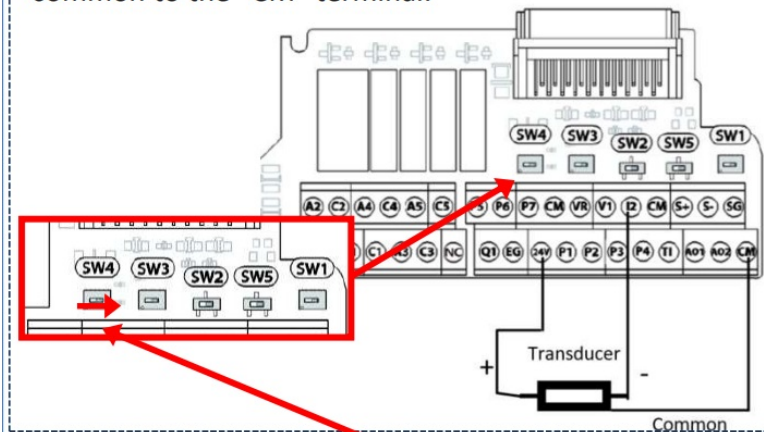"24V" is used to power the transducer.
"I2" is used for the 4-20mA input terminal from the transducer.
**Polarity MUST be correct.**



**3 wire transducers (4-20mA)**
Wiring is the same as 2 wire but with the addition of a
common to the "CM" terminal.



**0-10VDC and 0-5VDC transducers**
Utilize the "V1" terminal or "I2".
**Note: If using I2 for a voltage input** set SW4 to the right. This sets "I2" up as "V2".

## Step 2 – Basic PID Parameter Setup

At initial power up the VFDs keypad will prompt the operator to go through the EZ Start. If "Yes" is selected, the first question is macro selection. "Pressure Control" is recommended for PID setup. If the EZ Start is bypassed, you may also set the macro at **CNF43.**

**EZ Start**
This Step provides details on EZ start steps.

| Step | Parameter | Description |
|---|---|---|
| 1 | CNF-43: Select a macro. | 0. Basic (Default) |
| | | 1. Pressure Ctrl |
| | | 2. Lead-Lag |

The Pressure Control macro enables PID and sets up a special User Group. Press the "Mode" key to get to the "U&M" display.
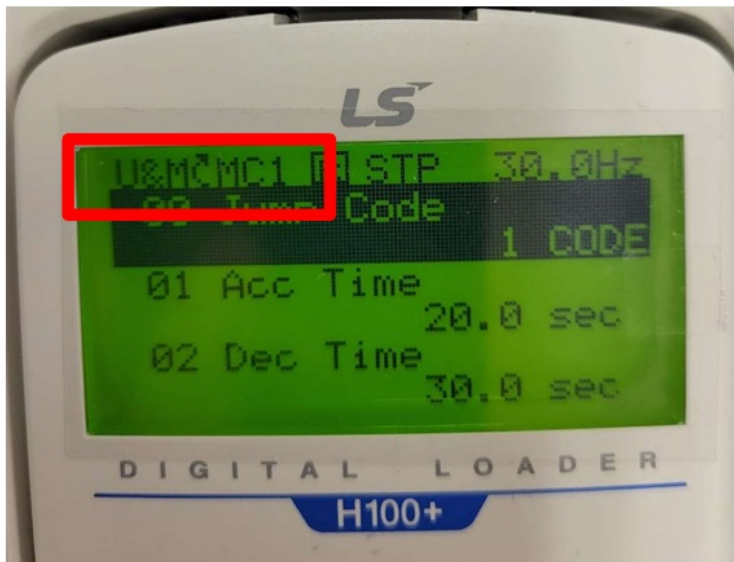


**Review and adjust any necessary parameters listed below to get the basic PID loop setup.**

| MACROCode | Group | No | Description | Default | Setting options | Recommended Setting |
|---|---|---|---|---|---|---|
| 17 | PID | 1 | PID Selection ( Enables PID ) | Yes | Yes/No | 1 – Yes |
| 18 | PID | 10 | PID Reference selection | Keypad | # (0-6) | 0- Keypad (typically) |
| 19 | PID | 11 | PID Reference 1 | 0 PSI(-100 to 100 PSI) | Based onfeedback scaling | ** SET THIS LAST ** |
| 20 | PID | 20 | PID Feedback Source | (3) = I2 | # (0-9), refer to the LCD keypad. | Depends on the system requirement, typically "I2". Refer to wiring done on step 1. |
| 21 | PID | 25 | PID P-Gain 1 | 100% | 0 – 200% | Adjust as needed to improve performance. |
| 22 | PID | 26 | PID I-Time 1 | 2.00 Sec. | 0 – 200 Sec. | Adjust as needed to improve performance. |
| 24 | PID | 50 | PID Unit Selection | PSI | 0-41, refer tothe LCD keypad. | Set to the unit being controlled. |
| 25 | PID | 51 | PID Unit Scale Multiplier | x10 | x0.01 up to x100 | Depends on the system requirement |
| 26 | PID | 53 | PID Unit Fitting [MAX] | 100 PSI | 100 PSI | Set to the max transducer value. For example, 100PSI |

**H100+ Step 3 – Commonly Set Parameters and Functions**

Listed below are commonly set parameters related to PID operation. These parameters are listed in both the U&M mode and standard PAR mode. Set accordingly based on the application requirements.

**Sleep**

- **PID-59 Sleep Level type**

  **The following sleep level types can be selected:**

**Setting**

1. Frequency (Factory Default)
2. Output Current
3. PID Feedback Value
4. RPM
5. Flow Rate

- **PID-62 PID Sleep 0 DT**
- **PID-63 PID Sleep 0 Lev**

  If the operating frequency stays below the frequencies set at PID-63 for the set times at PID-62, the VFD enters standby mode.

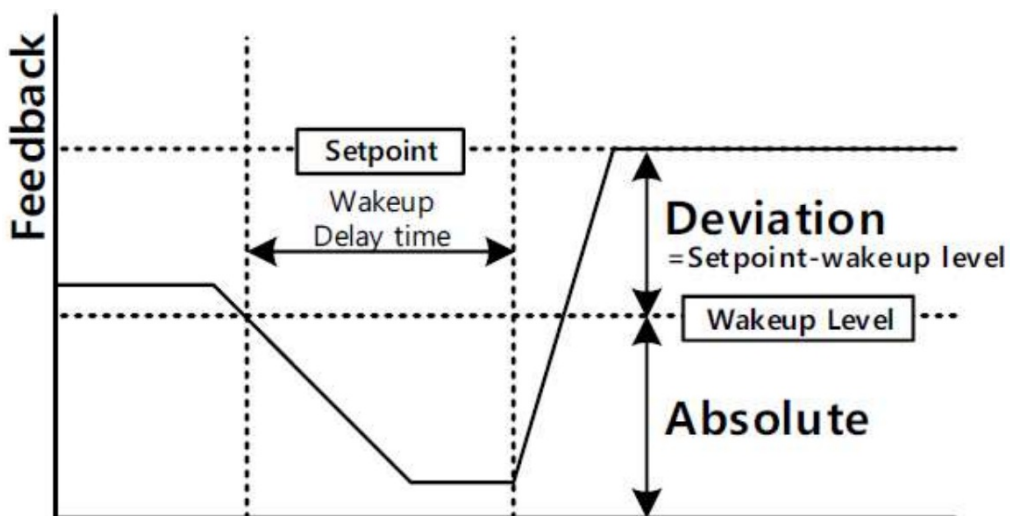- **PID-56 Pump Minimum Speed**

  Pump minimum speed sets the low limit on the command frequency. Minimum Limit operates based on the greatest value of following:

    - AP2 40 Thrust Frequency, PID 56 Pump Minimum Speed, ADV 25 Freq Limit Lo

**Wake-up**

- **PID-57 Wake UpLev type**

  0. Absolute or 1. Deviation (Factory default) can be selected for the Wake-up level



- **PID-64 PID Wake Up 0 DT**
- **PID-65 PID Wake Up 0Lev**

Sets the reference for PID operation in PID sleep mode. PID operation resumes when PID feedback variation

(from the PID reference) exceeds the values set in PID-65 for more than the time set in PID-64.

## Lost Feedback Detection

Lost Feedback Detection shuts the pump down when the feedback is lost. The VFD can be set to take the action programmed in **AP2-75.**

- **AP2-75 LostFbkMode**

**Setting**

1. None
2. Warning
3. Trip & Coast
4. Lost Preset

- **PRT-14 Lost Cmd Time**
- **PRT-15 Lost Preset Frequency**

## High/Low Feedback Detection

Low/High feedback detection detects whether PID feedback is higher than high feedback level or lower than low feedback level to trigger Warning or Trip&Coast stop.

- **AP2-48 High Feedback Detection Mode**
- **AP2-49 High Feedback Level Fault Delay Time**
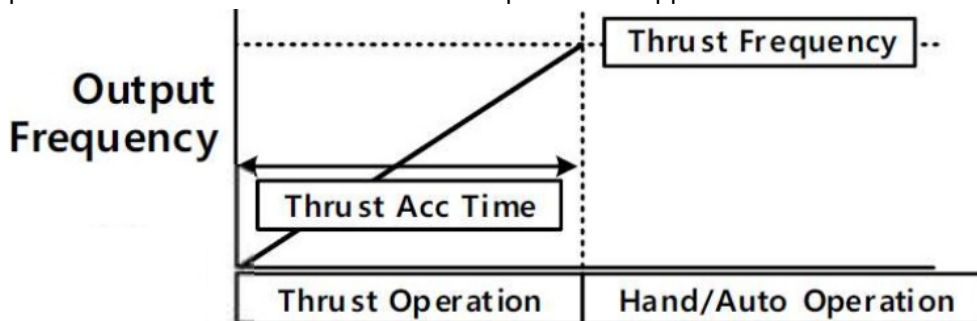- **AP2-50 High Feedback Level**
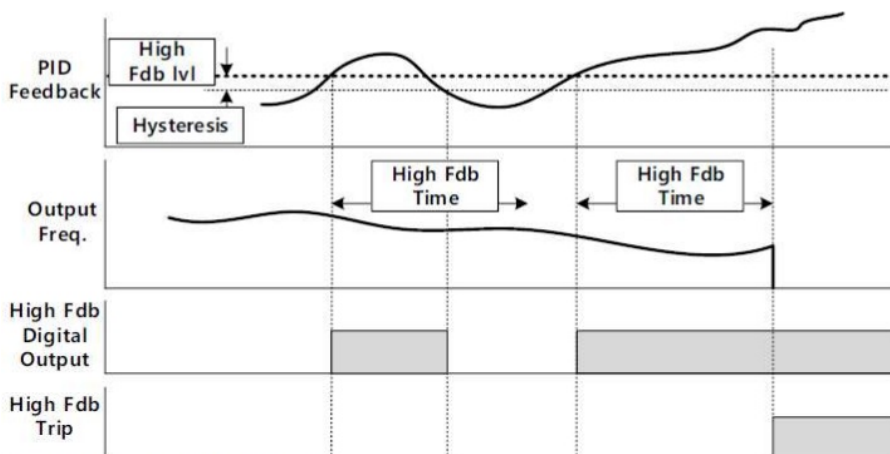


- **AP2-51 Low Feedback Mode**
- **AP2-52 Low Feedback Level Fault Delay Time**
- **AP2-53 Low Feedback Level**
- **AP2-54 Hysteresis Level**
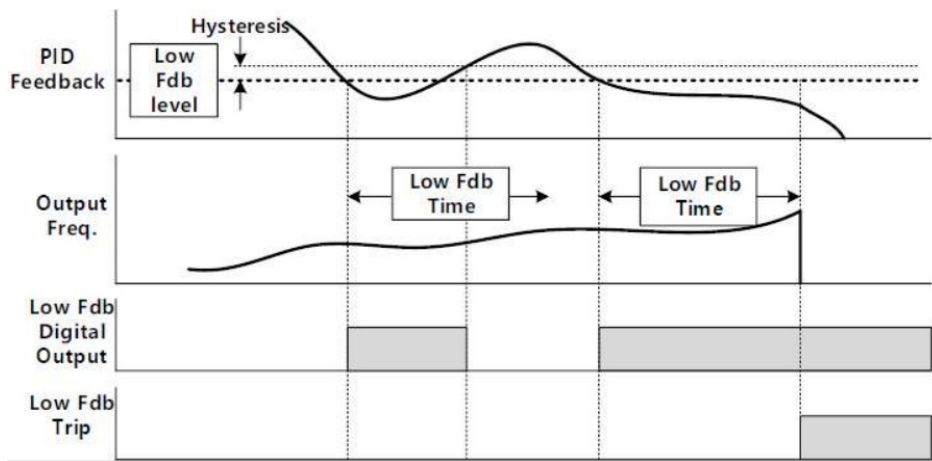
## Thrust Bearing Control

Thrust bearing control is commonly required on submersible pumps in order to protect the thrust bearing. This provides a fast accel and decel at lower speeds and applies to HAND and AUTO modes.



- **AP2-40 Thrust Frequency**
- **AP2-41 Thrust Bearing Acceleration Time**
- **AP2-42 Thrust Bearing Deceleration Time**

## Step 4 –Verifying Operation

The VFD must be in AUTO mode for PID to operate. Additionally, an active run command must be present. This is dependent on DRV06. The Pressure Control macro "pins" feedback and setpoint to the main monitor screen for easy viewing. Compare the Feedback monitor on the main screen to a mechanical gauge. See below examples.

**VFD is in sleep mode "SLP"**

**Programmed Set-point**

**Actual Feedback (above set-point)**
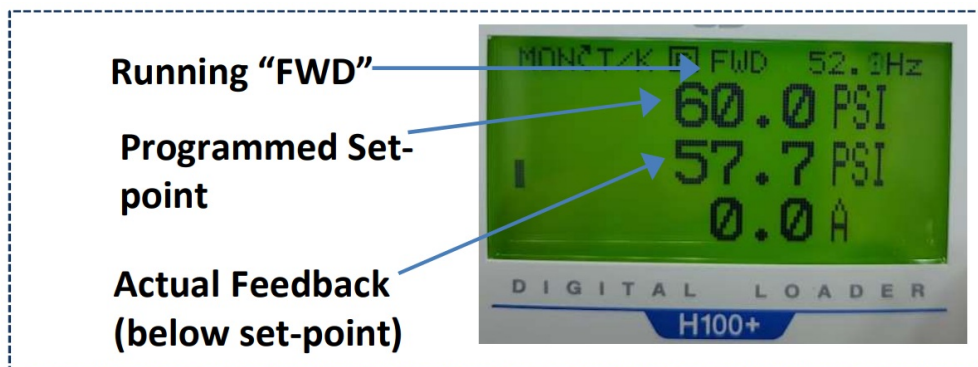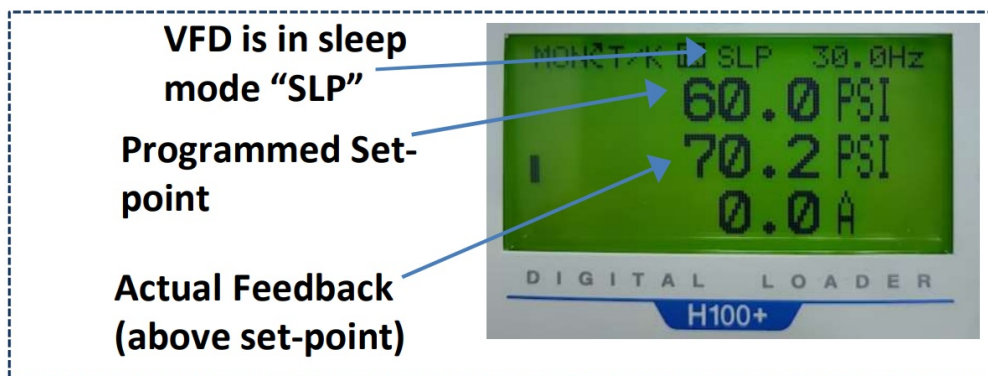
## Step 5 –PID Troubleshooting

**VFD is not running**

- Check run command
- Check that feedback is below the setpoint
- Check sleep and wakeup levels

**Feedback is always at "0".**

- Check that PID20 matches physical terminal used for feedback.
- Check transducer polarity.
- Check analog input monitor to verify signal. IN05(V1), IN35(V2), or IN50(I2).

**The VFD keeps starting and stopping**

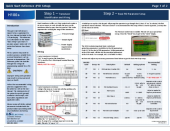- Check that sleep delay time is longer than accel time to prevent "sleep cycling"

**Slow response to feedback changes.**

- Gradually increase P gain and decrease I-Time.



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LS H100+ Quick Start Reference (PID Setup) Rev A

## Documents / Resources

**LS ELECTRIC H100 Variable Speed Drive** [pdf] User Guide
H100 Variable Speed Drive, H100, Variable Speed Drive, Speed Drive, Drive

# References

- **User Manual**