This application note applies to the H300 series of drives

H300 Speed Reference not following Analog Input

The H300 has two analog inputs that can be used as the speed reference. If the drive is not following the intended analog input it may be set up to look at the input that is not wired. This note will help get the speed reference to follow the desired analog input.

Analog Input Descriptions

Both analog inputs on the H300 accept:

Bi-polar single ended voltage signal 0- ±10 Vdc

Unipolar current signal:

- 4-20 mA
- 0-20 mA
- 0-40 mA
- 20-0 mA

Thermistor input:

- Din4408
- KTY84
- PT100
- PT1000
- PT2000
- NI1000

Make sure the input signal is one of the compatible protocols listed above.

The trip level and hysteresis are user programmable.

Please use updated reference material while working:

- User Guide/Manual
- Parameter Reference Guide
- Installation Guide
- Quick Startup, Operation, Maintenance, and Advanced User Guides

Guides are found on our website:
Controltechniques.com→search: "H300 Guide"

5	Analog input 1
6	Analog input 2
Terminal 5 Default function	Frequency / speed reference (Pr 1.036)
Terminal 6 Default function	Frequency / speed reference (Pr 1.037)
Type of input AI 1 [AI 2]	Unipolar current and Bipolar single-ended analog voltage
Mode controlled by...	Pr 07.007 [07.011]
Operating in current mode (Default for terminal 5)	
Current ranges	0 to 20 mA ±5 %, 20 to 0 mA ±5 %, 4 to 20 mA ±5 %, 20 to 4 mA ±5 %
Maximum offset	250 µA
Absolute maximum voltage (reverse bias)	±36 V relative to 0V
Absolute maximum current	±30 mA
Equivalent input resistance	≤ 300 Ω
Operating in voltage mode (Default for terminal 6)	
Full scale voltage range	±10 V ±2 %
Maximum offset	±10 mV
Absolute maximum voltage range	±36 V relative to 0 V
Input resistance	≥100 k Ω
Common to all modes	
Resolution	12 bits (11 bits plus sign)
Sample / update	250 µs with destinations Pr 01.036, Pr 01.037 or Pr 03.022, Pr 04.008 in RFC-A or RFC-S. 4 ms for open loop mode and all other destinations in RFC-A or RFC-S mode.
Operating in thermistor input mode	
Voltage range ±10 V ±2 %	
Supported thermistor types	Din 4408, KTY 84, PT100, PT 1000, PT 2000, NI 1000
Internal pull-up voltage 5 V	
Trip threshold resistance	User defined in Pr 07.055 [07.060]
Reset resistance	User defined in Pr 07.056 [07.061]
Short-circuit detection resistance	50 Ω ± 40 %
Common to all modes	
Resolution	12 bits (11 bits plus sign)
Sample / update period	4 ms

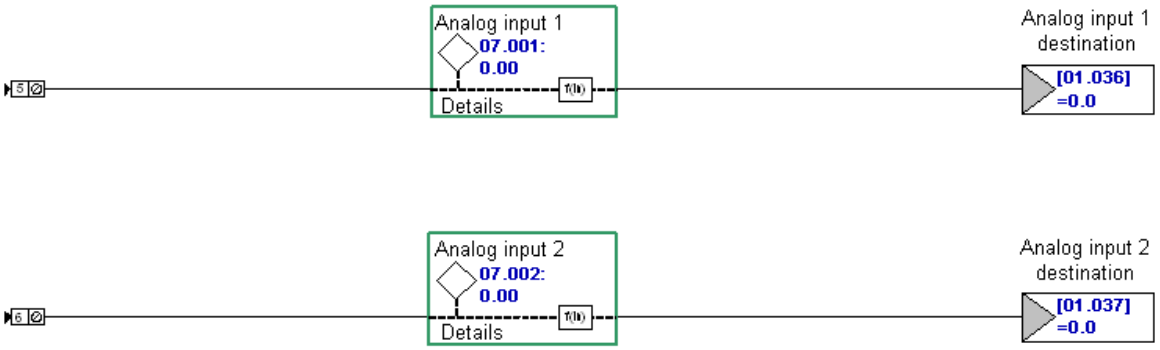
When an analog signal is received by the drive it is processed by logic and sent to its **destination**. Each analog input has a destination parameter in the drive. If the destination is not properly set the drive will not follow the intended analog input.

The two destinations used for analog speed references are:

- Reference 1 (Pr 01.036) & Reference 2 (Pr 01.037)
- The references can be used in any analog input mode but must have different destinations
- Reference 1 (Pr 01.036) is not always tied/wired to analog input 1

Analog Input Function Block Diagram:

Analog Inputs



1. **First determine what type of signal will be used and set the mode accordingly.**
   Wire that signal to the desired analog input. Terminal 5 or 6, and terminal 4 for 0 V Common
   NOTE: If replacing an Affinity it is very common to find analog input 1 unused and analog input 2's destination assigned to Pr 01.36 because analog **input 1 is voltage only on the Affinity**. The H300 can be
   set up the same way but remember when changing the destination of analog input 2 to Pr 01.036 the destination for analog input 1 must also be changed to prevent a DEST trip, where two or more parameters are assigned
   to the same destination. Typically you would set Pr 07.010→0.000 and Pr 07.014→1.036. After changing the analog input destinations the reset button must be pressed for the change to take effect then the **parameters should be saved**.

   5.7 Saving parameters (from the User Guide)
   When changing a parameter in Menu 0, the new value is saved when pressing the Enter button to return
   to parameter view mode from parameter edit mode.

   If parameters have been changed in the advanced menus, then the change will not be saved automatically.
   A save function must be carried out.
   Procedure
   1. Select 'Save Parameters'* in Pr **mm.000** (alternatively enter a value of 1000* in Pr **mm.000**)
   2. Either:

• Press the red reset button
• Toggle the reset digital input, or
• Carry out a drive reset through serial communications by setting Pr **10.038** to 100

* If the drive is in the under voltage state (i.e. when the control terminal 1 & 2 are being supplied from a low voltage DC supply) a value of 1001 must be entered into Pr **mm.000** to perform a save function.

2. **Verify the analog input is wired and its mode is set. Ensure the drive is reading the signal by viewing the read only reference parameters (Pr 07.001-input 1 and Pr 07.002-input 2).**
NOTE: Analog input 1 can be viewed in Pr 07.001 (read only), analog input 2 can be viewed in Pr 7.002 (read only). These parameters show the level of the input in %. For a 4-20 mA signal 4 mA is 0% and 20 mA is 100%. For a 0-10 V signal 0 V is 0% and 10 V is 100%. If you are not seeing Pr 07.001 or Pr 07.002 function as expected check the wiring and ensure the correct mode is selected. Your thermistor/input signal may be configurable it's important to know exactly what type of signal is being used. If possible adjust the input to 0%, 50%, 100% and back to ensure it is functioning as expected.

3. **With the input verified it's time to set the destination. If the analog input level was seen in Pr 07.001 AI1 level, set the AI1 destination in Pr 07.010. If the analog input level was seen in Pr 07.002 AI2 level, set the AI2 destination in Pr 07.014.**
NOTE: By default the drive is going to follow the reference sent to Pr 01.036 but there is a parameter that tells the drive to follow the reference sent to Pr 01.037, this parameter is Pr 01.041 (Reference Select flag 1). With Pr 01.041 "off" Pr 01.036 is selected and with Pr 01.041 "on" Pr 1.037 is selected. By default Pr 01.041 is assigned to digital input 5 (terminal 26).

Summary

The drive should now be following the analog input and the reference can be checked as it goes through the drive. If the input is wired to terminals 6 and 4 (Analog Input 2) make sure Pr 07.002 tracks from 0 to 100% with the input. Next, check Pr 07.014 for the destination parameter then view that parameter (Pr 01.036 or Pr 01.037) and it should vary from 0 to 60Hz (or the max ref clamp). Finally, check Pr 01.041 if it's "off" the drive will follow Pr 01.036 and if it's "on" the drive will follow Pr 01.037.

Parameters to Remember

	Analog input 1	Analog input 2
Level (read only)	Pr 07.001	Pr 07.002
Mode	Pr 07.007	Pr 07.011
Offset	Pr 07.030	Pr 07.031
Scaling	Pr 07.008	Pr 07.012
Invert	Pr 07.009	Pr 07.013
Destination	Pr 07.010	Pr 07.014
Minimum clamp	Pr 07.040	Pr 07.041
Maximum clamp	Pr 07.043	Pr 07.044

Analog Reference 1: Pr 01.036
Analog Reference 2: Pr 01.037
Reference Select Flag 1: Pr 01.041

Terminals to remember
Analog Input 1 signal→T5 w/ common on T4
Analog Input 2 signal→T6 w/ common on T4

Resources: can be found on our website: www.controltechniques.com

For help contact techsupport.cta@mail.nidec.com, or
call Technical Support at 952-995-8000, 24/7/365