

<i>Title</i> Setting up the PID loop in ACS880 – Hints and Tips		<i>Document number</i> ACS880, 0001	
<i>Product(s) affected</i> ACS880-xx		<i>Category</i> Firmware	
<i>Author</i> Andy Preston	<i>Date</i> 25 th September 2014	<i>Issue</i> 0	<i>Page</i> 1 of 3

Application Note Introduction

This note is intended to guide a new ACS880 user to set up a PID controller within the ACS880

It is highly recommended that you refer to the control chain diagrams in section 12 of the FW manual, and follow the “flow” of this set-up as we follow it through

Basic example specification

Controlling a compressor with a pressure sensor

0-30Bar, 4-20ma feedback sensor

7.1bar internal set point (fixed) required

Speed range 750 to 1500rpm (min speed on a compressor is typical)

DI1 start/stop

Always in EXT 2 (PID control)

Basic Drives set-up

Configure the motor parameters and basic drive set-up by following the “start-up assistant”, checking motor direction and completing an ID run

Set 96.04 to PID Macro

Set 40.07 set 1 PID operation mode = “ON when drive running”

Basic Start stop changes

May need to configure the basic I/O and control settings regarding EXT1 and EXT2. In our case we just need to fix the control to EXT2 and the run should come from DI1.

P20.08 EXT2 in1 source: change from DI6 to DI1, this will allow the EXT2 start command from DI1

P19.11 EXT1/2 select, set to EXT 2, to fix the control from EXT2

P20.12, run enable 1 source may need to be edited to be a “1”, but can be defeated with a wire link

Selecting and scaling the analogue feedback

Now scale the actual analogue input that is going to be used as the feedback, we need to achieve a 4-20ma range to give a 0-100 range, as the PID will be setup to expect a % input.

P12.27 set to 4ma

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P12.28 remains at 20ma

P12.29 set to 0

P12.30 set to 100

4 to 20ma will now request 0 – 100. The feedback scaling can be checked by monitoring P40.02, manually running the drive (in local control) could be used to check that the value changes.

Selecting and scaling the setpoint

We need to configure the PID loop to operate in % overall as this gives a sensible generic control range:

P40.12 Set 1 unit selection = %

To use an internal setpoint (setpoint 1) P40.19 and P40.20 can be left at default (not selected), the 0,0 combination selects internal setpoint 1.

Now set the value of your setpoint in %, so P40.21 = 23.66%
(30 bar sensor = 100%, so 7.1 bar = 23.66% for this example)

P40.16 Set 1 setpoint 1 source should now be set to Internal (the output of the setpoint selector)

NOTE – the correct setpoint value should now be showing in P40.03 (in %), if not, then follow the diagram to determine why.

The PID setpoint range now needs to be scaled

P40.14 Set 1 setpoint scaling = 100 (matches the 100% range we have decided to follow)

P40.15 Set 1 output scaling = 1500, to match the maximum required motor speed, this may change for different required maximum speeds

Limiting the PID control Range

The PID controller is designed to control a number of applications, in this case we are setting it up to ultimately control the speed of the motor, so limiting the range of the PID controller is important to prevent incorrect speeds from being requested:

P40.36 Set 1 output min = 750rpm, which should match the minimum speed of the application (this value should be set into P30.11 as well)

P40.37 Set 1 output Max = 1500rpm, which should match the maximum speed of the application (this value should be set into P30.12 as well)

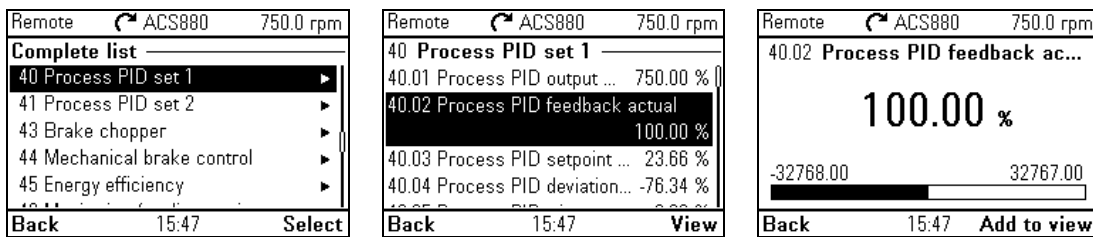
Parameter P40.01 Process PID output actual will now control over a range of 750 to 1500, it will be in rpm, which is correct as it is a speed reference.

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Displaying the PID in the “home Screen”

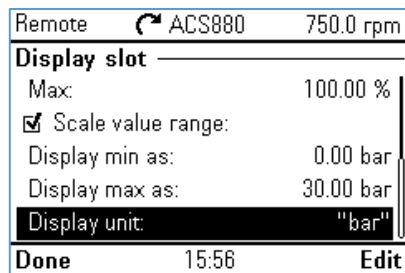
The fastest way to add items to the home screen is to navigate to the parameter then add it to view, proceed as follows:

Navigate to P40.02 Set 1 PID feedback > view > **add to view**, position using the cursor arrows, then press **add**



Then scale items properly in the home view editor, as follows:

- Min = 0%
- Max = 100%
- TICK the value range box
- Display Min as = 0
- Display Max as = 30 (as we have a 30 bar sensor)
- Unit = Edit to be “Bar”, then the Min and max will show in Bar



Repeat the above for setpoint (P40.03) and deviation (P40.04)

Tuning the PID loop

Alter the PID loop is set up as above, the gain (P40.32) and the Integration time (P40.33) can be tuned as normal

The PID loop is conservative, and reacts very slowly (due to integration time), suggested settings could be:

P40.32 = 5, P40.33 = 10