Technical Note

VFD Control by Physical Units

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History

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Table of Contents

1 Introduction 4
2 Set Point in Physical Units 5
2.1 C200, C2000 series, M300 series 5
2.2 VFD-E, VFD-EL, VFD-EL-W 5
3 Present Value in Physical Units 7
3.1 PID Feedback 7
3.2 Scaled Output Frequency 7

1 Introduction

In some applications, it is favourable or more comfortable to write the set point and read the present value in physical units instead of frequency.

An example is PID pressure control, where the user prefers to work with the unit [bar], rather than having to convert the desired pressure to a percentage of the feedback sensor range, converted back into a percentage of the maximum frequency.

This technical note will help you to set the drive up in a way that makes control and monitoring more intuitive.

Be aware that this document addresses qualified persons, and it cannot replace profound technical education and training.

2 Set Point in Physical Units

2.1 C200, C2000 series, M300 series

Parameters 00-25 and 00-26 provide the option to convert the set point to physical units. The three leftmost nibbles in parameter 00-25 determine the unit. The rightmost nibble in parameter 00-25 determines the number of decimal places. The definitions are hexadecimal. Add the nibbles together first, and then convert them from hexadecimal to decimal numbers.

Then scale the maximum value in parameter 00-26.

Example 2.1.0:

A pump controls water pressure in PID mode. The pressure sensor has a range of 16 bar and the user wants to set the pressure with a resolution of 0.1 bar.

According to the table in the description of parameter 00-25 in the user manual, the leftmost three nibbles for the unit bar are 016xh.

The rightmost nibble for one decimal is x = 1h.

The result is 0161h = 353d → Parameter 00-25 = 353

Parameter 00-26 = 16.0

The setting range changes from 0-f_{max} Hz to 0-16.0 bar.

2.2 VFD-E, VFD-EL, VFD-EL-W

There is an option that allows scaling the set point with a fixed multiplication factor, but without an indication of physical units.

Example 2.2.0:

A pump controls water pressure in PID mode. The pressure sensor has a range of 16 bar and the user wants to set the pressure with a resolution of 0.1 bar.

The maximum speed setting in parameter 01.00 = 50.00 Hz.

16 / 50 = 0.32

Parameter 00.05 only allows factors with one decimal and the result only works with one decimal up to set points of 9.9. No decimals from 10 upward. By modifying the factor, the user will see a range from 0-160 without a dot to indicate the decimal.

160 / 50 = 3.2

Parameter 00.03 = 3 to show the scaled setting immediately after power-up.

Parameter 00.04 = 16 shows the scaled setting on the keypad.

Parameter 00.05 = 3.2 changes the setting range from 0-f_{max} Hz to 0-160 decibar.

3 Present Value in Physical Units

These options exist in C200, C2000 series and M300 series drives.

3.1 PID Feedback

With the application according to example 2.1.0, the present value is the PID feedback value. The indication of that value on the keypad requires only one setting.

Parameter 00-04 = 10

The MODE key changes between the displayed values. In order to display the present value immediately after power-up, set parameter 00-03 = 2.

3.2 Scaled Output Frequency

For applications that do not have a PID feedback value, it is possible to scale the output frequency with a multiplication factor. With the values from example 2.2.0, i.e. maximum frequency 50 Hz, physical unit range 16 bar, the factor is as follows.

Parameter 00-05 = 16 / 50 = 0.32

Parameter 00-04 = 31 brings the scaled output frequency on the display.

The MODE key changes between the displayed values. In order to display the present value immediately after power-up, set parameter 00-03 = 2.