EcoDriveCN E5-P PID feedback closed loop control AC drive (VSD) commissioning guide for water supply in water pumping system, water booster system, civil water supply system

V&T Technologies Co., Ltd. is a reliable supplier & manufacturer of superb variable speed drives (frequency inverters, VSD, frequency converters, variable frequency drives, VFD), servo drives, motor soft starters, inverters, brake resistor, PG card, Profibus, CANopen optional card, and other power electronics.

As the leading manufacturer in the world of motor control, industrial automation, motion control and energy saving, we are competing with ABB, Siemens, Yaskawa and other top brands. From 200VAC to 1140VAC, power rating is from 0.4KW (0.5 Hp) to more than 3000KW (4000 Hp).

EcoDriveCN drives are widely accepted in the world for energy saving, motor control and motion control: constant pressure water supply, sewage disposal (wastewater treatment), circulation pumps, extruder machines, plastic injection molding machine, machine tools, air compressor, civil engineering, conveyor belt, wastewater treatment, extruder machines, fan and pump, HVAC (heating, ventilating and air conditioning), mine exhaust blower, dusting fan, dredger, mining industry...

Favorable factors of EcoDriveCN VSD, VFD, servo, motor soft starter:
Failure rate < 1%, similar as Siemens, Emerson Control Techniques, ABB, Danfoss, Eaton, Schneider, Allen Bradley, Lenze, Yaskawa, Mitsubishi, Omron;
Authorized CE certificate by ECMG. Under the audit of NVLAP. NVLAP Lab code: 200068-0. ISO/IEC 07025:1999, ISO 9002:1994;
18-month warranty period;
Supply to REGAL, Ingersoll Rand, Foxconn, Tata Group...

Pumps normally are sized such that they are the most efficient at their maximum flow rate. However, in reality systems do not operate at these levels except for short periods of time.

On average, 80% of the time pumps operate at 60% of their full capacity. And running a pump at 60% of its operating volume requires only 22% input power.

Volume	Pressure/Head	Hp Required
100%	100%	100%
80%	64%	51%
60%	36%	22%
40%	16%	6%

According to the above chart that it is obvious when operating a pump at reduced speeds decreases the horsepower required. To calculate the actual cost savings, the brake horsepower must be converted to watts and then multiplied by hours of operation:

Kilowatts = Hp x 0.746 [1 / SYS_{EFF}]

This value is then multiplied by energy cost per kilowatt hour:
Energy Cost = Kilowatts x Hrs/Yr x $/kWh

At 100 Hp (75KW), an **EcoDriveCN** E5-P AC drive (variable speed drive, frequency inverter, variable speed drive, VSD, VFD) operating a pump at 60% speed will result in **over $20,000 a year in energy savings** when compared to running at 100% flow volume and using a valve. This can pay for the installation of a drive in less than six months.

Fixed Speed Motor:
(100 HP)x(1/95% eff.)x(.746 kW/Hp)x(.08 $/kWh)x(12 H/Day)x(360 D/Year) = **$27,139 per year**

EcoDriveCN VFD Run Motor:
(100 HP)x(0.22)x(1/95% eff.)x(.746 kW/Hp)x(.08 $/kWh)x(12 H/Day)x(360 D/Year) = **$5,979 per year**

From the calculation above, you know, for 100 Hp (75KW) pumps, **just in 1 year, you can save about $20,000.00.**

Where **EcoDriveCN** E5-P AC drives (variable speed drives, variable frequency drives, VSDs, VFDs, AC inverter drives) would be of most benefit for pumping systems:

1. All friction system (No static head)
2. System where control valve is constantly modulated
3. Pumps in parallel or series operation
4. Pumping system with multiple design points
5. System with modulating bypass valve
6. Cooling towers that start and stop frequently

Below is commissioning guide of **EcoDriveCN** E5-P PID feedback closed loop control AC drive (VSD, VFD, variable speed drives, variable frequency drives) for water supply pumping system. The exact example is based on **EcoDriveCN** E5-P 5.5KW AC drives (VSDs, VFDs, inverters).

Application situation:
5.5KW pump; 0 – 10 bar (0 ~ 1MPa) pressure sensor: 4 ~ 20mA current signal; The terminal AI1 of **EcoDriveCN** AC drive (VSD) receive the current signal from the pressure sensor.

Requirements:
Constant running pressure: 4 bar (0.4MPa); Over-pressure pressure: 6 bar (0.6MPa); Under-pressure pressure: 2 bar (0.2MPa).

Commissioning guide:

1. Please set P0.01 = 2 (restore Parameters in zone P to factory default settings: all the parameters groups P are restored to default settings.)

set P0.12 = 415 (If the power supply is 380V, no need to set this parameter. If the power supply is 415V, set P0.12 = 415. If the rated voltage of power supply is other voltage, set it to the other values)

set PA.05 = 150 (If the motor runs normally, that means you don't need to set this parameter. If you set PA.05=150, then the current limit value is 150% rated current of VSD. For some motors, the start-up current is large. So you need to change this parameter. The range of values is from 20% to 150% rated current of **EcoDriveCN** VSD. The default setting is 120. You may increase it & try when the motor don't run.)

2. (For all P9.01, P9.02, P9.03 and P9.04 parameters, you should set the correct value according to the nameplate of the motor. That's very important. If you set the wrong value for auto-tuning, that may be wrong. You may refer to Page 87 of user manual.)

nameplate of the pump motor in this example

Set P9.01=2 (the numbers of motor poles. Now you use 2 poles motors.)
P9.02= 2910 (rated rotation of the motor: rated RPM of the motor)
P9.03=5.5 (rated power of the motor: 5.5KW)
P9.04=10.11 (rated current of the motor. According to the nameplate of the current motor, you may try P0.04 = 11.04 if there's any wrong when auto-tuning.)
P9.15 =1 (static auto-tuning),
then press RUN key to perform parameter auto-tuning. (Please refer to Page 124 of user manual for the process of auto-tuning).

3. Then set the following parameters of **EcoDriveCN** drives:
P0.03=1 (PID feedback closed loop control)
P0.06=1 (running command is from the terminal. if the value is 0, the command is given by the key panel. If P0.06 = 2, running command is given by the computer.)
P5.00=02 (X1 terminal input function: FWD)
P6.00=40 (AI analog input curve selection. single digit 0: the curve 1 determines the reference frequency P6.01 ~ P6.04.)

P6.01=20 (curve 1 input point A0: 20%)

P7.05=80 (AO1 gain: 80%)

P7.06=20 (AO1 bias: 20%)

H0.00=1 (1: closed loop control for constant pressure water supply)

H0.02 = 0.6 (upper pressure, over-pressure: 0.6MPa, 6bar)

H0.03 = 0.2 (lower pressure, under-pressure: 0.2MPa, 2bar)

H0.05=0.4 (pressure setting, constant pressure: 0.4MPa, 4bar)

P1.05=1 (main feedback mode of analog feedback closed loop control, 1 means terminal AI1. If you set P1.05 =2, 2 means terminal AI2)

H0.30=1 (dormancy as the setting of H0.31 ~ H0.34)

H0.31=2 (wake-up pressure: 0 ~ 10V, 2 means 2V)

H0.32=6 (dormancy pressure: 0 ~ 10V, 6 means 6V)

P7.02 = 32 (dormancy indicator, alarm output.)

P7.03=55 (terminal AO1 output function: 55 means "the same as AI1")

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