DANAHER MOTION

TECHNICAL BULLETIN

SECO Bronco VFD Series FAQ's

Q. What agency approvals does the Bronco VFD have?
A. The Bronco VFD units are UL and C-UL listed, chassis and enclosed.

Q. What does VFD stand for? Is it for AC or DC motors?
A. The Bronco VFD series are solid-state AC motor controllers. The VFD stands for "Variable Frequency Drive".

Q. What does "Variable Frequency Drive" mean?
A. It means that speed is controlled by output frequency not just voltage.

Q. How is the Bronco VFD series different from the Bronco AC series?
A. The VFD series has several additional enhancements. They include an isolated front end, DC injection braking, slip compensation, AC line fuses standard.

Q. What does an isolated front end mean?
A. That the Bronco VFD series units can accept a speed reference signal that is grounded without the addition of an option card.

Q. What kind of speed reference signal can be accepted?
A. 0-10VDC, 0-5VDC or 4-20mA.

Q. What input power can I supply to the Bronco VFD series?
A. The Bronco VFD accepts 115VAC or 230VAC single phase.

Q. At what output frequency would my motor reach rated speed?
A. Typically at 60Hz (the same as your input frequency).
Note: Variable Frequency Drives are also called "Volts per Hertz" (V/Hz) drives. The voltage output and Hertz (frequency) ratio essentially remains constant as the drive increases motor speed until the input voltage and input frequency are achieved. For example: For a 115VAC, 60Hz power supply that would be 115V/60Hz output.

Q. What is the maximum output frequency of the Bronco VFD?
A. 0-120Hz.

Q. If rated speed is reached at 60Hz, why can the Bronco VFD go to 120Hz?
A. Most AC motors have a rated or "base" speed and a maximum speed rating. The maximum speed is achieved by increasing the frequency (the voltage stays the same!) beyond the base frequency. In our case, up to 120Hz is available to reach that maximum speed.

Q. What happens to the torque when the motor runs above the “base” speed?
A. Horsepower increases and torque remains constant up to the base speed, however above base speed (i.e. above 60 Hz frequency), the torque decreases while the horsepower remains constant. This can easily be understood by the simple relationship between horsepower, speed and torque. [HP= Torque x Speed x K(units constant)].

Q. Does the Bronco VFD series have the voltage output ‘doubler’ feature?
A. Yes. A 230V three-phase output is provided to the motor when only a 115VAC single phase input is supplied.

Q. What motors can I use with the Bronco VFD drive?
A. The Bronco VFD series can drive AC motors that are three-phase induction, single phase permanent split capacitor (PSC), shaded pole and synchronous motors.

Q. What is the switching frequency?
A. Adjustable 4-16kHz. The unit is 16kHz as standard, but can be adjusted to a lower frequency (4, 8, 10 or 12kHz) by changing the carrier frequency capacitor.

Q. What is the difference between the two NEMA enclosures?
A. The standard NEMA 4 enclosure style is gray cast aluminum. The NEMA 4X wash-down style has a white corrosion resistant finish with stainless hardware.

Q. What operators or switches are on the cover of the enclosed units?
A. Mounted speed potentiometer and switches for Power ON/OFF, Run/Jog and Forward/Reverse.

Q. Do the Bronco VFD drives have DC injection braking?
A. Yes.

Q. What is DC injection braking?
A. When DC injection braking is initiated the drive instantly cuts off the AC supply to the motor and simultaneously applies a DC current to the motor stator windings. The magnetic field that results generates an efficient braking force, without damaging the motor. Thus, DC injection braking is an effective and quick way to stop the motor.

Q. What adjustments are on the Bronco VFD drives for DC injection braking?
A. There is a "Brake Current" trimmer pot and a "Brake Time" trimmer pot. The Brake Current pot sets the amount of DC current to be applied during braking. The maximum DC brake current available is equal to the continuous current rating of the unit. (For example a 4A rated drive would have up to 4A of DC current available). The Brake Time pot sets the amount of braking time from 1 to 10 seconds.

Q. Do the DC injection braking trimmer pots interact?
A. The user sets the "Brake Current" pot to the amount of actual DC current (expressed in percent, 0-100%) they wish applied to the motor for braking. The user then adjusts the "Brake Time" pot to set the amount of time that the DC brake current is applied (1-10

sec.). The user will most likely need to test a combination of different brake current and brake time settings in their application to determine what arrangement meets their requirements.

Q. Can the Bronco VFD series drives reverse?
A. Yes, the Bronco VFD series has solid-state reversing. When the direction switch changes state, the VFD will decelerate to zero speed, then accelerate to the set speed in the opposite direction.

Q. What trimmer potentiometers are on the Bronco VFD drives?
A. Minimum speed, maximum speed, current limit, acceleration, deceleration, slip compensation, boost, zero set, brake current, and brake time.

Q. What is the "boost" trim pot used for?
A. In cases of loads that are hard to get moving (high inertia or high static friction) a little extra torque than what is normally available at near zero speed is needed, thus the need for a "torque boost". This is accomplished by the drive adding extra voltage at start up (between 0-2Hz) of up to 4-5 times the peak V/Hz. This extra voltage boost tapers off linearly to zero at around 20Hz. Although the "boost" applied is extra voltage from the drive, it results in an increase in forced motor current to generate more starting torque. Thus, the boost trim pot is rated in percent of *torque* boost (0-200%).

Q. Can I still use the "boost" feature even if my operating range is in the lower speeds?
A. Yes you can but with some caution. Excessive boost settings can cause motor overheating if the motor continuously operates at the lower frequencies where the boost is in effect (less than 20Hz). So be cautious.

Q. What are the adjustable acceleration and deceleration ranges?
A. 1 to 12 seconds at no load.

Q. What are the adjustable brake current and brake time ranges?
A. 0-4 ADC and 1-10 seconds.

Q. Do the Bronco VFD drives accept encoder feedback?
A. No.

Q. What jumpers are on the Bronco VFD series?
A.
• Two jumpers to configure the input supply for either 115 or 230VAC.
• A jumper to select current input reference signal or potentiometer/voltage input signal.
• A jumper to select 4-20mA or 0-5VDC or 0-10VDC input
• Jumper to select auto restart or manual restart.
• Jumper to select brake to stop or coast to stop.

Q. What inputs can be wired to the terminal block?

A.
• The enclosed units are already pre-wired. The only connections a user needs to make are the AC power and motor output unless they will be providing an analog reference signal instead of using the potentiometer. In this case, they will need to wire the signal input to the appropriate terminals.
• The chassis unit terminal block has an enable/disable input, a direction input and terminals for wiring up a potentiometer or an external reference signal in addition to the AC input and motor output terminals.

Q. What LEDs are on the Bronco VFD drives?
A. Power, Fault, Enable and Torque limit.

Q. What is the maximum operating temperature of the Bronco VFD drives?
A. They are rated for an ambient operating temperature of 10-40°C.

Q. What is the maximum load capability of the Bronco VFD series?
A. 150% for 5 minutes. Meaning that a 2A drive can handle 3A for 5 minutes before faulting due to torque limit.

Q. What is "slip"?
A. Slip is the amount of speed the motor will lose when fully loaded compared to what its synchronous* speed would be. In other words, if a motor is rated for 900 RPM at 30Hz, but runs at 850 RPM when fully loaded and given 30Hz, the 50 RPM lost is due to slip. Slip is usually given as a percent. So in this example, the motor has 5.6% slip.
*The synchronous speed of a motor depends on the applied frequency, and the number of magnetic poles in the stator. (Synch speed= (120 X frequency) / (# of poles))

Q. Does the Bronco VFD series have slip compensation?
A. Yes.

Q. What does "slip compensation" on the drive actually do?
A. By sensing the DC bus current, slip compensation applies additional frequency to the motor restoring the speed lost to slip. In our example above, slip compensation would add an additional 1.7Hz to the 30Hz to get the needed 900RPM.

Q. What is the speed regulation of the Bronco VFD?
A. Regulation is approximately ±3% of base speed, however the actual number is affected by many factors: the motor, the temperature, the load and the speed range. The motor's slip characteristic has the greatest impact. With a single discrete RPM setting you could see a ±0.25% regulation, while regulation over a speed range, would not be as good.

Q. Are AC line fuses required when installing?
A. No. The Bronco VFD series drives come with AC line fuses.

Q. Does the Bronco VFD series accept a motor thermal switch?

A. The Bronco VFD does not have a specific motor thermal switch input, however the enable input can be used to accomplish the same function.

Q. What is the “torque foldback” feature on the Bronco VFD?
A. The torque limit function allows 200% torque for a period of time, then it acts to reduce the output current (torque) to a value set by the TQ LIMIT trim pot.

Q. What is the practical benefit of the torque foldback feature?
A. The benefit is that the drive allows up to 200% torque for short periods to overcome intermittent peak loads, yet will reduce the torque to a (preset) safe level so that equipment will not get damaged by a continuous 200% torque input

Q. Can I run multiple motors with one Bronco VFD drive?
A. Yes, you can run up to 8 motors in parallel. All motors must be the same and similarly loaded. The total current rating of all motors together must be less than the current rating of the drive.

Q. Does the Bronco VFD have an “Inrush Current Limiter”?
A. Yes, we have an active inrush current limiter. It's an SCR based soft start circuit.

Q. What’s the downside to a ‘passive’ inrush current limiter?
A. The drive is limited to 50/60 Hz AC inputs only. SCR generated line noise can also be a problem with this type of circuit as evidenced by some competitive products. Our SCR soft start circuit, however, has been designed to eliminate the possibility of such noise.