Introduction of EcoDriveCN vector control AC inverter (frequency converter) in the field of mine hoists (mine winders)

Introduction of application cases in the mine industry

Trend of development in the industry

In some areas, the extensive development mode with the features of high investment, high consumption and high pollution in the mineral resources exploitation, push the resources and environment out of the reach of them. So for any companies in the mineral resources exploitation, it's meaningful to improve the energy and exploitation efficiency. The hoisting machines are the most widely used conveyor equipments in the mine industry. Mine hoists include two kinds, such as single hook and twin hook. Nowadays rotor series resistance to adjust speed for wound-rotor AC motors is widely applied for many mine hoists (mine winders). The drawbacks include high failure rate, heavy maintenance workload, bad control performance, serious waste of electricity. Adjusting speed via AC inverter (VSD) in the field of mine winder will be the trend.

V5-H series AC inverters are high performance, vector control. The AC inverters adopt the technique of sensorless vector control (SVC), have excellent control performance as other famous brands in the world (such as Siemens, ABB, Danfoss, Yaskawa, Schneider Electric). For the mineral resources exploitation, the customized and industrial designs strengthen the reliability and environmental suitability, can meet different kinds of requirements of motion control.

Selection guide for AC inverters (frequency converters)

For the mine hoists, or mine winders, including other hoists, the features of load, belongs to constant torque and heavy duty machinery. So V5-H series AC drive must be chosen. Taking into account the safety factors, the power rating of AC inverter should be two levels larger than the rated power of the motor. For example, if the rated power of the motor is 110KW, the power of AC inverter should be 160KW at least. And dynamic braking or regenerative braking unit should be added.

If the motor itself offers the signal of the encoder, may choose V6-H series AC inverters. These V6-H series AC inverters can work for closed loop vector control, thus improving the speed precision and torque under low frequency of AC inverter.

The advantages of V&T EcoDriveCN AC inverters (VFDs) (http://www.EcoDriveCN.com) for mine hoist.

Advanced torque control, decreasing the mechanical failure rate, increasing the production

efficiency

1. Strong and large torque for low frequency, eliminating hook sliding phenomena. Even the brake is done during the process of rising, it can also raise the heavy goods in midway, doesn't need to put the goods to the level ground and restart. The startup torque is 180% for 0.25Hz when open loop, 180% for 0Hz when closed loop.

2. The failure rate of derailing of hoist is obvious decreasing. Stable acceleration and deceleration operation, avoid the possibility of derailment of winch, decreasing the wear and damage of rope and machinery obviously.

Intelligent failure assumption, avoiding the maintenance workload

1. Decreasing the additional maintenance workflow of original contactor and speed resistance, thus decreasing the maintenance cost. It has perfect multi-level protection functions, and offers the failure indication. This makes you to solve the problem in time, without affecting the normal working time.

2. The panel is with built-in function of parameters copy, decreasing the workflow of tuning and maintenance.

Easy operation. The same operation habit as before, supports coexistence of the original system.

1. People is familiar with the recast winch even for the first operation.
2. Support switching between power frequency and variable frequency. Support coexistence of the original system after reconstructing with frequency converter (AC inverter).

Multiple protection functions, ensure the improved safety and reliability of the system

1. Over-speed limiting protection function. When the speed of winch exceeds one value, automatically limit the max speed, increasing the safety greatly.

2. Reliable brake sequence control function. When starting, previously offer enough torque, then loose the brake, ensures no downwash. When it's close to completely stopping, but with torque output, brake is clasping. Then when the failure happens or there are problems with the safety circuit, mechanical braking is running automatically, ensures the safety.

3. Strong system protection functions and environment suitability. Up to 32 kinds of mature protection functions, ensure the stable operation of the system. Strong electrical grid adaptability. For wide voltage range 323V-480V, the frequency converter (inverter) is working normally.

4. Perfectly cooperating with mechanical braking system and safety circuit. Compatible with the safety circuit of old system, combining with different kinds of mechanical braking perfectly,

maximizes to ensure the safety of the whole system.

Maximizing the efficiency

1. When the mine hoist is during the hoisting process, the saving power is proportional with the speed.
2. When during hoist down, the motor is in generating mode. If adopting regenerative braking unit, the saved power is not only proportional with the speed, but also include the regenerative power.

Guide of applying EcoDriveCN frequency converter (AC inverter)

Wiring diagram

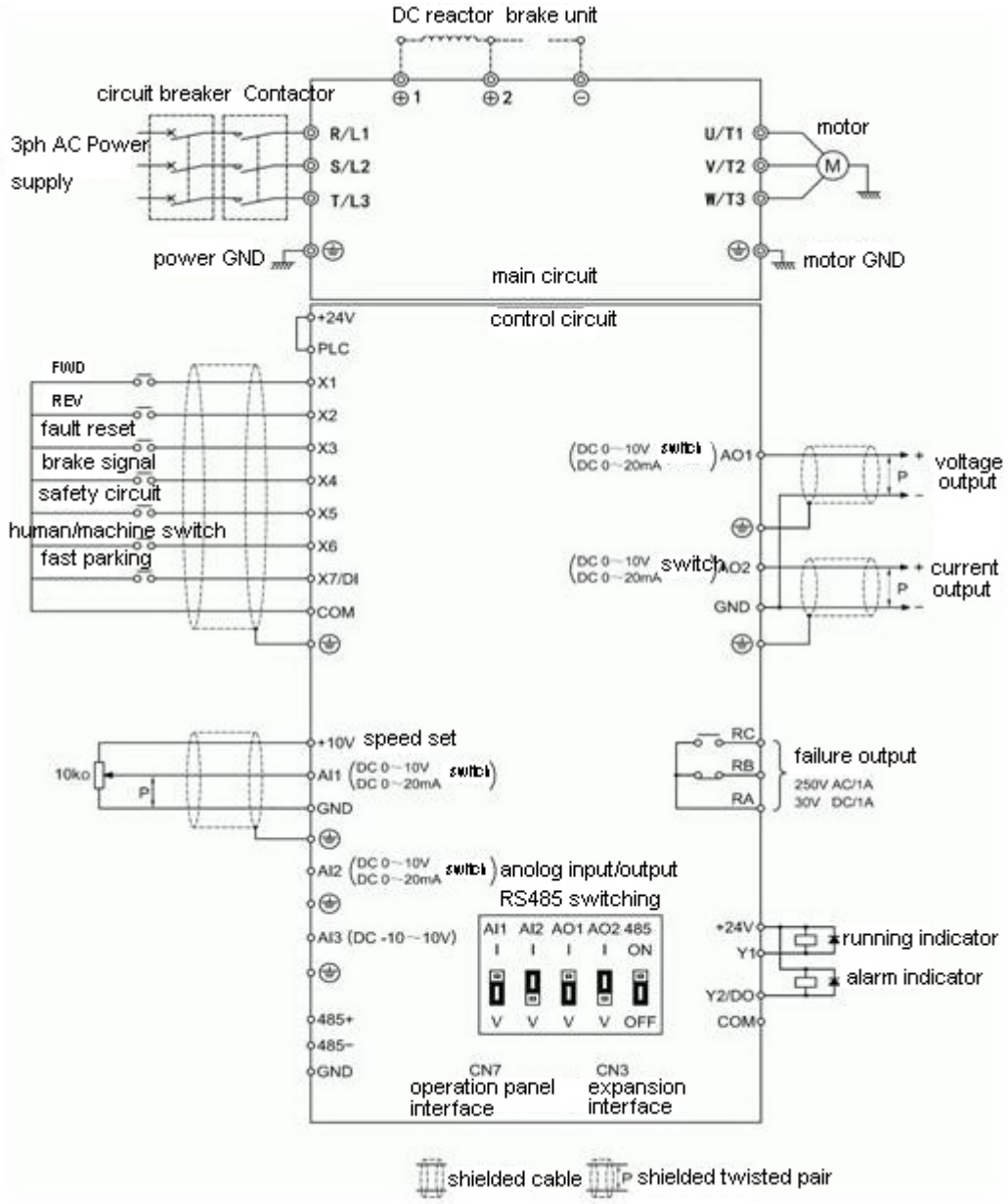

Figure. Wiring diagram of the drives with mine hoist

Input parameters according to motor nameplate

P0.11: the max frequency, configure according to the demand on site. P0.13: upper frequency limit, configure according to the demand on site.
P0.12: the max output voltage, set as the motor nameplate. P0.15: base operating frequency, set as the motor nameplate.
P9.01: motor pole, set as the motor nameplate. P9.02: the rated speed of motor, set as the motor nameplate.
P9.03: the rated power of motor, set as the motor nameplate. P9.04: the rated current of motor, set as the motor nameplate.

Set P9.15=1, for motor static self-tuning

Connect potentiometer to 10V, AI1 and GND, then configure.

P0.04=1: frequency setting through AI1.
P0.06=1: terminal control.
P3.09=0: allow REV.

Set the function of multi-function input terminal
P5.00=2: X1=FWD.
P5.01=3: X2=REV.
P5.02=20: X3=fault reset.
P5.03=21: X4=external interrupt contact input, connecting mechanical braking signal.
P5.04=22: X5=disallow AC inverter to run. Connect the safety circuit.
P5.05=55: X6=signal switching between human and machine
P5.06=26: X7=the fastest parking

Set the multi-function output terminal
P7.00=00: Y1=the signal from AC inverter running.
P7.01=15: Y2=alarm signal of the inverter.
P7.02=14: relay=failure signal of AC inverter

Connect analog output terminal
P7.03=53: AO1=output voltage of AC inverter
P7.04=50: AO2=output current of AC inverter

Remark:
1. Interlock between electromagnetic mechanical safety brake and AC inverter (frequency converter). After the electromagnet is powered on, you can start frequency converter (inverter). When the failure happens, holding the safety brake.
2. Electrical interlock between the switch of AC inverter FWD/REV and manual braking system.

Before manual braking system is loosed, AC inverter can't receive starting signal.

3. Electrical interlock of manual braking system and speed potentiometer. When the potentiometer is adjusted to run at 0V (according to 5Hz), if the manual braking is reset, AC inverter should output at zero speed promptly, and be stopped.

****

V&T Technologies Co., Ltd. (http://www.EcoDriveCN.com) was certificated as a "National Hi-tech and Double-Software Enterprise" in China. We are engaged in Variable Frequency Drive (VFD, frequency inverter, AC drive, variable speed drive), Servo Drive, Electric Vehicle Controller, Inverter and other power electronics products, with independent intellectual property rights, which cover related R&D, manufacturing, marketing.

With the profound know-how in the field of motor control, motion control, and energy saving, we have won the technical innovation prize, the most competitive brands prize, Champions of National Hybrid Electric Vehicle competition and one of Top Ten Variable Frequency Drive Enterprises in China and etc.

V&T Technologies Co., Ltd.

Add: XinFeng Building, YangGuang Industrial Area, XiLi Town, NanShan District, ShenZhen, 518055 China

Website: http://www.EcoDriveCN.com

Email: Richard@EcoDriveCN.com

Tel: +86-177-04027519

Whatsapp: +86-177-04027519

Skype & Line ID: EcoDriveCN