

SA3 drives PM motor



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1、PM motor tuning steps

(1) Correct wiring

Power line, control terminal wiring, PG card wiring

(2) AutoTuning of PM motor

VC: P.301=8 (first) (set the value of P.302~P.307 according to the nameplate)

P.301=9 (after) (the values of P.350 and P.351 are set according to the encoder)

SVC: P.301=8 (same as VC)

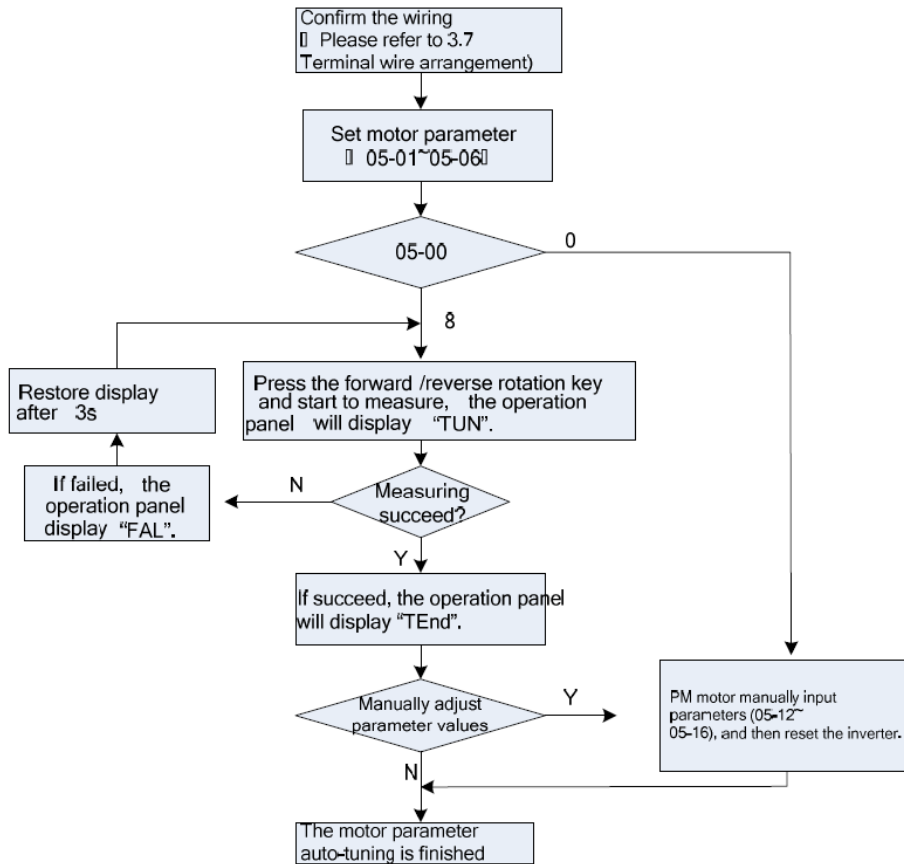
(3) PM motor speed mode test drive

P.300=5 (VC) or 6 (SVC), in PU mode set 10 Hz to test run, monitor the current, voltage and motor operation

(4) PM drive related parameter debugging for optimal performance

Note: PM motor only has vector control (VC or SVC), no VF control mode

2、PM motor AutoTuning



Note :

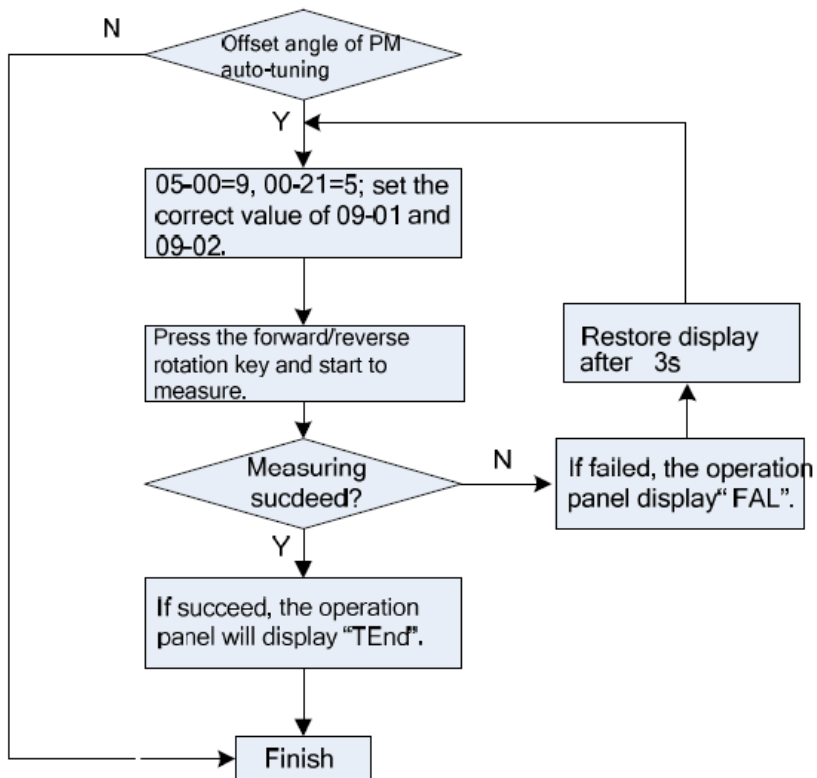
VC mode Tuning : P.301=8

C mode Tuning : P.301=8 、 9

P.301=8 Tuning block diagram

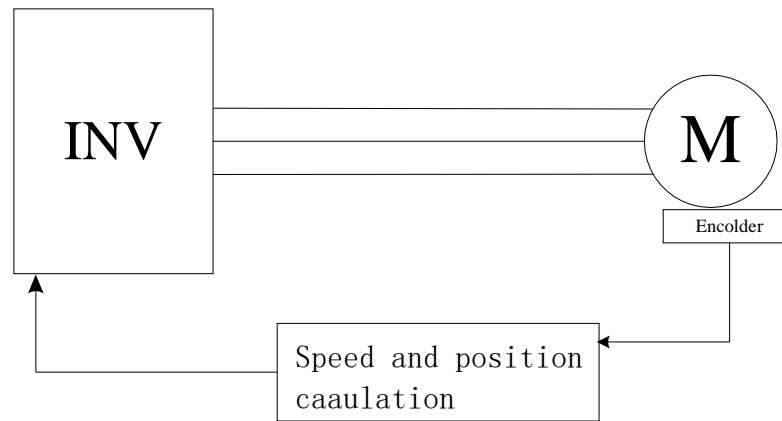
Note:

Only in the VC mode, you need to do the Z phase position Tuning. If the encoder has only the AB phase and no Z phase, you can not do the Z phase Tuning, and you need to turn off the Z phase position correction function (P.363=0), otherwise it may not work



P.301=9 Tuning block diagram

3、 PM motor closed loop speed control (VC)



VC vector control tuning notes:

- (1) Encoder parameters and wiring confirmation;
- (2) Confirmation of motor parameters;
- (3) Confirmation of Tuning results;
- (4) PID parameter confirmation;

3.1 SA3 PG expansion card



PG301C (Encorder PG card)



PG301L (Encorder PG card)



PG302L (Resolver PG card)

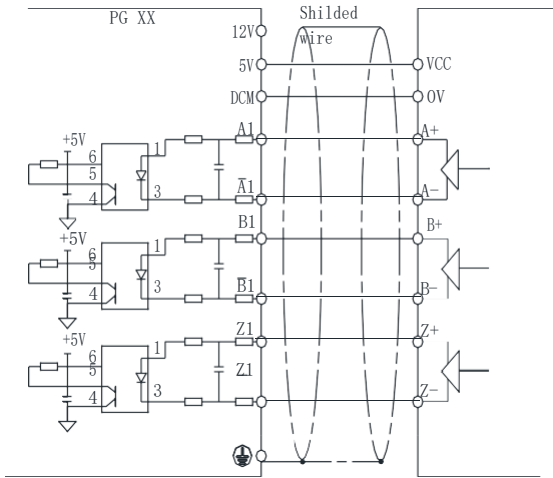
3.2 Encoder parameters and wiring confirmation

(1) Encoder parameters:

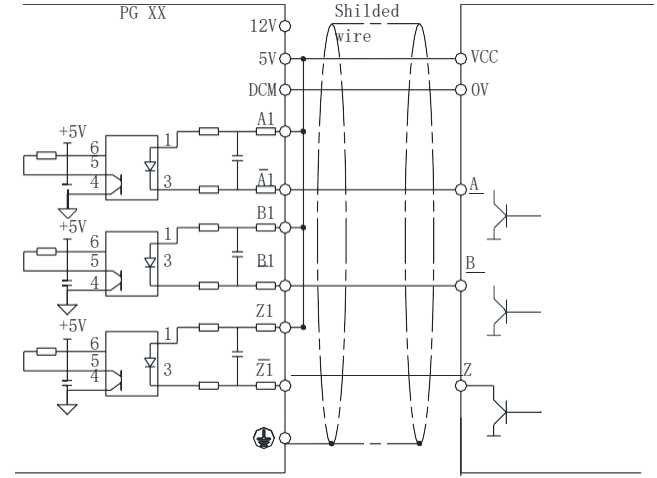
P.350 method: according to the nameplate or obtained from the customer;

P.351 method: P.351=1, trial run, if OK, P.351=1, if not OK, P.351=2

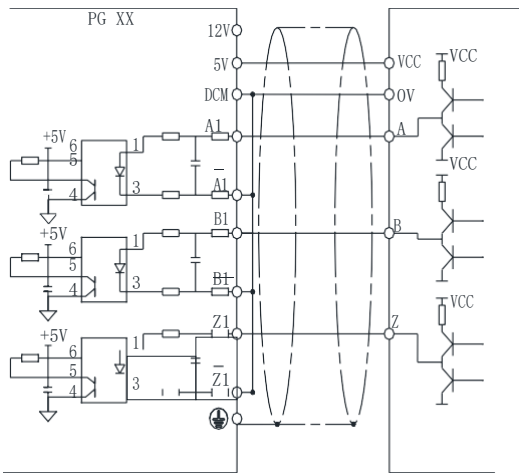
(1) Encoder wiring



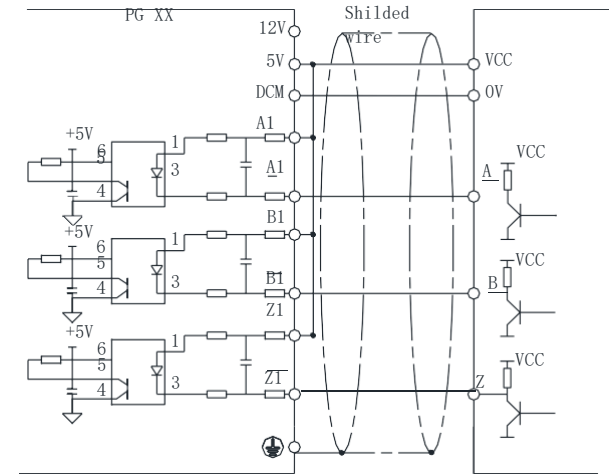
Line driver signal



Open collector signal

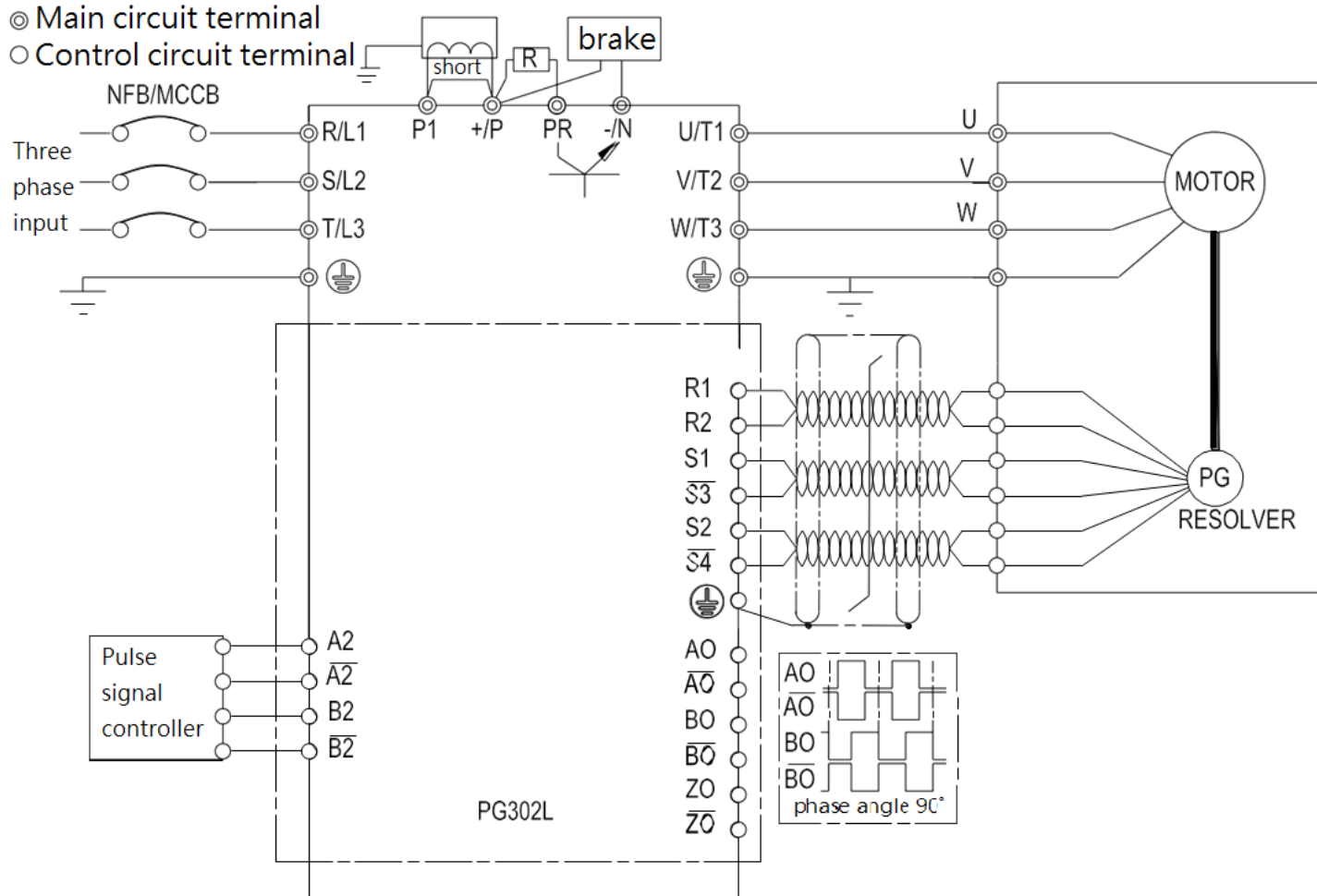


Push pull signal



Voltage output signal₉

(2) Resolver wiring



2.3 Motor parameter confirmation

Confirm P.302~P.307, P.318

method:

(1) Obtained according to the nameplate;

(2) from customer;

(3) P.303, P.305, P.307 of PM motor have a fixed relationship:

$P.307 = 120 * P.305 / P.303$;

2.4 Tuning result confirmation

Confirm P.313~P.316 (from P.301=8 Tuning), the larger the motor is, the smaller the value is, confirm P.317 (from P.301=9 Tuning) generally not zero.

2.3 PID result confirmation

(1) Speed loop regulator

The inverter can run different frequency while choosing different PI parameters. The rule is as follows:

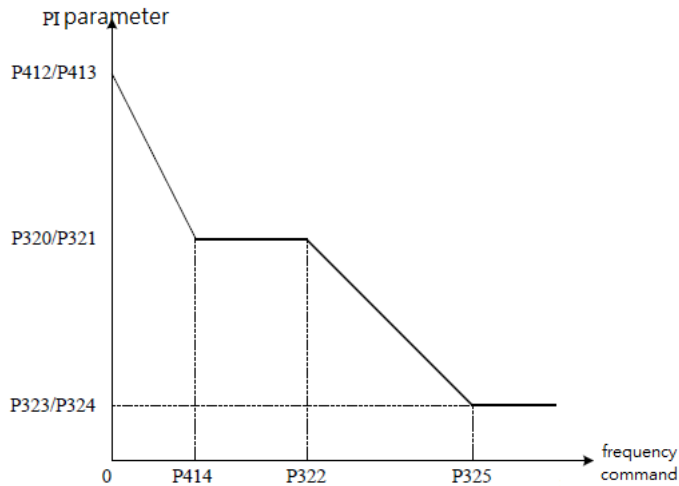
When the running frequency is 0, the speed loop PI parameter is P.412/P.413;

When the running frequency is between 0 and P.414, the speed loop PI parameter is linear switching from P.412/P.413 to P.320/P.321;

When the running frequency is between P.414 and P.322, the speed loop PI parameter is: P.320/P.321;

When the running frequency is between P.322 and P.325, the speed loop PI parameter is: linear switching from P.320/P.321 to P.323/P.324.

When the running frequency is greater than P.325, the speed loop PI parameter is: P.323/P.324, as shown on the left.



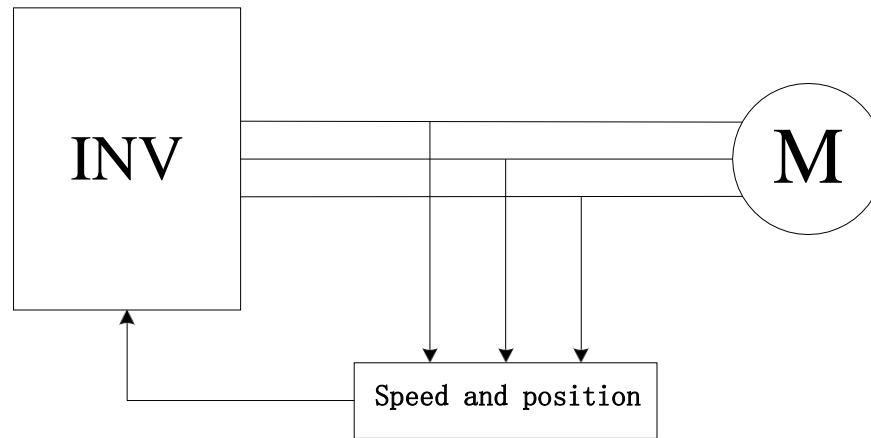
1. The speed dynamic response of vector control can be adjusted by adjusting the speed loop regulator scale factor and integration time.
2. Increase the proportional coefficient and reduce the integration time to speed up the dynamic response of the speed loop. However, if the proportional coefficient is too large or the integration time is too small, the system can oscillate. The recommended adjustment method is: if the factory parameters can not meet the requirements, then fine-tuning based on the factory parameters, first increase the proportional gain to ensure that the system does not oscillate; then reduce the integration time, so that the system has a faster response characteristics, small overshoot.

Note: If the PI parameters are set incorrectly, it may cause the speed overshoot to be too large, and even an overvoltage (OV) fault may occur when the overshoot falls back.

(2) Current loop regulator

Self-tuning, generally no need to set

4、 PM motor open loop speed control (SVC)



SVC vector control tuning notes:

- (1) Motor parameter confirmation (same as VC mode);
- (2) Tuning result confirmation (same as VC mode, no need to confirm P.317);
- (3) Confirmation of the regulator parameters;

4.1 regulator parameters

1, speed loop PID parameters (same as VC)

2, current loop PID parameters (same as VC)

3. Observer PID parameter P.366: K_p , P.367: T_i

Generally P.367 is fixed = 10000, adjust P.366 = 10, 20, 30...