

VEICHI

使用说明书（简易）

伟创刀库伺服



销售服务电话：139 2922 9175

第1章 刀库伺服安装步骤及配线

1.1 安装步骤

1. 将刀库挂入机台并在1号刀位置校正刀库中心位置，检查刀库与机头和主轴运动方向无干涉。锁紧连接刀库螺丝，调节弹簧在换刀点位置总长度。
2. 将控制电源两相（L1C、L2C）、主电源（L1、L2、L3）、动力线（U、V、W）和外置电阻按要求连接，将编码器插头连接至CN2端子，控制线连接至CN1（I/O线接入PLC定义的I/O板相应点位）。
3. 确保刀库运转无干涉后，驱动器上电，驱动器点动（Fn005）控制刀库转至1号刀位，设定原点（Pn90b=1）位置，再重启驱动器。
说明：如果伺服驱动器出现**Er.810**故障，需将刀库转到1号刀的位置，再重新设置原点，设置**Pn792=2**。设置完后按SET键，面板显示**done**后重启驱动器。
4. 进行通电调试。第一次通电调试时，通过系统控制缓慢监控正反转，确保转动分度是否正确以及自动换刀是否正确。

1.2 400W周边接线

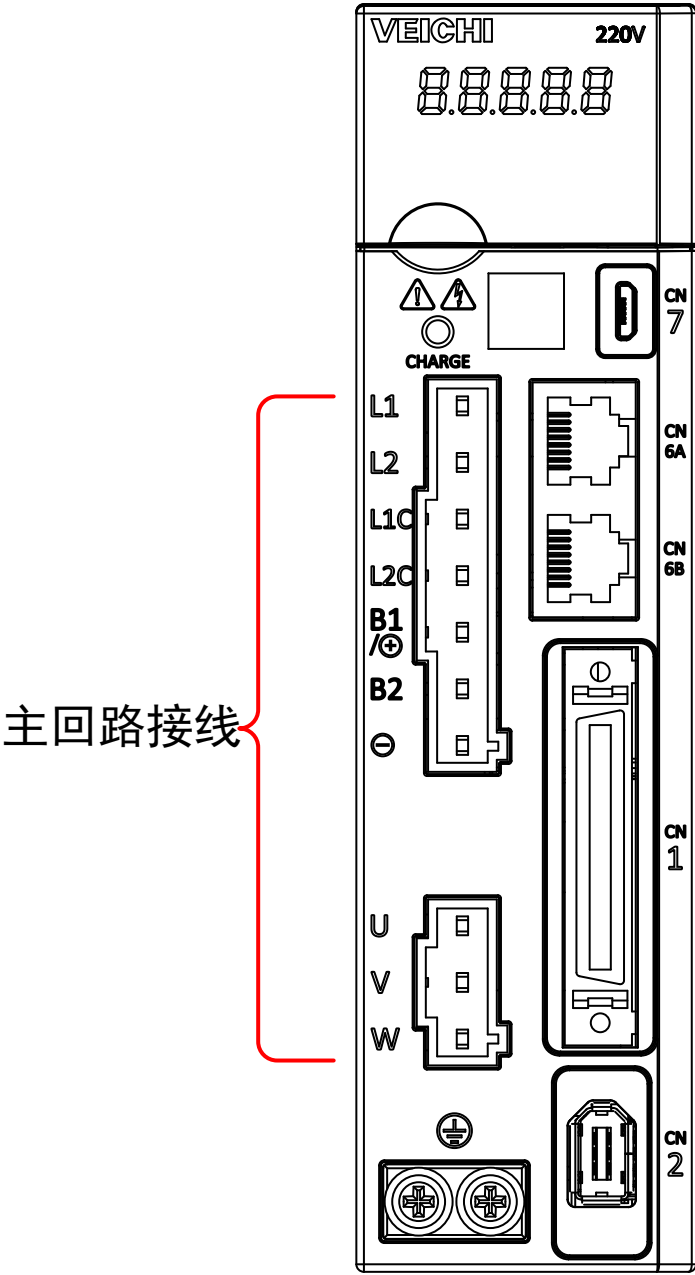


图1-1 400W周边接线示意图

表1-1 400W周边接线针号说明表

针号	信号名称	功能
1	L1	主回路电源输入
2	L2	主回路电源输入
3	L1C	控制电源输入
4	L2C	控制电源输入
5	B1/+	内、外部制动电阻引脚/整流后直流电源正
6	B2	能耗制动输出
7	-	直流电源负
8	U	电机电源U相
9	V	电机电源V相
10	W	电机电源W相
外壳	接地	安全地

1.3 750W周边接线

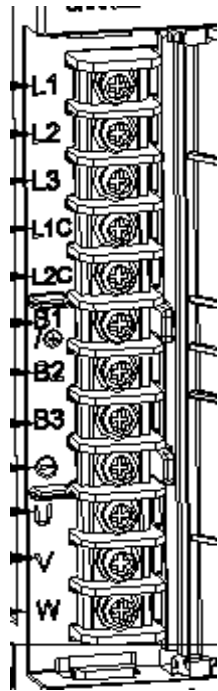


图1-2 750W周边接线示意图

表1-2 750W周边接线针号说明

针号	信号名称	功能
1	L1	主回路电源输入
2	L2	主回路电源输入
3	L3	主回路电源输入
4	L1C	控制电源输入
5	L2C	控制电源输入
6	B1/+	内、外部制动电阻引脚/整流后直流电源正
7	B2	能耗制动输出
8	B3	内部制动电阻引脚
9	-	直流电源负
10	U	电机电源U相
11	V	电机电源V相
12	W	电机电源W相
外壳	接地	安全地

第2章 CN1端子接线定义

2.1 NPN型I/O接线

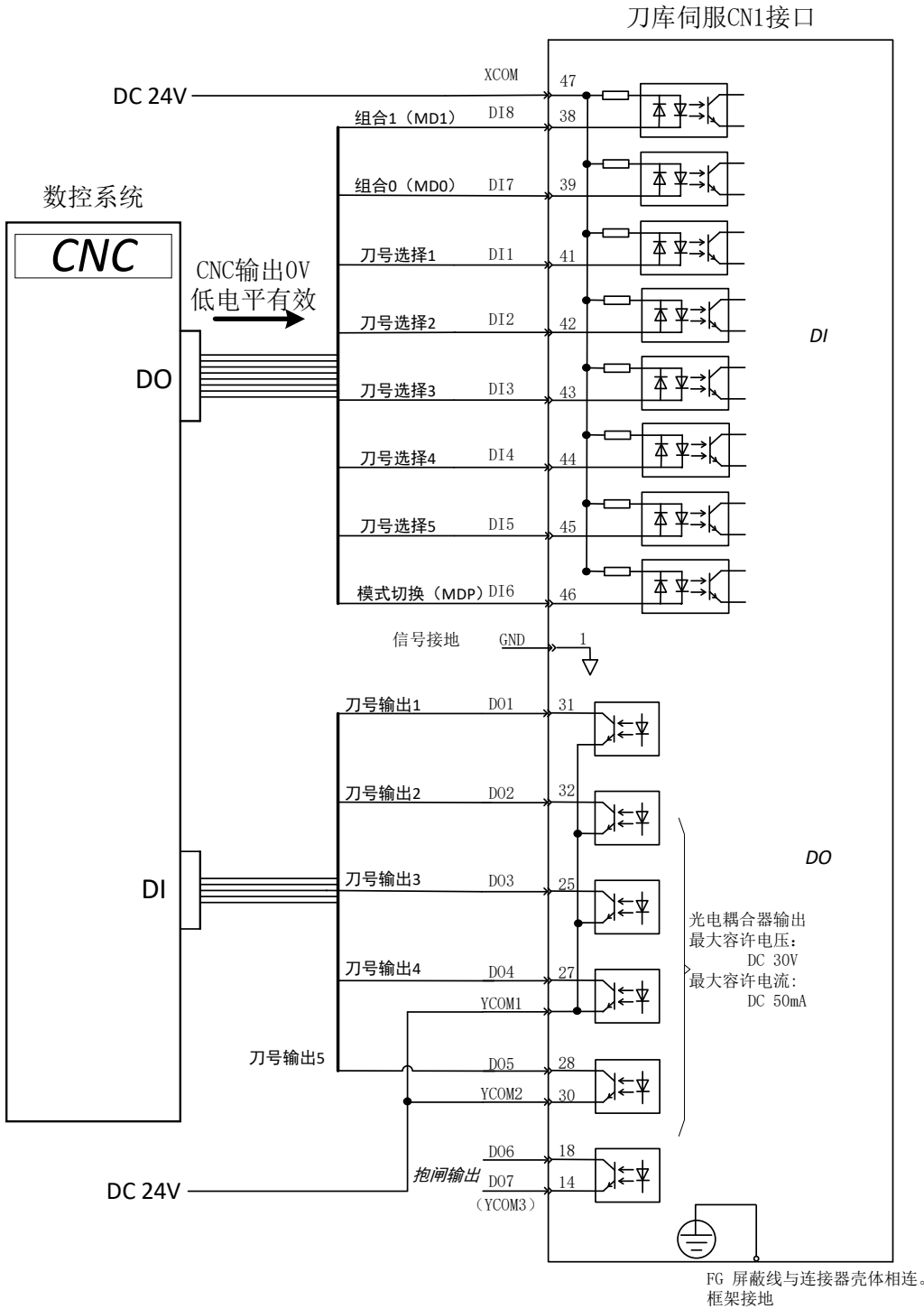


图2-1 NPN型I/O接线示意图

2.2 PNP型I/O接线

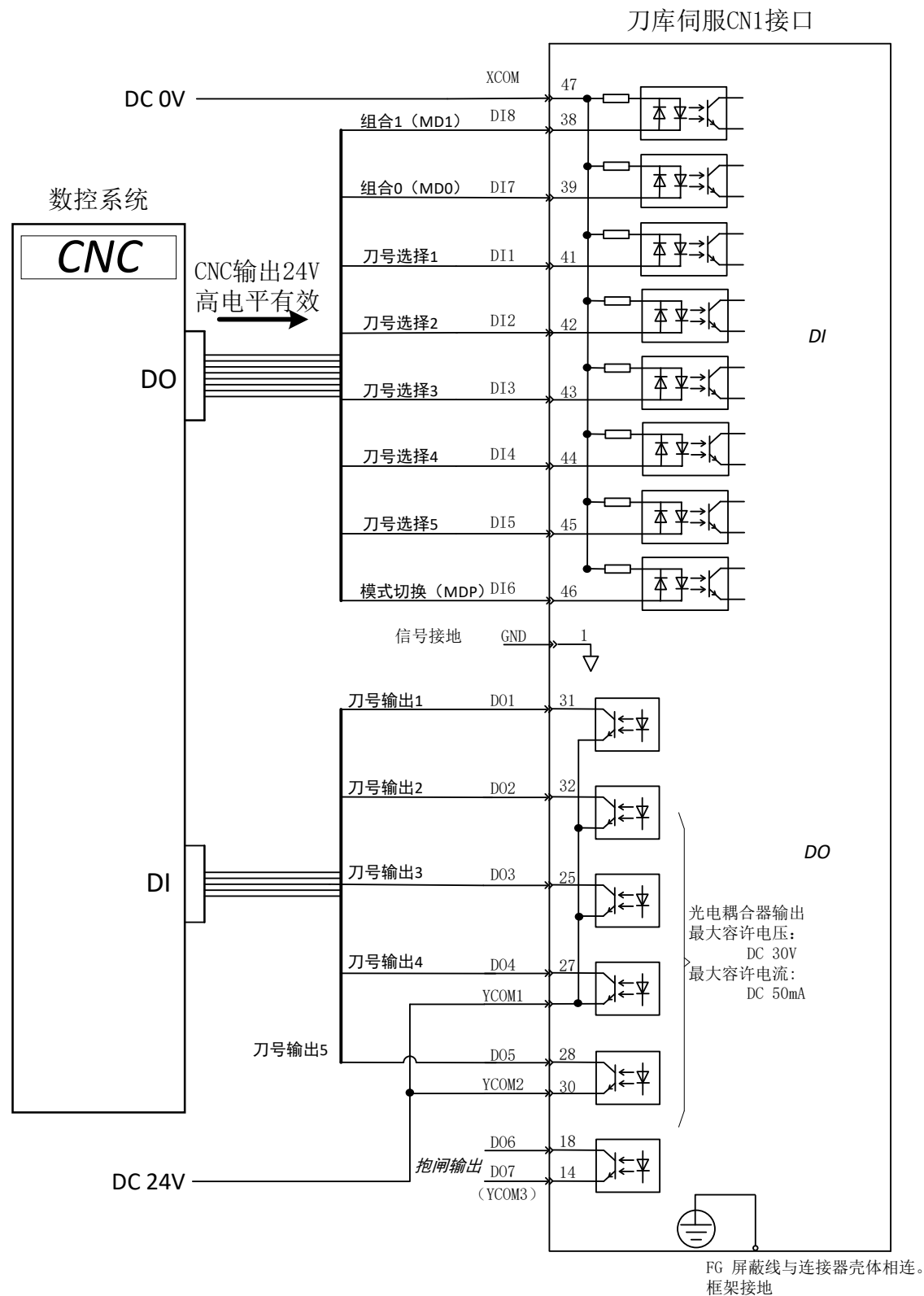


图2-2 PNP型I/O接线示意图

第3章 SI点功能定义

3.1 DI和DO功能定义

表3-1 DI和DO功能定义

伺服	针脚	功能定义	
DI1	41	输入指令 CMD1	刀号编码（刀号二进制编码）
DI2	42	输入指令 CMD2	
DI3	43	输入指令 CMD3	
DI4	44	输入指令 CMD4	
DI5	45	输入指令 CMD5	
DI6	46	模式切换1	刀库模式（功能切换模组）
DI7	39	组合0	
DI8	38	组合1	
XCOM1	47	0V或24V	NPN接法用24V，PNP接法用 0V
DO1	31	刀号输出1	刀号输出（刀号二进制编码）
DO2	32	刀号输出2	
DO3	25	刀号输出3	
DO4	27	刀号输出4	
DO5	28	刀号输出5	
DO6	18	抱闸输出	抱闸输出
DO7	14	抱闸输出	抱闸输出
YCOM1	26	接24V	刀号输出的电源
YCOM2	30		

说明：

DI—系统 PLC 输出，伺服驱动器输入。（指令）

DO—系统 PLC 输入，伺服驱动器输出。（反馈）

3.2 模式与组合匹配

表3-2 模式与组合匹配功能表

MDP1	MD0	MD1	组合逻辑
OFF	OFF	OFF	扭矩缩减
	OFF	ON	分度触发
	ON	OFF	对位清零
	ON	ON	紧急停止
ON	OFF	OFF	无效
	OFF	ON	逆向手动
	ON	OFF	正向手动
	ON	ON	无效

3.3 DI/O点输入/输出组合表

3.3 DI/O点输入/输出组合表

DI输入逻辑组合						定义	DO 输出逻辑组合				
编号	DI5	DI4	DI3	DI2	DI1	功能	DO5	DO4	DO3	DO2	DO1
1	---无---					刀位不正、伺服报警	0	0	0	0	0
2						无效	0	0	0	0	1
3						无效	0	0	0	1	1
4						定位未完成	0	0	1	0	0
5	0	0	0	0	1	选刀编号T1	0	0	1	0	1
6	0	0	0	1	0	选刀编号T2	0	0	1	1	0
7	0	0	0	1	1	选刀编号T3	0	0	1	1	1
8	0	0	1	0	0	选刀编号T4	0	1	0	0	0
9	0	0	1	0	1	选刀编号T5	0	1	0	0	1
10	0	0	1	1	0	选刀编号T6	0	1	0	1	0
11	0	0	1	1	1	选刀编号T7	0	1	0	1	1
12	0	1	0	0	0	选刀编号T8	0	1	1	0	0
13	0	1	0	0	1	选刀编号T9	0	1	1	0	1
14	0	1	0	1	0	选刀编号T10	0	1	1	1	0
15	0	1	0	1	1	选刀编号T11	0	1	1	1	1
16	0	1	1	0	0	选刀编号T12	1	0	0	0	0
17	0	1	1	0	1	选刀编号T13	1	0	0	0	1
18	0	1	1	1	0	选刀编号T14	1	0	0	1	0
19	0	1	1	1	1	选刀编号T15	1	0	0	1	1
20	1	0	0	0	0	选刀编号T16	1	0	1	0	0
21	1	0	0	0	1	选刀编号T17	1	0	1	0	1
22	1	0	0	1	0	选刀编号T18	1	0	1	1	0
23	1	0	0	1	1	选刀编号T19	1	0	1	1	1
24	1	0	1	0	0	选刀编号T20	1	1	0	0	0
25	1	0	1	0	1	选刀编号T21	1	1	0	0	1

第4章 原点设定及刀位调节

4.1 设定驱动器上使能

1、在面板显示OFF状态下	 MODE DATA ● ● ● ● SET ▲ ▼ ◀
2、按MODE键2次，显示Pn000	 MODE DATA ● ● ● ● SET ▲ ▼ ◀
3、按▲键修改为1	 MODE DATA ● ● ● ● SET ▲ ▼ ◀
4、长按DATA，进入Pn001，将最后一个0修改为1	 MODE DATA ● ● ● ● SET ▲ ▼ ◀
5、按SET，面板显示donE	 MODE DATA ● ● ● ● SET ▲ ▼ ◀
6、按MODE，面板显示on，代表上使能	 MODE DATA ● ● ● ● SET ▲ ▼ ◀

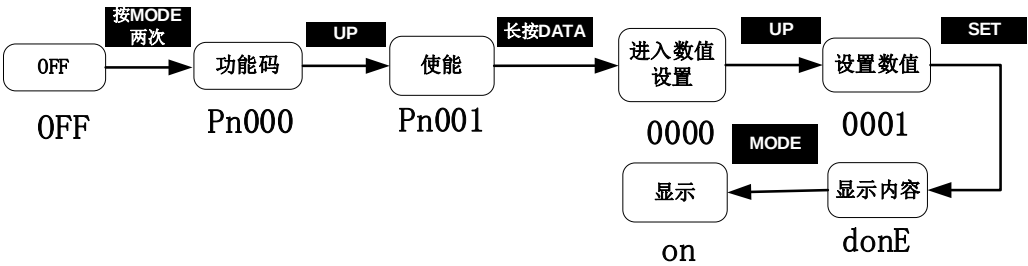
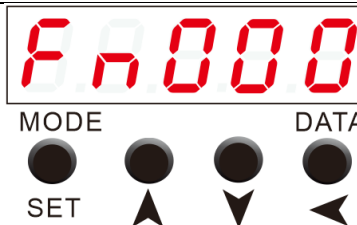
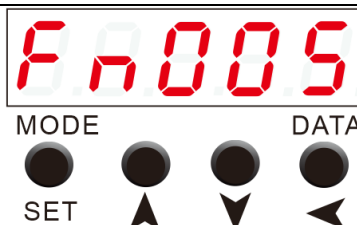


图 4-1 驱动器上使能操作流程

4.2 设定驱动器手动对刀

1、在面板显示OFF状态下	
2、按MODE键，显示Fn000	
3、按▲键修改为5	
4、长按DATA，面板显示JoG，再按SET使能JoG，上下箭头代表正反转	

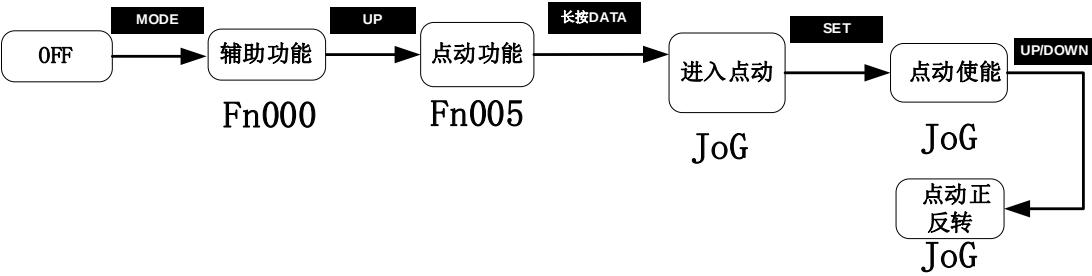


图 4-2 驱动器手动对刀操作流程

4.3 设定首刀

1、在OFF或ON状态下	
2、按MODE键2次，显示Pn000	
3、按DATA键，切换到第一个0，再按▲键修改为9	
4、按DATA键，将第3个0修改为b	
5、长按DATA键，进入Pn90B，将最后一个0修改为1	
6、再按SET面板，显示donE后，重启驱动器	

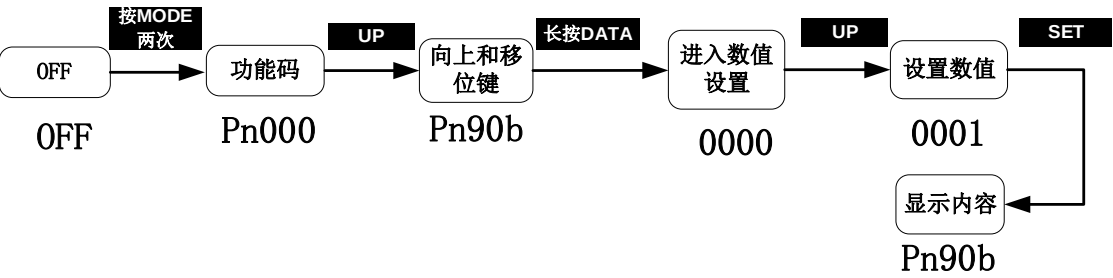
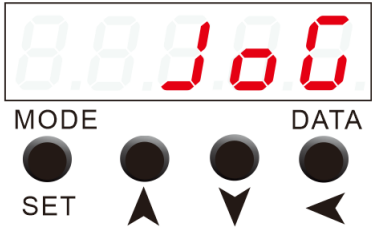
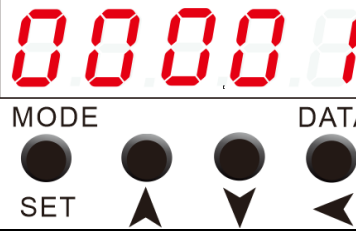
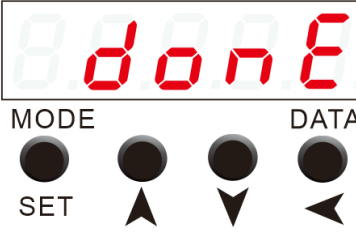


图4-3 设定手刀操作流程

4.4 清除AL9F1报警

出现AL9F1刀位不正预警，通过点动机械对刀（见步骤2驱动器手动对刀）后执行对首刀设定的操作	
1、在OFF或者ON状态下	
2、按MODE键2次，显示Pn000	
3、按DATA键，切换到第一个0，再按▲键修改为9	
4、按DATA键，将第3个0修改为b	
5、再长按DATA，进入Pn90B，将最后一个0修改为1	
6、再按SET面板，显示donE后，重启驱动器	

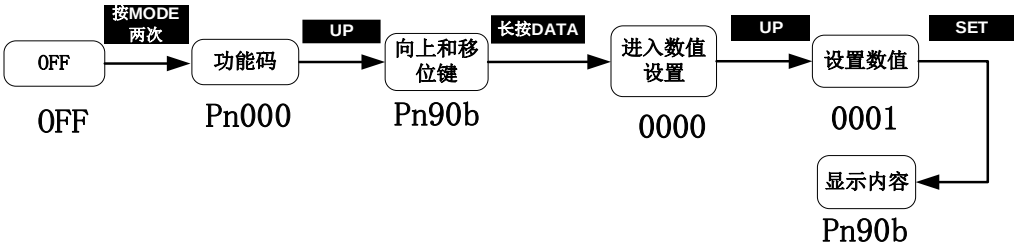


图 4-4 清除 AL9F1 报警操作流程

4.5 清除ER.810故障

1、在OFF或者ON状态下	
2、按MODE键2次，显示Pn000	
3、按DATA键，切换到第一个0，再按▲键修改为7	
4、按DATA键，将第2个0修改为9	
5、再按DATA，将第3个0修改为2	
6、长按DATA，进入Pn792，将最后一个0修改为2	
7、按SET面板，显示donE后，重启驱动器	

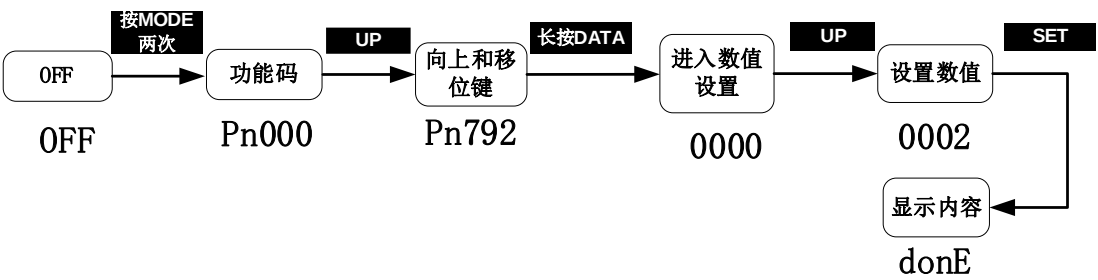


图4-5 清除ER.810故障操作流程图

4.6 驱动器断开使能

1、在面板显示on状态下	
2、按MODE键，显示Pn000	
3、按DATA键，切换到最后一个0，再按▲键修改为1	
4、长按DATA，进入Pn001，将最后一个1修改为0	
5、按SET面板，显示donE	
6、再按MODE，面板显示OFF代表断开使能	

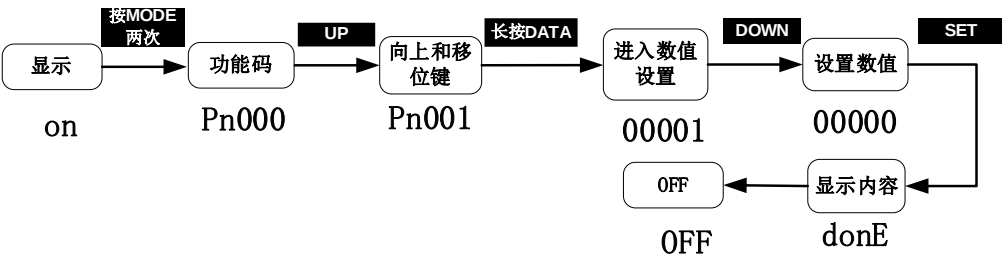


图4-6 清驱动器断开使能操作流程

第5章 报警处理

故障代码	故障类型	解决方案
Er.410	欠电压	1、检查电源输入端子线是否接好 2、不使能状况下，测量电源电压，同时监控母线电压（Un140）是否为输入电源电压（交流有效值）的1.414倍。若偏差较大，则可判定为母线电压检测硬件故障 3、测量输入电源电压，若电源若电源电压可调，则将电源电压调到产品规格范围以内 4、测量输入电源电压，若输入电源电压波动较大，则可推荐客户加装稳压器 5、若电源容量可调，则可建议客户讲电源容量调高
Er.710	过载（瞬时最大负载）	1、检查电机运行时是否存在堵转的情况 2、确认电机接线（相序、及连接）、编码器接线是否有问题 3、考虑运行的条件和负载，确定驱动器或者电机选择是否合理 4、观察电机在运行的过程中是否有大的抖动，是否存在大的噪音，若有，则调节增益参数，消除噪音或抖动，同时可用虚拟示波器监控电机输出转矩是否有异常
Er.720	过载(连续最大负载)	1、确认电机接线（相序、及连接）、编码器接线是否有问题 2、考虑运行的条件和负载，确定驱动器或者电机选择是否合理 3、观察电机在运行的过程中是否有大的抖动，是否存在大的噪音，若存在，则调节增益参数，消除噪音或抖动，同时可用虚拟示波器监控电机输出转矩是否有异常
Er.810	编码器备份异常	1、检查多圈编码器电池供电情况 2、进行多圈编码器清零动作PN792改成2重启
Er.830	电池欠压	更换多圈编码器电池
Er.C10	失控报警	1.确认电机接线是否正常 2、检查电机及编码器是否正常 3、重新接通伺服驱动器电源，仍发生警报，则可能是伺服驱动器故障

Er.C90	编码器通信故障：断线	1、万用表测试编码器线的各条信号线，是否存在信号线断线
Er.C91	编码器通信位置数据加速度异常	2、检查编码器线型号，确认型号是否正确 3、检查编码器线长度，编码器线不能过长 4、有可能是干扰导致，尝试将驱动器接地或者编码器线绕磁环
Er.CA0	编码器参数异常	5、检查电机组参数，确认电机是否正确 6、排除各种原因，可能伺服驱动器故障，更换伺服单元
Er.D00	位置偏差过大	1、设置合适的位置偏差过大警报值 2、检查编码器线、电机线是否连接正常，可用手转动电机，监控Un003（转子相对Z脉冲位置）是否在0~16777216（24位编码器）之间变化 3、计算脉冲频率输入、加速度规划或电子齿轮比设置的是否合理 4、确定相关参数设置是否合理，例如：转矩限制、速度限制、惯量比、位置增益、速度增益是否太小、位置滤波器是否太大等 5、计算是否电机选择过小，加减速太慢导致位置偏差过大

Chapter 1 Installation and Wiring of Turret Servo Drive

1.1 Installation

5. Put the turret in place and correct the center position at the position of No.1 tool, and conform that there is no interference in the movement direction among the turret, the tools and spindle. Lock the screw connecting the turret and adjust the total length of the spring at the tool change position.
6. Connect two phases of control power supply (L1C, L2C), main power supply (L1, L2, L3), power line (U, V, W) and the external resistor as required, connect encoder plug to CN2 terminal, and control line to CN1 (I/O line is connected to corresponding point of I/O board defined by PLC).
7. Ensure that there is no interference in the operation of the turret, power on the drive and start jogging(**Fn005**) to turn the turret to No.1 tool position and set it as home position(**Pn90b=1**), and then restart the drive.

Note: If the servo drive reports **Er.810**, run the turret to No.1 tool position again and then set the home position again, set **Pn792=2**. After setting, press SET, and the panel will display “**Done**”, restart the drive then.

8. Start debugging with power on. During the first power-on debugging, the forward and reverse operation should be carefully monitored under system control to ensure whether the rotation index is correct and whether the automatic tool change is correct.

1.2 Peripheral Wiring of 400W Models

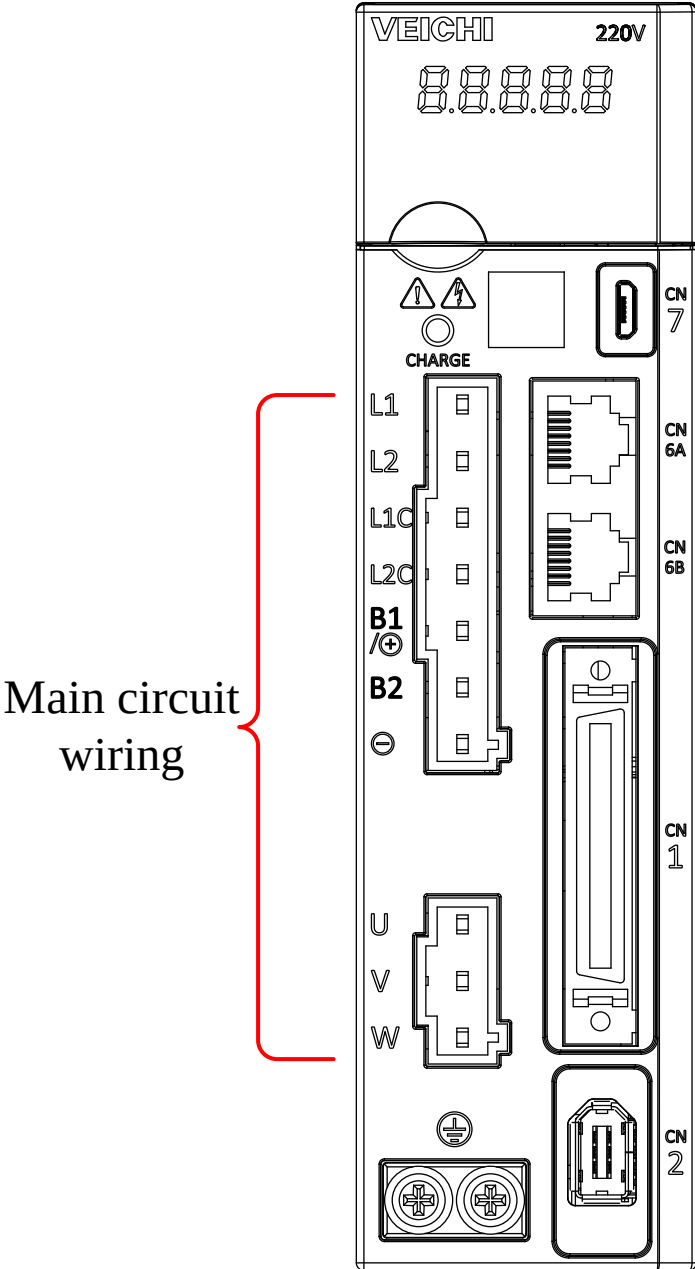


Figure 1-1 Peripheral Wiring of 400W Models

Table 1-1 Peripheral Wiring Pin Description of 400W Models

Pin No.	Name	Description
1	L1	Main circuit power input
2	L2	Main circuit power input
3	L1C	Control power input
4	L2C	Control power input
5	B1/+	Internal and external brake resistor pins/rectified DC supply positive
6	B2	Dynamic brake output
7	-	DC power negative
8	U	Motor power U-phase
9	V	Motor power V-phase
10	W	Motor power W-phase
Housing	Ground	Safety reference

1.3 Peripheral Wiring of 750W Models

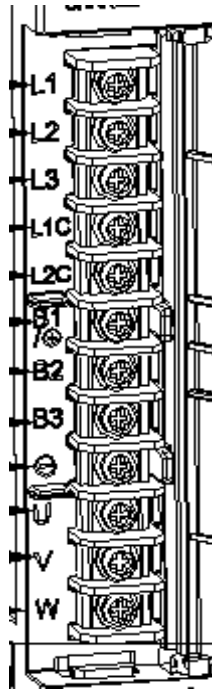


Figure 1-2 Peripheral Wiring of 750W Models

Table 1-2 Peripheral Wiring Pin Description of 750W Models

Pin No.	Name	Description
1	L1	Main circuit power input
2	L2	Main circuit power input
3	L3	Main circuit power input
4	L1C	Control power input
5	L2C	Control power input
6	B1/+	Internal and external brake resistor pins/rectified DC supply positive
7	B2	Dynamic brake output
8	B3	Internal brake resistor pin
9	-	DC power negative
10	U	Motor power U-phase
11	V	Motor power V-phase
12	W	Motor power W-phase
Housing	Ground	Safety reference

Chapter 2 CN1 Terminal Definition

2.1 NPN I/O Wiring

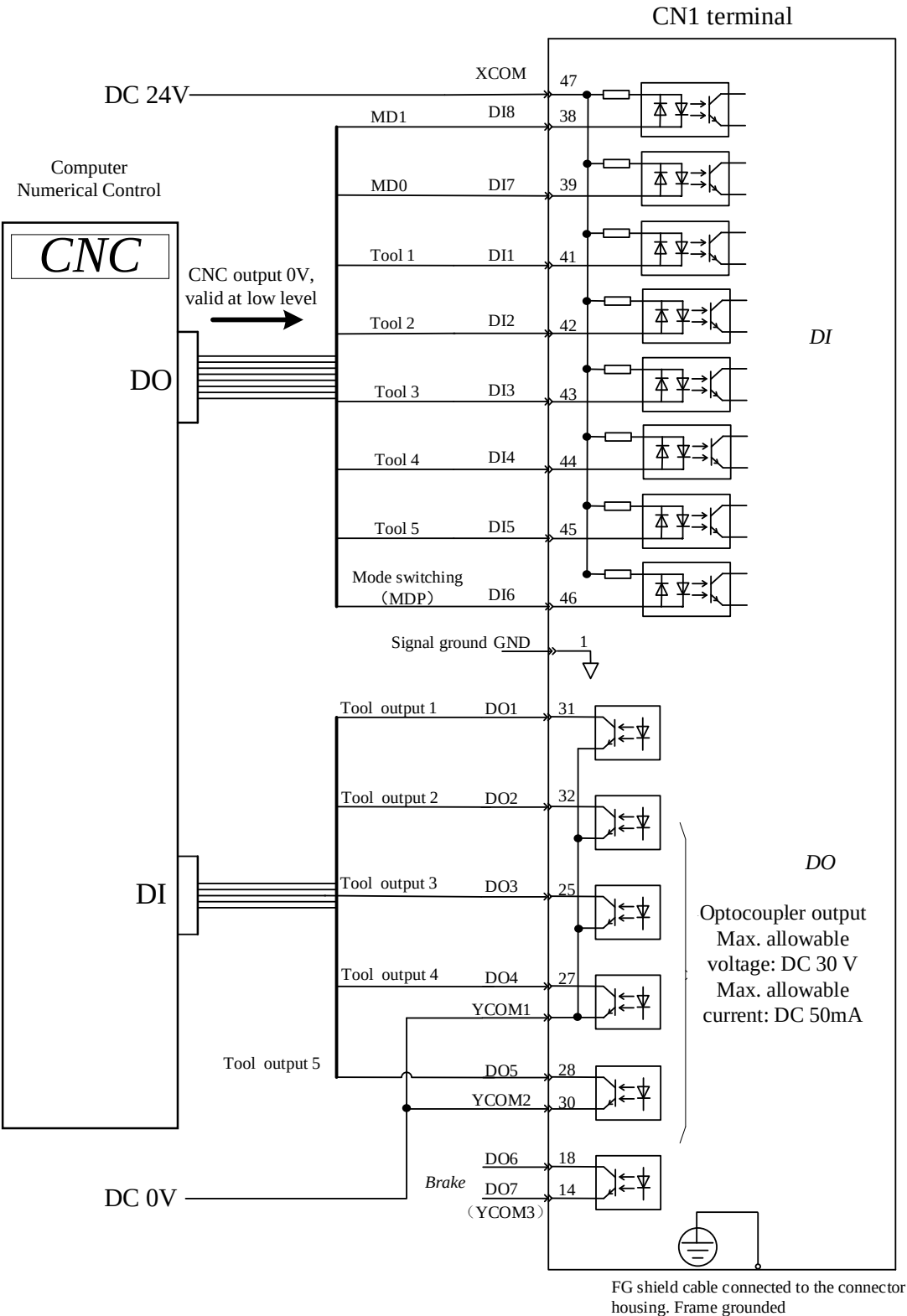


Figure 2-1 NPN I/O Wiring

2.2 PNP I/O Wiring

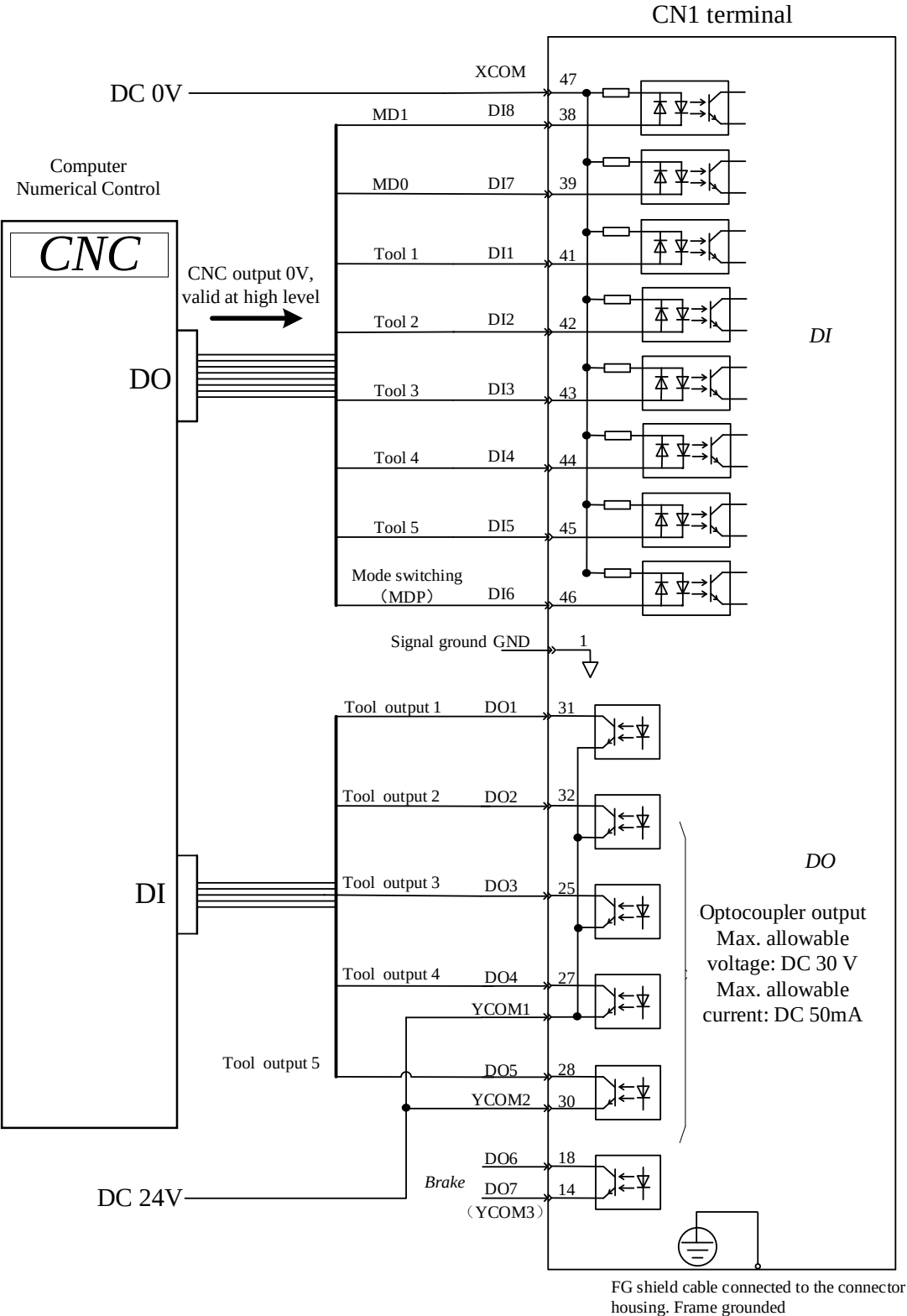


Figure 2-2 PNP I/O Wiring

3 SI Definition

3.1 DI and DO Definitions

Table 3-1 DI/DO Definition

Servo	Pin	Definition	
DI1	41	Input command CMD1	Tool number coding (binary)
DI2	42	Input command CMD2	
DI3	43	Input command CMD3	
DI4	44	Input command CMD4	
DI5	45	Input command CMD5	
DI6	46	Mode switching 1	Turret mode (function switching module)
DI7	39	Mode 0	
DI8	38	Mode 1	
XCOM1	47	0V or 24V	24V for NPN connection and 0V for PNP connection
DO1	31	Tool output 1	Tool number output (binary)
DO2	32	Tool output 2	
DO3	25	Tool output 3	
DO4	27	Tool output 4	
DO5	28	Tool output 5	
DO6	18	Brake output	Brake output
DO7	14	Brake output	Brake output
YCOM1	26	Connected to 24V	Power supply for tool number output
YCOM2	30		

Note:

DI- PLC output, servo drive input. (Command)

DO- PLC input, servo drive output. (Feedback)

3.2 Pattern and Mode

Table 3-2 Pattern and Mode Table

MDP1	MD0	MD1	Combinational Logic
OFF	OFF	OFF	Torque reduction
	OFF	ON	Index trigger
	ON	OFF	First tool position
	ON	ON	Emergency stop
ON	OFF	OFF	Invalid
	OFF	ON	Reverse manual
	ON	OFF	Forward manual
	ON	ON	Invalid

3.3 DI/DO Combination Table

3.3 DI/DO Combination Table

DI Combinatorial Logic						Definition	DO Combinatorial Logic				
No	DI5	DI4	DI3	DI2	DI1	Function	DO5	DO4	DO3	DO2	DO1
1	None					Incorrect tool position, servo drive sends out alarm	0	0	0	0	0
2						Invalid	0	0	0	0	1
3						Invalid	0	0	0	1	1
4						Position not completed	0	0	1	0	0
5	0	0	0	0	1	Tool number T1	0	0	1	0	1
6	0	0	0	1	0	Tool number T2	0	0	1	1	0
7	0	0	0	1	1	Tool number T3	0	0	1	1	1
8	0	0	1	0	0	Tool number T4	0	1	0	0	0
9	0	0	1	0	1	Tool number T5	0	1	0	0	1
10	0	0	1	1	0	Tool number T6	0	1	0	1	0
11	0	0	1	1	1	Tool number T7	0	1	0	1	1
12	0	1	0	0	0	Tool number T8	0	1	1	0	0
13	0	1	0	0	1	Tool number T9	0	1	1	0	1
14	0	1	0	1	0	Tool number T10	0	1	1	1	0
15	0	1	0	1	1	Tool number T11	0	1	1	1	1
16	0	1	1	0	0	Tool number T12	1	0	0	0	0
17	0	1	1	0	1	Tool number T13	1	0	0	0	1
18	0	1	1	1	0	Tool number T14	1	0	0	1	0
19	0	1	1	1	1	Tool number T15	1	0	0	1	1
20	1	0	0	0	0	Tool number T16	1	0	1	0	0
21	1	0	0	0	1	Tool number T17	1	0	1	0	1
22	1	0	0	1	0	Tool number T18	1	0	1	1	0
23	1	0	0	1	1	Tool number T19	1	0	1	1	1
24	1	0	1	0	0	Tool number T20	1	1	0	0	0
25	1	0	1	0	1	Tool number T21	1	1	0	0	1

Chapter 4 Home Setting and Tool Position Adjustment

4.1: Enable Setting on Servo Drive

1. Panel displays OFF	 MODE DATA ● ● ● ● SET ▲ ▼ ◀
2. Press MODE twice to display Pn000	 MODE DATA ● ● ● ● SET ▲ ▼ ◀
3. Press ▲ to change it to 1	 MODE DATA ● ● ● ● SET ▲ ▼ ◀
4. Long press DATA, enter Pn001 editing state, and modify the last 0 to 1	 MODE DATA ● ● ● ● SET ▲ ▼ ◀
5. Press SET, and the panel displays donE	 MODE DATA ● ● ● ● SET ▲ ▼ ◀
6. Press MODE, and the panel displays on, which means enable	 MODE DATA ● ● ● ● SET ▲ ▼ ◀

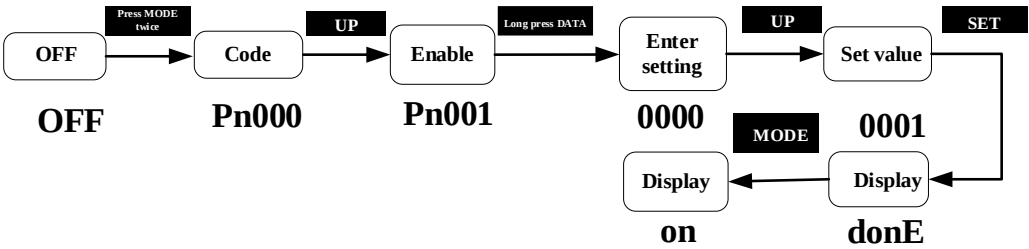
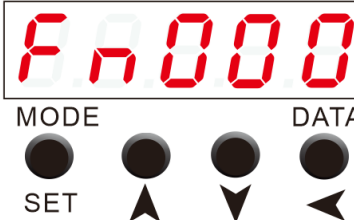
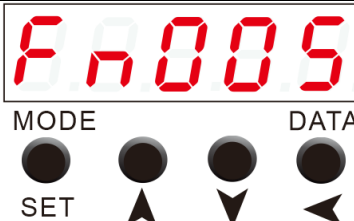


Figure. 4-1 Flow Chart of Enable Operation on Drive

4.2 Turret Jogging on Servo Drive

1. Panel displays OFF	
2. Press MODE to display Fn000	
3. Press UP to change it to 5	
4. Long press DATA display JoG on the panel, and then press SET to enable JoG. The up and down arrows represent forward and reverse.	

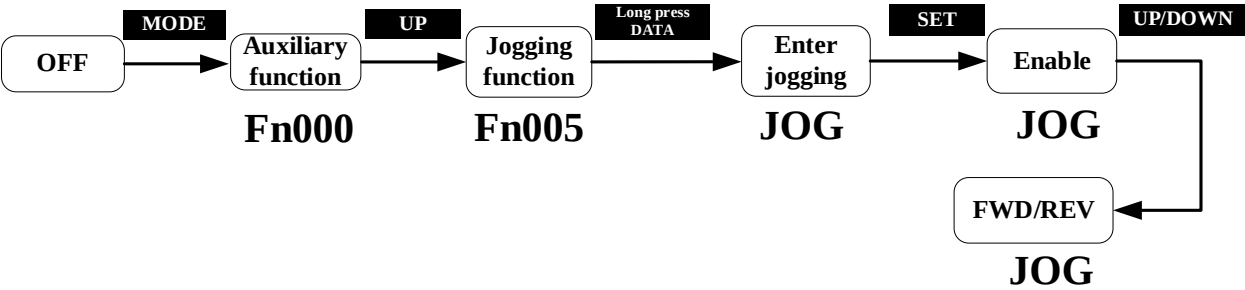


Figure. 4-2 Operation Flow Chart of Turret Jogging on Drive

4.3 First Tool Setting

1. In the OFF or ON state	
2. Press MODE twice to display Pn000	
3. Press DATA to switch to the first 0, and then press UP to change it to 9	
4. Press DATA to change the third 0 to b	
5. Long press DATA to enter Pn90B editing state, and modify the last 0 to 1	
6. Press SET again. After doneE is displayed, restart the drive	

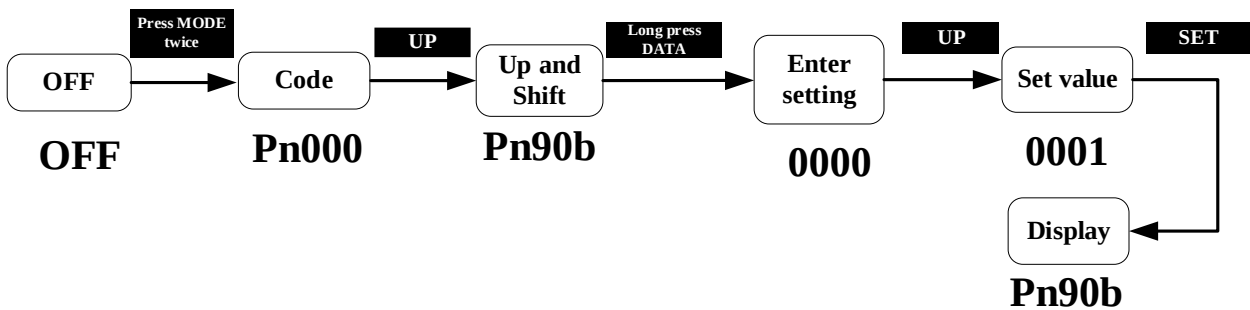
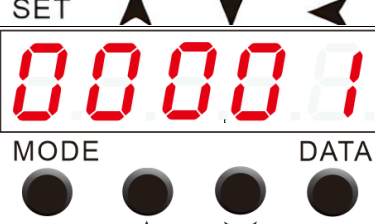
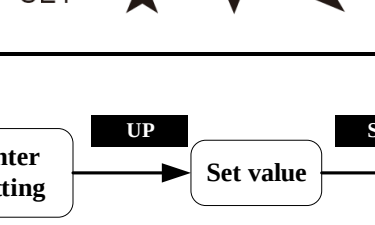


Figure. 4-3 Operation Flow Chart of First Tool Setting on Drive

4.4: Clear AL9F1

When AL9F1 [Incorrect Tool Position] occurs, perform jogging to set the first tool mechanically (see step 2 for drive jogging) and set the first tool.	
--	--

1. In the OFF or ON state	
2. Press MODE twice to display Pn000	
3. Press DATA to switch to the first 0, and then press UP to change it to 9	
4. Press DATA to change the third 0 to b	
5. Long press DATA, enter Pn90B editing state, and modify the last 0 to 1	
6. Press SET again. After donE is displayed, restart the drive	

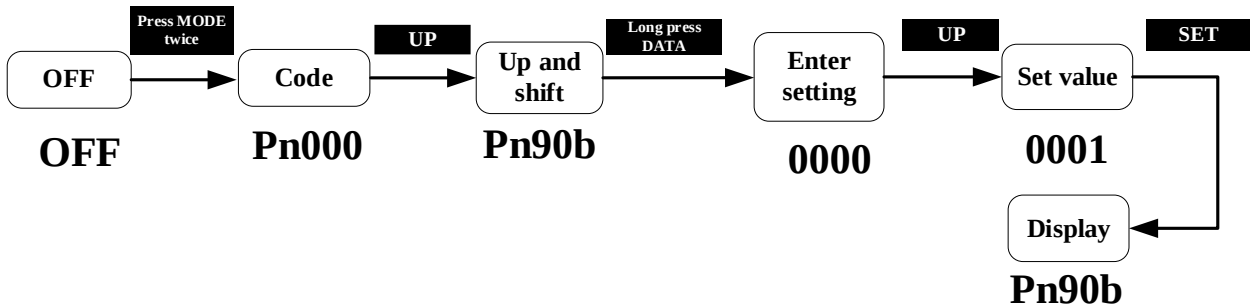


Figure. 4-4 Operation Flow Chart of Clearing AL9F1

4.5: Clear ER.810

1. In the OFF or ON state	
2. Press MODE twice to display Pn000	
3. Press DATA to switch to the first 0, and then press UP to change it to 7	
4. Press DATA to change the second 0 to 9	
5. Press DATA again to change the third 0 to 2	
6. Long press DATA, enter Pn792 editing state, and modify the last 0 to 2	
7. Press SET panel to display donE and restart the drive	

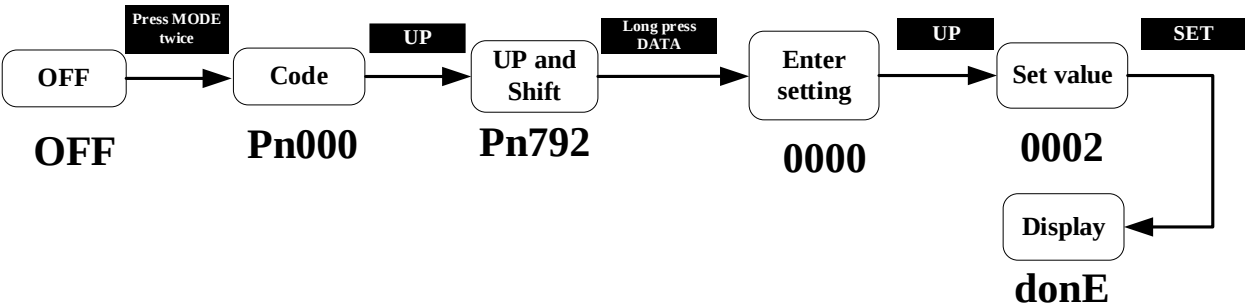


Figure 4-5 Operation Flow Chart for Clearing ER.810

4.6: Disable Setting on Servo Drive

1. In the ON state	
2. Press MODE to display Pn000	
3. Press DATA, switch to the last 0, and then press UP to change it to 1	
4. Long press DATA, enter Pn001 editing state, and modify the last 1 to 0	
5. Press SET to display doneE	
6. Press MODE, and the panel shows OFF for disable	

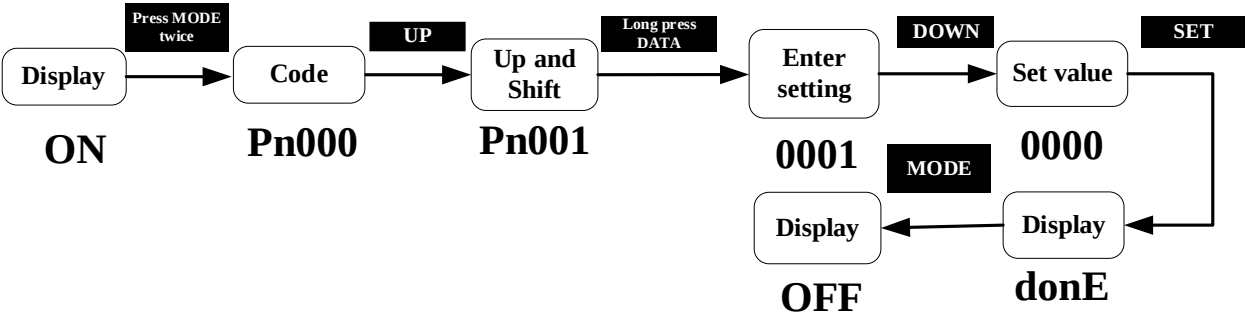


Figure. 4-6 Flow Chart of Disable Operation

Chapter 5 Troubleshooting

Code	Type	Solutions
Er.410	Undervoltage	1. Check whether the power input terminal is connected well 2. Measure the power supply voltage and monitor whether the bus voltage (Un140) is 1.414 times of the input power supply voltage (AC RMS) when it is not enabled. If the deviation is large, it is bus voltage detection hardware fault 3. Measure the input power supply voltage. If the power supply voltage is adjustable, adjust the power supply voltage to the product specification range 4. Measure the input power supply voltage. If the input power voltage fluctuates greatly, it is recommended to install voltage stabilizers 5. If the power capacity is adjustable, please increase the power capacity
Er.710	Overload (instantaneous maximum load)	1. Check whether the motor is clogged during operation 2. Check that the motor wiring is correct 3. Check whether the drive or motor is correctly selected considering the operating conditions and loads 4. Check whether there is strong jitter and large noise in the running process of the motor. If there is, adjust the gain to eliminate noise or jitter. At the same time, monitor whether there is abnormality in the output torque of the motor with virtual oscilloscope.
Er.720	Overload (continuous maximum load)	1. Check that the motor wiring is correct 2. Check whether the drive or motor is correctly selected considering the operating conditions and loads 4. Check whether there is strong jitter and large noise in the running process of the motor. If there is, adjust the gain to eliminate noise or jitter. At the same time, monitor whether there is abnormality in the output torque of the motor with virtual oscilloscope.
Er.810	Encoder backup error	1. Check battery for the multi-turn encoder 2. Clear multi-turn encoder by setting PN792 to 2 to restart

Er.830	Battery undervoltage	Change the battery for multi-turn encoder
Er.C10	Out of control	1. Check if the motor wiring is normal 2. Check if motor and encoder are normal 3. Repower the servo drive to see if the alarm occurs again. If it exits, it may be a servo drive failure
Er.C90	Encoder disconnection	1. Use the multimeter to test each signal line of the encoder to see whether there is a signal line disconnection - Check if encoder cable type is correct
Er.C91	Encoder acceleration error	3. Check if the encoder line is too long 4. It may be caused by interference. Try to ground the drive or wind the encoder lines around the magnetic ring
Er.CA0	Encoder parameter error	5. Check if the motor wiring is correct. 6. It may be a servo drive failure. Replace the servo drive.
Er.D00	Excessive position deviation	1. Set a reasonable fault threshold for excessive position deviation 2. Check whether the encoder and motor are connected normally. Turn the motor by hand and monitor whether Un003 (Rotor Position Relative to Z Pulse) changes between 0 and 16777216 (24-bit encoder) 3. Calculate whether the pulse frequency input, acceleration planning or electronic gear ratio setting is reasonable or not 4. Check whether the relevant parameters are reasonable, such as torque limit, speed limit, inertia ratio, position gain, or whether the speed gain is too small, or the position filter is too large, etc. 5. Calculate whether the motor power is too low, or acceleration and deceleration are too slow, resulting in excessive position deviation

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