Monarch

User Guide
NICE900 Series
Integrated Door Operator Controller

User Guide

INOVANCE

A02
Data code 19010269

Preface

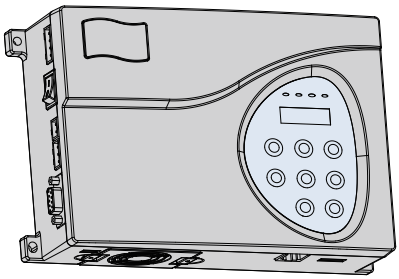
Thank you for purchasing the NICE900 series integrated door machine controller.

The NICE900 series integrated door machine controller (shorted as "the NICE900" or "the controller" hereinafter) is a variable frequency controller specialized for driving the door machine system such as elevator door, cold storage door, and subway door.

It integrates door open/close logic control and motor drive, and implements control on the entire door system with door open/close commands from the external system. The NICE900 can drive the AC asynchronous motor and permanent synchronous motor (PMSM), and supports two control modes, speed control and distance control. Applicable to various applications, it can meet drive and control requirements of most door systems.

This manual describes correct use of the NICE900, including product features, safety information and precautions, installation, parameter setting, commissioning, and troubleshooting. Read and understand the manual before using the product, and keep it carefully for reference to future maintenance.

Notes
• The drawings in the manual are sometimes shown without cover or protective guard. Remember to install the cover or protective guard as specified first, and then perform operations in accordance with the instructions. • The drawings in the manual are shown for description only and may not match the product that you have purchased. • The instructions are subject to change due to product upgrade, specification modification, as well as the efforts to increase the accuracy and convenience of the manual. • Contact our regional agent or customer service center if the manual delivered is lost or damaged. • Contact our customer service center if you have problems during the use. • Email: UM@inovance.com



Approvals

Certification marks on the product nameplate indicate compliance with the corresponding certificates and standards.

Certification	Mark	Directives		Standard
CE	CE	EMC directives	2014/30/EU	EN 12015 EN 12016
		LVD directives	2014/35/EU	EN 61800-5-1
		RoHS directives	2011/65/EU	EN 50581
TUV	TÜV SÜD	-		EN 61800-5-1
UL	c UL us LISTED	-		UL61800-5-1 C22.2 No.14-13

Note

- The above EMC directives are complied with only when the EMC electric installation requirements are strictly observed.
- Machines and devices used in combination with this drive must also be CE certified and marked. The integrator who integrates the drive with the CE mark into other devices has the responsibility of ensuring compliance with CE standards and verifying that conditions meet European standards.
- The installer of the drive is responsible for complying with all relevant regulations for wiring, circuit fuse protection, earthing, accident prevention and electromagnetic (EMC regulations). In particular fault discrimination for preventing fire risk and solid earthing practices must be adhered to for electrical safety (also for good EMC practice).
- For more information on certification, consult our distributor or sales representative.

Contents

1

Safety Information and Precautions

Chapter 1 Safety Information and Precautions

In this manual, the notices are graded based on the degree of danger:

- ⚠DANGER indicates that severe personal injury or even death may result due to improper operation.
- ⚠CAUTION indicates that personal injury or equipment damage may result due to improper operation.

Read the following safety notices carefully so that you understand how to install, commission, operate and maintain the equipment. Inovance assumes no liability or responsibility for any injury or loss caused by improper operation of the equipment described in the manual.

1.1 Safety Information

■ Before Installation

⚠DANGER
• Do not install the equipment if you find the controller damaged upon unpacking. • Do not install the equipment if the packing list does not conform to the product you receive.

⚠CAUTION
• Handle the equipment with care during transportation. Otherwise, the equipment may be damaged. • Do not touch the components with your hands. Failure to comply will result in static electricity damage.

■ During Installation

⚠DANGER
• Mount the controller on incombustible surface such as metal. Keep it far away from flammable materials. Failure to comply may result in a fire. • Do not loosen the fixed screws of the components, especially the screws with red mark.

⚠CAUTION
• Do not drop wire end or screw into the controller. Otherwise, the controller may be damaged. • Install the controller in places free of vibration and direct sunlight.

■ At Wiring

⚠ DANGER

- Wiring must be performed only by qualified personnel under instructions described in this manual. Failure to comply may result in unexpected accidents.
- A circuit breaker must be used to isolate the power supply and the controller. Failure to comply may result in a fire.
- Tie the controller to ground properly according to the standard. Failure to comply may result in electric shock.

⚠ DANGER

- Never connect the power cables to the output terminals (U, V, W) of the controller. Pay attention to the marks of the wiring terminals and ensure correct wiring. Failure to comply will result in damage to the controller.
- Ensure that the cabling satisfies the EMC requirements and the local codes. Use wire sizes recommended in the manual. Failure to comply may result in accidents.
- Use the shielded cable for the encoder, and ensure that the shield is reliably grounded at one end.
- Use a twisted cable with twisted distance of 20−30 mm as the communication cable, and ensure that the shield is reliably grounded.

■ Before Power-On

⚠ DANGER

- Check that the following requirements are met:

  The voltage class of the power supply is consistent with the rated voltage class of the controller.

  The input terminals (L, N) and output terminals (U, V, W) are correctly connected.

  No short circuit exists in the peripheral circuit.

  The wiring is secured.

  Failure to comply will result in damage to the controller.
- For the PMSM, ensure that motor auto-tuning is performed before running for the first time. Failure to comply may result in motor runaway.
- Do not perform the voltage resistance test on any part of the controller because such test has been done in the factory. Failure to comply will result in accidents.

⚠ DANGER

- Cover the controller properly before power-on to prevent electric shock.
- All peripheral parts must be connected correctly under the instructions described in this manual. Failure to comply may result in accidents.

■ After Power-On

⚠DANGER
• Do not open the cover of the controller after power-on. Failure to comply may result in electric shock. • Do not touch any input or output terminal of the controller with hands. Failure to comply may result in electric shock.

⚠DANGER
• Do not touch the rotating part of the motor during the motor auto-tuning or running. Failure to comply may result in personal injury. • Do not change the factory parameters. Otherwise, the equipment may be damaged.

■ During Running

⚠DANGER
• Do not touch the fan or the discharging resistor to check the temperature. Otherwise, you may get burnt. • Signal detection must be performed only by qualified personnel during operation. Failure to comply will result in personal injury or damage to the controller.

⚠CAUTION
• Avoid objects falling into the controller when it is running. Failure to comply will result in damage to the controller. • Do not start/stop the controller by opening or closing the contactor. Failure to comply will result in damage to the controller.

■ During Maintenance

⚠DANGER
• Do not repair or maintain the controller at power-on. Failure to comply will result in electric shock. • Repair or maintenance of the controller must be performed only by qualified personnel. Otherwise, personal injury or equipment damage may result. • Set the parameters again after the controller is replaced. All the pluggable components must be plugged or removed only after power-off.

1.2 Precautions

1. Motor Insulation Test

   Perform an insulation test on the motor under the following conditions:

   - Before the motor is used for the first time
   - When the motor is reused after being stored for a long time
   - During periodic inspection

   This is to prevent the poor insulation of motor windings from damaging the controller. The motor must be disconnected from the controller during the insulation test. A 500-volt megameter is recommended for this test, and the insulation resistance must not be less than 5 MΩ.

2. Motor Heat and Noise

   The output of the controller is pulse width modulation (PWM) wave with certain harmonic wave, and therefore, the motor temperature rise, noise, and vibration are slightly greater than those at running with the mains frequency.

3. Voltage-sensitive device or capacitor on the output side of the controller

   The controller outputs PWM waves, and therefore, do not install the capacitor for improving power factor or lightning protection voltage-sensitive resistor on the output side of the controller. Otherwise, the controller may suffer transient overcurrent or even be damaged.

4. Use outside the rated voltage

   The controller must not be used outside the allowable voltage range specified in this manual. Otherwise, components inside the controller may be damaged. If required, use a corresponding voltage step-up or step-down device to match the power voltage to the rated voltage range for the controller.

5. Surge Suppressor

   The controller has a built-in varistor for suppressing the surge voltage generated when the inductive loads (electromagnetic contactor, electromagnetic relay, solenoid valve, electromagnetic coil and electromagnetic brake) around the controller are switched on or off. If the inductive loads generate very high surge voltage, use a surge suppressor for the inductive load or use a surge suppressor together with a diode.

Note

Do not connect the surge suppressor to the output side of the controller.

6. Altitude and De-rating

   In places where the altitude is above 1000 m and the cooling effect reduces due to thin air, it is necessary to de-rate the controller. Contact Inovance for technical support.

7. Disposal

   The electrolytic capacitors in the main circuit and PCB board may explode when they are burnt. Poisonous gas is generated when the plastic parts are burnt. Treat them as ordinary industrial waste.

8. Adaptable Motor

   - The standard adaptable motor is an adaptable four-pole squirrelcage asynchronous induction motor and AC PMSM. Select the proper controller model according to the motor ratings.
   - To reach better control result, perform motor auto-tuning based on actual conditions. For a PMSM, motor auto-tuning is mandatory.
   - The controller might alarm or be damaged when a short circuit exists on cables or inside the motor. Therefore, perform the insulation short circuit test when the motor and cables are newly installed or during routine maintenance. During the test, disconnect the controller from the tested parts

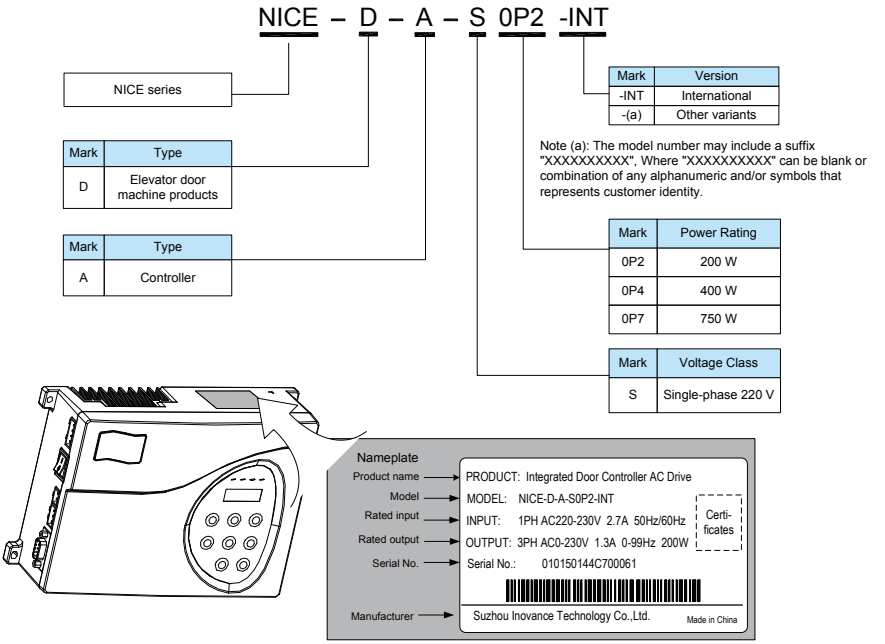
2

Product Information

Chapter 2 Product Information

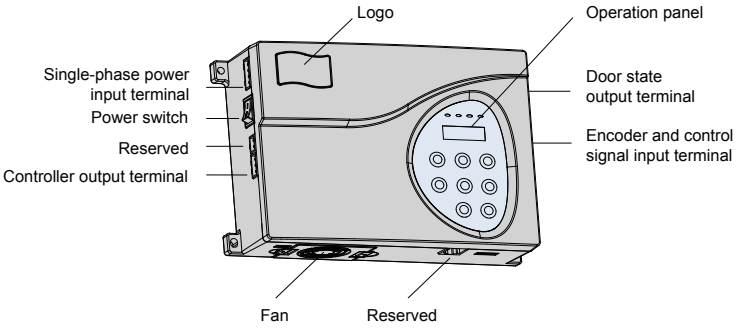
2.1 Designation Rules and Nameplate

Figure 2-1 Designation rules and nameplate of the NICE900



2.2 Structure

Figure 2-2 Structure of the NICE900



2.3 NICE900 Models

Table 2-1 NICE900 models

Model	Input Voltage	Power Capacity (kVA)	Input Current (A)	Output Current (A)	Adaptable Motor (W)
NICE-D-A-S0P2	Single-phase 220 V (-15% to 20%)	0.5	2.7	1.3	200
NICE-D-A-S0P4		1.0	5.4	2.3	400
NICE-D-A-S0P7		1.5	8.2	4.0	750

2.4 General Specifications

Item		Specifications
Basic specifications	Maximum output frequency	99.00 Hz
	Speed range	1:50 (SVC) 1:1000 (CLVC) SVC: sensorless vector control CLVC: closed-loop vector control
	Speed stability	±0.5% (SVC) ±0.05% (CLVC)
	Startup torque	1 Hz/150% (SVC) 0 Hz/180% (CLVC)
	Frequency resolution	0.01 Hz
	Current resolution	0.01 A
	Carrier frequency	2–16 kHz
Major functions		Two auto-tuning modes are supported, with-load auto-tuning and no-load auto-tuning.
		For CLVC on the AC PMSM using a common ABZ encoder, open-collector output or push-pull output is supported.
		For SVC, functions such as fixed torque boost, customized torque boost and over-excitation are supported.
		Door width auto-tuning is supported.
		Automatic demonstration is supported.
		Automatic identification upon hindering is supported.
Protection functions		Controller overload protection (1 minute for 150% of rated current , 1 second for 180% of rated current) is supported.
		Protections on overvoltage, undervoltage, overcurrent, output phase loss and inter-phase short circuit are supported.

Item		Specifications
Environment	Installation location	Indoors Free from direct sunlight, dust, corrosive gas, combustible gas, oil mist, vapor, drip and salt
	Altitude	Lower than 1000 m Deratedif the altitude is above 1000 m
	Ambient temperature	-10°C to +40°C Derated if ambient temperature is within 45–50°C
	Humidity	Less than 95% RH, non-condensing
	Vibration	< 5.9 m/s^2 (0.6 g)
	Storage temperature	-20°C to +60°C
	Cooling method	Natural cooling for 0.2 kW Forced air cooling for 0.4 kW and 0.75 kW
	Ingress protection	IP20
	Storage location	Indoors, clean and dry
	Transportation	Packed in standard box and transported by coach, train, aircraft or ship.
	Vibration during transportation	15 m/s^2 (1.5 g) when SIN vibration is 9–200 Hz

3

Mechanical and Electrical Installation

Chapter 3 Mechanical and Electrical Installation

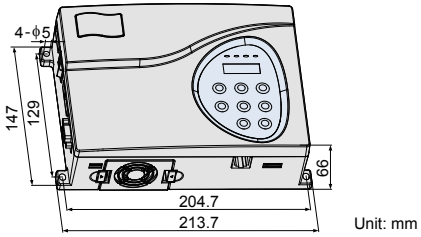
3.1 Mechanical Installation

3.1.1 Installation Environment

Item	Requirement
Ambient temperature	-10°C to 50°C
Heat dissipation	Mount the controller on the surface of incombustible objects with sufficient room for heat dissipation. Install the controller on the base with screws vertically.
Mounting location	Free from direct sunlight, high humidity and condensation
	Free from corrosive, explosive and combustible gas
	Free from oil dirt, dust and metal powder

3.1.2 Physical Dimensions

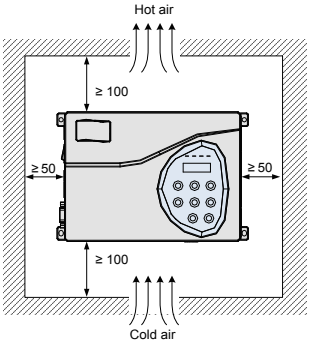
Figure 3-1 Physical Dimensions of the NICE900



3.1.3 Mounting Clearance

The clearance that needs to be reserved varies with the power rating of the NICE900. The following figure shows the clearance that needs to be reserved for mounting.

Figure 3-2 Clearance around the NICE900 for mounting

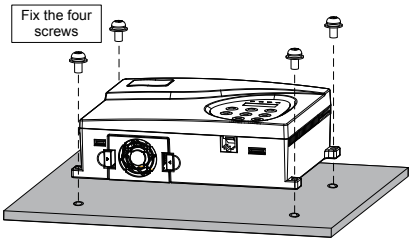


3.1.4 Mounting Orientation

Use 4 M4x15 screws (with elastic flat washer) with the tightening torque of 1.2 N.m during installation.

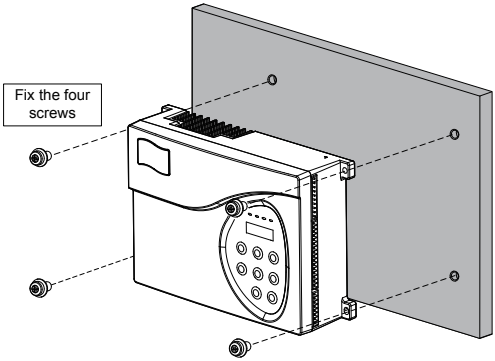
a) Horizontal installation

Figure 3-3 Horizontal installation diagram



b) Vertical installation

Figure 3-4 Vertical installation diagram



3.2 Electrical Installation

3.2.1 Wiring and Description of Main Circuit Terminals

Figure 3-5 Main circuit terminal arrangement

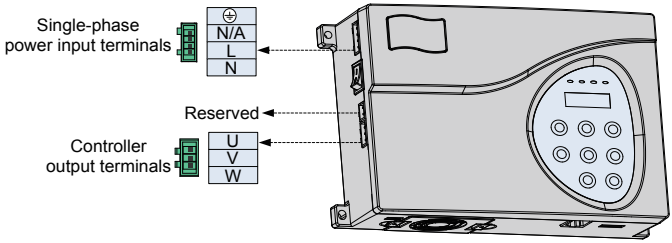
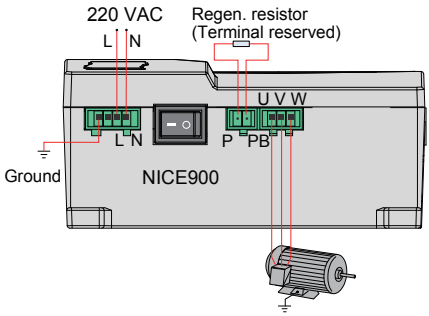


Table 3-1 Main circuit terminal description

Terminal	Name	Description
L, N	Single-phase power input terminals	Provide single-phase 220 VAC power supply.
P, PB	Reserved	These terminal are generally reserved, but they can be connected with the external regen. resistor if required.
U, V, W	Controller output terminals	Connect the three-phase motor.
⏚	Grounding terminal	Must be grounded.

Figure 3-6 Main circuit wiring example



In the applications with large inertia such as the cold storage door, a regen. resistor is required. Select a proper one according to the recommended models listed in the following table.

Table 3-2 Recommended regen. resistor models

Controller Model	Power of Regen. Resistor (W)	Resistance of Regen. Resistor (Ω)
NICE-D-A-S0P2	80 W	≥ 250 Ω
NICE-D-A-SOP4	80 W	≥ 200 Ω
NICE-D-A-SOP7	80 W	≥ 150 Ω

3.2.2 Wiring and Description of Control Circuit Terminals

Figure 3-7 Control circuit terminal arrangement

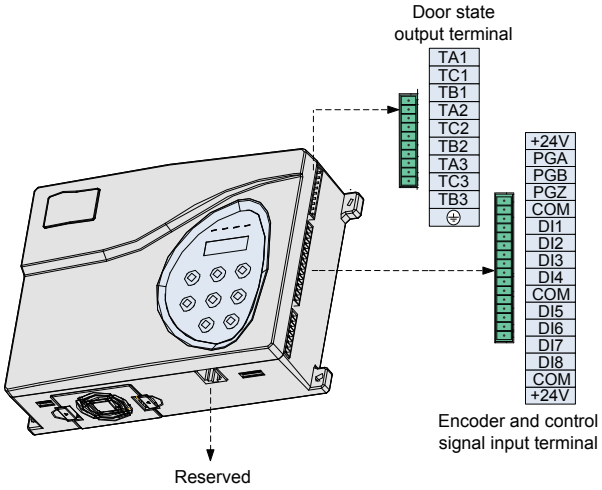


Table 3-3 Control circuit terminal description

Name	Type	Mark	Function Description	Remarks
Door state output terminal	Relay output and grounding	TA1/TB1/TC1 TA2/TB2/TC2 TA3/TB3/TC3	Relay output	1. TA-TB: normally closed (NC) TA-TC: normally open (NO) Contact capacity: 250 ACV, 3A; 30 VDC, 1 A 2. Insulation voltage class between contact and control circuit: 2.5 kVAC

Name	Type	Mark	Function Description	Remarks
Encoder and control signal input terminal	Internal 24 V power supply	+24V	24 VDC power supply	Used as the non-contact switch or power supply for the encoder. Maximum output current: 200 mA
		COM	24 V power common	Isolated with the internal 24 V power common terminal of the controller
	Encoder input	PGA	Encoder phase A	Open-collector output or push-pull output
		PGB	Encoder phase B	
		PGZ	Encoder phase Z	
	Digital input	DI1 to DI8	Digital signal input	Optocoupler isolation, low level active Input voltage range: 0–30 VDC Input impedance: 3.3 kΩ
Reserved	Software burning interface	RJ45	Software burning interface	-

Check the peripheral wiring before power-on to ensure device and personal safety:

1. The wiring is performed according to the instructions.
2. All switches act reliably.
3. Check the inter-phase resistance of the main circuit to ensure that there is no short circuit to ground.
4. The mechanical installation is proper.
5. Check that the resistance between the following points and the ground is close to infinity.
   - L, N and PE
   - U, V, W and PE
   - Encoder 24V, PGA, PGB, PGZ, COM and PE

3.3 Peripheral Electrical Devices

3.3.1 Selection of Peripheral Electrical Devices

Controller Model	Air Switch (A)	Contactor (A)	Main Circuit Conducting Cable (mm^2)
NICE-D-A-S0P2	10	10	2.5
NICE-D-A-S0P4	16	10	2.5
NICE-D-A-S0P7	16	10	2.5

3.3.2 Description of Peripheral Electrical Devices

Electrical Device	Mounting Location	Function Description
Air switch	Power input side	It is used to cut off the controller's power supply and provide short circuit protection.
AC input reactor	Controller input side	• Improve the power factor of the input side. • Eliminate the higher harmonics of the input side effectively, • Protect the rectifier bridge effectively. • Eliminate the input current unbalance caused by inter-phase unbalance.
AC output reactor	Between the controller output side and the motor, close to the controller	If the controller is more than 100 m far away from the motor, install the AC output reactor.

4

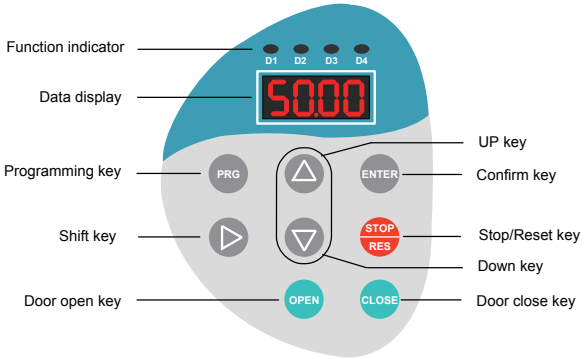
Operation and Trial Running

Chapter 4 Operation and Trial Running

4.1 Operation Panel

You can modify the parameters, monitor the working status and run or stop the controller by operating the operation panel shown as below:

Figure 4-1 Operation panel diagram



1. Indicator Descriptions

Table 4-1 Indicator descriptions

Indicator	Meaning of ON at Stop		Meaning of ON During Running
	Speed Control	Distance Control	
D1	DI1 signal active	DI1 signal active	External door close command
D2	DI2 signal active	Phase A and B signal correct	During door close
D3	DI3 signal active	Phase Z signal active	During door open
D4	DI4 signal active	DI4 signal active	External door open command

2. Description of Keys on the Operation Panel

Table 4-2 Description of keys on the operation panel

Key	Name	Function
PRG	Programming	Enter or exit Level I menu.
ENTER	Confirm	Enter the menu interfaces level by level, and confirm the parameter setting.
STOP RES	Stop/Reset	Stop the running in the running state and reset the operation in the fault state.

Key	Name	Function
▷	Shift	Select the displayed parameters in turn in the stop or running state, and select the digit to be modified when modifying parameters.
△	Up	Increase data or function code.
▽	Down	Decrease data or function code.
OPEN	Door open	Open the door in the operation panel operation mode.
CLOSE	Door close	Close the door in the operation panel operation mode.

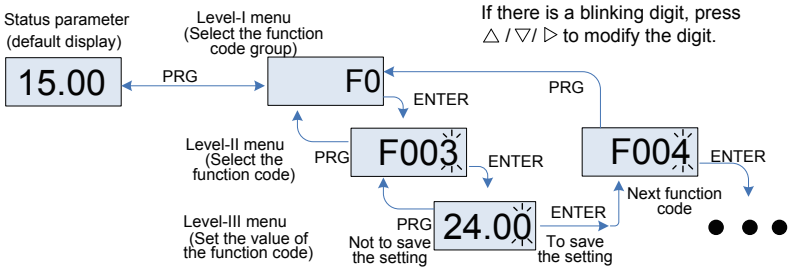
4.2 Basic Operations

4.2.1 Operation Procedure of the Operation Panel

The operation panel of the NICE900 adopts three-level menu, convenient for quick querying and modification of parameters.

The three-level menu consists of function code group (Level I), function code (Level II), and function code setting value (level III), as shown in the following figure.

Figure 4-2 Operation procedure on the operation panel

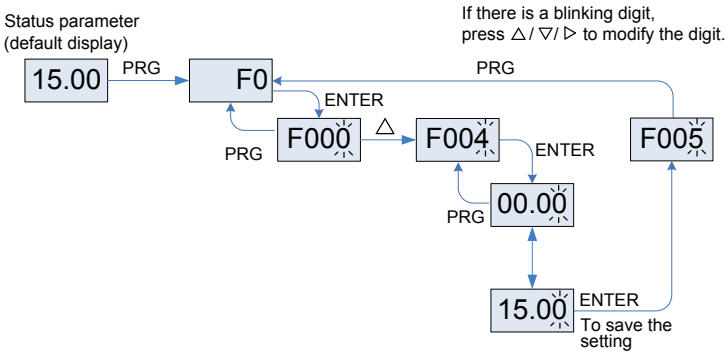


You can return to Level II from Level III by pressing PRG or ENTER.

- After you press ENTER, the system saves parameter setting first, and then goes back to Level II and shifts to the next function code.
- After you press PRG, the system does not save parameter setting, but directly returns to Level II and remains at the current function code.

Here is an example of changing the value of F0-04 to 15.00 Hz.

Figure 4-3 Example of editing function code



In Level III menu, if the parameter has no blinking digit, it means that the parameter cannot be modified. This may be because:

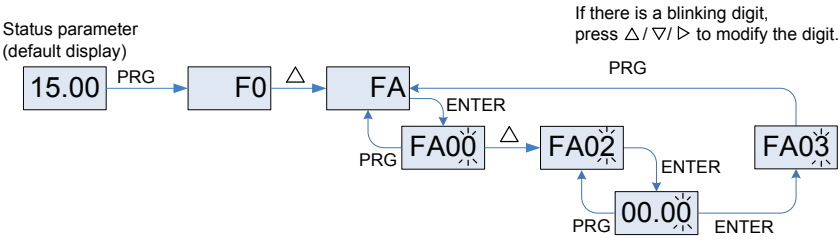
- Such a function code is only readable, such as actually detected parameter and running record parameter.
- Such a function code cannot be modified in the running state and can only be changed at stop.

4.2.2 Viewing Fault Information

When a fault occurs on the controller, the operation panel displays the fault code, based on which, you can find the cause of the fault and rectify the fault quickly.

The controller saves the last four fault codes, and details of the frequency, current, bus voltage and DI/DO status at the latest fault are recorded.

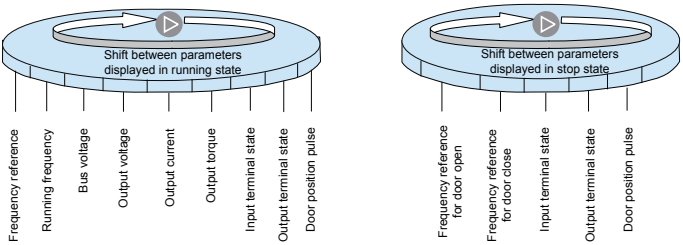
Figure 4-4 Viewing fault information



4.2.3 Viewing Display at Running or Stop

In the stop/running state without fault, you can view the parameters circularly by pressing ▷.
The parameters to be displayed are set in by setting FA-00 and FA-01.

Figure 4-5 Shift between parameters displayed in the running/stop state

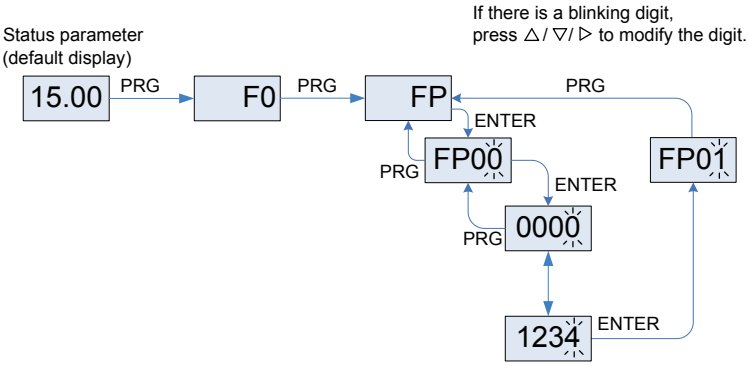


4.2.4 Setting the Password

To protect the parameters more effectively, the NICE900 provides the user password protection function. To cancel the password protection function, enter the password and set FP-00 to 0.

The following figure shows an example of changing the password to 1234.

Figure 4-6 Changing the password



4.3 Command Source and Motor Auto-tuning

4.3.1 Command Source

The NICE900 supports four command sources, as described in the following table.

Function Code	Value	Description
F0-02	0 (Default)	Operation panel control It is mainly used in motor auto-tuning. The door machine runs at the frequency set in F0-04. You can control door open or close by pressing OPEN or CLOSE, and stop the door machine by pressing STOP RES on the operation panel.
	1	Door machine terminal control Door open and close commands are input via DI terminal. It is used in normal running state.
	2	Door machine manual control It is used in door width auto-tuning, during which the door machine accelerates and decelerates. The running and stop of the door machine are controlled by using the operation panel.
	3	Door machine auto demonstration It is used in the door machine demonstration and trial running in the factory. After door width auto-tuning is completed in distance control or peripheral signals are connected properly in speed control, set the door machine auto demonstration mode to start automatic running of the door machine. Start demonstration by pressing OPEN or CLOSE, and stop demonstration by pressing STOP RES on the operation panel. The demonstration time interval and times are set in group F7 parameters.

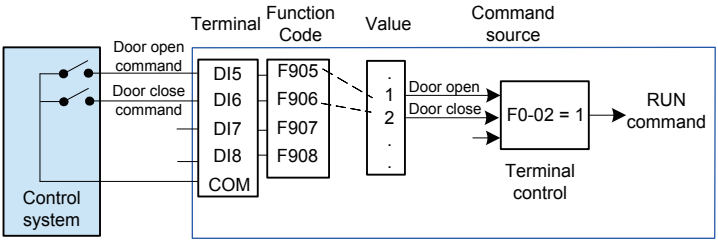
■ **Door machine manual control (F0-02 = 1)**

In this mode, the door open/close commands are given by DI terminal.

You can allocate the DI terminals with relevant signals in F9-01 to F9-08.

For example, connect the door open and close signals respectively to DI5 and DI6, as shown in the following figure.

Figure 4-7 Door open/close control by DI terminal



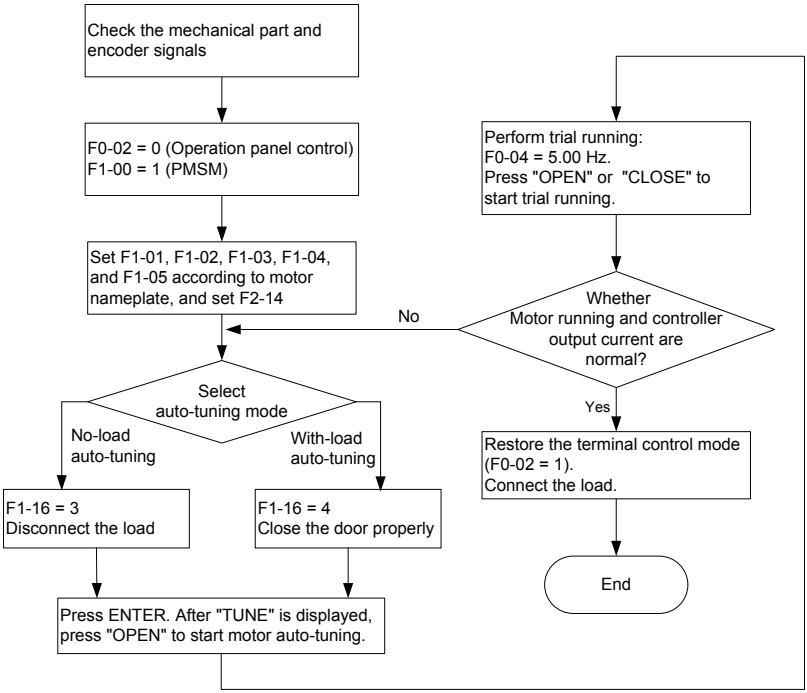
4.3.2 Motor Auto-tuning

The following part takes the PMSM as an example to describe motor auto-tuning.

Follow the precautions for motor auto-tuning:

- The magnetic pole position must be identified before first-time running of the PMSM. Otherwise, the PMSM cannot be used properly.
- After you change motor wiring or encoder wiring, or replace the encoder, the encoder position angle must be identified again. Ensure that the magnetic position is consistent with motor wiring during normal running.
- The motor rotates during auto-tuning. Ensure safety before starting motor auto-tuning.

Figure 4-8 Motor auto-tuning flowchart (PMSM)



More descriptions about motor auto-tuning are as follows:

1. Before starting motor auto-tuning, ensure that the encoder signals are normal. If the door closes and motor locked-rotor occurs after you start auto-tuning, it indicates that the motor running direction is abnormal. You need to change the motor wiring or encoder wiring.
2. During no-load auto-tuning, the controller executes the forward or reverse running command, and runs in the opposite direction after a period of time.

   After several cycles of forward and reverse running, the controller calculates all parameters and completes no-load auto-tuning. If Er20 is reported during auto-tuning, replace any two of UVW phases and perform motor auto-tuning again.

3. During with-load auto-tuning, ensure that the door is fully closed. Press OPEN to make the motor slowly open the door at 25% of the rated speed and press CLOSE to make the motor close the door after the door opens to a certain distance.

   After three times of such operations, the controller calculates all parameters and completes with-load auto-tuning.

4. During with-load auto-tuning, if the motor does not run or the running direction is inconsistent with the actual door open/close command, it indicates that motor wiring is

incorrect. You need to replace any two of UVW phases and perform motor auto-tuning again.

5. The identified encoder zero position angle is viewed or modified in F1-14. This parameter must not be modified after motor auto-tuning; otherwise, the controller may not run properly.

   This parameter obtained through with-load auto-tuning is not so accurate as that obtained through no-load auto-tuning. Perform no-load auto-tuning if conditions are allowed.

6. If Er19 is reported during identification of the encoder zero position angle, check whether encoder wiring is correct.

4.4 Door Open/Close Control Mode

The NICE900 supports two door open/close control modes, speed control and distance control.

In speed control, the controller instructs deceleration at slow-down point and judge door open/close limit based on the door open/close limit signal.

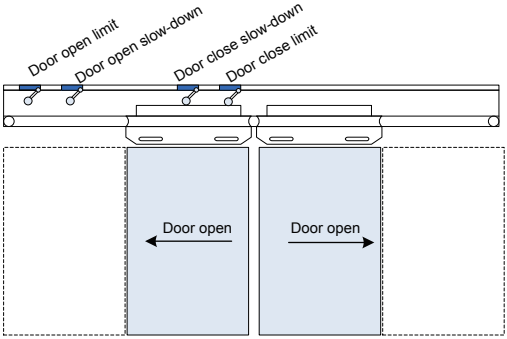
In distance control, the controller needs to identify the door width pulses correctly, and instructs deceleration and judge door open/close limit based on the door open/close curve.

4.4.1 Speed Control Mode

1. Four travel switches need to be installed on the door for this mode. The controller decelerates at the slow-down point and judges door open/close limit based on the door open/close limit signal.

The following figure shows the installation positions of relevant signals (travel switch) of the door machine system in speed control mode.

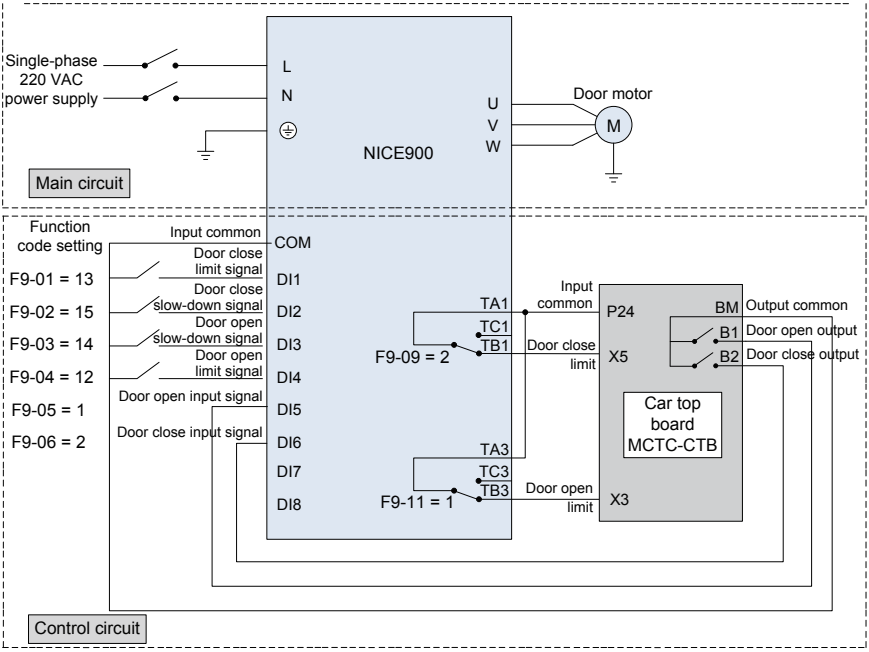
Figure 4-9 Installation position of signals of the door machine system



2. Check wiring of the door open/close signals for speed control.

The following figure takes Inovance elevator control system to describe wiring of the relevant signals.

Figure 4-10 Typical system wiring for speed control

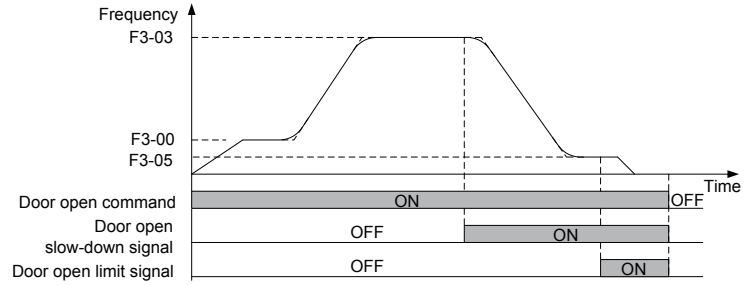


3. Related parameter setting

Function Code	Parameter Name	Value
F0-01	Door open/close control mode	0: Speed control
F0-02	Command source selection	1: Door machine terminal control
F9-01	DI1 function selection	13: Door close limit signal NO
F9-02	DI2 function selection	15: Door close slow-down point signal NO
F9-03	DI3 function selection	14: Door open slow-down point signal NO
F9-04	DI4 function selection	12: Door open limit signal NO
F9-05	DI5 function selection	1: Door open command
F9-06	DI6 function selection	2: Door close command

4. Door open/close running curve in speed control

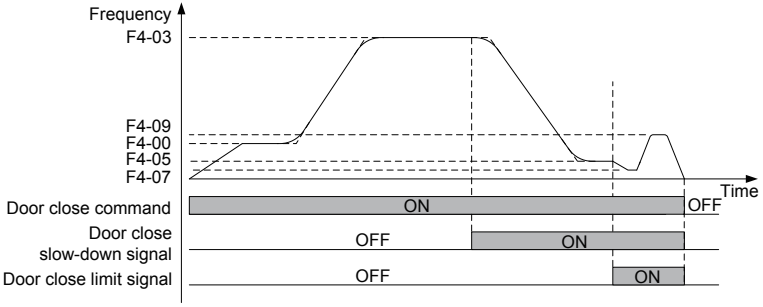
Figure 4-11 Door open running curve in speed control



When the door open command is active, the door machine accelerates to the speed set in F3-00. After the low speed door open time reaches the setting of F3-02, the door machine accelerates to normal speed set in F3-03.

After the door open slow-down signal is active, the door machine decelerates to the speed set in F3-05. After the door open limit signal is active, the door machine enters the door open holding state with the holding torque set in F3-08.

Figure 4-12 Door close running curve in speed control



When the door close command is active, the door machine accelerates to the speed set in F4-00. When the low speed door close time reaches the setting of F4-02, the door machine accelerates to normal speed set in F4-03.

When the door close slow-down signal is active, the door machine decelerates to the speed set in F4-05. When the door close limit signal is active, the door machine enters the door close holding state:

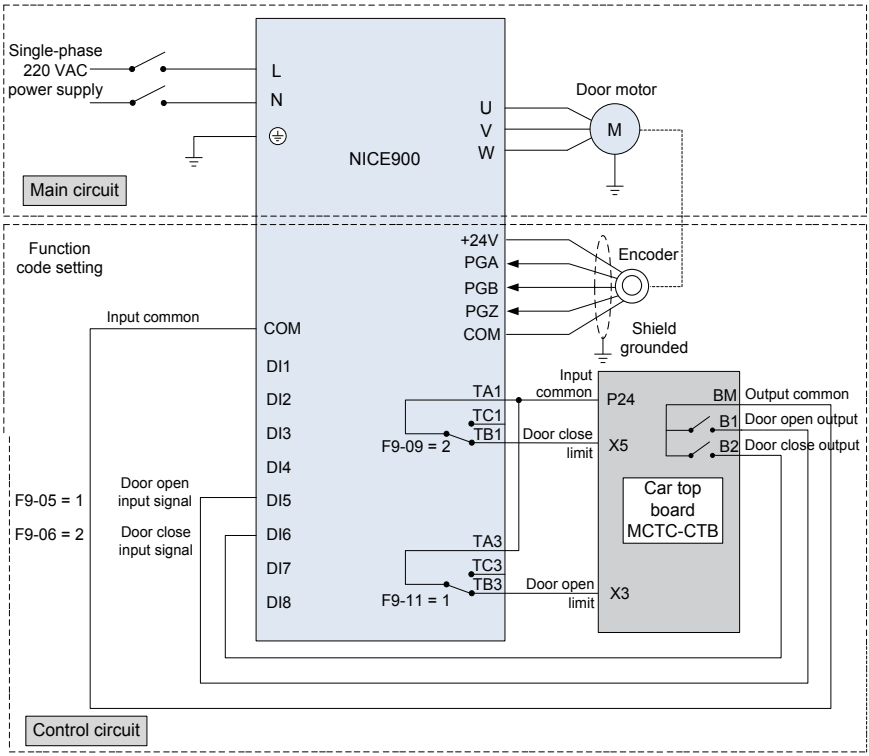
- Holding speed: F4-07
- Holding time: F4-08
- Holding torque: F4-12
- Door vane retraction speed and time: F4-09 and F4-10

4.4.2 Distance Control Mode

1. The encoder needs to be installed for this mode. The controller judges the door position based on the encoder signals. The door width pulses need to be identified at first-time running. The controller decelerates and judges door open/close limit based on the door open/close curve.

The following figure takes Inovance elevator control system to describe wiring of the relevant signals.

Figure 4-13 Typical system wiring for distance control



2. Check the encoder.

The pulse signal from the encoder is critical to accurate control of the system. Before commissioning, check the following items carefully:

1) The encoder is installed reliably with correct wiring.

2) The signal cable and strong-current circuit of the encoder are laid in different ducts to prevent interference.

3) The encoder cable is preferably directly connected to the controller. If the cable is not long enough and an extension cable is required, the extension cable must be a shielded cable and preferably welded to the original encoder cable by using the soldering iron.

4) The shield of the encoder cable is grounded on the end connected to the controller (only one end is grounded to prevent interference).

3. Related parameter setting

Function Code	Parameter Name	Value
F0-01	Door open/close control mode	1: Distance control
F0-02	Command source selection	1: Door machine terminal control
F9-05	DI5 function selection	1: Door open command
F9-06	DI6 function selection	2: Door close command

4. Door width auto-tuning

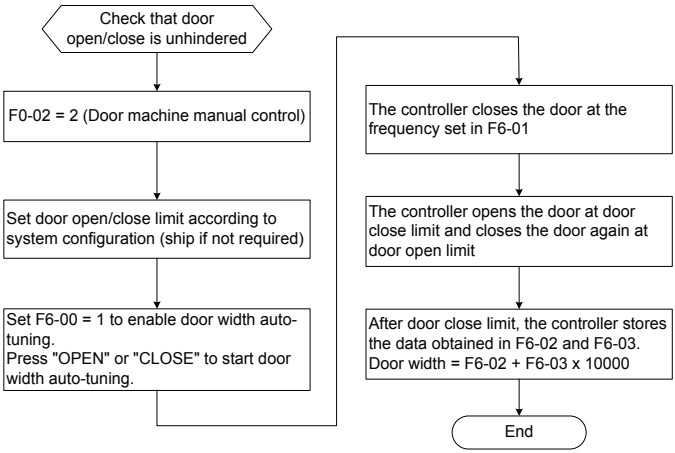
Door width auto-tuning is required before running in distance control. During door open/close, the controller records the pulses of door movement in real time, and judges door open/close limit based on the door width pulses.

Pay attentions to the following precautions:

- Before performing door width auto-tuning in distance control for asynchronous motor, check that the AB phase cables of the encoder are connected correctly.
- During door width auto-tuning, the door acting direction changes automatically; guarantee personal safety before starting the operation.
- Check that there is no obstacle in the running track of the door before starting door width auto-tuning. If the door is hindered by an obstacle, the controller considers that door open/close limit is reached, resulting in incorrect auto-tuning data.

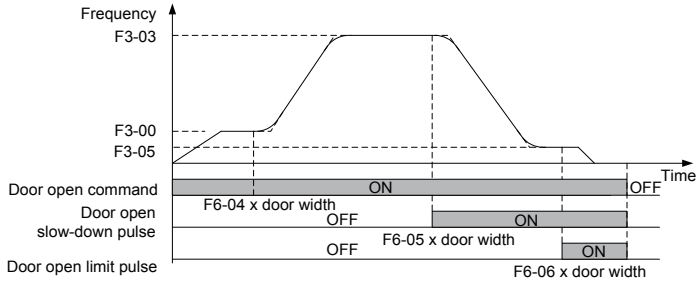
The following figure shows the door width auto-tuning flowchart.

Figure 4-14 Door width auto-tuning flowchart



5. Door open/close running curve in distance control mode

Figure 4-15 Door open running curve in distance control mode



When the door open command is active, the door machine accelerates to the speed set in F3-00.

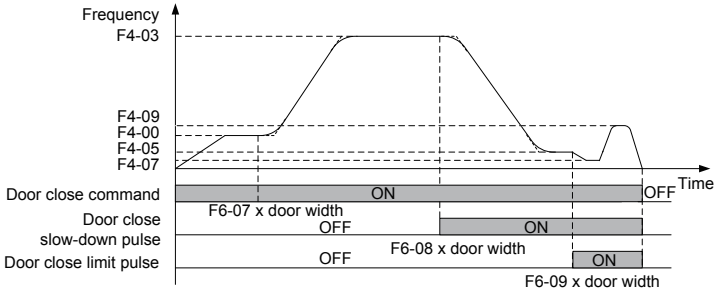
When the door open position reaches (F6-04 x door width), the door machine accelerates to the speed set in F3-03.

When the door open position reaches (F6-05 x door width), the door machine enters the deceleration and creeping state with the speed set in F3-05 and deceleration time set in F3-06.

When the door open position reaches (F6-06 x door width), the door machine continues low speed creeping, and then enters the door open holding state, with the holding torque set in F3-08. The door position is reset to 100%.

After the door open command is cancelled, the torque holding state ends.

Figure 4-16 Door close running curve in distance control mode



When the door close command is active, the door machine accelerates to the speed set in F4-00.

When the door close position reaches (F6-07 x door width), the door machine accelerates to the speed set in F4-03.

When the door close position reaches (F6-08 x door width), the door machine decelerates to the speed set in F4-05.

When the door close position reaches (F6-09 x door width), the door machine decelerates again to the speed set in F4-07. It is recommended that F6-09 ≥ 96.0%; reduce F6-09 if there is pulse loss during door open/close.

Set the threshold for retracting the door vane in F6-20. After the door vane is retracted and door limit is reached, the door machine enters the torque holding state, with the speed set in F4-07 and holding torque set in F4-12. The door position is reset to 0.

After the door close command is cancelled, the torque holding state ends.

4.4.3 Door Close Hindered

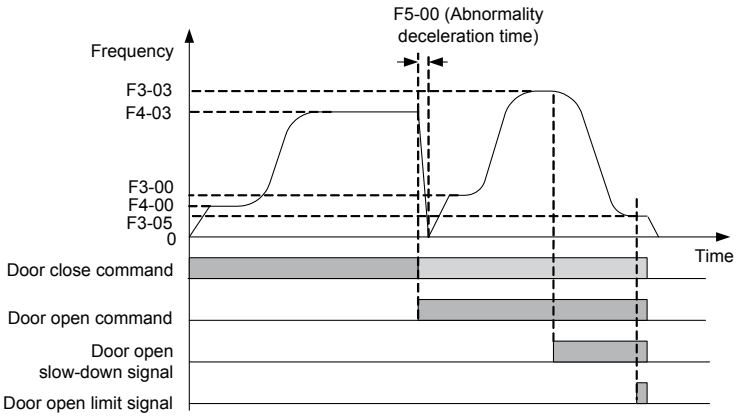
Door close hindered means that one of the following conditions occur during door close:

- Light curtain/safety edge signal active
- Output torque larger than the door close hindered torque
- Door open command active

If door close hindered occurs, the NICE900 processes this abnormality in two ways: decelerate to stop or re-open the door, selected in F4-14. This abnormality is judged based on the time or torque.

1. Running curve of door open command active during door close in speed control mode

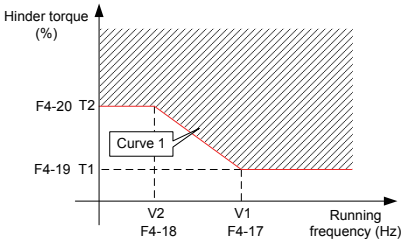
Figure 4-17 Running curve of door open command active during door close in speed control mode



After the time reaches the deceleration time in F5-00, the controller re-opens the door at low speed, and enters normal speed running state after the time set in F3-02.

After the door open slow-down signal is active, the controller enters the low speed running state and opens the door to the open limit position, and then outputs the door open limit signal.

2. Related parameter setting

<table>
<tr><th>Function Code</th><th>Parameter Name</th><th>Setting</th><th>Description</th></tr>
<tr><td>F4-14</td><td>Working mode upon door close hindered</td><td>0: Reserved
1: Output door close hindered signal
2: Immediate stop
3: Door re-open</td><td>F4-14 = 2
Upon door close hindered, the controller stops immediately, outputs the door close hindered signal, and does not respond to the door close command within 10s. However, if the controller receives the door close or RUN (door open/close) cancellation command within the time, it executes door close immediately rather than restricted by the 10s time counting.
F4-14 = 3
The controller re-opens the door upon door close hindered, and does not respond to the external door open/close commands during door re-open.
Door close hindered occurs on one of the following conditions during door close:
• The light curtain/safety edge signal is active.
• The output torque is larger than the door close hindered torque.
• The door close time exceeds the value of F5-02.</td></tr>
<tr><td>F4-15</td><td>Door close hindered judging time</td><td>0–9999 ms</td><td>It is used to set the filter time when door close is hindered. If it is set to 0, door close hindered is not detected.</td></tr>
<tr><td>F4-17</td><td>Normal speed at door close hindered</td><td>F4-18 to F1-04
12.00 Hz</td><td rowspan="4"> 

F4-17 to F4-20 are used to judge door close hindered.
Set them according to the requirement:
V1 (F4-17) ≥ V2 (F4-18), T1 (F4-19) ≤ T2 (F4-20)
The torque threshold for judging door close hindered is curve 1 shown in the figure. The shadow part shows that door close hindered occurs.</td></tr>
<tr><td>F4-18</td><td>Low speed at door close hindered</td><td>0.00 Hz to F1-04
2.00 Hz</td></tr>
<tr><td>F4-19</td><td>Normal speed torque</td><td>0.00–150.0%
100.0%</td></tr>
<tr><td>F4-20</td><td>Low speed torque</td><td>0.00–150.0%
100.0%</td></tr>
<tr><td>F5-00</td><td>Abnormality deceleration time</td><td>0.1–5.0s</td><td>It is used to set the time for the system to decelerate from the door close speed to 0 when door close is hindered. Set this parameter to the minimum value as possible when ensuring that over-current does not occur during deceleration.</td></tr>
</table>

Function Code	Parameter Name	Setting	Description
F5-02	Door close time limit	0–9999s	It is used to limit the door close time. If the controller does not receive the door close limit signal within the time, it determines that door close is hindered, and performs door re-open or zero speed holding based on the setting of F4-14. This parameter is invalid when it is set to 0.

5

Function Code Table

Chapter 5 Function Code Table

5.1 Description of Function Codes

The NICE900 series door machine controller has a total of 13 groups of function codes, namely, F0 to F9, FA, FF and FP. FX–YZ in this manual indicates the function code whose function code group is "X" and whose function code is "YZ". For example, F3-02 indicates function code "2" in group F3.

To facilitate the setting of the function codes, the operation panel adopts three-level menu. The function code group is Level-I menu, function code is Level-II menu, and the setting value corresponds to Level-III menu.

The meaning of each column in the function code table is as follows:

Function Code	Indicates the function code number.
Parameter Name	Indicates the parameter name of the function code.
Setting Range	Indicates the setting range of the parameter.
Default	Indicates the default setting of the parameter at factory.
Unit	Indicates the measurement unit of the parameter.
Property	Indicates whether the parameter can be modified (including the modification conditions)

The symbols in the function code table are described as follows:

"☆": The parameter can be modified when the NICE900 is in either stop or running state.

"★": The parameter cannot be modified when the NICE900 is in the running state.

"●": The parameter is the actually measured value and cannot be modified.

"*": The parameter is factory parameter and can be set only by the manufacturer.

The system automatically restricts the modification property of all parameters to prevent mal-function.

"Default Value" indicates the value after parameter update when you restore factory settings, but the actually detected parameter values or recorded values are not updated.

To protect the parameters more effectively, the NICE900 provides the password protection.

5.2 Function Code Table

After pressing 

key and then  or  key, the Level-I menu is displayed, corresponding to the following function code groups:

Group F0: Basic Parameters	Group F7: Distance Control Parameters
Group F1: Motor Parameters	Group F8: Auxiliary Parameters
Group F2: Performance Control Parameters	Group F9: Input and Output Function Parameters
Group F3: Door Open Running Curve Parameters	Group FA: Display and Fault Parameters
Group F4: Door Close Running Curve Parameters	Group FF: Factory Parameters (Reserved)
Group F5: Door Open/Close Auxiliary Parameters	Group FP: User Parameters
Group F6: Distance Control Parameters	

Function Code	Parameter Name	Setting Range	Default	Min. Unit	Property
Group F0: Basic Parameters					
F0-00	Control mode	0: Sensorless vector control (SVC) 1: Closed-loop vector control (CLVC)	1	1	★
F0-01	Door open/close mode selection	0: Speed control 1: Distance control	1	1	★
F0-02	Command source selection	0: Operation panel control 1: Door machine terminal control 2: Door machine manual control 3: Door machine auto demonstration	0	1	★
F0-04	Running frequency under operation panel control	0.00 to F1-04	5.00 Hz	0.01 Hz	☆
F0-05	Input signal quick setting	0–2	1	1	★
F0-06	Speed at low speed running	0.00 to F1-04	4.00 Hz	0.01 Hz	☆
F0-07	Carrier frequency	2.0–16.0 kHz	8.0 kHz	0.1 kHz	☆
Group F1: Motor Parameters					
F1-00	Motor type	0: Asynchronous motor 1: PMSM	8.0 kHz	0.1 kHz	★
F1-01	Rated motor power	0–750 W	1	1	★
F1-02	Rated motor voltage	0–250 V	Model dependent	1 V	★
F1-03	Rated motor current	0.001–9.900 A	100 V	1 V	★
F1-04	Rated motor frequency	1.00–99.00 Hz	Model dependent	0.001 A	★
F1-05	Rated motor speed	0–9999 RPM	24.00 Hz	0.01 Hz	★

Function Code	Parameter Name	Setting Range	Default	Min. Unit	Property
F1-06	Stator phase resistance of PMSM	0.00–99.99 Ω	Model dependent	0.01 Ω	★
F1-07	Rotor phase resistance of asynchronous motor	0.00–99.99 Ω	Model dependent	0.01 Ω	★
F1-08	Leakage inductance of asynchronous motor	0.0–99.99 mH	Model dependent	0.01 mH	★
F1-09	Mutual inductance of asynchronous motor	0–999.9 mH	Model dependent	0.1 mH	★
F1-10	Magnetizing current of asynchronous motor	0.001–9.900 A	Model dependent	0.001 A	★
F1-11	Shaft D inductance of PMSM	0.0–999.9 mH	Model dependent	0.1 mH	★
F1-12	Shaft Q inductance of PMSM	0.0–999.9 mH	Model dependent	0.1 mH	★
F1-13	Back EMF of PMSM	0–250	Model dependent	1	★
F1-14	Encoder zero position angle of PMSM	0.0–359.9°	Model dependent	0.1°	★
F1-15	Real-time angle of PMSM	0.0–359.9°	Model dependent	0.1°	●
F1-16	Motor auto-tuning mode	0: No auto-tuning 1: Static auto-tuning for asynchronous motor 2: Complete auto-tuning for asynchronous motor 3: No-load auto-tuning for PMSM 4: With-load auto-tuning for PMSM	0	1	★
Group F2: Performance Control Parameters					
F2-00	Speed loop proportional gain 1	0–100	15	1	☆
F2-01	Speed loop integral time 1	0.01–10.00s	1.00s	0.01s	☆
F2-02	Switchover frequency 1	0.00 to F2-05	5.00 Hz	0.01 Hz	☆
F2-03	Speed loop proportional gain 2	0–100	15	1	☆
F2-04	Speed loop integral time 2	0.01–10.00s	1.00s	0.01s	☆
F2-05	Switchover frequency 2	F2-02 to F1-04	30	1	☆
F2-06	Current loop proportional gain	10–500	120	1	☆
F2-07	Current loop integral gain	10–500	50	1	☆

Function Code	Parameter Name	Setting Range	Default	Min. Unit	Property
F2-08	Slip compensation coefficient	50%–200%	100%	1%	☆
F2-09	Inertia compensation	0–9999	0	1	★
F2-10	Torque boost	0.0%–30.0%	8.0%	0.1%	☆
F2-11	Over-excitation gain	0–200	64	1	☆
F2-12	Initial position judging method	1: Based on pulses 2: Using data of other tested PMSM	1	1	★
F2-13	Feedback speed filter level	0–20	0	1	☆
F2-14	Encoder PPR	1–9999	2048	1	★
F2-15	Encoder direction selection	0: Forward direction 1: Reverse direction	1	1	★
Group F3: Door Open Running Curve Parameters					
F3-00	Door open startup low speed	0.00 Hz to F3-03	5.00 Hz	0.01 Hz	☆
F3-01	Door open startup acceleration time	0.1–999.9s	1.0s	0.1s	☆
F3-02	Low speed running time for door open startup in speed control	0.1–999.9s	1.0s	0.1s	☆
F3-03	Door open normal speed	0.00 Hz to F1-04	15.00 Hz	0.01 Hz	☆
F3-04	Door open acceleration time	0.1–999.9s	2.0s	0.1s	☆
F3-05	Door open ending low speed	0.00 Hz to F3-03	3.00Hz	0.01 Hz	☆
F3-06	Door open deceleration time	0.1–999.9s	1.5s	0.1s	☆
F3-07	Torque switchover threshold at door open limit	0.0%–150.0%	50.0%	0.1%	☆
F3-08	Door open limit holding torque	0.0%–150.0%	50.0%	0.1%	☆
F3-09	Door open hindered torque	0.0%–150.0%	80.0%	0.1%	☆
F3-10	Door open startup torque	0.0% to F3-09	0.0%	0.1%	★
F3-11	Door open hindered judging time	0–9999 ms	0ms	1 ms	☆
F3-12	Door open limit low speed	0.00 Hz to F3-03	3 Hz	0.01 Hz	☆
F3-13	Door re-open speed	0.00 Hz to F3-03	0 Hz	0.01 Hz	☆
Group F4: Door Close Running Curve Parameters					
F4-00	Door close startup low speed	0.00 Hz to F4-03	4.00 Hz	0.01 Hz	☆

Function Code	Parameter Name	Setting Range	Default	Min. Unit	Property
F4-01	Door close startup acceleration time	0.1–999.9s	1.0s	0.1s	☆
F4-02	Low speed running time for door close startup in speed control	0.1–999.9s	1.0s	0.1s	☆
F4-03	Door close normal speed	0.00 Hz to F1-04	12.00 Hz	0.01 Hz	☆
F4-04	Door close acceleration time	0.1–999.9s	2.0s	0.1s	☆
F4-05	Door close ending low speed	0.00 Hz to F4-03	2.00 Hz	0.01 Hz	☆
F4-06	Door close deceleration time	0.1–999.9s	1.5s	0.1s	☆
F4-07	Door close limit low speed	0.00 Hz to F4-03	1.00 Hz	0.01 Hz	☆
F4-08	Low speed running time at door close limit	0–9999 ms	300 ms	1 ms	☆
F4-09	Door vane retraction speed	0.00 to F4-03	2.00 Hz	0.01 Hz	☆
F4-10	Door vane retraction running time	0–9999 ms	500 ms	1 ms	☆
F4-11	Torque switchover threshold at door close limit	0.0%–150.0%	50.0%	0.1%	☆
F4-12	Door close limit holding torque	0.0%–150.0%	30.0%	0.1%	☆
F4-13	Door close hindered torque	0.0%–150.0%	100.0%	0.1	★
F4-14	Working mode upon door close hindered	0: Reserved 1: Output door close hindered signal 2: Immediate stop 3: Door re-open	1	1	★
F4-15	Door close hindered judging time	0–9999 ms	500 ms	1 ms	☆
F4-16	Door close normal speed at fire emergency	5.00 to F1-04	10.00 Hz	0.01 Hz	☆
F4-17	Normal speed at door close hindered	F4-18 to F1-04	12.00 Hz	0.01 Hz	☆
F4-18	Low speed at door close hindered	0.00 Hz to F1-04	2.00 Hz	0.01 Hz	☆
F4-19	Normal speed torque	0.00%–150.0%	100.0%	0.1%	☆
F4-20	Low speed torque	0.00%–150.0%	100.0%	0.1%	☆
Group F5: Door Open/Close Auxiliary Parameters					
F5-00	Abnormality deceleration time	0.1–5.0s	0.3s	0.1	☆

Function Code	Parameter Name	Setting Range	Default	Min. Unit	Property
F5-01	Door open time limit	0–999.9s	30.0s	1s	☆
F5-02	Door close time limit	0–999.9s	0s	1s	☆
F5-03	Low speed running time limit	0–999.9s	0s	1s	☆
F5-04	Delay of external door open command	0–999.9s	60.0s	1s	☆
F5-05	Delay of external door close command	0–999.9s	60.0s	1s	☆
F5-06	Door open curve	0, 1	1	1	★
F5-07	Start segment time of door open acceleration S curve	10.0%–50.0% (acceleration/deceleration time, start segment + rising segment ≤ 90%)	20.0%	0.1%	★
F5-08	Rising segment time of door open acceleration S curve	10.0%–80.0% (acceleration/deceleration time, start segment + rising segment ≤ 90%)	60.0%	0.1%	★
F5-09	Start segment time of door open deceleration S curve	10.0%–50.0% (acceleration/deceleration time, start segment + falling segment ≤ 90%)	20.0%	0.1%	★
F5-10	Falling segment time of door open deceleration S curve	10.0%–80.0% (acceleration/deceleration time, start segment + falling segment ≤ 90%)	60.0%	0.1%	★
F5-11	Start segment time of door close acceleration S curve	0, 1	1	1	★
F5-12	Rising segment time of door close acceleration S curve	10.0%–50.0% (acceleration/deceleration time, start segment + rising segment ≤ 90%)	20.0%	0.1%	★
F5-13	Start segment time of door close deceleration S curve	10.0%–80.0% (acceleration/deceleration time, start segment + rising segment ≤ 90%)	60.0%	0.1%	★
F5-14	Falling segment time of door close deceleration S curve	10.0%–50.0% (acceleration/deceleration time, start segment + falling segment ≤ 90%)	20.0%	0.1%	★
F5-15	Start segment time of door open acceleration S curve	10.0%–80.0% (acceleration/deceleration time, start segment + falling segment ≤ 90%)	60.0%	0.1%	★
F5-16	Speed deviation threshold	0%–80%	50%	0%	☆
F5-17	Time for determining speed deviation too large	0–5000 ms	400 ms	1 ms	☆

Function Code	Parameter Name	Setting Range	Default	Min. Unit	Property
F5-18	Door close steady speed delay	0–9999 ms	200 ms	1 ms	★
F5-19	Fault braking current	0.1%–150.0%	100%	0.1%	★
Group F6: Distance Control Parameters					
F6-00	Door width auto-tuning function	0: Disabled 1: Enabled	0	1	★
F6-01	Door width auto-tuning speed	0 to F0-04	3.00 Hz	0.01 Hz	☆
F6-02	Low bits of door width pulse	0–9999	0	1	★
F6-03	High bits of door width pulse	0–9999	0	1	★
F6-04	Low speed running distance of door open startup in distance control	0.0%–30.0%	10.0%	0.1%	☆
F6-05	Door open slow-down point in distance control	60.0%–90.0%	70.0%	0.1%	☆
F6-06	Door open limit point in distance control	80.0%–99.0%	96.0%	0.1%	☆
F6-07	Low speed running distance of door close startup in distance control	0.0%–30.0%	10.0%	0.1%	☆
F6-08	Door close slow-down point in distance control	60.0%–90.0%	70.0%	0.1%	☆
F6-09	Door close limit point in distance control	80.0%–99.0%	96.0%	0.1%	☆
F6-10	Output torque display	0.0-1–80.0%	0.0%	0.1%	☆
F6-11	Low bits of the door open limit switch position	0–9999	0	1	★
F6-12	High bits of the door open limit switch position	0–9999	0	1	★
F6-13	Position of the door close limit switch	0–9999	0	1	★
F6-14	Torque setting for door width auto-tuning or initial running	0.0%–150.0%	80.0%	0.1%	★
F6-15	Low bits of the pulse of door open slow-down point	0–9999	0	1	★
F6-16	High bits of the pulse of door open slow-down point	0–9999	0	1	★
F6-17	Low bits of the pulse of door close slow-down point	0–9999	0	1	★
F6-18	High bits of the pulse of door close slow-down point	0–9999	0	1	★

Function Code	Parameter Name	Setting Range	Default	Min. Unit	Property
F6-19	Pulse at door open limit output	0.0%–99.9%	0.0%	0.1%	☆
F6-20	Pulse at door close limit output	0.0%–99.9%	0.0%	0.1%	☆
F6-21	Door position feedback pulse	0.0%–99.9%	33.0%	0.1%	☆
Group F7: Distance Control Parameters					
F7-00	Door open limit holding time in demonstration mode	1.0–999.9s	0.1s	2.0s	★
F7-01	Door close limit holding time in demonstration mode	1.0–999.9s	0.1s	2.0s	★
F7-02	Actual door open and close times in demonstration mode	0–9999	0	1	☆
F7-03	Limit of door open and close times in demonstration mode	0–9999	0	1	☆
Group F8: Auxiliary Parameters					
F8-00	Software version	0.00–99.99	1.00	0.01	●
F8-01	Module temperature	0–100°C	0°C	1°C	●
F8-02	Fault auto reset times	0–100	0	1	★
F8-03	Brake use ratio	0–100%	100%	1%	☆
F8-04	Accumulative power-on time	0–9999 h	0	1	★
F8-05	Reserved (working time: minutes)	0	0	1	★
F8-06	Accumulative running time	0–9999 h	0	1	★
F8-07	Reserved (working time: minutes)	0	0	1	★
F8-08	Accumulative working time setting	0–9999 h	0	1	★
F8-09	Accumulative operation time setting	0–9999 h	0	1	★
F8-10	Auxiliary function selection	0–9999	12	1	★
F8-12	Drive function selection	0–9999	0	1	★
F8-14	Overload coefficient	0–10.00	2.00	0.01	☆
Group F9: Auxiliary Parameters					
F9-00	Terminal filter time	0–100 ms	20 ms	1 ms	☆

Function Code	Parameter Name	Setting Range	Default	Min. Unit	Property
F9-01	DI1 function selection	0: Invalid 1: Door open command 2: Door close command 3: External reset signal 4: Forbid terminal input during door open 5: Forbid terminal input during torque holding 6: Low speed door close command 7: Fire emergency input 8 to 109: Reserved 10/110: Light curtain signal NO/NC 11/111: Safety edge signal NO/NC 12/112: Door open limit signal NO/NC 13/113: Door close limit signal NO/NC 14/114: Door open slow-down signal NO/NC 15/115: Door close slow-down signal NO/NC 16/116: Door lock signal NO/NC	0	1	★
F9-02	DI2 function selection		0	1	★
F9-03	DI3 function selection		0	1	★
F9-04	DI4 function selection		0	1	★
F9-05	DI5 function selection		1	1	★
F9-06	DI6 function selection		2	1	★
F9-07	DI7 function selection		10	1	★
F9-08	DI8 function selection		6	1	★
F9-09	Relay output selection (TA1/TB1/TC1)	0: Invalid 1: Door open limit signal output 0 2: Door close limit signal output 0 3: Door open limit signal output 1 4: Door close limit signal output 1 5: Fault signal output 1 6: Reserved 7: Door open limit signal output 2 8: Door close limit signal output 2 9: Door lock signal output 10: Door re-open signal output 11: Hindering signal output 12: Door position feedback output	2	1	★
F9-10	Relay output selection (TA2/TB2/TC2)		5	1	★
F9-11	Relay output selection (TA3/TB3/TC3)		1	1	★

Function Code	Parameter Name	Setting Range	Default	Min. Unit	Property
Group FA: Display and Fault Parameters					
FA-00	Display in running state	1–511	319	1	☆
FA-01	Display in stop state	1–63	39	1	☆
FA-02	1st fault type	0–30	0	1	●
FA-03	1st fault prompt	0–9	0	1	●
FA-04	2nd fault type	0–30	0	1	●
FA-05	2nd fault prompt	0–9	0	1	●
FA-06	3rd fault type	0–30	0	1	●
FA-07	3rd fault prompt	0–9	0	1	●
FA-08	4th fault type	0–30	0	1	●
FA-09	4th fault prompt	0–9	0	1	●
FA-10	5th fault type	0–30	0	1	●
FA-11	5th fault prompt	0–9	0	1	●
FA-12	Bus voltage upon latest fault	0–999.9 V	0 V	0.1 V	●
FA-13	Output current upon latest fault	0–99.00 A	0.00 A	0.01 A	●
FA-14	Running frequency upon latest fault	0–99.00 Hz	0.00 Hz	0.01 Hz	●
FA-15	Output torque upon latest fault	0.0–180.0% (percentage of output torque to rated torque)	0.0%	0.1%	●
FA-16	Input terminal status upon latest fault	0–1023	0	1	●
FA-17	Output terminal status upon latest fault	0–15	0	1	●
FA-18	Terminal state display	*	*	*	●
FA-19	Input signal display	*	*	*	●
FA-20	Output signal display	*	*	*	●
FA-21	Parameter display selection	0–9999	0	1	☆
FA-22	Display 1	0–9999	0	1	●
FA-23	Display 2	0–9999	0	1	●
FA-24	Analog voltage display	0.00–10.10 V	0.00 V	0.01 V	●
FA-25	Low bit of current door position	0–9999	0	1	●
FA-26	High bit of current door position	0–9999	0	1	●
FA-27	Door machine state display	0–9999	0	1	●
FA-28	Door direction judgment	*	*	*	●

Function Code	Parameter Name	Setting Range	Default	Min. Unit	Property
Group FF: Factory Parameters (Reserved)					
FF-00	Reserved	-	-	-	●
Group FP: Display and Fault Parameters					
FP-00	User password	0–9999	0	1	☆
FP-01	Parameter update	0: No function 1: Restore the default setting 2: Clear fault records and time	0	1	★

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Description of Function Codes

Chapter 6 Description of Function Codes

Group F0: Basic Parameters

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F0-00	Control mode	0, 1	1	1

- 0: Sensorless vector control (SVC)

  It applies to common applications except for the permanent magnet synchronous motor (PMSM).

- 1: Closed-loop vector control (CLVC)

  It is used only for the PMSM in distance control mode.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F0-01	Door open/close control mode	0, 1	1	1

- 0: Speed control

  In this mode, four travel switches need to be installed on the door. They are door open deceleration switch, door open limit switch, door close deceleration switch and door close limit switch.

  The controller instructs deceleration at the slow-down point and judges door open/close limit based on signals from the limit switches.

- 1: Distance control

  In the distance control mode, door width pulses must be obtained through auto-tuning. After relevant door open/close curve parameters are set, the controller instructs deceleration and judges door open/close limit.

  If a DI is allocated with door open/close limit signal in group F9, the controller judges door open/close limit based on the related limit signal from the DI.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F0-02	Command source selection	0, 1, 2, 3	0	1

- 0: Operation panel control

  It is used mainly for motor auto-tuning.

  RUN or stop of the door machine is controlled by using the operation panel. Press OPEN to instruct forward rotation, press CLOSE to instruct reverse rotation, and press STOP RES o stop the door machine.

  In such control mode, the controller runs as a general controller and does not execute the special door machine logics.

- 1: Door machine terminal control

  Door open/close is controlled by status combination of DI terminals of the controller.

DI with Signal "Door Open Command"	DI with Signal "Door Close Command"	Running State
0	0	Stop
0	1	Door close
1	0	Door open
1	1	Door open

- 2: Door machine manual control

  It is used for door width auto-tuning. RUN or stop of the door machine is controlled by using the operation panel. Press OPEN to instruct forward rotation, press CLOSE to instruct reverse rotation, and press STOP RES to stop the door machine.

  During the process, the door machine accelerates and decelerates.

- 3: Door machine auto demonstration

  It applies to the demonstration of door machine and factory trial running without use of the controller. Set this mode after you finish commissioning the door machine running curve in operation panel control mode.

  Press OPEN or CLOSE to repeat door open/close demonstration. The time interval and times of door open/close demonstration are set in group F7.

  Press STOP RES to stop the door machine.

Note

- Door width auto-tuning is valid only in the door machine manual control mode (F0-02 = 2).
- Motor auto-tuning is valid only in the operation panel control mode (F0-02 = 0).

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F0-04	Running frequency under operation panel control	0.00 to F1-04	5.00 Hz	0.01 Hz

It is used to set the running frequency when the speed is input via operation panel.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F0-05	Input signal quick setting	0–2	0	1

It is used to quickly set the NO/NC feature of signals input from the limit switches and slow-

down switches in the speed control mode (F0-01 = 0). When F0-05 is set to a non-zero value, the NO/NC feature of the corresponding input signals are as follows:

F0-05 = 1	F0-05 = 2
F9-01 = 13 (Door close limit NO)	F9-01 = 113 (Door close limit NC)
F9-02 = 15 (Door close deceleration NO)	F9-02 = 115 (Door close deceleration NC)
F9-03 = 14 (Door open deceleration NO)	F9-01 = 114 (Door open deceleration NC)
F9-04 = 12 (Door open limit NO)	F9-01 = 112 (Door open limit NC)

Changing F9-01 to F9-04 is allowed only when F0-05 = 0.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F0-06	Speed at low speed running	0–20.00 Hz	4.00 Hz	0.01 Hz

It is used to set the speed at first-time running after power-on or inspection when the distance control mode is used or the low speed door close input is active.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F0-07	Carrier frequency	2.0–16.0 kHz	8.0 kHz	0.1 kHz

It is used to adjust the carrier frequency of the controller, aiming to reduce motor noise, avoid resonance of the mechanical system, and reduce the leakage current to the earth and interference generated by the controller.

If the carrier frequency is low, output current has high harmonics, and the power loss and temperature rise of the motor increase.

If the carrier frequency is high, power loss and temperature rise of the motor declines. However, the system has an increase in power loss, temperature rise and interference.

Adjusting the carrier frequency will exert influences on the aspects listed in the following table.

Carrier frequency	Low	High
Motor noise	Large	Small
Output current waveform	Bad	Good
Motor temperature rise	High	Low
Controller temperature rise	Low	High
Leakage current	Small	Large
External radiation interference	Small	Large

Group F1: Motor Parameters

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F1-00	Motor type	0: Asynchronous motor 1: PMSM	1	1

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F1-01	Rated motor power	0–750 W	Model dependent	1 W
F1-02	Rated motor voltage	0–250 V	100 V	1 V
F1-03	Rated motor current	0.001–9.900 A	Model dependent	0.001 A
F1-04	Rated motor frequency	1.00–99.00 Hz	24.00 Hz	0.01 Hz
F1-05	Rated motor speed	0–9999 RPM	180 RPM	1 RPM

Set the parameters according to the motor nameplate. Ensure that these motor parameters are set correctly. Incorrect setting affects the motor auto-tuning and the vector control effect.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F1-06	Stator phase resistance of PMSM	0.00–99.99 Ω	Model dependent	0.01 Ω
F1-07	Rotor phase resistance of asynchronous motor	0.00–99.99 Ω	Model dependent	0.01 Ω
F1-08	Leakage inductance of asynchronous motor	0.0–99.99 mH	Model dependent	0.01 mH
F1-09	Mutual inductance of asynchronous motor	0–999.9 mH	Model dependent	0.1 mH
F1-10	Magnetizing current of asynchronous motor	0.001–9.900 A	Model dependent	0.001 A
F1-11	Shaft D inductance of PMSM	0.0–999.9 mH	Model dependent	0.1 mH
F1-12	Shaft Q inductance of PMSM	0.0–999.9 mH	Model dependent	0.1 mH
F1-13	Back EMF of PMSM	0–250	Model dependent	1
F1-14	Encoder zero position angle of PMSM	0.0–359.9°	Model dependent	0.1°
F1-15	Real-time angle of PMSM	0.0–359.9°	Model dependent	0.1°

Select a proper motor model according to the adaptable motor power. If there is a great difference between the actual motor power and the adaptable motor power, the system control performance will degrade.

F1-06 to F1-14 are updated automatically after motor auto-tuning is completed successfully.

For an asynchronous motor, the NICE900 obtains the corresponding parameters through complete auto-tuning or static auto-tuning. If the onsite conditions does not allow motor auto-tuning, manually input the value of these parameters by referring to data of the motor with the same nameplate parameters.

Each time F1-01(Rated motor power) is changed, the controller automatically resumes parameters F1-06 to F1-10 to the default values.

For a PMSM, the NICE900 can obtain F1-06 and F1-11 to F1-14 through complete auto-tuning. After F1-01 is changed, the related parameters will not update.

F1-15 is used to display the magnetic pole position of the motor in real time.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F1-16	Motor auto-tuning mode	0–4	0	1

Note

Motor auto-tuning can be performed only in the operation panel control mode (F0-02 = 0). Before motor auto-tuning, set motor ratings (F1-00 to F1-05) and PPR of the encoder (F2-14) correctly.

If a PMSM is used, motor auto-tuning is mandatory in one of the following conditions:

- Before first-time running
- When the motor/encoder is replaced
- When wiring of the encoder is changed

PMSM running is prohibited before motor auto-tuning succeeds, because it may result in runaway. If locked-rotor occurs, it indicates that motor auto-tuning fails.

The auto-tuning procedure is as follows:

1. After setting F1-16, press ENTER. Then "TUNE" is displayed and blinks.
2. Press the OPEN or CLOSE to start auto-tuning, and "TUNE" stops blinking. The auto-tuning process can be stopped by pressing STOP RES.
3. After the auto-tuning ends, the operation panel restores to the display at stop state. F1-16 resumes to 0 automatically.

The values of F1-16 are described as follows:

- 0: No auto-tuning
- 1: Static auto-tuning for asynchronous motor

  It applies to the applications where complete auto-tuning cannot be performed because the asynchronous motor must be connected with the load. The stator resistance, rotor resistance and leakage inductance are obtained from auto-tuning. The magnetizing current and mutual inductance can be calculated.
- 2: Complete auto-tuning for asynchronous motor

  Complete auto-tuning is preferred to ensure dynamic control performance of the controller. This mode requires the motor to be disconnected from the load.

  The controller performs static auto-tuning first. Then according to the default system setting, the controller accelerates to 80% of the rated motor frequency within 2s, keeps the frequency for a certain period and then decelerates to zero speed within 2s.
- 3: No-load auto-tuning for PMSM

  The following parameters are obtained by auto-tuning:

  - F1-14 (Encoder zero position angle of PMSM)
  - F1-06 (Stator phase resistance of PMSM)
  - F1-11 (Shaft D inductance of PMSM)

- F1-12 (Shaft Q inductance of PMSM)

  For no-load auto-tuning, the PMSM must be disconnected from the load. If not, F1-14 is not accurate, which affects motor control performance.

  During auto-tuning, the controller opens or closes the door slowly after receiving the door open/close command, and instructs reverse running after a distance. Then, the controller calculates all related parameters and completes no-load auto-tuning.

  If fault Er20 occurs during auto-tuning, the encoder input direction may be incorrect. Exchange phases A and B of the encoder or the motor wiring. and perform motor auto-tuning again.

• 4: With-load auto-tuning for PMSM

  The following parameters are obtained by auto-tuning:

- F1-14 (Encoder zero position angle of PMSM)
- F1-06 (Stator phase resistance of PMSM)
- F1-11 (Shaft D inductance of PMSM)
- F1-12 (Shaft Q inductance of PMSM)

  F1-14 obtained by this mode is less accurate than that by no-load auto-tuning. Therefore, perform no-load auto-tuning for PMSM if possible.

  If the door is in the close state, press OPEN to start auto-tuning. If the door is in the completely open state, press CLOSE to start auto-tuning. The controller opens or closes the door slowly at 25% of the rated motor frequency, repeats the action and instructs reverse running. After three times of auto-tuning, the controller calculates all related parameters and completes with-load auto-tuning.

  If locked-rotor occurs during door open or close after you press OPEN or CLOSE , motor wiring or encoder wiring is incorrect. Correct the wiring and perform motor auto-tuning again.

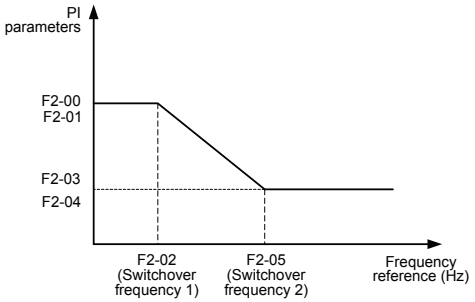
For more details on auto-tuning, refer to section 4.3.

Group F2: Performance Control Parameters

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F2-00	Speed loop proportional gain 1	0–100	15	1
F2-01	Speed loop integral time 1	0.01–10.00s	1.00s	0.01s
F2-02	Switchover frequency 1	0.00 to F2-05	5.00 Hz	0.01 Hz
F2-03	Speed loop proportional gain 2	0–100	15	1
F2-04	Speed loop integral time 2	0.01–10.00s	1.00s	0.01s
F2-05	Switchover frequency 2	F2-02 to F1-04	30	1

- F2-00 and F2-01 are PI regulation parameters when the running frequency is smaller than the value of F2-02 (Switchover frequency 1).
- F2-03 and F2-04 are PI regulation parameters when the running frequency is larger than the value of F2-05 (Switchover frequency 2).
- If the running frequency is between F2-02 and F2-05, the speed loop PI parameters are obtained from the weighted average value of the two groups of PI parameters (F2-00, F2-01 and F2-03, F2-04), as shown in the following figure.

Figure 6-1 Relationship between running frequencies and PI parameters



The speed dynamic response characteristics in vector control can be adjusted by setting the proportional gain and integral time of the speed regulator.

To achieve a faster system response, increase the proportional gain and reduce the integral time. Be aware that this may lead to system oscillation.

The recommended adjustment method is as follows:

If the default setting cannot meet the requirements, make proper adjustment. Increase the proportional gain first to ensure that the system does not oscillate, and then reduce the integral time to ensure that the system has quick response and small overshoot.

If both F2-02 (Switchover frequency 1) and F2-05 (Switchover frequency 2) are 0, only F2-03 and F2-04 are valid.

Note

Improper PI parameter setting may cause too large speed overshoot and even overvoltage when overshoot drops.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F2-06	Current loop proportional gain	10–500	120	1
F2-07	Current loop integral gain	10–500	50	1

F2-06 and F2-07 are current loop adjusting parameters in vector control. Generally, you need not adjust these two parameters because the required control performance can be achieved with their default values.

They are adjusted in the same way as PI parameters.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F2-08	Slip compensation coefficient	50%–200%	100%	1%

It is used only in CLVC mode. It affects the dynamic performance and load current of the motor and requires no adjustment generally.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F2-09	Inertia compensation	0–9999	0	1

It increases the system dynamic performance in CLVC mode.

Inertia compensation torque = System inertia x Acceleration rate. You need not modify it generally. Increase it properly when the door is too heavy.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F2-10	Torque boost	0.0%–30.0%	8.0%	0.1%

This parameter compensates for insufficient torque production by boosting output voltage of the controller. But very large setting will result in motor overheat and controller overcurrent.

Increase this parameter when a heavy load is applied but the startup torque of the motor is insufficient.

If it is set to 0.0%, fixed torque boost is enabled.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F2-11	Over-excitation gain	0–200	64	1

The over-excitation gain restrains rise of bus voltage to avoid overvoltage during deceleration. The larger the over-excitation gain is, the better the restraining result will be.

Set this parameter to 0 in the applications where the inertia is small or where there is regen. resistor.

Increase this parameter properly in the applications where the inertia is large.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F2-12	Initial position judging method	0–2	1	1

It is used to judge the magnetic pole initial position of the PMSM.

- 1: Based on pulses
- 2: Using data of other tested PMSM

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F2-13	Feedback speed filter level	0–20	0	1

It is used to set the filter level of the encoder feedback speed. You need not modify it generally.

In the applications where interference is serious or the encoder PPR is small but CLVC is adopted, increase this parameter properly to stabilize motor running.

Note

In the applications where the motor is of small power or the load inertia is small, a large value of this parameter may result in serious motor overshoot or oscillation.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F2-14	Encoder PPR	1–9999	2048	1

This parameter must be set correctly in the CLVC mode.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F2-15	Encoder direction selection	0: Forward direction 1: Reverse direction	1	1

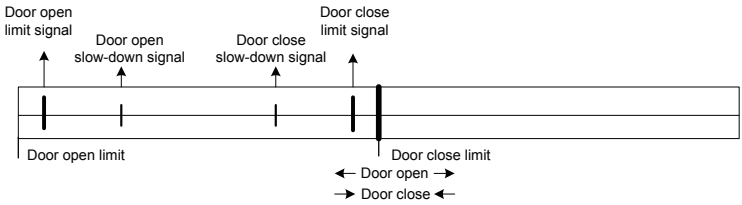
Be cautious that it will resume to 0 when the default settings are restored.

Group F3: Door Open Running Curve Parameters

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F3-00	Door open startup low speed	0.00 Hz to F3-03	5.00 Hz	0.01 Hz
F3-01	Door open startup acceleration time	0.1–999.9s	1.0s	0.1s
F3-02	Low speed running time for door open startup in speed control	0.1–999.9s	1.0s	0.1s
F3-03	Door open normal speed	0.00 Hz to F1-04	15.00 Hz	0.01 Hz
F3-04	Door open acceleration time	0.1–999.9s	2.0s	0.1s
F3-05	Door open ending low speed	0.00Hz to F3-03	3.00Hz	0.01 Hz
F3-06	Door open deceleration time	0.1–999.9s	1.5s	0.1s

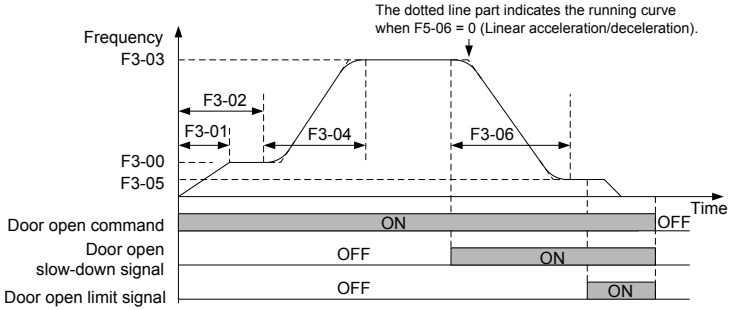
The travel switches of the door machine in the speed control mode are installed according to the following figure.

Figure 6-2 Installation of travel switches in speed control mode



Set the parameters in group F3 related to speed control correctly. Set the deceleration switches and limit switches properly. The door open running curve in speed control is shown in the following figure.

Figure 6-3 Door open running curve in speed control mode

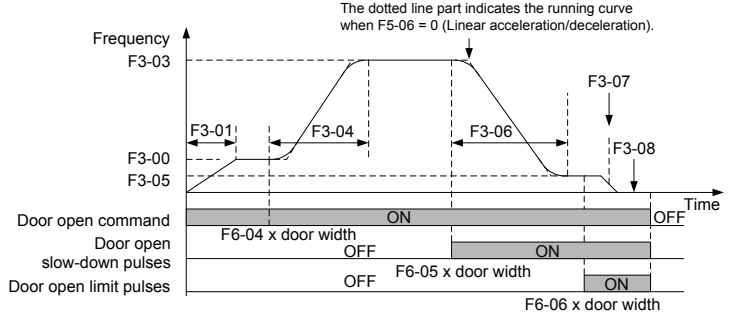


The door open process in speed control is as follows:

1. When the door open command becomes active, the door machine accelerates to the speed set in F3-00 within the acceleration time set in F3-01.
2. After the low speed door open running time reaches the value set in F3-02, the door machine accelerates to the speed set in F3-03 within the acceleration time set in F3-04.
3. After the door open slow-down signal becomes active, the door machine decelerates to the creeping speed set in F3-05 within the deceleration time set in F3-06.
4. After the door open limit signal becomes active, the door machine enters door open holding state, with the holding torque set in F3-08.
5. If the torque is required to keep up, increase F5-04.
6. The dotted line part in the figure indicates the running curve when F5-06 (Door open curve) = 0 (Linear acceleration/deceleration).

Set the parameters in group F6 related to distance control correctly. The door open running curve in distance control is shown in the following figure.

Figure 6-4 Door open running curve in distance control mode



The door open process in distance control is as follows:

1. After the door open command becomes active, the door machine accelerates to the speed set in F3-00 within the acceleration time set in F3-01.

2. When the door open position reaches (F6-04 x door width), the door machine accelerates to the speed set in F3-03 within the acceleration time set in F3-04.
3. When the door open position reaches (F6-05 x door width), the door machine decelerates to creep, with the speed =set in F3-05 and deceleration time set in F3-06.
4. When the door open position reaches (F6-06 x door width), the door machine continues low speed creeping, and then enters the door open holding state, with the holding torque set in F3-08. The door position is reset to 100%.
5. After the command is cancelled, the torque holding state ends. If torque holding needs to continue, increase the delay time set in F5-04.
6. The dotted line part in the figure indicates the running curve when F5-06 (Door open curve) = 0 (Linear acceleration/deceleration).

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F3-07	Torque switchover threshold at door open limit	0.0%–150.0%	50.0%	0.1%

It is valid only in distance control. After the door reaches the set door open limit position, if the output torque is greater than F3-07, the door controller resets the width pulses to 100% and enters the door open limit torque holding state.

If the output torque is not greater than F3-07 after locked-rotor occurs, decrease F3-07 slightly to smaller than the output torque), ensuring that the door width pulses can be reset.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F3-08	Door open limit holding torque	0.0%–150.0%	50.0%	0.1%

It is used to set the holding torque after the door open limit position is reached.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F3-09	Door open hindered torque	0.0%–150.0%	80.0%	0.1%

It is used to set the door open hindered torque during door open.

Upper limit of door open torque = F3-09 + 10.0%

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F3-10	Door open startup torque	0.0% to F3-09	0.0%	0.1%

It is used to set the torque at startup of door open to ensure the good startup result of the door machine.

Actual startup torque = F3-10 x Rated motor torque

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F3-11	Door open hindered judging time	0–9999 ms	0 ms	1 ms

It is used to set the filter time when the door open is hindered. If it is set to 0, door open hindered is not detected.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F3-12	Door open limit low speed	0.00 Hz to F3-03	3 Hz	0.01 Hz

It is used to set the target frequency at which the door machine runs when the door open limit signal is received or the pulses reach the door open limit requirement during open.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F3-13	Door re-open speed	0.00 Hz to F3-03	0 Hz	0.01 Hz

At door close hindered during door open deceleration or door open due to light curtain hindered, the door machine re-opens the door at the speed set in this parameter. After door open limit, the controller decelerates to the speed set in F3-12.

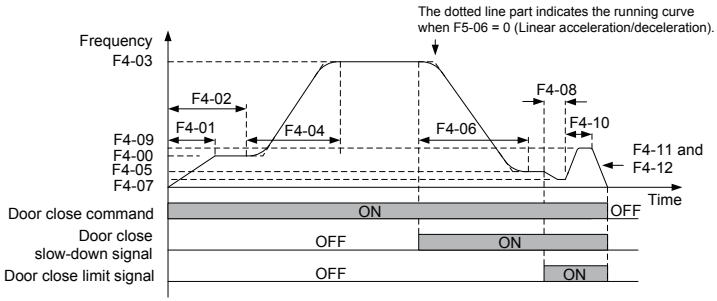
If this parameter is set to 0, this function is invalid.

Group F4: Door Close Running Curve Parameters

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F4-00	Door close startup low speed	0.00 Hz to F4-03	4.00 Hz	0.01 Hz
F4-01	Door close startup acceleration time	0.1–999.9s	1.0s	0.1s
F4-02	Low speed running time for door close startup in speed control	0.1–999.9s	1.0s	0.1s
F4-03	Door close normal speed	0.00 Hz to F1-04	12.00 Hz	0.01 Hz
F4-04	Door close acceleration time	0.1–999.9s	2.0s	0.1s
F4-05	Door close ending low speed	0.00 Hz to F4-03	2.00 Hz	0.01 Hz
F4-06	Door close deceleration time	0.1–999.9s	1.5s	0.1s

Set the parameters in group F4 related to speed control correctly, and define the slow-down switches and limit switches properly. The door close running curve in speed control is shown in the following figure.

Figure 6-5 Door close running curve in speed control mode



The door close process in speed control is as follows:

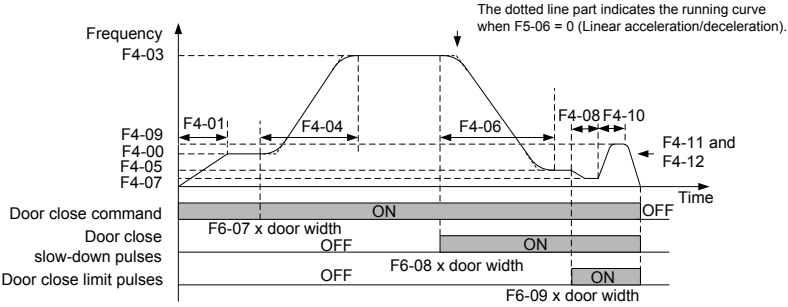
1. After the door close command becomes active, the door machine accelerates to the speed set in F4-00 within the acceleration time set in F4-01.
2. After the low speed door close running time reaches the value set in F4-02, the door machine accelerates to the speed set in F4-03 within the acceleration time set in F4-04.
3. After the door close slow-down signal becomes active, the door machine decelerates to the speed set in F4-05 within the deceleration time set in is F4-06.
4. After the door close limit signal becomes active, the door machine enters the door close holding state, with the holding torque set in F4-12.
5. If torque is required to keep up, increase F5-05.
6. The dotted line part in the figure indicates the door close running curve when F5-06 (Door open curve) = 0 (Linear acceleration/deceleration)..

Note

For synchronous door vane, set F4-09 and F4-07 to the same value.

Set the parameters in group F6 related to distance control correctly. The door close running curve in distance control is shown in the following figure

Figure 6-6 Door close running curve in distance control mode



The door close process in distance control is as follows:

1. After the door close command becomes active, the door machine accelerates to the speed set in F4-00 within the acceleration time set in F4-01.
2. When the door close position reaches (F6-07 x door width), the door machine accelerates to the value set in F4-03 within the acceleration time set in F4-04.
3. When the door close position reaches (F6-08 x door width), the door machine decelerates to the speed set in F4-05 within the deceleration time set in F4-06.
4. When the door open position reaches (F6-09 x door width), the door machine decelerates again to the speed set in F4-07. It is recommended that F6-09 ≥ 96.0%. If pulse loss occurs during door close, decrease F6-09. Set F6-20 to specify the door vane retraction action.

5. After door vane retraction is completed and the rotor is locked, the door machine enters the torque holding state at the speed set in F4-07 and holding torque set in F4-12. The door width is reset to 0.
6. After the door close command becomes inactive, the torque holding state ends. If torque holding needs to continue, decrease the delay time in F5-05.
7. The dotted line part in the figure indicates the door close running curve when F5-06 (Door open curve) = 0 (Linear acceleration/deceleration).

Note

For synchronous door vane, set F4-09 and F4-07 to the same value.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F4-07	Door close limit low speed	0.0 to F4-03	1.00 Hz	0.01 Hz

It is used to set the target frequency at which the door machine runs when the controller receives the door close limit signal or the pulses reach the door close limit requirement during door close.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F4-08	Low speed running time at door close limit	0-9999 ms	300 ms	1 ms

The door machine runs at the low speed set in F4-07 after receiving the door close limit signal. When the running time is equal to or larger than F4-08, the door machine enters the door vane retraction stage.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F4-09	Door vane retraction speed	0.00 to F4-03	2.00 Hz	0.01 Hz

It is used to set the running speed at the door vane retraction stage during door close.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F4-10	Door vane retraction running time	0-9999 ms	500 ms	1 ms

If the door vane retraction running time is equal to or larger than F4-10, the door machine decelerates again.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F4-11	Torque switchover threshold at door close limit	0.0%–150.0%	50.0%	0.1%

It is valid only in distance control. After the door vane is retracted, if the controller output torque is greater than F4-11, the controller resets the door width to 0 and enters the door close limit torque holding state.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F4-12	Door close limit holding torque	0.0%–150.0%	30.0%	0.1%

It is used to set the door close holding torque after the door close limit is reached.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F4-14	Working mode upon door close hindered	0–3	1	1

- 0: Reserved
- 1: Output door close hindered signal

  After door close hindered occurs, the relay with this function outputs a corresponding signal.
- 2: Immediate stop

  The controller stops immediately and outputs the door close hindered signal. It does not respond to any door close command 10s after this fault occurs. It executes the door close command again immediately after a door close command is given again or the RUN command is cancelled.
- 3: Door re-open

  The controller does not respond to the external door open/close commands during the door re-open.

Door close hindered means that the output torque is greater than the door close hindered torque during door close.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F4-15	Door close hindered judging time	0–9999 ms	500 ms	1 ms

It is used to set the filter time when door close is hindered. If it is set to 0, door close hindered is not detected.

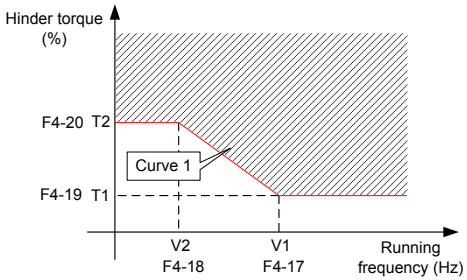
Function Code	Parameter Name	Setting Range	Default	Min. Unit
F4-16	Door close normal speed at fire emergency	5.00 to F1-04	10.00Hz	0.01Hz

It is used to set the normal-speed running speed at door close when the fire emergency input signal is active.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F4-17	Normal speed at door close hindered	F4-18 to F1-04	12.00 Hz	0.01 Hz
F4-18	Low speed at door close hindered	0.00 Hz to F1-04	2.00 Hz	0.01 Hz
F4-19	Normal speed torque	0.00%–150.0%	100.0%	0.1%
F4-20	Low speed torque	0.00%–150.0%	100.0%	0.1%

These four parameters are used to judge how to handle door close hindered.

Figure 6-7 Door close hindered judgment



1. According to the preceding figure, set these parameters according to the requirement:

V1 (F4-17) ≥ V2 (F4-18), T1 (F4-19) ≤ T2 (F4-20)

2. The torque threshold for judging door close hindered is curve 1 shown in the figure. The shadow part shows that door close hindered occurs.

Group F5: Door Open/Close Auxiliary Parameters

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F5-00	Abnormality deceleration time	0.1–5.0s	0.3s	0.1s

It is used to set the time for the system to decelerate from the door close speed to zero speed when door close is hindered. Set this parameter to the minimum value as possible when ensuring that overcurrent does not occur during deceleration.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F5-01	Door open time limit	0–999.9s	30.0s	1s

It is used to limit the door open time. If the controller does not receive the door open limit signal (pulse loss occurs in distance control mode) within the time, it performs door open timeout protection (Er28).

This parameter is invalid when it is set to 0.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F5-02	Door close time limit	0–999.9s	0s	1s

It is used to limit the door close time. If the controller does not receive the door close limit signal within the time, it determines that door close is hindered, and performs door re-open or zero speed holding based on the setting of F4-14.

This parameter is invalid when it is set to 0.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F5-03	Low speed running time limit	0–999.9s	0s	1s

It is used to set the maximum running time of low speed door open and close when the low speed running signal is enabled. Set this parameter based on the actual situation. The value must be equal to or greater than the sum of the door open and door close time setting (parameter group of door open and close running curve); otherwise, Er26 is reported, indicating that the parameter setting is incorrect. The correct setting implements protection of the door machine in low speed running state in the case of abnormalities.

The normal running time does not exceed the setting of this parameter. When the door open limit switch and door close limit switch fail, and an abnormality occurs (for example, the controller cannot determine whether door open/close reaches the limit switch), the running time exceeds the setting. In this case, Er30 is reported, indicating a door open/close operation error in low speed running.

This parameter is invalid when it is set to 0.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F5-04	Delay of external door open command	0–999.9s	60.0s	1s

It is used to set the torque holding time upon door open limit, that is, the holding time of the door open running state when the door open limit signal is active but the door open command from the terminal becomes inactive.

If the actual holding time exceeds the value of this parameter, the controller stops. If the door open command is cancelled when door open limit is not reached, the controller stops immediately. At this moment, the delay function is invalid.

When it is set to 9999s, the delay of external door open command remains valid.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F5-05	Delay of external door close command	0–999.9s	60.0s	1s

It is used to set the torque holding time upon door close limit, that is, the holding time of the door close running state when the door close limit signal is active but the door close command from the terminal becomes inactive.

If the actual holding time exceeds the value of this parameter, the controller stops. If the door close command is cancelled when door close limit is not reached, the controller stops immediately. At this moment, the delay function is invalid.

When it is set to 9999s, the delay of external door close command remains valid.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F5-06	Door open curve	0, 1	1	1

It is used to set the running curve of the door machine during door open.

- 0: Linear acceleration/deceleration
- 1: S curve acceleration/deceleration

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F5-11	Door close curve selection	0, 1	1	1

It is used to set the running curve of the door machine during door close.

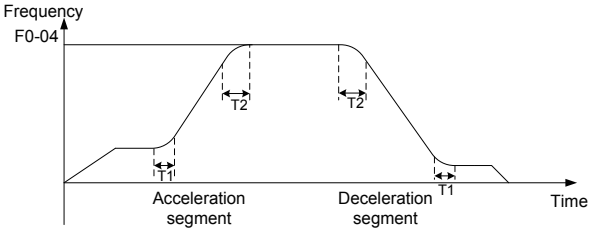
- 0: Linear acceleration/deceleration
- 1: S curve acceleration/deceleration

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F5-07	Start segment time of door open acceleration S curve	10.0%–50.0% (acceleration/ deceleration time, start segment + rising segment ≤ 90%)	20.0%	0.1%
F5-08	Rising segment time of door open acceleration S curve	10.0%–80.0% (acceleration/ deceleration time, start segment + rising segment ≤ 90%)	60.0%	0.1%
F5-09	Start segment time of door open deceleration S curve	10.0%–50.0% (acceleration/ deceleration time, start segment + falling segment ≤ 90%)	20.0%	0.1%
F5-10	Falling segment time of door open deceleration S curve	10.0%–80.0% (acceleration/ deceleration time, start segment + falling segment ≤ 90%)	60.0%	0.1%
F5-12	Start segment time of door close acceleration S curve	10.0%–50.0% (acceleration/ deceleration time, start segment + rising segment ≤ 90%)	20.0%	0.1%
F5-13	Rising segment time of door close acceleration S curve	10.0%–80.0% (acceleration/ deceleration time, start segment + rising segment ≤ 90%)	60.0%	0.1%
F5-14	Start segment time of door close deceleration S curve	10.0%–50.0% (acceleration/ deceleration time, start segment + falling segment ≤ 90%)	20.0%	0.1%
F5-15	Falling segment time of door close deceleration S curve	10.0%–80.0% (acceleration/ deceleration time, start segment + falling segment ≤ 90%)	60.0%	0.1%

These eight parameters are used to define the S curve features of each segment speed during running of the controller.

Each curve that combines the acceleration segment and deceleration segment is symmetric. Take acceleration of S curve 1 in the following figure as an example.

Figure 6-8 S curve acceleration/deceleration diagram



T1 stands for F5-07, during which the output frequency change slope (that is, speed change rate) increases gradually. T2 is stands for F5-08, during which the output frequency change slope reduces gradually to low speed frequency. Between T1 and T2, the output frequency change slope keeps unchanged.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F5-16	Speed deviation threshold	0%–80%	50%	0%
F5-17	Time for determining speed deviation too large	0–5000 ms	400 ms	1 ms

The speed deviation detection function of the NICE900 is effective only in the CLVC mode. The controller determines whether the deviation between the running frequency and the frequency reference is too large based on the value of F5-16. If the deviation remains too large for more than the time set in F5-17, the controller reports Er32 and performs protection for too large speed deviation.

When F5-16 is set to 0, the controller does not detect speed deviation.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F5-18	Door close steady speed delay	0–9999 ms	200 ms	1 ms

It is used to set the steady speed delay at door close. The controller determines whether door close is hindered only after the steady speed delay in F5-18.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F5-19	Fault braking current	0.1%–150.0%	100%	0.1%

After detecting overspeed, reversal or encoder signal abnormality, the controller performs braking with the current set in this parameter and reports the fault after completion of braking.

If this parameter is set to 0, this function is invalid.

Group F6: Distance Control Parameters

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F6-00	Door width auto-tuning function	0, 1	0	1

It is used to enabled or disable the door width auto-tuning function.

- 0: Disabled
- 1: Enabled

F6-00 = 1 in the prerequisite of F0-02 = 2.

After you press OPEN or CLOSE, door width auto-tuning is started. The door machine runs with the close-open-close logic, and stores the door width upon door open limit and locked-rotor. For details on the operation, see Chapter 4.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F6-01	Door width auto-tuning speed	0 to F0-04 (Running frequency under operation panel control)	3.00 Hz	0.01 Hz

It is used to set the running frequency during door width auto-tuning.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F6-02	Low bits of door width pulse	0–9999	0	1
F6-03	High bits of door width pulse	0–9999	0	1

The door width is calculated using the formula:

Door width = F6-03 x 10000 + F6-02

The obtained door width pulses can be modified on the operation panel.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F6-04	Low speed running distance of door open startup in distance control	0.0%–30.0%	10.0%	0.1%

It records the number of pulses in real time during door open in distance control. When the number of pulses is equal to or greater than the value (door width x F6-04), the door machine switches over from door open startup low speed (F3-00) to door open normal speed (F3-03).

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F6-05	Door open slow-down point in distance control	60.0%–90.0%	70.0%	0.1%

It records the number of pulses in real time during door open in distance control. When the number of pulses is equal to or greater than the value (door width x F6-05), the door machine switches over from door open startup normal speed (F3-03) to door open ending low speed (F3-05).

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F6-06	Door open limit point in distance control	80.0%–99.0%	96.0%	0.1%

It records the number of pulses in real time during door open in distance control. When the number of pulses is equal to or greater than the value (door width x F6-06), the door machine performs related processing of door open limit.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F6-07	Low speed running distance of door close startup in distance control	0.0%–30.0%	10.0%	0.1%

It records the number of pulses in real time during door close in distance control. When the number of pulses is equal to or less than value (door width x (100% – F6-07)), the door machine switches over from door open startup low speed (F3-00) to door open normal speed (F3-03).

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F6-08	Door close slow-down point in distance control	60.0%–90.0%	70.0%	0.1%

It records the number of pulses in real time during door close in distance control. When the number of pulses is equal to or less than the value (door width x (100% – F6-08)), the door machine switches over from door close startup low speed (F4-03) to door close ending low speed (F4-05).

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F6-09	Door close limit point in distance control	80.0%–99.0%	96.0%	0.1%

It records the number of pulses in real time during door close in distance control. When the number of pulses is equal to or less than the value (door width x (100% – F6-09)), the door machine performs related processing of door close limit.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F6-10	Output torque display	0.0%–180.0%	0.0%	0.1%

It facilitates the torque setting for door width auto-tuning or initial running (F6-14) at door width auto-tuning for asynchronous motor. After the door width auto-tuning is complete and the rotor is locked, ensure that F6-14 is slightly smaller than F6-10.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F6-11	Low bits of the door open limit switch position	0–9999	0	1
F6-12	High bits of the door open limit switch position	0–9999	0	1
F6-13	Position of the door close limit switch	0–9999	0	1

The three parameters are used to record the positions of the limit switches obtained during door width auto-tuning. During normal running, when the door open limit switch is valid, the door position is restored to: F6-12 x 10000 + F6-11. When the door close limit switch is valid, the door position is restored to the setting of F6-13.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F6-14	Torque setting for door width auto-tuning or initial running	0.0%–150.0%	80.0%	0.1%

It is used to set the torque upper limit during door width auto-tuning and first power-on running. This parameter is valid only in distance control. For details, see Chapter 4.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F6-15	Low bits of the pulse of door open slow-down point	0–9999	0	1
F6-16	High bits of the pulse of door open slow-down point	0–9999	0	1
F6-17	Low bits of the pulse of door close slow-down point	0–9999	0	1
F6-18	High bits of the pulse of door close slow-down point	0–9999	0	1

The four parameters are used to set the positions of the slow-down points.

The slow-down point is set based on the number of pulses rather than a percentage of the door width.

Position of the door open slow-down point = F6-16 x 10000 + F6-15

Position of the door close slow-down point = F6-18 x 10000 + F6-17

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F6-19	Pulse at door open limit output	0.0%–99.9%	0.0%	0.1%

It is valid only in distance control.

When the door width position is larger than F6-19, the door open limit signal is output. At this moment, even if the output torque is larger than F3-07, the door position is not restored to 100%. The door position is restored to 100% only when the door position is larger than F6-06 and the output torque is larger than F3-07.

When F6-19 is set to 0, the controller determines whether to output the door open limit signal based on the value of F6-06.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F6-20	Pulse at door close limit output	0.0%–99.9%	0.0%	0.1%

It is valid only in distance control.

When the door position is larger than F6-20, the door close limit signal is output, and the door vane is retracted. At this moment, even if the output torque is larger than F4-11, the door position is not restored to 100%. The door position is restored to 100% only when the door position is larger than F6-09 and the output torque is larger than F4-11.

When F6-20 is set to 0, the controller determines whether to output the door close limit signal based on the value of F6-09.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F6-21	Door position pulse feedback	0.0%–99.9%	33.0%	0.1%

It is valid only in distance control. When the door width position is larger than F6-21, the door

position feedback signal is output. It is used together with F9-12 (Door position feedback signal output).

Group F7: Demonstration Function Parameters

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F7-00	Door open limit holding time in demonstration mode	1.0–999.9s	2.0s	0.1s

It is used to set the time from torque holding upon door open limit to reverse door close in demonstration mode. Set this parameter based on actual demonstration requirements.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F7-01	Door close limit holding time in demonstration mode	1.0–999.9s	2.0s	0.1s

It is used to set the time from torque holding upon door close limit to forward door open in demonstration mode. Set this parameter based on actual demonstration requirements.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F7-02	Actual door open and close times in demonstration mode	0–9999	0	1

It is used to record the times of door open and close for demonstration. The parameter value is stored automatically at power failure. Upon door open/close limit after power-on again, the value is calculated by adding 1 for each door open/close to the original value.

The demonstration mode is an automatically cyclic running process, described as follows:

1. After you press OPEN or CLOSE, demonstration running is started.
2. The door machine closes the door at a low speed, and opens the door based on the running curve upon door close limit.
3. The door machine starts timing upon door open limit, and automatically performs reverse door close after the time reaches the value set in F7-00.
4. The door machine starts timing upon door close limit, and performs reverse door open after the time reaches the value set in F7-01.
5. This process is repeated until you press STOP RES to stop the controller. Then the demonstration process ends.

Demonstration running can be performed in speed control or distance control mode. It applies to demonstration and aging test.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F7-03	Limit of door open and close times in demonstration mode	0–9999	0	1

It is used to set the limit of door open and close times in demonstration mode. When the actual door open and close times in demonstration mode is equal to or greater than F7-03, demonstration running ends automatically. When F7-03 is set to 0, this function is invalid, and demonstration running does not end automatically.

Group F8: Auxiliary Parameters

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F8-00	Software version	0.00–99.99	1.00	0.01

It is used to indicate the current software version of the controller.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F8-01	Module temperature	0–100°C	0°C	1°C

It is used to record the temperature of the bottom-level module in the controller.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F8-02	Fault auto reset times	0–100	0	1

The controller stops running after a fault occurs, and automatically resets and continues running after an interval of 2s.

If this parameter is set to 0, the automatic reset function is disabled, and faults must be reset manually. If no fault occurs or manual reset is performed within an hour, the controller automatically clears the reset times.

Note

The controller does not automatically reset faults Er19 (Motor auto-tuning fault), Er26 (Prompt of incorrect parameter setting), and Er27 (Door width auto-tuning fault).

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F8-03	Brake use ratio	0–100%	100%	1%

It is valid for the controller with a built-in braking unit and used to adjust the braking effect of the brake unit.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F8-04	Accumulative power-on time	0–9999 h	0	1

It is used to record the actual accumulative power-on operation time (hour) of the controller. After the value exceeds the maximum value 9999 hours, the controller starts a new round of counting.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F8-06	Accumulative running time	0–9999 h	0	1

It is used to record the accumulative running time (hour). After the value exceeds the maximum

value 9999 hours, the controller starts a new round of counting.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F8-10	Auxiliary function selection	0–9999	12	1

It is used to select the required function.

Bit	Function	Default
Bit0	1: Trigger door open/close command 0: Non-trigger door open/close command	0
Bit1	1: Not reset pulses upon reaching the initial running torque 0: Reset pulses upon reaching the initial running torque	0
Bit2	1: Learn positions of limit switches during door width auto-tuning. Reset the pulse signal when limit switches are valid 0: Not learn positions of limit switches	1
Bit3	In the SVC mode (F0-00 = 0) with distance control (F0-01= 1): 1: Judge door open/close limit during door width auto-tuning and initial running, and door close hindered based on the torque 0: Judge door width auto-tuning, initial running, door open/close limit and door close hindered if there is no pulse signal within a certain time (2s)	1
Bit4	Door processing when both door open and close commands are active: 1: Door close preferred 0: Door open preferred	0
Bit5	In door machine terminal control mode (F0-02 =1): 1: The controller runs properly when you press STOP/RES during running. 0: The controller suspends and displays "STP" when you press STOP/RES during running, and restores normal running when you press STOP/RES again.	0
Bit6	Hinder detection mode: 1: Detect hindered torque based on F4-13 0: Detect hindering separately for normal speed running and low speed running	0
Bit7	Demonstration running: 1: Start demonstration running automatically upon power-on 0: Start demonstration running manually upon power-on	0
Bit8	Current cancelling: 0: Cancel current when the command is cancelled 1: Stop immediately when the command is cancelled	0
Bit9	0: Enter standby state when the command is cancelled 1: Stop when the command is cancelled	0
Bit10	Used together with Bit4 0: Keep present door processing (open or close) state when both door open and close commands are active 1: Act according to the setting of F8-10 Bit4	

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F8-12	Drive function selection	0–9999	0	1

Bit0 = 0: Overall 7-segment modulation (reduce the noise)

Bit0 = 1: 7-segment/5-segment automatic switchover during running

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F8-14	Overload coefficient	0–10.00	2.00	0.01

If the output current exceeds the value (rated motor current x F8-14), the controller reports fault Er11, indicating motor overload.

Group F9: Input and Output Function Parameters

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F9-00	Terminal filter time	0–100 ms	20 ms	1 ms

It is used to set the terminal sensitivity. If DI terminals are liable to interference and may cause malfunction, increase the value of this parameter to enhance the anti-interference capability. However, increase of DI filter time will reduce response of DI terminals.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F9-01	DI1 function selection	0–127	0	-
F9-02	DI2 function selection		0	-
F9-03	DI3 function selection		0	-
F9-04	DI4 function selection		0	···
F9-05	DI5 function selection		1	
F9-06	DI6 function selection		2	
F9-07	DI7 function selection		10	
F9-08	DI8 function selection		6	-

These parameters are used to set the functions of DI terminals DI1 to DI8. Note that the same signal (except the value "0") must not be repeatedly allocated to different DIs.

- 0: Invalid
- 1: Door open command
- 2: Door close command
- 3: External reset signal

  It is allocated to the external fault reset terminal.
- 4: Forbid terminal input during door open

  When this signal is active, the controller does not respond to external door open commands.

- 5: Forbid terminal input during torque holding

  During torque holding upon door open/close limit, zero torque holding is performed if this signal is active.

- 6: Low speed door close command

  When this signal is active, the door closes at a low speed frequency (F0-06).

- 7: Fire emergency input

  When this signal is active, the door closes in the fire emergency normal speed (F4-16).

- 8 to 109: Reserved

- 10/110: Light curtain signal NO/NC

  If this signal is active during door close, the system outputs the door close hindered signal and performs processing according to the setting of F4-14.

- 11/111: Safety edge signal NO/NC

  If this signal is active during door close, the system outputs the door close hindered signal and performs processing according to the setting of F4-14.

- 12/112: Door open limit signal NO/NC

  When this signal is active, the controller performs door open limit processing.

- 13/113: Door close limit signal NO/NC

  When this signal is active, the controller performs door close limit processing.

- 14/114: Door open slow-down signal NO/NC

  During door open in speed control, the system switches to low speed running of the end segment after this signal becomes active.

- 15/115: Door close slow-down signal NO/NC

  During door close in speed control, the system switches to low speed running of the end segment after this signal becomes active.

- 16/116: Door lock signal NO/NC

  The controller receives information related to door lock.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
F9-09	Relay output selection (TA1/TB1/TC1)	0–12	2	1
F9-10	Relay output selection (TA2/TB2/TC2)	0–12	5	1
F9-11	Relay output selection (TA3/TB3/TC3)	0–12	1	1

- 0: Invalid

- 1: Door open limit signal output 0

  During door open, the controller outputs this signal after the controller receives the door open limit signal or the counting pulses reach the value for door open limit.

- 2: Door close limit signal output 0

During door close, the controller outputs this signal after the controller receives the door close limit signal or the counting pulses reach the value for door close limit.

- 3: Door open limit signal output 1

  During door open, the controller outputs this signal after the controller receives the door open limit signal or the counting pulses reach the value for door open limit, and the hindered torque reaches the value set in F3-07.

- 4: Door close limit signal output 1

  During door close, the controller outputs this signal after the controller receives the door close limit signal or the counting pulses reach the value for door close limit, and the ratio of the hindered torque to the rated torque reaches the value set in F4-11.

- 5: Fault signal output 1

  Er26 is only a prompt rather than a fault.

- 6: Reserved

- 7: Door open limit signal output 2

  During door open, the controller outputs this signal after the controller receives the door open limit signal or the counting pulses reach the value for door open limit, the door lock signal becomes inactive, and the ratio of the hindered torque to the rated torque reaches the value set in F3-07.

- 8: Door close limit signal output 2

  During door close, the controller outputs this signal after the controller receives the door close limit signal or the counting pulses reach the value at door close limit, the door lock signal becomes inactive, and the ratio of the hindered torque to the rated torque reaches the value set in F4-11.

- 9: Door lock signal output

  It is simultaneous with the door lock signal input.

- 10: Door re-open signal output

  This signal is output during door re-open.

- 11: Hindering signal output

  This signal is output when door close is hindered.

- 12: Door position feedback output

  When the door width position is greater than F6-21, the door position feedback signal is output.

Group FA: Display and Fault Parameters

Function Code	Parameter Name	Setting Range	Default	Min. Unit
FA-00	Display in running state	1–511	319	1

It is used to set the parameters displayed on the operation panel when the door machine is in

the running state.

FA-00 includes 9 binary bits, each defining a parameter. A total of 9 parameters can be can be displayed during running.

The 9 binary bits correspond to the running parameters listed in the following table.

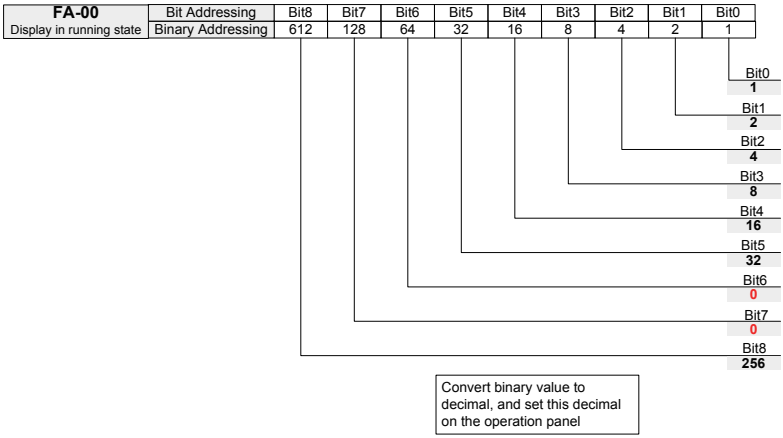
Bit	Parameter Name	Default
Bit0	Frequency reference	1
Bit1	Running frequency	1
Bit2	Bus voltage	1
Bit3	Output voltage	1
Bit4	Output current	1
Bit5	Output torque	1
Bit6	Input terminal state	0
Bit7	Output terminal state	0
Bit8	Door position pulse	1

The method of setting FA-00 is as follows:

If a bit is set to 1, the parameter indicated by this bit is displayed; if this bit is set to 0, the parameter is not displayed.

Convert the sum of binary values of all 9 bits to decimal, and then set the decimal on the operation panel.

Figure 6-9 Converting binary value of FA-00 to decimal



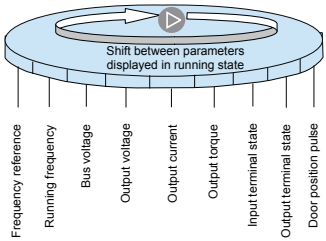
By default, all 16 parameters are displayed; therefore, the value set on the operation panel is:

1 + 2 + 4 +8+16+32+0+0+256 = 319

The method of viewing FA-00 is as follows:

In the running state, the display of FA-00 is a decimal value. You can press to view the parameter indicated by each bit circularly.

Figure 6-10 Shift between parameters displayed in the running state



Function Code	Parameter Name	Setting Range	Default	Min. Unit
FA-01	Display in stop state	1–63	39	1

It is used to set the parameters displayed on the operation panel when the door machine is in the running state.

FA-00 includes 6 binary bits, each defining a parameter. A total of 6 parameters can be can be displayed during running.

The 6 binary bits correspond to the running parameters listed in the following table.

Bit	Parameter Name	Default
Bit0	Frequency reference for door open	1
Bit1	Frequency reference for door close	1
Bit2	Bus voltage	1
Bit3	Input terminal state	0
Bit4	Output terminal state	0
Bit5	Door position pulse	1

The method of viewing and setting FA-01 is the same as that of FA-00.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
FA-02	1st fault type	0–30	0	1
FA-03	1st fault prompt	0–9	0	1
FA-04	2nd fault type	0–30	0	1
FA-05	2nd fault prompt	0–9	0	1
FA-06	3rd fault type	0–30	0	1
FA-07	3rd fault prompt	0–9	0	1
FA-08	4th fault type	0–30	0	1
FA-09	4th fault prompt	0–9	0	1
FA-10	5th fault type	0–30	0	1

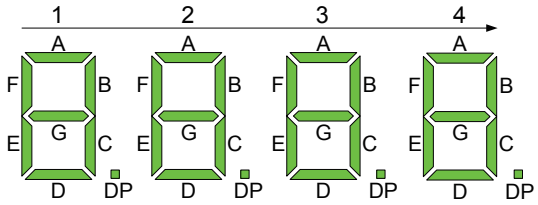
Function Code	Parameter Name	Setting Range	Default	Min. Unit
FA-11	5th fault prompt	0–9	0	1
FA-12	Bus voltage upon latest fault	0–999.9 V	0 V	0.1 V
FA-13	Output current upon latest fault	0–99.00 A	0.00 A	0.01 A
FA-14	Running frequency upon latest fault	0–99.00 Hz	0.00 Hz	0.01 Hz
FA-15	Output torque upon latest fault	0.0–180.0% (percentage of output torque to rated torque)	0.0%	0.1%
FA-16	Input terminal status upon latest fault	0–1023	0	1
FA-17	Output terminal status upon latest fault	0–15	0	1

These parameters record the latest five faults and detailed information about the latest fault. For details, see Chapter 4.

Note that Er26 is only a message prompting that the parameter setting is incorrect, and is not stored in the fault record.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
FA-18	Terminal state display	*	*	*

It is used to view the states of the corresponding input and output terminals. When the terminal is input active or output active, the corresponding LED segment is ON. The LEDs are arranged as 1, 2, 3, and 4 from left to right.

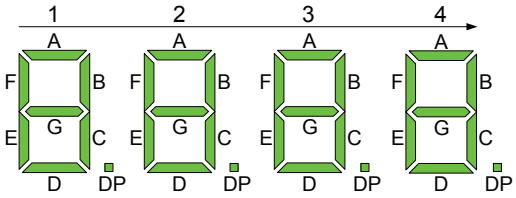


The meaning of each segment is defined in the following table.

Segment (LED1)	Meaning of ON	LED2	LED3	Segment (LED4)	Meaning of ON
A	DI1 input active	Door open running procedure (for viewing and commissioning)	Door close running procedure (for viewing and commissioning)	A	TA1 and TC1 ON
B	DI2 input active			B	TA2 and TC2 ON
C	DI3 input active			C	TA3 and TC3 ON
D	DI4 input active			D	Reserved
E	DI5 input active			E	
F	DI6 input active			F	
G	DI7 input active			G	
DP	DI8 input active			DP	Blink, indicating normal RS485 communication

Function Code	Parameter Name	Setting Range	Default	Min. Unit
FA-19	Input signal display	*	*	*

It is used to view the input signal state. When an input signal is active, the corresponding LED is ON. The LEDs are arranged as 1, 2, 3, and 4 from left to right.

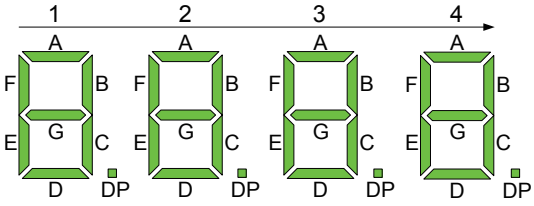


The meaning of each segment is defined in the following table.

Segment (LED1)	Meaning of ON	Segment (LED2)	Meaning of ON	Segment (LED3 & LED4)	Meaning of ON
A	Door open command active	A	Reserved	Reserved	Reserved
B	Door close command active	B	Light curtain signal active		
C	External reset signal active	C	Safety edge signal active		
D	Forbid terminal input during door open active	D	Door open limit signal active		
E	Forbid terminal input during torque holding active	E	Door close limit signal active		
F	Low speed door open input active	F	Door open slow-down signal active		
G	Fire emergency input active	G	Door close slow-down signal active		
DP	Reserved	DP	Door lock signal active		

Function Code	Parameter Name	Setting Range	Default	Min. Unit
FA-20	Output signal display	*	*	*

It is used to view the output signal state. When an input signal is active, the corresponding LED is ON. The LEDs are arranged as 1, 2, 3, and 4 from left to right.



The meaning of each segment is defined in the following table.

Segment (LED1)	Meaning of ON	Segment (LED2)	Meaning of ON	Segment (LED3 & LED4)	Meaning of ON
A	Door open limit signal output 0	A	Door lock signal output	Reserved	Reserved
B	Door close limit signal output 0	B	Door re-open signal output		
C	Door open limit signal output 1	C	Hindering signal output		
D	Door close limit signal output 1	D	Reserved		
E	Fault signal output 1	E			
F	Reserved	F			
G	Door open limit signal output 2	G			
DP	Door close limit signal output 2	DP			

Function Code	Parameter Name	Setting Range	Default	Min. Unit
FA-21	Parameter display selection	0–9999	0	1
FA-22	Display 1	0–9999	0	1
FA-23	Display 2	0–9999	0	1

FA-21 is used to set the actually displayed content of FA-22 and FA-23 for fault identification and commissioning onsite. The meanings of values are as follows:

Value	Displayed Content of FA-22	Displayed Content of FA-23
1	Average speed within 1s (Hz)	Average value of speed fluctuation within 1s (Hz)
2	Maximum speed within 1s (Hz)	Minimum speed within 1s (Hz)
3	Slip frequency (Hz)	Actual feedback frequency (Hz)
4	Excitation current component (A)	Torque current component (A)
Other	Number of pulses received from the encoder within 1s (high bit)	Number of pulses received from the encoder within 1s (low bit)

Function Code	Parameter Name	Setting Range	Default	Min. Unit
FA-24	Analog voltage display	0.00–10.10 V	0.00 V	0.01 V

It is used to display the sampled analog voltage in real time.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
FA-25	Low bits of current door position	0–9999	0	1

Function Code	Parameter Name	Setting Range	Default	Min. Unit
FA-26	High bits of current door position	0–9999	0	1

The two parameters record the current door position.

Current door position = FA-26 x 10000 + FA-25

Function Code	Parameter Name	Setting Range	Default	Min. Unit
FA-27	Door machine state display	0–9999	0	1

It is used to view the state of the door machine, such as door open, door close, or running.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
FA-28	Door direction judgment	*	*	*

It is used to detect the signal wiring of the encoder AB phase.

- If "OPEN" is displayed when you manually pull the door to the open direction, it indicates that the AB phase signal wiring is correct. Otherwise, the AB phase signal is abnormal.
- If "CLOSE" is displayed when you manually pull the door to the close direction, it indicates that the AB phase signal wiring is correct. Otherwise, the AB phase signal is abnormal.

Group FP: User Parameters

Function Code	Parameter Name	Setting Range	Default	Min. Unit
FP-00	User password	0–9999	0	1

It is used to set the user password.

If it is set to any non-zero number, the password protection function is enabled. After a password has been set and taken effect, you must enter the correct password in order to enter the menu. If the entered password is incorrect, you cannot view or modify parameters.

If FP-00 is set to 00000, the previously set user password is cleared, and the password protection function is disabled.

Remember the password that you set. If the password is set incorrectly or forgotten, contact Inovance to replace the control board.

Function Code	Parameter Name	Setting Range	Default	Min. Unit
FP-01	Parameter update	0–2	0	1

- 0: No function
- 1: Restore the default setting
- 2: Clear fault records and time

7

Maintenance and Troubleshooting

Chapter 7 Maintenance and Troubleshooting

7.1 Maintenance

7.1.1 Routine Maintenance

The influence of the ambient temperature, humidity, dust and vibration will cause the aging of the components inside the controller, which may cause potential faults or reduce the service life of the controller. Therefore, it is necessary to carry out routine and periodic maintenance.

⚠CAUTION
The filter capacitor still has residual voltage after the power supply is cut off. Thus, do not repair or maintain the controller immediately. Wait at least 10 minutes and ensure that the bus voltage measured by multimeter is not higher than 36 V.

Routine maintenance involves checking:

- Whether abnormal noise exists during motor running
- Whether the motor vibrates excessively
- Whether the installation environment of the controller changes
- Whether the cooling fan works properly
- Whether the controller overheats

Routine cleaning involves:

- Keep the controller clean all the time.
- Remove the dust, especially metal powder on the surface of the controller, to prevent the dust from entering the controller.
- Clear the oil stain on the cooling fan of the controller.

7.1.2 Periodic Inspection

Perform periodic inspection on the items that are difficult to check during running. Periodic inspection involves:

- Check and clean the air filter periodically.
- Check whether the screws become loose.
- Check whether the controller is corroded.
- Check whether the wiring terminals have arc signs.
- Carry out the main circuit insulation test.

Note

Before measuring the insulating resistance with megameter (500 VDC megameter recommended), disconnect the main circuit from the controller. Do not use the insulating resistance meter to test the insulation of the control circuit. The high voltage test need not be performed again because it has been completed before delivery.

7.1.3 Replacement of Vulnerable Components

Vulnerable components of the controller include the cooling fan and filter electrolytic capacitor. Their service life is related to the operating environment and maintenance.

The service life of the two components is listed in the following table.

Table 7-1 Service life of cooling fan and filter electrolytic capacitor

Component	Service Life	Possible Damage Cause	Judging Criteria
Fan	2 to 3 years	• Bearing worn • Blade aging	• Check whether there is crack on the blade. • Check whether there is abnormal vibration noise upon startup.
Electrolytic capacitor	4 to 5 years	• Input power supply in poor quality • High ambient temperature • Frequent load jumping • Electrolytic aging	• Check whether there is liquid leakage. • Check whether the safety valve has projected. • Measure the static capacitance. • Measure the insulating resistance.

7.1.4 Storage of the Controller

For storage of the controller, pay attention to the following two aspects:

1. Pack the controller with the original packing box provided by Inovance.
2. Long-term storage degrades the electrolytic capacitor. Thus, the controller must be energized once every 2 years, each time lasting at least 5 hours. The input voltage must be increased slowly to the rated value with the regulator.

7.2 Fault Information and Troubleshooting

The controller provides almost 32 pieces of alarm information and corresponding protection functions. It monitors all types of input signals, running conditions and external feedback. If any abnormality occurs, the controller implements corresponding protection function and displays the fault code.

If a fault occurs, the controller performs corresponding processing based on the error code. You can analyze the fault based on the information provided in the following table, find out the causes, and rectify the fault.

Fault Code	Description	Cause	Troubleshooting	Remarks
Er02	Overcurrent during acceleration	1. The main circuit output is grounded or short-circuited. 2. Motor auto-tuning is performed improperly. 3. The load is too heavy.	1. Eliminate external faults such as wiring error. 2. Perform motor auto-tuning again. 3. Reduce the burst load.	
Er03	Overcurrent during deceleration	1. The main circuit output is grounded or short-circuited. 2. Motor auto-tuning is performed improperly. 3. The load is too heavy. 4. The deceleration rate is too short.	1. Eliminate external problems such as wiring error. 2. Perform motor auto-tuning again. 3. Reduce the burst load. 4. Modify the related parameters.	
Er04	Overcurrent at constant speed	1. The main circuit output is grounded or short-circuited. 2. Motor auto-tuning is performed improperly. 3. The load is too heavy. 4. Strong interference exists on the encoder.	1. Eliminate external problems such as wiring error. 2. Perform motor auto-tuning again. 3. Reduce the burst load. 4. Choose a proper encoder and uses a shielded cable for the encoder.	
Er05	Overvoltage during acceleration	1. The input voltage is too high. 2. The braking resistance is too large. 3. The acceleration rate is too short.	1. Reduce the input voltage. 2. Choose a proper brake resistor. 3. Modify the related parameters.	
Er06	Overvoltage during deceleration	1. The input voltage is too high. 2. The braking resistance is too large. 3. The deceleration rate is too short.	1. Reduce the input voltage. 2. Choose a proper brake resistor. 3. Modify the related parameters.	
Er07	Overvoltage at constant speed	1. The input voltage is too high. 2. The braking resistance is too large.	1. Reduce the input voltage. 2. Choose a proper brake resistor.	
Er09	Undervoltage protection	1. Instantaneous power failure occurs on the input power supply. 2. The input voltage is too low. 3. The control board is abnormal.	1. Eliminate external power supply problems. 2. Contact the agent or the vendor.	The controller resets automatically after the voltage becomes normal.

Fault Code	Description	Cause	Troubleshooting	Remarks
Er10	System overloaded	1. The guide rail of the elevator door is blocked by stuff. 2. The load is too heavy.	1. Check the guide rail of the elevator door. 2. Reduce the load.	
Er11	Motor overload	1. The guide rail of the elevator door is blocked by stuff. 2. The load is too heavy. 3. The value of F8-14 is too small.	1. Check the guide rail of the elevator door. 2. Reduce the load. 3. Set F8-14 to a proper value.	A large setting of F8-14 may cause motor overheat. Use the default value.
Er13	Power output phase loss	1. The wiring of the main circuit is loose on the output side. 2. The motor is damaged.	1. Check the wiring. 2. Rectify faults of the motor.	The controller decelerates and stops.
Er14	Module overheat	1. The ambient temperature is too high. 2. The fan is damaged. 3. The air filter is blocked.	1. Reduce the ambient temperature. 2. Replace the fan. 3. Clear the air filter.	The controller decelerates and stops, and automatically resets after the temperature becomes normal.
Er16	EEPROM fault	An EEPROM reading or writing abnormality occurs.	Contact the agent or vendor.	
Er18	Current detection fault	The control board is abnormal.	Contact the agent or vendor.	
Er19	Motor auto-tuning timeout	1. The motor parameters are incorrectly set. 2. Parameter identification times out. 2. The encoder for the PMSM is abnormal.	1. Enter the motor parameters correctly. 2. Check the lead wire of the motor. 3. Check wiring of the encoder and ensure the PPR is set correctly.	
Er20	Encoder fault	1. The encoder model is improper. 2. Wiring of the resolver is incorrect.	1. Use an open-collector ABZ phase resolver. 2. Eliminate wiring problems.	

Fault Code	Description	Cause	Troubleshooting	Remarks
Er26	Parameter setting incorrect	1. F5-01 (Door open time limit) is smaller than the total door open time. 2. F5-02 (Door close time limit) is smaller than the total door close time. 3. During door width auto-tuning, F0-02 (Command source selection) is not set to 2 (Door machine manual control), or F0-01 (Door open/close control mode) is not set to 1 (Distance control). 4. F0-00 (Control mode) is set to 0 (SVC). 2. F0-00 is set to 0 (SVC) when the controller drives a PMSM.	1. Set F5-01 to larger than the total door open time. 2. Set F5-02 to larger than the total door close time. 3. Set F0-02 to 2 or F0-01 to 1 during door width auto-tuning. 4. When F1-00 (Motor type selection) is set to 1 (PMSM), set F0-00 (Control mode) to 1 (CLVC).	It is only a prompt, and not recorded as a fault.
Er27	Door width auto-tuning fault	1. The door width obtained through door width auto-tuning is smaller than 20 pulses. 2. Distance control running is performed before door width auto-tuning.	1. Check wiring of the encoder and related parameters. 2. Check the mechanical system of the door machine. 3. Perform door width auto-tuning before starting distance control running.	
Er28	Door open timeout	1. The door open limit signal is abnormal or incorrectly set. 3. The wire to the pulse encoder is broken.	1. Check the door open limit signal. 2. Check wiring of the encoder.	The controller can reset automatically.
Er30	Low speed door open/ close timeout	1. The door open/close limit signal is abnormal or incorrectly set. 2. The wire of the pulse encoder is broken.	1. Check the door close limit signal. 2. Check wiring of the encoder.	The controller can reset automatically.
Er31	Door open hindered protection	1. The guide rail of the elevator door is blocked by stuff. 2. The door open hindering parameters are incorrectly set.	1. Clear the stuff in the guide rail. 2. Set the upper limit of door open torque to a proper value. 3. Set F3-11 (Door open hindered judging time) to a proper value.	The controller can reset automatically.

Fault Code	Description	Cause	Troubleshooting	Remarks
Er32	Speed deviation protection	1. Acceleration or deceleration is too abrupt. 2. The motor angle obtained through auto-tuning is incorrect, causing runaway. 3. The speed deviation setting and time are too small.	1. Increase the acceleration or deceleration time. 2. Perform angle auto-tuning again. 3. Change the value of F5-16 and F5-17.	
Er33	Door close limit switch abnormal	This signal is not detected during door close when the limit switch is used in distance control mode.	1. Check whether this switch is installed. If not, cancel the input signal setting. 2. Check whether wiring of the switch is correct. 3. Check whether the switch is damaged	The controller can run properly based on the encoder signals. The controller can reset automatically if the switch becomes normal.

Revision History

Date	Version	Change Description
Jan 2015	V0.0	First issue.
Dec 2016	A01	Modified product name, designation rule and nameplate.
Nov 2018	A02	Updated logo.

INOVANCE Warranty Agreement

1) Inovance provides an 18-month free warranty to the equipment itself from the date of manufacturing for the failure or damage under normal use conditions.
2) Within the warranty period, maintenance will be charged for the damage caused by the following reasons:
   a. Improper use or repair/modification without prior permission
   b. Fire, flood, abnormal voltage, natural disasters and secondary disasters
   c. Hardware damage caused by dropping or transportation after procurement
   d. Operations not following the user instructions
   e. Damage out of the equipment (for example, external device factors)
3) The maintenance fee is charged according to the latest Maintenance Price List of Inovance.
4) If there is any problem during the service, contact Inovance's agent or Inovance directly.
5) Inovance reserves the rights for explanation of this agreement.

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