涌现集团
YONGXIAN GROUP

NICE3000-B/W Series Integrated Elevator Control Cabinet

User Manual

MON-CM-A02-2025-0047

Preface

Overview

Thank you for purchasing the NICE3000-B/W series integrated elevator control cabinet.

This product is a new generation of elevator control cabinet independently designed and produced by Inovance. The complete solution offerings that comply with high national and international standards can meet various applications. New structural design and layout and more environment-friendly materials are adopted. The new NICE3000^{new} integrated elevator controller is equipped for greater safety, reliability, and energy efficiency. A change of one parameter enables the control of AC asynchronous motors and permanent magnet synchronous motors. Also, fewer traveling cables are required and standard interfaces are to facilitate use and maintenance.

This guide describes the types and features, safety information, installation and electrical design, and maintenance of the control cabinet. Read this guide carefully before using the product, and keep it properly for future maintenance reference. For more commissioning and running details, see *NICE3000^{new} Series Integrated Elevator Controller Installation and Commissioning User Guide* on www.inovance.com.

Notes

Notes
• The drawings in the manual are sometimes shown without covers or protective guards. When using this product, be sure to reinstall them and operate in accordance with the guide. • The drawings in the user guide are shown for illustration only and may be different from the product you purchased. • The instructions are subject to change due to product upgrade, specification modification as well as efforts to increase the accuracy and convenience of the manual. • Contact the regional agent or customer service center of Inovance if you need a new user guide. • Contact the customer service center of Inovance if you have problems during use.

Revision History

Date	Version	Change description
October 2023	A02	Modify the flowcharts of the asynchronous motor with-load and no-load auto-tuning. Modify the acting sequence of the leveling switches.
June 2022	A01	Optimize manual style.
June 2022	A00	First issue

Table of Contents

Safety Instructions

Safety Disclaimer

- This section describes the safety precautions that help you use this product correctly. Before operating the equipment, read through the guide and comprehend all the safety instructions. Failure to comply may result in severe personal injuries or even death or equipment damage.
- "DANGER", "WARNING", and "DANGER" items in the user guide do not indicate all safety precautions that need to be followed; instead, they just supplement the safety precautions.
- Use this equipment according to the designated environment requirements. Damage caused by improper usage is not covered by warranty.
- Inovance shall take no responsibility for any personal injuries or property damage caused by improper usage.

Safety Levels and Definitions

	Indicates that failure to comply with the notice will result in severe personal injuries or even death.
	Indicates that failure to comply with the notice may result in severe personal injuries or even death.
	Indicates that failure to comply with the notice may result in minor or moderate personal injuries or equipment damage.

Safety Instructions

- For illustration purpose, the drawings in this user guide are sometimes shown without covers or protective guards. Remember to install the covers or protective guards as specified before using the product, and perform operations following the instructions.
- The drawings in this guide are for reference only and may not match the product you purchased.

Unpacking
 • Do not install the equipment if you find damage, rust, or indications of use on the equipment or accessories. • Do not install the equipment if you find water seepage, component missing or damage upon unpacking. • Do not install the equipment if you find the packing list does not conform to the equipment you received.

- Check whether the packing is intact and whether there is damage, water seepage, damp, and deformation.
- Unpack the package by following the unpacking sequence. Do not hit the package with force.
- Check whether there is damage, rust, or injuries on the surface of the equipment or equipment accessories.
- Check whether the number of packing materials is consistent with the packing list.

Storage and Transportation

- Use professional loading and unloading equipment to carry large-scale or heavy equipment. Failure to comply may result in personal injuries or equipment damage.
- Before hoisting the equipment, ensure the equipment components such as the front cover and terminal blocks are secured firmly with screws. Loosely-connected components may fall off and result in personal injuries or equipment damage.
- Never stand or stay below the equipment when the equipment is lifted by hoisting equipment.
- When hoisting the equipment with a steel rope, ensure the equipment is hoisted at a constant speed without suffering from vibration or shock. Do not turn the equipment over or let the equipment stay hanging in the air. Failure to comply may result in personal injuries or equipment damage.

- Handle the equipment with care during transportation and mind your step to prevent personal injuries or equipment damage.
- When carrying this equipment with bare hands, hold the equipment casing firmly with care to prevent parts falling. Failure to comply may result in personal injuries.
- Store and transport this product in strict accordance with the storage and transportation requirements. Failure to comply may result in damage to the product.
- Avoid transporting the equipment in environments such as water splashing, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
- Avoid storing the product for more than 3 months. Long-term storage shall require stricter protection and necessary inspections.
- Pack the equipment strictly before transportation. Use a sealed box for long-distance transportation.
- Never transport this equipment with other equipment or materials that may harm or have negative impacts on this equipment.

Installation

- Installation must be performed by only experienced personnel who have been trained with necessary electrical information. Operations by others are prohibited.

WARNING

- Thoroughly read the safety instructions and user guide before installation.
- Do not install this equipment in places with strong electric or magnetic fields.
- Before installation, check that the mechanical strength of the installation site can bear the weight of the equipment. Failure to comply will result in mechanical hazards.
- Do not wear loose clothes or accessories during installation. Failure to comply may result in an electric shock.
- When installing the equipment in a closed environment (such as a cabinet or casing), use a cooling device (such as a fan or air conditioner) to cool the environment down to the required temperature. Failure to comply may result in equipment over-temperature or a fire.
- Do not modify this equipment.
- Do not rotate the equipment components or loosen fixed bolts (especially those marked in red) on equipment components.
- When this equipment is installed in a cabinet or final equipment, protection measures such as a fireproof enclosure, electrical enclosure, or mechanical enclosure must be provided. The IP rating must meet IEC standards and local laws and regulations.
- Before installing equipment with strong electromagnetic interference, such as a transformer, install an electromagnetic shielding device for this equipment to prevent malfunctions.
- Install the equipment onto flame retardant materials, such as metal. Keep the equipment away from combustible objects. Failure to comply will result in a fire.

CAUTION

- Cover the top of the equipment with a piece of cloth or paper during installation. This is to prevent unwanted objects such as metal chippings, oil, and water from falling into the equipment and causing faults. After installation, remove the cloth or paper for effective ventilation and cooling.
- Resonance may occur when the equipment operating at a constant speed executes variable speed operations. In this case, install the vibration-proof rubber under the motor frame or use the vibration suppression function to reduce resonance.

Wiring

DANGER

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by only professionals.
- Before wiring, cut off all the power supplies. Wait as specified on the product warning sign before further operations because residual voltage exists after power-off. Measure the DC voltage of the main circuit and make sure that it is below the safety voltage. Failure to comply will result in an electric shock.
- Never perform wiring at power-on. Failure to comply will result in an electric shock.
- Make sure that the equipment is well grounded. Failure to comply will result in an electric shock.

- Never connect the power cable to output terminals of the equipment. Failure to comply may cause equipment damage or even a fire.
- When connecting a drive with the motor, make sure that the phase sequences of the drive and motor terminals are consistent to prevent reverse motor rotation.
- Wiring cables must meet diameter and shielding requirements. The shielding layer of the shielded cable must be reliably grounded at one end.
- Fasten screw terminals with the specified tightening torque. Insufficient or excessive torque may cause overheating, damage, and even a fire.
- After wiring, make sure that no screws are fallen and cables are exposed in the equipment. Failure to comply may result in an electric shock or equipment damage.

- During wiring, follow the proper electrostatic discharge (ESD) procedures, and wear an antistatic wrist strap. Failure to comply will result in damage to internal equipment circuits.
- In wiring the control circuit, use shielded twisted pair cable and connect the shield to the PE terminal. Otherwise, the equipment may not function properly.

Power-on

- Before power-on, make sure that the equipment is installed properly with reliable wiring and the motor can be restarted.
- Before power-on, make sure that the power supply meets product requirements to prevent product damage or even a fire.
- After power-on, do not open the cabinet door or protective cover of the equipment. Do not touch any terminals, or remove any part of the equipment at power-on. Failure to comply will result in an electric shock.

- Perform a trial run after wiring and parameter setting to ensure that the equipment operates safely. Failure to comply may result in personal injuries or equipment damage.
- Before power-on, check that the rated voltage of the equipment is consistent with that of the power supply. Failure to comply may result in a fire. If the power supply voltage is used incorrectly, it will result in a fire.
- Before power-on, check that no one is near the equipment, motor, or other mechanical parts. Failure to comply may result in personal injuries or even death.

Operation

- The equipment must be operated only by professionals. Failure to comply will result in personal injuries or even death.
- Do not touch any terminals or remove any part of the equipment during operation. Failure to comply will result in an electric shock.

- Do not touch the equipment shell, fan, or resistor for temperature detection. Failure to comply will result in heat injuries.
- Prevent metal or other objects from falling into the device during operation. Failure to comply may result in fire or equipment damage.

Maintenance

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by only professionals.
- Do not maintain the equipment at power-on. Failure to comply will result in an electric shock.
- Before maintenance, cut off all equipment power supplies and wait as specified on the product warning sign.
- In case of a permanent magnet motor, do not touch the motor terminals even after power-off because there is still induced voltage generated during rotation. Failure to comply will result in an electric shock.

- Perform daily and periodic inspection and maintenance for the equipment according to maintenance requirements and keep a maintenance record.

Repair

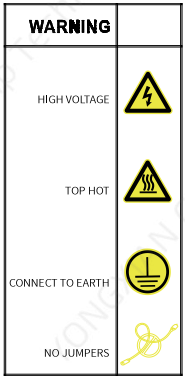
- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by only professionals.
- Do not repair the equipment at power-on. Failure to comply will result in an electric shock.
- Before inspection and repair, cut off all equipment power supplies and wait as specified on the product warning sign.

- Require for repair services according to the product warranty agreement.
- When the fuse is blown or the circuit breaker or earth leakage circuit breaker (ELCB) trips, wait as specified on the product warning sign before power-on or further operations. Failure to comply may result in personal injuries, equipment damage or even death.
- When the equipment is faulty or damaged, require professionals to perform troubleshooting and repair by following repair instructions and keep a repair record.
- Replace quick-wear parts of the equipment according to the replacement guide.
- Do not operate damaged equipment. Failure to comply may result in worse damage.
- After the equipment is replaced, perform wiring inspection and parameter settings again.

Disposal
WARNING • Dispose of retired equipment by following local regulations or standards. Failure to comply may result in property damage, personal injuries, or even death. • Recycle retired equipment by following industry waste disposal standards to avoid environmental pollution.

Safety Sign

To ensure safe operations, comply with safety signs on the device, and do not damage or remove the safety labels. The following table describes the safety signs.

Safety Sign	Description
	High voltage!
	Top hot!
	Burn hazard!
	• High voltage! • Top hot! • Connect to earth! • No jumpers left!

1 Introduction

Connection of Peripheral Devices

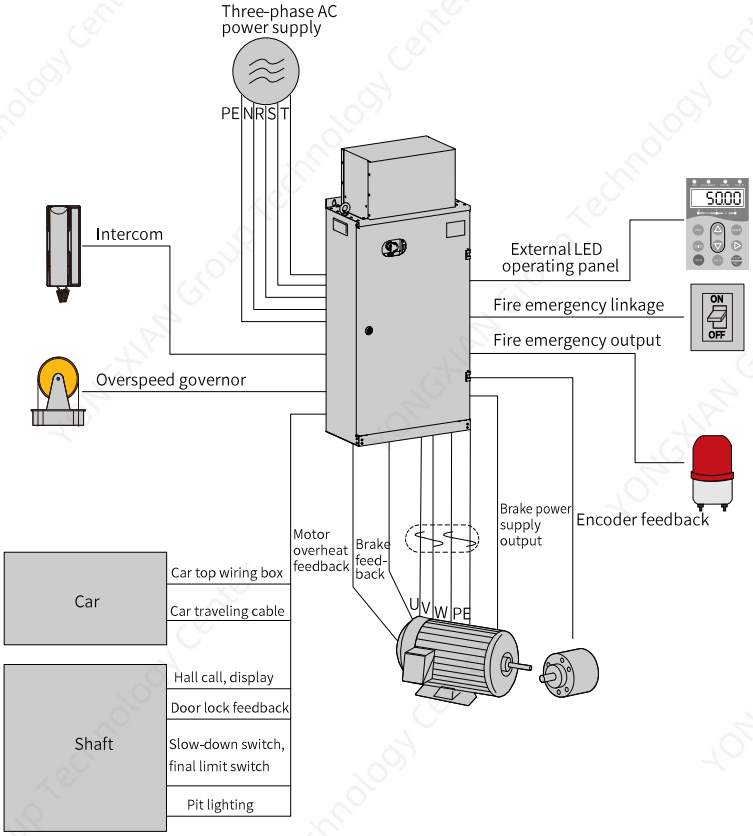


Figure 1-1 Connections between the control cabinet and peripheral devices

Note

- The figure above briefly shows the connection between the control cabinet and its peripheral devices.
- Inovance provides some of the peripheral devices. Contact our sales personnel if you have any needs.

List of Basic Functions

Function	Description
Common running functions	
Detection of door circuit faults	When the car door or landing door opens, the system detects their operations. If a car/landing door fault is detected, the elevator stops running.
Full collective selective	In the automatic running or attendant state, this function enables the elevator to respond to both car calls and hall calls. Passengers at any service floor can call the elevator by pressing the up button or down button.
Door open time setting	The system automatically determines different door open time for door open for call, command, protection, or delay according to the set door open holding time.
Door open holding	In the automatic running state, you can hold down the door open button in the car to postpone the door close so that goods can be moved in or out.
Service floor setting	You can set the required service floors as needed.
Advance door closing using the door close button	During door open holding in the automatic running state, you can close the door in advance by pressing the door close button to improve the efficiency.
Floor display setting	The system supports display of floor numbers in the form of numbers and letters, meeting the requirements of special conditions.
Light curtain signal judgment	If the car door is blocked by stuff during door close, the light the light curtain acts and the elevator opens the door. This function is inactive in the fire emergency state.
Independent control of the front and rear doors	When the elevator has two car doors, automatic control on the two doors can be implemented as required.
Repeated door close	If the door lock is not applied after the elevator performs door close for a certain time, the elevator automatically opens and then closes the door again.
Voice announcement	The elevator automatically announces information such as the running direction and next arriving floor during running.
Idle elevator returning to main floor	In the automatic running state, the elevator automatically returns to the set parking floor and waits for passengers if it does not receive any car calls or hall calls within the set time.
Landing at another floor	If the door open time exceeds the door open protection time but the door open limit signal is still inactive, the elevator closes the doors and automatically runs to the next landing. The system reports E55.
Cancellation of wrong calls	Passengers can cancel a wrong car call by double-pressing the floor button in the car.

Function	Description
Service floor setting	You can enable or disable the system service for one or more floors as required.
Service floor selection	You are allowed to set the time range and service floors of time-based floor services or select the service floors using the service floor switchover switch.
Independent running	The elevator does not respond to any call, and the door needs to be closed manually. In group control mode, the elevator runs independently.
Attendant running	After the elevator enters the attendant state, the running of the elevator is controlled by the attendant.
Low-speed self-rescue	When the elevator is in the non-inspection state and stops in the non-leveling zone, the elevator automatically runs to the leveling zone at a low speed and opens the doors if the safe running requirements are met.
Automatic startup torque compensation	Before running, the system automatically implements the startup torque compensation based on the current car load to achieve a smooth startup, improving the riding comfort.
Direct travel ride	The system automatically computes and generates the running curves based on the distance, which enables the elevator to directly stop at the leveling position.
Service suspension signal output	When the elevator cannot respond to hall calls, the corresponding terminal outputs a service suspension signal.
Running times record	In the automatic running state, the system automatically records the running times of the elevator.
Running time recording	The system automatically records the accumulative working hours and days of the elevator.
Automatic door open upon door lock abnormality	If the system detects a door lock circuit abnormality during door open/close, the elevator automatically re-opens/re-closes the doors and reports a fault after the set door open/close times is reached.
Disability service	When the elevator is waiting at the leveling position, if there is a call or door open command from the car operating panel (COP) for the disabled at this floor, the door open holding time will be prolonged.
Direct travel ride with full-load	When the car is fully loaded in the automatic running state, the elevator does not respond to hall calls from passing floors. These hall calls, however, can still be registered. They will be executed during the next running (in the case of single elevator) or by other elevators (in the case of parallel/group control).
Overload protection	When the car load exceeds the rated elevator load, the elevator alarms and stops running.
Fault data record	The system automatically records the detailed fault information, improving the efficiency of maintenance.
Inspection-related functions	

Function	Description
Bypass running	Commissioning personnel can let the elevator enter the inspection state by operating the bypass plug and start running to maintain the landing/car door lock.
Simple-maintenance keypad	The 3-button keypad on the main control board (MCB) allows the commissioning of running floors, door open/close, and so on.
Inspection running	After the elevator enters the inspection state, the system cancels automatic running and automatic door operations. You can press the up/down button to make the elevator jog at the inspection speed.
Motor auto-tuning	With a simple parameter setting of auto-tuning, the system can obtain the parameters of the motor with or without load.
Intelligent floor position correction	Every time the elevator runs to the terminal floors, the system automatically checks and corrects the car position based on slow-down switch 1, and eliminates top-hitting or bottom-clashing with the assistance of the slow-down system.
Dual-speed inspection	Considering inaccurate running control at high inspection speed but long running time at low inspection speed, the system provides the dual-speed curve for inspection, which greatly improves the efficiency at inspection.
Running tests	The running tests include the fatigue test of a new elevator, car/hall call test, hall call forbidden, door open/close forbidden, limit switches disabled, overload signal disabled, and so on.
Fire emergency landing	After receiving a fire emergency signal, the elevator does not respond to any call but returns to the fire emergency floor and waits.
Fire emergency and safety functions	
Firefighter operation	After the elevator enters the firefighter running mode, door open/close is implemented by the jog operation (optional) by using the door open and close buttons rather than automatically. The elevator responds only to car calls and only one car call can be registered every time.
Security floor	After the security floor function is enabled, the security floor remains active from 22:00 to 06:00 (24-hour clock). During this period, the elevator goes to the security floor, stops, and opens the doors, before moving to the destination floor every time. This enhances safety.
Elevator lock	In the automatic running state, when the elevator lock switch operates or the set lock time is reached, the elevator clears all the calls registered, returns to the elevator lock floor, stops running, and turns off the lighting and fan in the car.
Automatic identification of power failure	The system automatically identifies power failure and outputs a signal to the relay to which emergency evacuation automatic switchover function is allocated to implement emergency evacuation at power failure.
Automatic running mode switchover at power failure	In applications where synchronous motor is used, after the supply system is disconnected, the system can perform automatic switchover between shorting stator braking mode and controller drive mode, achieving quick and stable self-rescue.

Function	Description
Main floor verification	After detecting a position abnormality, the system runs the elevator to each floor until reaching the terminal floor for verification, guaranteeing the system's safety.
Earthquake function	When the earthquake detection device operates and inputs a signal to the system, the elevator lands at the nearest floor and stops running. It restores normal running only after the earthquake signal becomes inactive and the fault is reset manually.
Energy-saving functions	
Car energy saving	If the system does not receive a running command within the set time, it automatically cuts off the power supplies of the lighting and fan in the car.
Arrival gong disabled at night	This function allows the elevator to cancel the arrival gong announcement within the set time range.
Energy saving of idle door operator	After the car lighting is turned off, the system stops outputting the door close command to reduce the power consumed by the door operator.

Optional Functions

Function	Description	Remark
Micro-leveling	After landing at a floor, the elevator may move upward or downward due to the load change and the car door is not aligned with the landing sill, which is inconvenient for passengers and goods to get in and out. In this case, the system allows the elevator to run to the leveling position in the door open state at the re-leveling speed.	MCTC-SCB required
Emergency evacuation at power failure	For elevators configured with an emergency power supply, the system uses this power supply to implement low-speed self-rescue at power failure.	MCTC-ARD-C required
Advance door opening	In the automatic running state, when the elevator speed is smaller than 0.2 m/s during stop and the door zone signal is active, the system shorts the door lock through the shorting door lock circuit relay and outputs a door open signal in advance. This maximizes the elevator use efficiency.	MCTC-SCB required
IC card	Passengers need to use the IC card to go to floors that require authorization.	IC card required

Function	Description	Remark
Parallel control	The system supports the parallel control of two elevators, meeting the requirements of different customers.	-
Anti-nuisance	The system automatically judges the number of passengers in the car and compares it with the number of registered car calls. If there are excessive car calls, the system determines that it is nuisance and cancels all car calls. In this case, passengers need to register correct car calls again.	-

2 Product Information

2.1 Model and Nameplate

NICE3000 - B - 40 17 S - T - B 1 - A4
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

① **Product name** NICE3000 series	④ **Power rating** 05: 5.5 kW 15: 15 kW 22: 22 kW	⑦ **Motor type** A: Asynchronous motor B: Synchronous motor
② **Controller type** B: MR W: MRL	⑤ **Model structure** F: MD500 models S: Encrypted	⑧ **Contactor type** None: MR Fuji contactor 1: MRL contactor from Tianjin Second Relay Factory 2: MRL Fuji contactor 3: MRL Tianshui contactor
③ **Voltage class** 40: Three-phase 380 V	⑥ **Standard** T: TSG version G: GB version	⑨ **SCB board type** A4: With A4 board D4: With D4 board

Note

- The MRL control cabinet only supports the synchronous motor.
- ATO models are for NICE3000^{new}.

Table 2–1 Table of product naming rules

Cabinet type	Model	Applicable power class	Installation method
MR control cabinet	NICE3000-B-4005 to NICE3000-B-4015	5.5 kW, 7.5 kW, 11 kW, and 15 kW	Backplate mounting
	NICE3000-B-4018 NICE3000-B-4022	18.5 kW, 22 kW	Floor mounting
	NICE3000-B-4030 NICE3000-B-4037	30 kW, 37 kW	
MRL control cabinet	NICE3000-W-4005 to NICE3000-W-4022	5.5 kW, 7.5 kW, 11 kW, 15 kW, 18.5 kW, and 22 kW	Floor mounting

Note

- This part only describes the model number of standard products. If you have any customized requirements, contact the sales personnel of Inovance.
- The serial No. is only applicable to MRL control cabinets, such as NICE3000-W-4015-B1 and NICE3000-W-4015-B2.

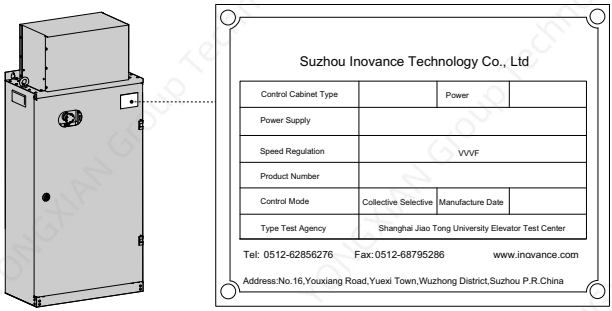


Figure 2-1 Nameplate description

2.2 Components

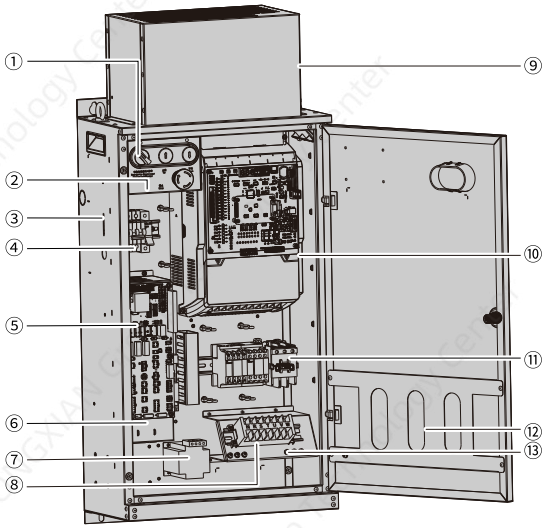


Figure 2-2 Components of the MR control cabinet (NICE3000-B-4005 to NICE3000-B-4037)

No.	Name	No.	Name	No.	Name
①	EEO operating panel	⑥	Brake power supply board (below interface board)	⑪	• RUN contactor • Shorting motor stator contactor • Brake contactor
②	Advance door opening board (below the operating panel)	⑦	Transformer	⑫	File folder
③	External intercom	⑧	Power terminal	⑬	Grounding connection
④	Air switch or residual current device (RCD)	⑨	Braking resistor box	-	-
⑤	Interface board	⑩	Integrated controller	-	-

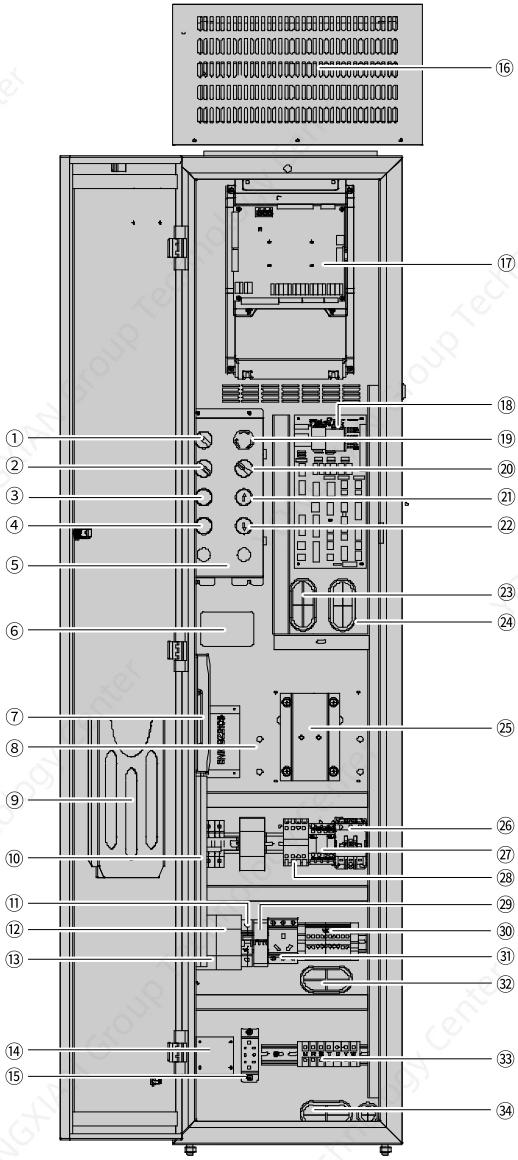


Figure 2-3 Components of the MRL control cabinet (NICE3000-W-4005-B1 to NICE3000-W-4022-B1)

No.	Name	No.	Name	No.	Name
①	Overspeed governor test switch	⑬	Door operator braking circuit RCD	㉕	Power supply box for the electric brake release
②	Overspeed governor remote activation button	⑭	Safety circuit transformer	㉖	RUN contactor
③	Overspeed governor remote releasing button	⑮	Grounding copper busbar	㉗	Brake contactor
④	Shaft lighting switch	⑯	Braking resistor box	㉘	Shorting motor stator contactor
⑤	Brake power supply board	⑰	NICE3000^{new} integrated controller	㉙	Phase sequence
⑥	Window	⑱	Interface board	㉚	Signal terminal block
⑦	Telephone	⑲	Emergency stop button	㉛	Maintenance socket
⑧	Brake release spanner	⑳	EEO switchover button	㉜	Cable hole
⑨	File folder	㉑	EEO up button	㉝	Power cable terminals
⑩	Lighting	㉒	EEO down button	㉞	Cable hole
⑪	Lighting air switch	㉓	Traveling cable hole	-	-
⑫	Safety circuit RCD	㉔	Shaft cable hole	-	-

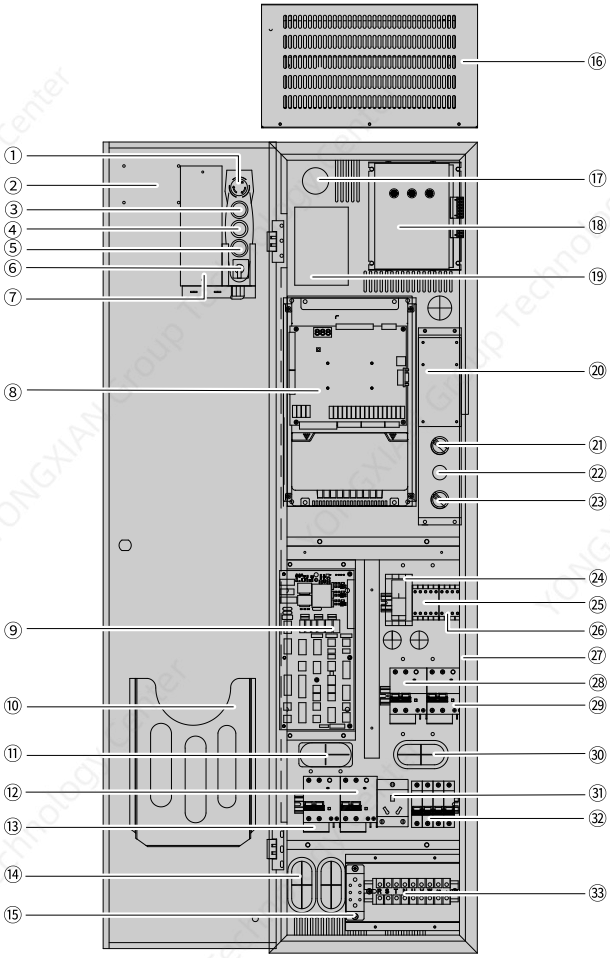


Figure 2-4 Components of the MRL control cabinet (NICE3000-W-4005-B2 to NICE3000-W-4022-B2)

No.	Name	No.	Name	No.	Name
①	Emergency stop button	⑫	Car top fan/lighting air switch	㉓	Shaft lighting switch
②	Nameplate holes	⑬	Shaft lighting air switch	㉔	RUN contactor
③	EEO up button	⑭	Cable hole	㉕	Brake contactor
④	EEO common button	⑮	Grounding copper busbar	㉖	Shorting motor stator contactor
⑤	EEO down button	⑯	Braking resistor box	㉗	Lighting strip (side)

No.	Name	No.	Name	No.	Name
⑥	EEO switchover button	⑰	Shaft lighting	㉘	Safety circuit RCD
⑦	Control cabinet intercom	⑱	Electric brake release device	㉙	Door operator braking circuit RCD
⑧	NICE3000^{new} integrated controller	⑲	Window	㉚	Cable hole
⑨	Interface board	⑳	UCMP module	㉛	Maintenance socket
⑩	File folder	㉑	Overspeed governor test switch	㉜	Power cable main air switch
⑪	Cable hole	㉒	Overspeed governor action/reset switch	㉝	Power cable terminals

Table 2–2 Function description

Name	Function
NICE3000^{new} integrated controller	The core elevator part that integrates the control system and drive system
EEO switchover button	Enables the switchover between the elevator EEO and normal running
EEO up button	For the elevator EEO up running
EEO down button	For the elevator EEO down running
Emergency stop button	For the elevator emergency stop
Overspeed governor test switch	For MRL overspeed governor test
Overspeed governor action/reset switch	For MRL overspeed governor test or action reset
Shaft lighting switch	MRL shaft lighting switch
Safety circuit RCD	For safety circuit current leakage and overcurrent protection
Door operator braking circuit RCD (or air switch)	For door operator brake circuit current leakage and overload protection
Car lighting RCD	For car lighting circuit leakage and overload protection
Shaft lighting switch	For shaft lighting circuit control
Main air switch	For circuit control in the elevator control system except lighting
Three-prong socket	Provides power interface for maintenance or field service personnel
Grounding terminal block	For grounding cable connection

Name	Function
Steel rope lighting	For car position and elevator direction judgement
Control cabinet lighting	Provides lighting power for control cabinet operation
Micro switch	Control cabinet lighting control switch
Advance door opening board (below the operating panel)	For advance door opening or re-leveling function (MCTC-SCB-A1 for the synchronous motor and single door, and MCTC-SCB-D for the synchronous motor and through-type door and asynchronous motor)
Cable outlet hole	For cable routing
Interface board	Connection interface of shaft, machine room and traveling cables
Intercom position	For mounting the intercom
Brake power supply board	Provides the traction machine voltage and the system 24 V power supply
Main circuit terminals	System power input and motor output terminals
Control transformer	Provides supply voltage to the safety circuit
Braking resistor box	Consumes excessive energy during braking
Brake contactor	For brake circuit control
RUN contactor	For system output voltage circuit control
Shorting motor stator contactor	For shorting synchronous motor stator coil to produce resistance and limit the car movement
File folder	For easy placement of documents and drawings

2.3 Product Dimensions

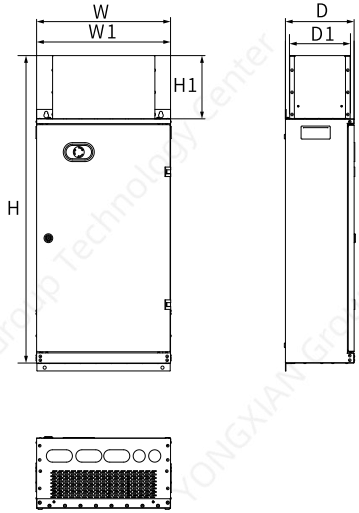


Figure 2-5 Dimensions of the MR control cabinet (NICE3000-B-4005 to NICE3000-B-4015)

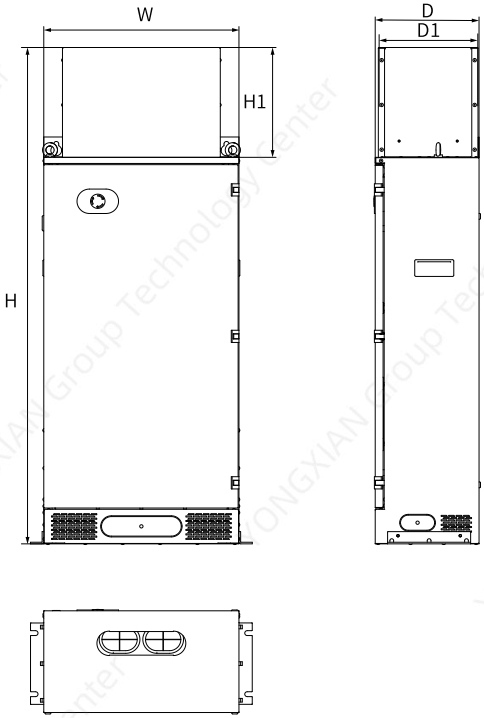


Figure 2-6 Dimensions of the MR control cabinet (NICE3000-B-4018 to NICE3000-B-4037)

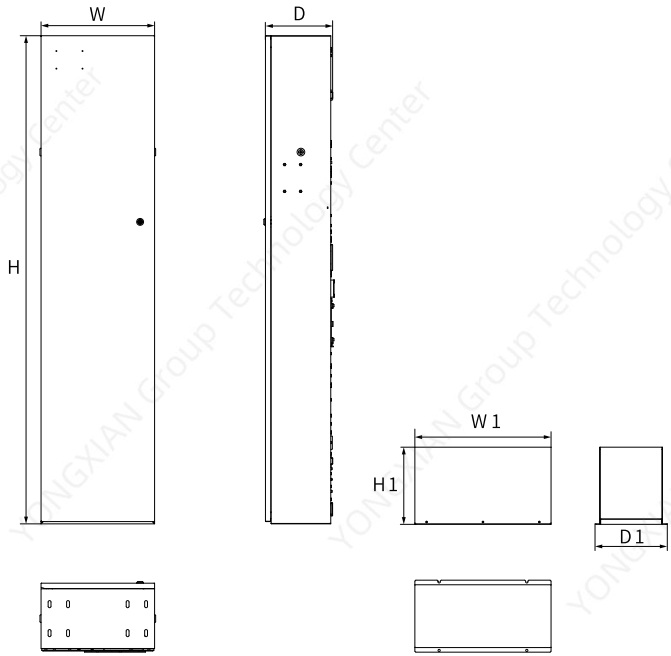


Figure 2-7 Dimensions of the MRL control cabinet (NICE3000-W-4005 to NICE3000-W-4022)

Table 2–3 Dimensions of the control cabinet and resistor box

Control cabinet model	Cabinet W x D x H (mm)	Resistor box W1 x D1 x H1 (mm)
NICE3000-B-4005 to NICE3000-B-4015	442 x 232 x 972	330 x 195 x 200
NICE3000-B-4018	470 x 250 x 1220	380 x 240 x 270
NICE3000-B-4022		
NICE3000-B-4030	510 x 275 x 1330	420 x 265 x 280
NICE3000-B-4037		
NICE3000-W-4005-B1 to NICE3000-W-4022-B1	400 x 243 x 1720	435 x 230 x 247
NICE3000-W-4005-B2	350 x 240 x 1350	440 x 260 x 100
NICE3000-W-4007-B2		
NICE3000-W-4011-B2 to NICE3000-W-4018-B2		440 x 260 x 150
NICE3000-W-4022-B2		440 x 260 x 195

Note

- The dimensions provided in the preceding table only apply to standard control cabinets.
- The resistor box for MR control cabinets must be installed on the cabinet top.

2.4 Technical Specifications

Table 2–4 Main technical specifications

Item	Specification		
Basics	Maximum frequency	99 Hz	
	Carrier frequency	2 kHz to16 kHz, adjusted automatically based on load features	
	Motor control mode	Feedback vector control (FVC)	
	Startup torque	0.5 Hz: 180% sensorless vector control (SVC) 0 Hz: 200% FVC	
	Speed range	1:100 (SVC)	1:1000 (FVC) 1:50 (V/f control)
	Speed stability accuracy	±0.5% (SVC)	±0.05% (FVC)
	Torque control accuracy	±5% (FVC)	
	Overload capacity	60s for 150% of the rated current, 1s for 200% of the rated current	
	Motor Auto-tuning	With-load auto-tuning; No-load auto-tuning	
	Distance control	Direct travel ride mode in which the leveling position can be adjusted flexibly	
	Acceleration/ Deceleration curve	Automatic generation of multiple curves	
	Slow-down function	Automatically identifies the position of slow-down brackets	
	Shaft auto-tuning	32-bit data, accurately recording the shaft position	
	Leveling adjustment	Flexible and easy-to-use leveling adjustment function	
	Startup torque compensation	Load cell pre-torque compensation or automatic pre-torque compensation without a load cell	
	Real-time clock	Accurate real-time clock allows time-based floor service, peak service, and automatic password	
	Test Function	Easy to implement multiple elevator commissioning functions	
	Fault protection	Solutions to different levels of elevator faults	
	Intelligent management	Implements such functions as remote monitoring, user management, and elevator dispatch in group control	
	Safety checks at power-on	Safety check of peripheral devices, such as grounding and short- circuit, after power-on	
	State monitoring	Monitoring the status of feedback signals to ensure that the elevator works properly	

Item	Specification	
Inputs/ Outputs (I/O)	Power cable terminals	Control cabinet three-phase input terminals: R, S, T, (and N) Motor power cable input terminals: U, V, W
	Control terminal block	Mains power supply input terminals, motor brake coil terminals, fire emergency linkage and output terminals, (and shaft lighting terminals, overspeed governor terminals)
	PG card interface	Connected to the encoder cable.
Operation and commissioning	Operating panel (MR control cabinet)	Equipped with the emergency stop button, EEO switch, and EEO up/down button
	Operating panel (MRL control cabinet)	Equipped with the shaft lighting switch, overspeed governor reset button, and electric brake release button
	Keypad	3-digit LED display, implementing certain commissioning functions
	Operating Panel	5-digit LED display, enabling the query and modification of most parameters and the monitoring of system state
	Mobile phone APP	Views and modifies all parameters, uploads or downloads parameters, and monitors various system state parameters and running curves

Item	Specification	
Protection features	Phase loss protection	The AC drive provides the phase loss detection function. In case of incorrect input phase sequence, the control system will report phase loss and stop the elevator to prevent accidents.
	Grounding protection	Connect the peripheral grounding cable to the grounding copper busbar in the control cabinet to ensure that the control cabinet and the ground have the same electromotive force, avoiding electric shock.
	Over-temperature protection	If the transformer temperature rises due to too long system running time or other reasons, the system becomes disconnected when the transformer temperature exceeds 105°C. When the transformer temperature falls to below 75°C, the system restores running.
	Short circuit protection	The drive controller is protected when any two-phase short circuit on the output side causes overcurrent.
	Speed abnormality protection	When the encoder feedback speed exceeds the limit or the deviation between the torque limit and the feedback speed is too large, the system will immediately perform protection, generate an alarm, and prohibit running, achieving quick protection against abnormal elevator speed.
	Rotary encoder abnormality protection	The system performs protection immediately to prevent accidents when any of the following rotary encoder malfunctions occurs: phase loss, reverse direction, disconnection, and pulse interference.
	Leveling switch abnormality protection	Leveling switches are malfunctioned when they fail and are stuck. The system judges the malfunction type according to the change of leveling signal feedback. If the leveling signals have no change in the set time, the system will generate an alarm.
	Floor data abnormality protection	The system obtains the floor information through shaft auto-tuning. If the floor data is abnormal, the system reports the fault during first-time running after power-on. During actual running, the system continuously compares the position information input by signals with the stored floor data. If the deviation between them is too large, the system generates an alarm.

Item	Specification	
Environment	Altitude	Below 1000 m (De-rated by 1% for each 100 m higher if the altitude is above 1000 m)
	Ambient temperature	–10°C to +45°C (De-rated if the ambient temperature is above 40°C)
	Humidity	Less than 95%RH, non-condensing
	Vibration	Below 5.9 m/s^2 (0.6 g)
	Storage temperature	–20°C to +55°C
	Pollution degree	PD2
	IP rating	IP20
	Power distribution system	TN/TT

2.5 Major Components of the Control Cabinet

2.5.1 NICE3000^{new} Integrated Controller

The NICE3000^{new} series integrated elevator control system combines the functions of both the elevator controller and high-performance vector AC drive. Select the proper controller according to the actual required motor and brake parameters.

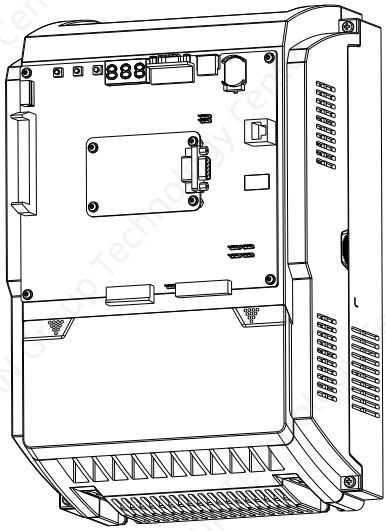


Figure 2-8 NICE3000^{new} integrated elevator controller

The integrated controller is the core of the NICE3000-B/W control cabinet. Select a proper model based on the motor power, input/output current, and power capacity. The following table lists the details.

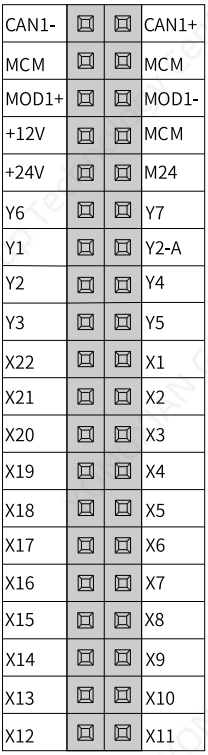
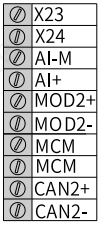
Table 2–5 Related parameters about the integrated elevator controller

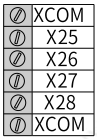
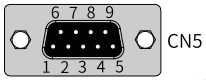
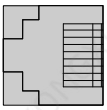
Power capacity (kVA)	Input current (A)	Output current (A)	Applicable motor (kW)	Control cabinet model
8.9	14.8	13	5.5	NICE3000-B/W-4005
11	20.5	18	7.5	NICE3000-B/W-4007
17	29	27	11	NICE3000-B/W-4011
21	36	33	15	NICE3000-B/W-4015
24	41	39	18.5	NICE3000-B/W-4018
30	49.5	48	22	NICE3000-B/W-4022
40	62	60	30	NICE3000-B/W-4030
57	77	75	37	NICE3000-B/W-4037

Note

The integrated controller is also applicable to the NICE3000-W MRL control cabinet models.

Table 2–6 Description of control circuit terminals on the MCB

Mark	Code	Name	Function	Layout
CN1	Y1 to Y7/ Y2A	Relay control signal output	Functions are set by F5-26 to F5-31 and F5-45 to F5-46	 CN1
	CAN1+/-	CANbus differential signals	CAN communication interface with the CTB, MRL monitoring board and DI/DO expansion board interface	
	MOD1+/-	RS485 differential signals	Standard RS485 communication interface for hall call and display	
	M24V/ +12V/ +24V/ MCM	Power supply	24 V power supply and emergency 12 V power input	
	X1 to X22	Digital input	Input voltage range of 10 VDC to 30 VDC. DI terminal function is set by F5-01 to F5-24.	
CN3	X23-X24/ MCM			 CN3
	AI-M/AI+	Analog differential input	Used for the analog load cell device	
	MOD2+/-	RS485 differential signals	MOD2 communication interface, used for remote monitoring and Internet of Things	
	CAN2+/-	CANbus differential signals	CAN2 communication interface, used for parallel/group control	

Mark	Code	Name	Function	Layout
CN2	X25 to X28/ XCOM	High-voltage detection terminal	Input voltage 110 VAC ±15% and 110 VDC ±20% for safety and door lock feedback circuits: functions are set by F5-37 to F5-40	
CN8	USB interface	RS232 communication interface	Mobile phone bluetooth commissioning interface	
CN5	DB9 interface	RS232 communication interface	For site commissioning software, remote elevator monitoring board, RS232/ RS485 parallel/group control, and MCB and DSP board software download	
CN12	RJ45 interface	Operating panel interface	Operating panel connection	
J12	PG card connection			
J1	Used by the manufacturer only, optional grounding terminal for AI, and COM not shorted by default			

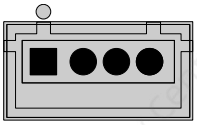
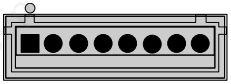
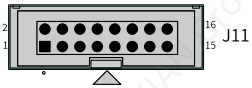
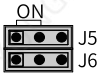
Mark	Code	Name	Function	Layout
J2	Drive board connection			
J3				
J4				
J11				
J5 J6	Used by the manufacturer only, MOD2 termination resistor, and ON shorted by default			
J13 J14	Used by the manufacturer only, CAN2 termination resistor, and ON shorted by default			
J9/J10	Used by the manufacturer only. Do not short these terminals randomly. Otherwise, the control cabinet may not work properly.			-

Table 2–7 Description of indicators on the MCB

Mark	Name	Function
MOD2	Modbus2 indicator	Flashing (green) for normal communication with IoT and remote monitoring board
COP	CAN1 indicator	Flashing (green) for normal communication between the MCB and CTB
HOP	Modbus1 indicator	Flashing (green) for normal communication between the MCB and HCB
CAN2	Group control indicator	Steady ON (green) for parallel/group control communication and flashing for normal running in parallel/group control mode
232	Serial communication indicator	Flashing (green) for normal communication with the host controller and remote monitoring board

Mark	Name	Function
X1 to X28	Input signal indicator	Lights up when the external input signal is active.
Y1 to Y7/ Y2A	Output signal indicator	Lights up when the system has an output.

2.5.2 Braking Components

The NICE3000^{new} series integrated controller models of 75 kW and below have built-in brake units. So the control cabinet is only equipped with the braking resistor (installed inside the resistor box).

Select a proper braking resistor according to the following table.

Table 2–8 Recommended braking component selection of the NICE3000^{new} integrated elevator controller

Controller model	Motor power (kW)	Max. resistance (Ω)	Min. resistance (Ω)	Power (W)	Braking unit
Three-phase 380 V (range of 380 V to 440 V)					
NICE-L-C-4005	5.5	115	90	1600	Built-in
NICE-L-C-4007	7.5	85	65	2500	
NICE-L-C-4011	11	55	43	3500	
NICE-L-C-4015	15	43	35	4500	
NICE-L-C-4018F	18.5	34	25	5500	
NICE-L-C-4022F	22	24	22	6500	
NICE-L-C-4030F	30	20	16	9000	
NICE-L-C-4037F	37	16	13	11000	

Note

Contact Inovance or your supplier to replace the braking resistor.

2.5.3 Transformer

NICE3000-B series integrated control cabinet has the control transformer (TRF) as standard configuration with 110 VAC safety circuit output. The details are shown in the following table.

Table 2–9 Control transformer (TRF) parameters

Model	Capacity	Input voltage	Output voltage	Remark
TRF	63VA	220 VAC	125 VAC	Standard for size 1 and size 2
TRF	110VA	220 VAC	125 VAC or 110 VAC	Standard for size 3

Note

The control transformer (TRF) has overtemperature protection. This function is activated when the transformer temperature reaches 105°C and deactivated when the transformer temperature drops to 70°C.

2.5.4 Brake Power Supply Board

The brake of the NICE3000-B control cabinet is powered by the brake power supply board.

The standard brake voltage can be set to different values in the range of 48 V to 207 V. The sustaining voltage is adjustable. The following figure shows the brake power supply board.

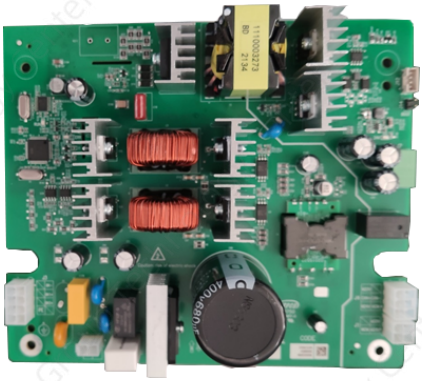


Figure 2-9 Brake power supply board appearance

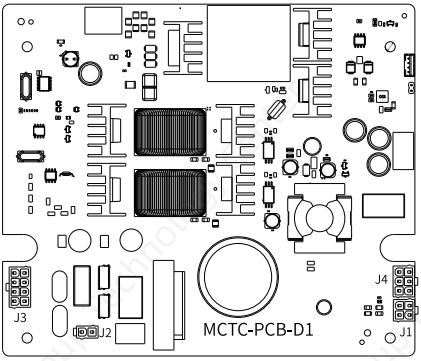
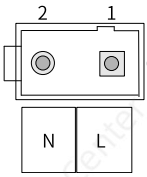
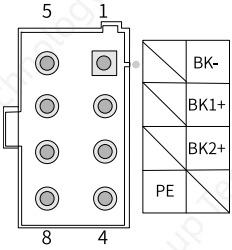
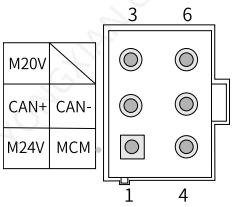


Figure 2-10 Layout of the brake power supply board terminals

Table 2–10 Description of the brake power supply board terminals

Name	Layout	Function	Max. current	Holding current
J2 terminal		220 V input	5 A	-
J3 terminal		Brake output	One-channel 3 A	One-channel 2 A
J4 terminal		24 V system power supply output	6.7 A (160 W)	-

Note

- PE is the grounding terminal.
- J3 terminal outputs brake voltage that can be adjusted from 48 V to 207 V and high-voltage startup of brake can be adjusted from 0s to 5s.
- J4 terminal outputs power 160 W with adjustable voltage output of 24 V, 26 V, 28 V, and 30 V.
- The maximum current is 6.7 A for 24 V output and 5.3 A for 30 V.

2.5.5 Main Control Interface Board

The NICE3000-B provides fixed interfaces, facilitating the wiring and reducing the number of cables required. For peripheral device cables, you can either choose the service package offered by Inovance or fabricate the cables by yourself according to the wiring diagram provided by Inovance.

The following figure shows the interface board.

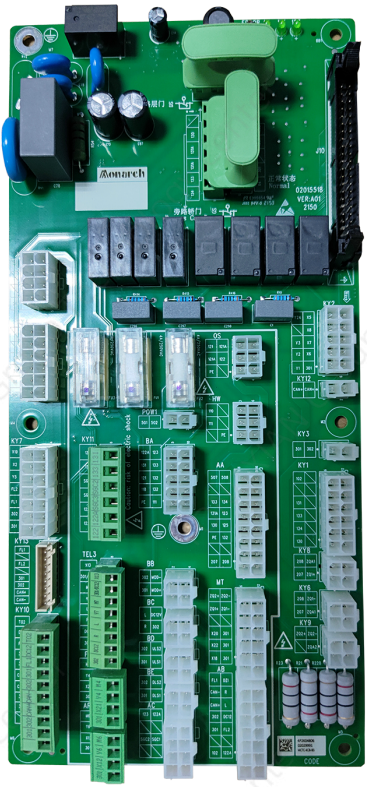


Figure 2-11 Interface board appearance

The following figure shows the terminal layout.

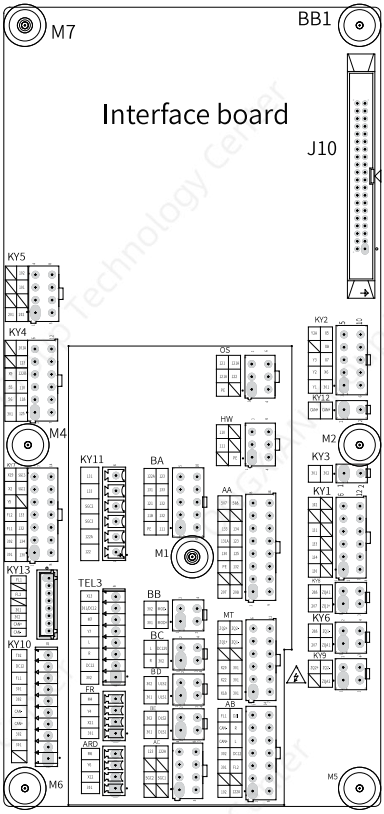


Figure 2-12 Layout of interface board terminals

Note

For more details, see *"4.1.4 Main Control Interface Board Terminals" on page 59*.

2.5.6 PG Card

The controller in all models of the control cabinet is equipped with a PG card to implement the FVC. According to the type of external motors, different types of PG card will be configured (MCTC-PG-E for synchronous motor and MCTC-PG-A2 for asynchronous motor).

Table 2–11 MCTC-PG card selection

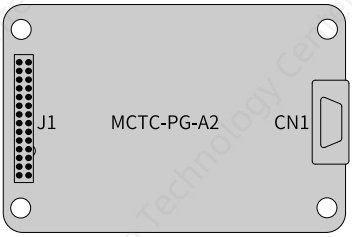
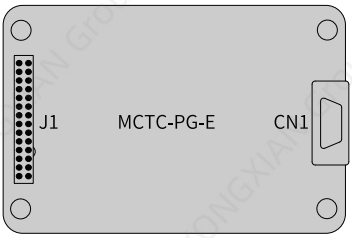
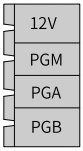
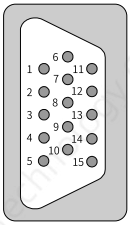
Motor type	Encoder type	PG card	Appearance
Asynchronous motor	Incremental encoder with push-pull/open-collector encoder output	MCTC-PG-A2	
Synchronous motor	Sin/Cos encoder	MCTC-PG-E	

Table 2–12 Definitions of the CN1 terminals of different PG card models

Terminal No.	Mark	Terminal No.	Mark	Terminal No.	Mark	Terminal No.	Mark
MCTC-PG-A2		MCTC-PG-E					
1	12V	1	B-	6	A-	11	C-
2	PGM	2	Null	7	COM	12	D+
3	PGA	3	Z+	8	B+	13	D-
4	PGB	4	Z-	9	VCC	14	Null
-	-	5	A+	10	C+	15	Null
 CN1		 CN1					

2.5.7 Terminal Block of the Control Cabinet

The main circuit terminals are screw-clamping terminals, which creates a secure and stable connection. Also, they have transparent protective covers to prevent electric shock.

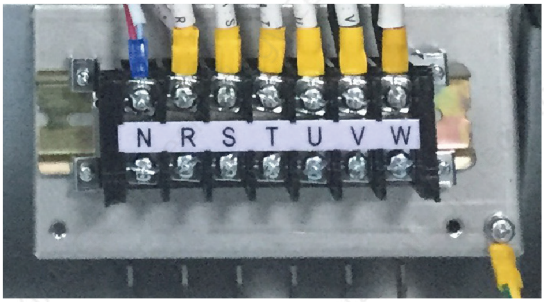


Figure 2-13 Main circuit terminals

For details about the main circuit terminals and control signal terminals, see *"4.1.2 Main Circuit Terminals" on page 57* and *"4.1.3 Control Signal Terminals" on page 58*.

2.6 List of Accessories

Contact the sales personnel of Inovance as required. The following accessories are delivered with the control cabinet.

Table 2–13 List of accessories

Accessories	Model	Function	Remark
External operating panel and wire	MDKE	LED operating panel with powerful and user-friendly functions	RJ45 interface
Plug and pin	Applicable to the interface board	For jobsite use with prefabricated cables	Contact Inovance.

3 Mechanical Installation

3.1 Requirements on Installation

3.1.1 Installation Environment Requirements

Item	Requirement
Altitude	1000 m or below (de-rated by 1% for each 100 m higher if the altitude is above 1000 m) Maximum altitude: 3000 m
Ambient temperature	–10°C to +45°C, with the rated current de-rated by 1.5% for each 1°C higher if the ambient temperature is above 40°C; Maximum temperature: +45°C; Temperature variation: < 0.5°C/min
Humidity	Less than 95%RH, non-condensing.
Vibration	Below 5.9 m/s^2 (0.6 g)
Height	For a machine-room control cabinet, the net height of the working area cannot be less than 2.5 m.
Working area in front of the control cabinet	For inspection and repair, reserve a 0.5m x 0.7m space in front of the control cabinet.
Ventilation	The machine room must be properly ventilated to protect the control cabinet and cables from dust, harmful gas, and moisture.

3.1.2 Mounting Clearance Requirements

For the dimensions of the control cabinet and backplate installation, see related drawings in delivered technical documents. Install all cabinets according to the drawings, with sufficient space around for air flow, maximum door swing, and maintenance. Provide a passageway for entering the installation foundation and reserve sufficient space for the auxiliary equipment to transport the control cabinet.

MR Control Cabinet

There is no requirement on the clearance between the equipment back and the wall. Ensure the equipment can be placed in the room. The minimum height of room in which the equipment is installed is 2500 mm. The clearance between the equipment front and the wall and between the equipment side and the wall must not be less than 700 mm and 600 mm, respectively. All cabinets must be fixed on hard surfaces by expansion bolts.

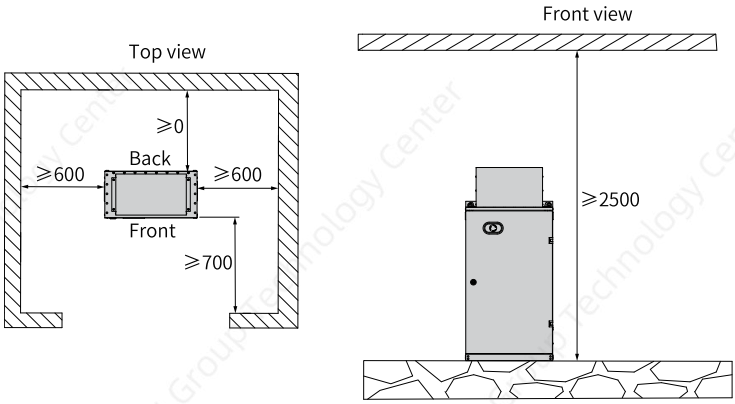


Figure 3-1 Mounting clearance requirements of the MR control cabinet (Unit: mm)

Note

The space requirements above are applicable to both backplate-mounted and floor-mounted control cabinets.

MRL control cabinet

The equipment back is connected to the shaft. The minimum height of the room in which the control cabinet is placed is 2000 mm, greater than the height of the control cabinet. The minimum clearance between the equipment front and the wall is 700 mm. There is no requirement on the clearance between the equipment side and the wall. Ensure the equipment can be placed in the room.

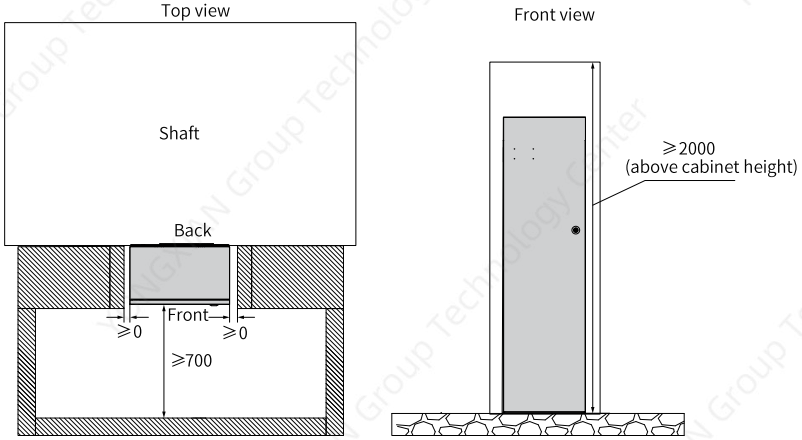


Figure 3-2 Mounting clearance requirements of the MRL control cabinet (Unit: mm)

3.2 Handling

3.2.1 Packaged Cabinet

The packaged cabinet can be moved using a forklift or crane.

Forklift

When using the forklift, adjust the fork spread to maintain stability and prevent the cabinet from tipping over.

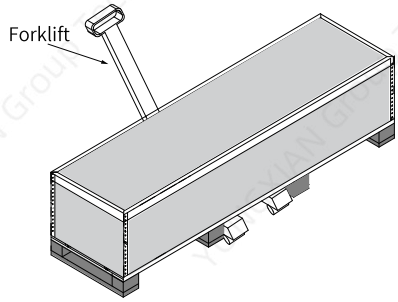


Figure 3-3 Moving the packaged cabinet using a forklift

Crane

When hoisting the cabinet with a crane, have people stationed on the left and right sides to ensure stability and minimize any swinging that could occur during the lifting process.

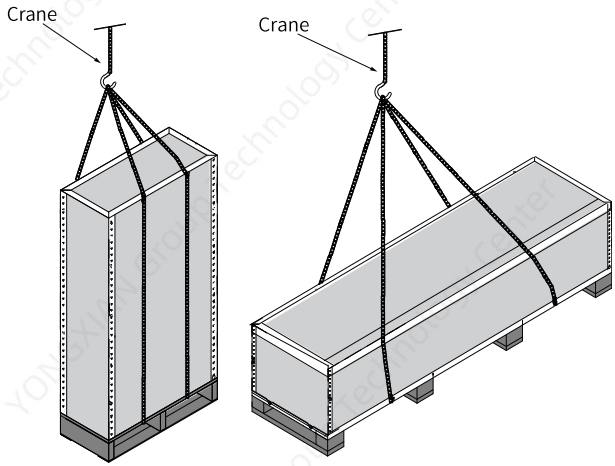


Figure 3-4 Moving the packaged cabinet using a crane

3.2.2 Cabinet Unpacking

Square holes are cut into the cabinet sides as a secure grip for manual handling. Use great care when moving the cabinet to prevent any damage.

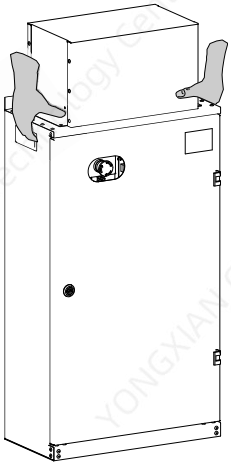


Figure 3-5 Moving the cabinet after unpacking

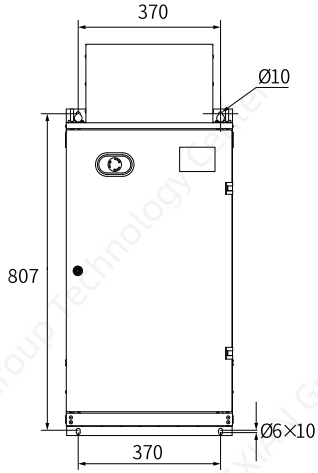
3.3 Installation Guide

3.3.1 MR Control Cabinet

There are two installation methods: backplate mounting for the models of 15 kW and below and floor mounting for models of above 15 kW. See the following part for details.

Backplate Mounting

The locations and dimensions of the two mounting holes in the upper and lower parts each of the cabinet back are shown in the following figure.



NICE3000-B-4005 to NICE3000-B-4015

Figure 3-6 Locations and dimensions of the mounting holes of the backplate-mounted control cabinet (Unit: mm)

Fix the control cabinet on the wall using four M8 expansion bolts. The following figure shows the backplate mounting details.

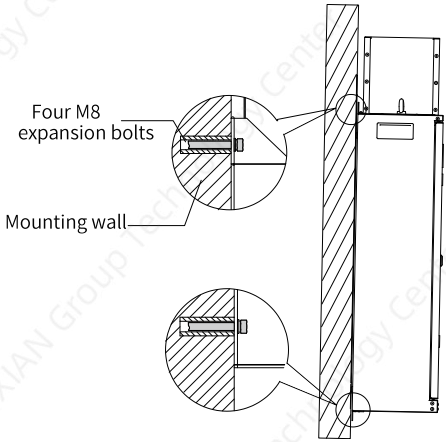


Figure 3-7 Backplate mounting of the control cabinet

Note

Mount the control cabinet on the wall close to the motor.

Floor Mounting

There are four mounting holes at the bottom, two on the left and the right each. The locations and dimensions of mounting holes are shown in the following figure.

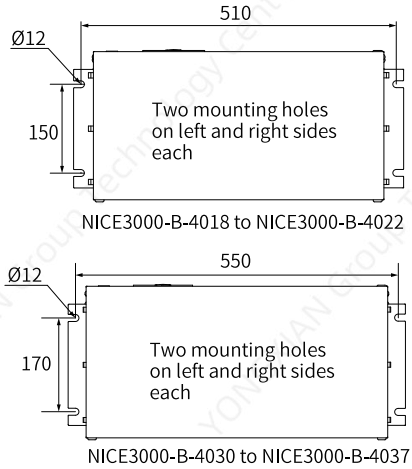


Figure 3-8 Locations and dimensions of the mounting holes of the floor-mounted control cabinet (Unit: mm)

Fix the control cabinet on the floor using four M8 expansion bolts. The following figure shows the floor mounting details.

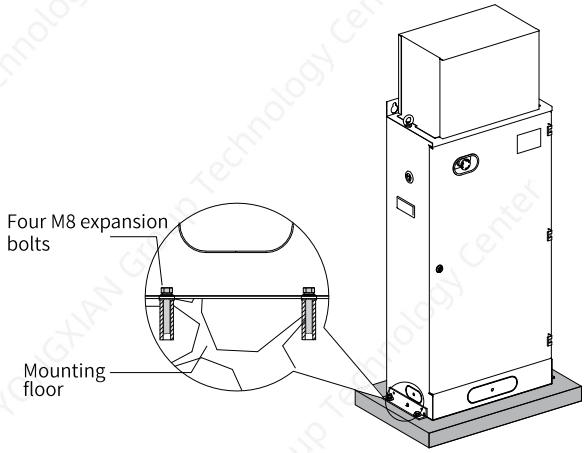


Figure 3-9 Floor mounting of the control cabinet

3.3.2 MRL Control Cabinet

The MRL control cabinet is floor-mounted.

There are eight holes at the bottom with the four located at the outer edge being the mounting holes. The details are shown in the following figure.

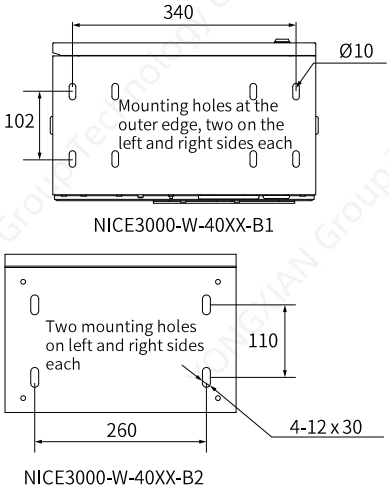


Figure 3-10 Locations and dimensions of the mounting holes at the bottom of the MRL control cabinet (Unit: mm)

During installation, the cabinet is fixed directly to the floor with four M8 expansion bolts. See the following figure.

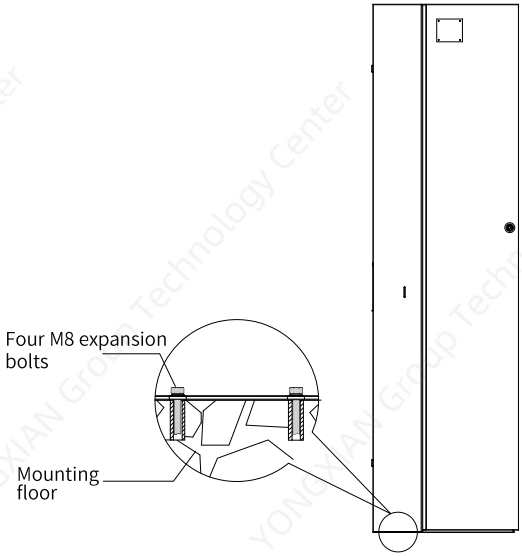


Figure 3-11 Mounting of the MRL control cabinet

3.3.3 MRL Braking Resistor Box

The braking resistor box of the MR elevator control cabinet is installed on the cabinet top. The braking resistor box has to be separately from the MRL cabinet due to cabinet height limit.

There are four mounting holes at the bottom of the braking resistor box, two on the left side and two on the right side. The locations and dimensions of mounting holes are shown in the following figure.

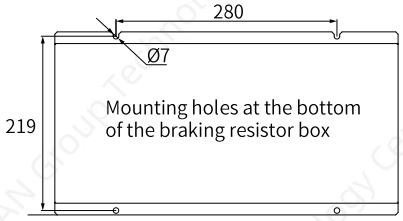


Figure 3-12 Locations and dimensions of mounting holes at the bottom of the braking resistor box (Unit: mm)

During installation, fix the braking resistor box vertically on the wall by using four M8 expansion bolts. The following figure shows the installation of the braking resistor box.

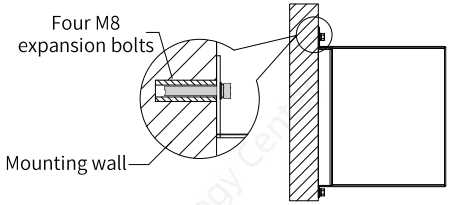


Figure 3-13 Installation of the braking resistor box

Note

- Install the braking resistor box of the MRL control cabinet in a site near the control cabinet in the shaft. The location is up to you.
- The brake resistor box is equipped with a 4-m resistance wire.
- After the installation is complete, connect the resistor cable to terminals PB and + on the controller. You can determine the wiring mode yourself based on the working condition. Consult the technical personnel of Inovance if you have any problem.

4 Electrical Installation

The electrical installation method varies with different control cabinets. Select the appropriate control cabinet for your specific application and control system. In general, the MR control cabinet must be equipped with an external power distribution box, and each elevator must be installed with a main switch that can cut off all power supply circuits.

Caution

- All the peripheral cables must be prepared.
- Ensure that the cross sectional area and voltage withstanding capacity of power cables and control power input cables meet the requirements.
- Route the input cables and output cables separately to avoid cable mixing and danger caused by insulation damage.
- Signal cables and power cables must be laid separately. Use shielded twisted pairs (STPs) as analog signal cables, and ensure that the shielded cables are reliably grounded at one end.
- Before measuring the insulation resistance of the transformer or conducting the mains frequency test, the cables between the main control board and the interface board must be disconnected. Otherwise, damage to the unit will result.
- Do not omit the short-circuit cables in the control cabinet. Otherwise, dangers may be caused.

4.1 Interface to External Devices

This section mainly introduces the major external interfaces in the control cabinet. Prepare the peripheral cables according to the schematic diagrams. Before wiring, make preparations following the descriptions in this section.

The external interfaces in the control cabinet include main circuit terminals, signal cable terminals, grounding copper busbar, and PG card port.

4.1.1 Locations of External Interfaces

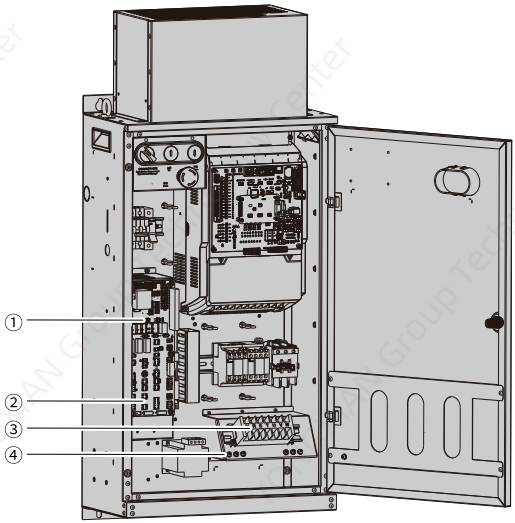


Figure 4-1 Locations of external interfaces in the MR control cabinet (NICE3000-B-40XX)

No.	Name	No.	Name
①	Interface board	③	Main circuit terminal
②	Control signal terminal	④	Grounding connection

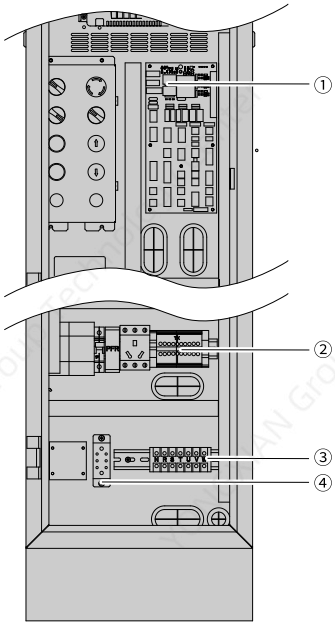


Figure 4-2 Locations of external interfaces in the MRL control cabinet (NICE3000-B-40XX-B1)

Table 4–1 Components of NICE3000-B-40XX-B1

No.	Name	No.	Name
①	Interface board	③	Main circuit terminal
②	Control signal terminal	④	Grounding connection

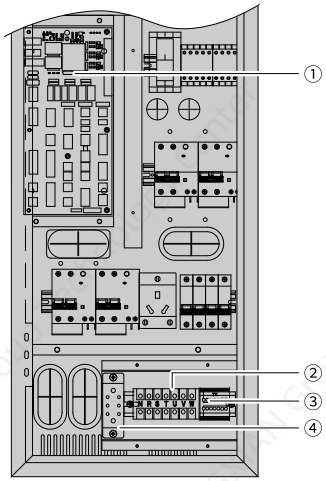


Figure 4-3 Locations of external interfaces in the MRL control cabinet (NICE3000-B-40XX-B2)

Table 4–2 Components of NICE3000-B-40XX-B2

No.	Name	No.	Name
①	Interface board	③	Control signal terminal
②	Main circuit terminal	④	Grounding copper busbar

4.1.2 Main Circuit Terminals

The main circuit terminals are screw-clamping terminals, which creates a secure and stable connection. Also, they have transparent protective covers to prevent electric shock. The MR and MRL control cabinets have the same main circuit cable interfaces.

The terminal layout of the main circuit is shown in the following figure.

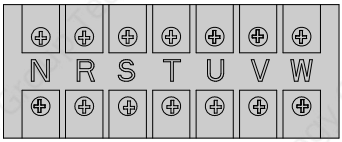


Figure 4-4 Main circuit terminals

N, R, S, and T are power input terminals of the control cabinet, and U, V, and W are output terminals.

Table 4–3 Main circuit terminal description

Mark	Function
(N), R, S, T	Three-phase power input terminals; N: neutral terminal
U, V, W	Control cabinet output terminals, connected to the motor

The following figure shows the main circuit connection.

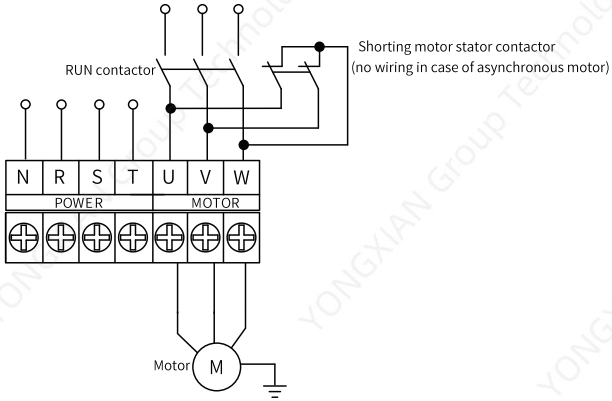


Figure 4-5 Main circuit connection

Note

- During installation, ensure the proper phase sequence of main circuit cables and correct input/output cables. Otherwise, the control cabinet cannot operate properly.
- During wiring, connect the neutral wire (N) to the control cabinet. Otherwise, the control cabinet cannot operate properly.

4.1.3 Control Signal Terminals

MR Control Cabinet

Except for the main circuit terminals, all the signal terminals of the MR control cabinet are located on the interface board.

MRL Control Cabinet

Weidmüller 2.5 mm^2 feed-through crimp terminals are used for the signal terminals in the MRL control cabinet to connect to the corresponding external interfaces. There are seven numbered signal terminals in the control cabinet for two signal types, overspeed governor signal and shaft lighting signal. Control signal terminals are shown in the following figure.

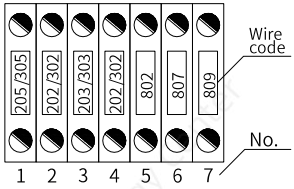


Figure 4-6 Signal terminals of the MRL control cabinet

Signal terminals in the MRL control cabinet differ from those of the MR cabinet in terms of the quantity and function. The overspeed governor coil terminal and the shaft lighting terminal are added, and there is no mains power supply input terminal.

Table 4–4 Terminal description

Terminal	Wire code	Function	Remark
1 to 4	205, 202, 203, and 202	220 V voltage is supplied to the overspeed governor coil by the control cabinet. Terminals 203 and 202 are connected to the overspeed governor remote activation coil and 205 and 202 to the releasing coil.	220 VAC is newly provided
	305, 302, 303, and 302	220 VDC voltage is supplied to the overspeed governor coil by the control cabinet. Terminals 303 and 302 are connected to the overspeed governor remote activation coil and 305 and 302 to the releasing coil.	220 VDC is newly provided
5 to 7	802, 807, 809	They are for shaft lighting and the shaft lighting switch is in the MRL control cabinet.	Standard configuration

4.1.4 Main Control Interface Board Terminals

The interface board for the control cabinet is of the same model and the Molex solder terminal blocks are used to minimize the number of cables and simplify user operations.

Terminal layout is shown in the following figure.

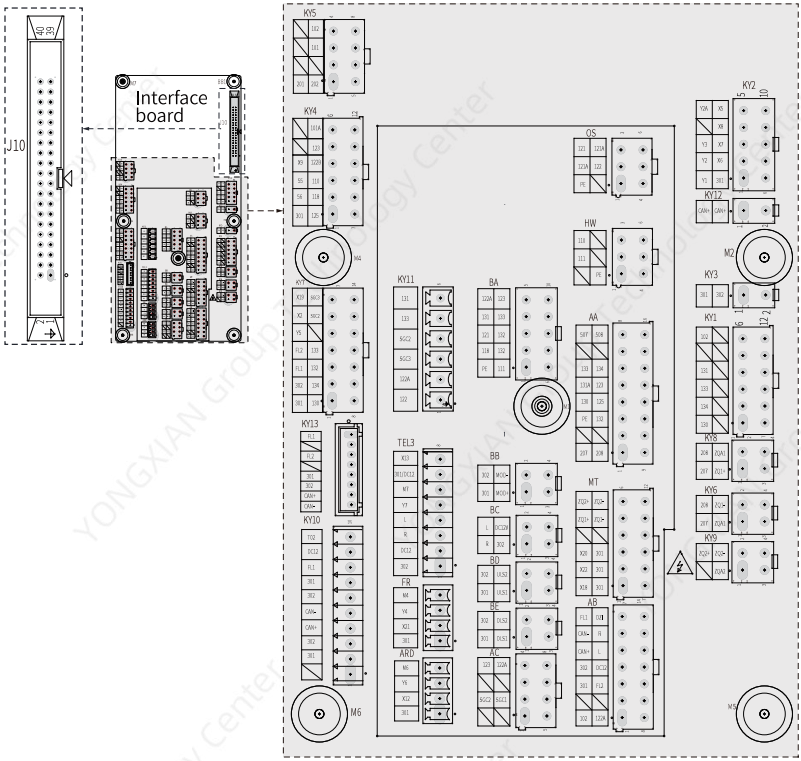


Figure 4-7 Layout of interface board terminals

Table 4–5 External interface definition of interface board terminals

Plug-in	Signal No.		Function description	
AA (Traveling cable terminal)	507	508	507	Car lighting power supply 220 V- N
	-	-	508	Car lighting power supply 220 V - L
	133	134	133	Car door lock safety signal - 110 V
	131A	123	134	Car top safety signal - 110 V
	130	125	131A	Front car door lock end signal 110 V
	PE	132	123	Car top safety signal 110 V
	-	-	130	Safety circuit end signal 110 V
	207	208	125	EEO signal - 110 V
			PE	Grounding
			132	Front landing door lock end signal 110 V
			207	Door operator power supply 220 V - L
			208	Door operator power supply 220 V - N
AB (Traveling cable terminal)	FL1	DZI	FL1	Up leveling signal - X1
	CAN-	R	DZI	Door zone signal - X2
	CAN+	L	CAN-	CAN-
	302	DC12	R	Intercom signal +
	301	FL2	CAN+	CAN+
	-	-	L	Intercom signal –
	102	122A	302	24 V power supply –
			DC12	12 V intercom signal +
			301	24 V power supply +
			FL2	Down leveling signal - X3
			102	Safety circuit - neutral wire
			122A	Disconnection of safety circuit start in bypass state
AC (Traveling cable terminal)	123	122A	123	Disconnection of safety circuit end in EEO state
	-	-	122A	Disconnection of safety circuit start in bypass state
	SGC2	SGC1	SGC2	Auxiliary car door lock 2
	-	-	SGC1	Auxiliary car door lock 1

Plug-in	Signal No.		Function description	
BA (Shaft safety cable)	122A	123	122A	Disconnection of safety circuit start in bypass state
	131	133	123	Disconnection of safety circuit end in EEO state
	121	132	131	Landing door lock circuit start point
	118	132	133	Rear landing door lock circuit end point
	PE	111	121	Shaft/Pit safety circuit end point
			132	Front landing door lock circuit end point
			118	Pit shorting point in EEO state
			PE	Grounding wire connected to the safety circuit
			111	Shaft/Pit safety circuit start point
BB (Pit intercom terminal)	302	MOD-	302	12/24 V power supply common terminal
	301	MOD+	MOD-	Modbus signal –
			301	24 V power supply +
			MOD+	Modbus signal +
BC (Hall call communication terminal)	L	12V DC	L	Intercom signal - L
	R	302	12V DC	Intercom power supply +12 V
			R	Intercom signal - R
			302	Intercom power ground
BD (Up slow-down switch terminal)	302	ULS2	302	24 V power supply –
	301	ULS1	ULS2	Up slow-down 1 signal input - X14
			301	24 V power supply +
			ULS1	Up slow-down 2 signal input - X16
BE (Down slow-down switch terminal)	302	DLS2	301	24 V power supply +
	301	DLS1	302	24 V power supply –
			DLS2	Down slow-down 1 signal input - X15
			DLS1	Down slow-down 2 signal input - X17

Plug-in	Signal No.		Function description	
MT (Motor brake signal terminal)	ZQ2+	ZQ2-	ZQ2+	Output brake power supply 2 +
			ZQ2-	Output brake power supply 2 –
	ZQ1+	ZQ1-	ZQ1+	Output brake power supply 1 +
	-	-	ZQ1-	Output brake power supply 1 –
	X20	301	X20	Motor over-temperature protection detection input
	X22	301	301	24 V power supply +
	X18	301	X22	Brake travel switch 2 detection input
			X18	Brake travel switch 1 detection input
HW (Hand wheel terminal)	110	-	110	Hand wheel switch start point
	111	-	111	Hand wheel switch end point
	-	PE	PE	Safety circuit grounding
OS (Overspeed governor switch terminal)	121	121A	121	Overspeed governor switch start point
	121A	122	121A	Reserved for counterweight overspeed governor
	PE	-	122	Overspeed governor switch end point
			PE	Grounding
POW1 (Mains power supply input terminal)	501	502	501	Mains power supply - L
			502	Mains power supply - N
KY11 (Additional functions)	131		131	Landing door lock start point
	133		133	Landing door lock end point
	SGC2		SGC2	Auxiliary brake signal
	SGC3		SGC3	Auxiliary brake signal
	122A		122A	Backup safety switch end point
	122		122	Backup safety switch start point

Plug-in	Signal No.	Function description	
TEL3 (Machine room intercom)	X13	X13	Reserved DI
	301/DC12	301/DC12	Reserved DI power supply
	M7	M7	Alarm filtered DO
	Y7	Y7	Alarm filtered DO
	L	L	Intercom signal L
	R	R	Intercom signal R
	DC12	DC12	Intercom power supply
	302	302	Intercom ground
FR (Fire-related)	M4	M4	Fire emergency linkage DO
	Y4	Y4	Fire emergency linkage DO
	X21	X21	Fire emergency linkage signal
	301	301	DI power supply
ARD (Automatic rescue device)	M6	M6	Rescue completion signal
	Y6	Y6	Rescue completion signal
	X12	X12	Emergency leveling signal
	301	301	DI power supply

Table 4–6 Internal interface definition of MCB terminals

Plug-in	Code		Function description	
KY1 (MCB feedback signal)	102	-	102	Detection signal common terminal - N
	-	-	131	Front door lock stuck detection signal
	131	-	133	Rear door lock stuck detection signal
	133	-	134	Door lock circuit detection signal
	134	-	130	Safety circuit detection signal
	130	-		
KY2 (Contactor output and feedback)	Y2A	X5	Y2A	Brake 2 contactor output control
	-	X8	Y3	Shorting motor stator contactor output control
	Y3	X7	Y2	Brake 1 contactor output control
	Y2	X6	Y1	RUN contactor output control
	Y1	301	X5	Brake 2 contactor feedback
			X8	Shorting motor stator contactor feedback
			X7	Brake 1 contactor feedback
			X6	RUN contactor feedback
			301	24 V power supply +
KY3 (24 V input)	301	302	301	24 V power supply +
			302	24 V power supply –

<table>
<tr><th>Plug-in</th><th colspan="2">Code</th><th colspan="2">Function description</th></tr>
<tr><td rowspan="12">KY4
(EEO-related)</td><td rowspan="12"><table><tr><td>-</td><td>101A</td></tr><tr><td>-</td><td>123</td></tr><tr><td>X9</td><td>122B</td></tr><tr><td>55</td><td>110</td></tr><tr><td>56</td><td>118</td></tr><tr><td>301</td><td>125</td></tr></table></td><td>101A</td><td>Control cabinet emergency stop signal start point</td></tr>
<tr><td>123</td><td>EEO disconnection safety end point</td></tr>
<tr><td>X9</td><td>EEO signal input - X9</td></tr>
<tr><td>122B</td><td>EEO disconnection safety start point</td></tr>
<tr><td>55</td><td>EEO up input - X10</td></tr>
<tr><td>110</td><td>Control cabinet emergency stop signal end point</td></tr>
<tr><td>56</td><td>EEO down input - X11</td></tr>
<tr><td>118</td><td>Pit EEO shorting point</td></tr>
<tr><td>301</td><td>24 V power supply +</td></tr>
<tr><td>125</td><td>Car top EEO shorting point</td></tr>
<tr><td rowspan="4">KY5 (Power supply signal input)</td><td rowspan="4"><table><tr><td>-</td><td>102</td></tr><tr><td>-</td><td>101</td></tr><tr><td>-</td><td>-</td></tr><tr><td>201</td><td>202</td></tr></table></td><td>102</td><td>Safety circuit power supply - N</td></tr>
<tr><td>101</td><td>Safety circuit power supply - L</td></tr>
<tr><td>201</td><td>Door operator brake power supply input - L</td></tr>
<tr><td>202</td><td>Door operator brake power supply input - N</td></tr>
<tr><td rowspan="4">KY6
(Brake power supply box input and output)</td><td rowspan="4"><table><tr><td>208</td><td>ZQ1-</td></tr><tr><td>207</td><td>ZQA1</td></tr></table></td><td>208</td><td>Brake power supply box - N</td></tr>
<tr><td>207</td><td>Brake power supply box - L</td></tr>
<tr><td>ZQ1-</td><td>Output brake 1 power supply –</td></tr>
<tr><td>ZQA1</td><td>Output brake 1 power supply follow current</td></tr>
</table>

<table>
<tr><th>Plug-in</th><th>Code</th><th colspan="2">Function description</th></tr>
<tr><td rowspan="15">KY7
(Advance door opening)</td><td rowspan="15"><table><tr><td>X19</td><td>SGC3</td></tr><tr><td>X2</td><td>SGC2</td></tr><tr><td>Y5</td><td>-</td></tr><tr><td>FL2</td><td>133</td></tr><tr><td>FL1</td><td>132</td></tr><tr><td>302</td><td>134</td></tr><tr><td>301</td><td>130</td></tr></table></td><td>X19</td><td>Shorting door lock circuit relay feedback signal</td></tr>
<tr><td>X2</td><td>Door zone signal</td></tr>
<tr><td>Y5</td><td>Shorting door lock circuit relay output signal</td></tr>
<tr><td>FL2</td><td>Down re-leveling</td></tr>
<tr><td>FL1</td><td>Up re-leveling</td></tr>
<tr><td>302</td><td>24 V power supply –</td></tr>
<tr><td>301</td><td>24 V power supply +</td></tr>
<tr><td>SGC3</td><td>Auxiliary brake control signal output 2</td></tr>
<tr><td>SGC2</td><td>Auxiliary brake control signal output 1</td></tr>
<tr><td>133</td><td>Front door lock circuit end point</td></tr>
<tr><td>132</td><td>Front door lock circuit end point</td></tr>
<tr><td>134</td><td>Rear door lock circuit end point</td></tr>
<tr><td>130</td><td>Safety circuit end</td></tr>
<tr><td rowspan="4">KY8
(Brake 1 power supply and follow current)</td><td rowspan="4"><table><tr><td>208</td><td>ZQA1</td></tr><tr><td>207</td><td>ZQ1+</td></tr></table></td><td>208</td><td>Safety circuit transformer power supply N</td></tr>
<tr><td>207</td><td>Safety circuit transformer power supply L</td></tr>
<tr><td>ZQA1</td><td>Output brake 1 power supply follow current</td></tr>
<tr><td>ZQ1+</td><td>Output brake 1 power supply +</td></tr>
<tr><td rowspan="3">KY9
(Brake 2 power supply and follow current)</td><td rowspan="3"><table><tr><td>ZQ2+</td><td>ZQ2-</td></tr><tr><td>-</td><td>ZQA2</td></tr></table></td><td>ZQ2+</td><td>Brake 2 power supply +</td></tr>
<tr><td>ZQ2-</td><td>Brake 2 power supply –</td></tr>
<tr><td>ZQA2</td><td>Brake 2 power supply follow current</td></tr>
</table>

Plug-in	Code	Function description	
K10 (Backup in the cabinet)	T02 DC12 FL1 301 302 CAN1- CAN1+ 302 301 -	T02	MCB evacuation power supply
		DC12	Intercom power supply +
		FL1	Up re-leveling
		301	24 V power supply +
		302	24 V power supply –
		CAN1-	CAN1 communication
		CAN1+	CAN1 communication
KY12 (CAN communication)	CAN+ CAN-	CAN+	CAN signal of the brake power supply board in communication mode
		CAN-	
KY13 (Advance door opening drag signal)	FL1 - FL2 - 301 302 CAN+ CAN-	FL1	Up leveling signal input - X1
		FL2	Down leveling signal input - X3
		301	24 V power supply +
		302	24 V power supply –
		CAN+	CAN+
		CAN-	CAN-

Table 4–7 Description of interface board indicators

Mark	Name	Function
OV	Overvoltage protection circuit indicator	Red indicator steady ON for fault (380 V is input when 220 V input is the right option and the output is shorted)
111/121/123	Overvoltage protection circuit indicator	Green indicator steady ON for normal conditions (the safety circuit before 111/121/123 functions normally)

4.1.5 Grounding System

A uniform grounding wire position is reserved in the control cabinet. Ground the exposed conductive part to ensure that the control cabinet enclosure and the power grid grounding cable have the same electromotive force (EMF), thereby avoiding personal injuries caused by electric shock by indirect contact.

During the wiring process, the grounding wire is passed through the corresponding terminal hole, and then the screw on the terminal is tightened using a cross-head screwdriver, fixing it into the grounding hole.

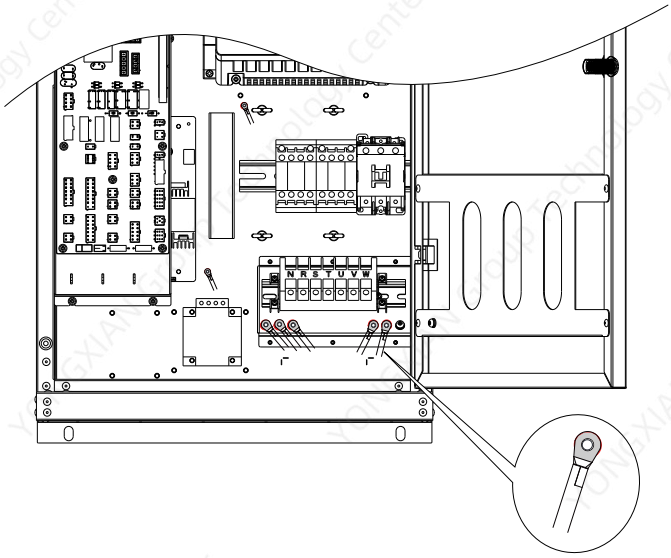


Figure 4-8 Grounding wire installation into the grounding hole

Note

- Select the appropriate grounding cable. For selection details, see *"Table 4–8 " on page 73*.
- Mark the grounding cable clearly.
- Before wiring, confirm that the control cabinet is de-energized.
- After the wiring is complete, confirm that all bolts on the copper busbar are tightened to prevent current leakage.

4.1.6 PG Card Connection

A speed closed-loop vector system is formed by connecting the J1 terminal and CN1 terminal of the MCTC-PG card to the J12 terminal of the MCB on the NICE3000^{new} and the encoder of the motor traction machine respectively. The connection between different MCTC-PG cards and the MCB is the same, but the connection between the MCTC-PG cards and the encoder varies with the port type of these cards. The following figure shows the electrical connection between the MCTC-PG-E card and NICE3000^{new} integrated controller.

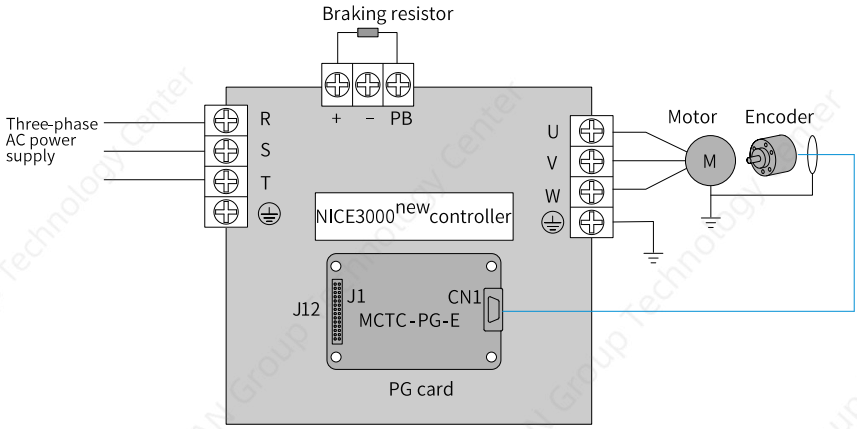


Figure 4-9 Electrical connection between the MCTC-PG-E card and NICE3000^{new} integrated controller

Note

- The elevator control cabinet is designed with specialized encoder wire inlets and outlets to prevent EMI. Follow the relevant instructions in the manual.
- CN1 terminal of the MCTC-PG-A2 is a screw-clamping terminal. Before installation, prepare a straight screwdriver.
- CN1 terminal of the MCTC-PG-E is a DB15 female. The encoder cables prepared by users themselves must be equipped with a DC15 male.

4.2 Wiring of External Interfaces

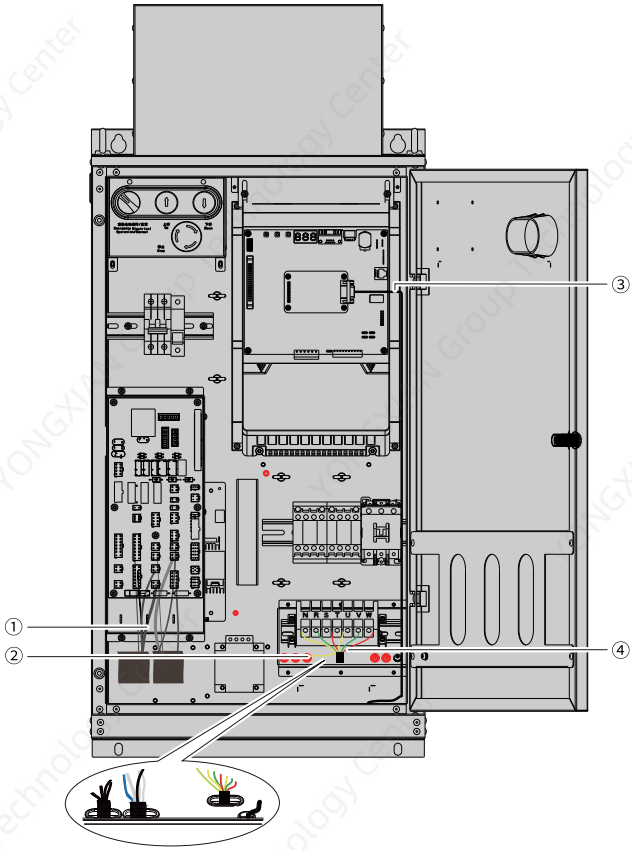


Figure 4-10 Wiring of external interfaces in the MR control cabinet

No.	Name	No.	Name
①	Interface board wiring	③	Encoder wiring
②	Grounding cable wiring	④	Main circuit terminals wiring

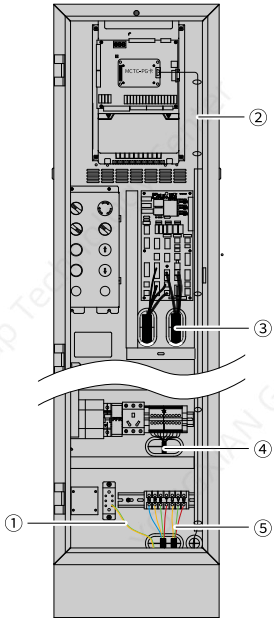


Figure 4-11 Wiring of external interfaces in the MRL control cabinet

No.	Name	No.	Name
①	Grounding cable wiring	④	Control signal terminals wiring
②	Encoder wiring	⑤	Main circuit terminals wiring
③	Interface board terminals wiring	-	-

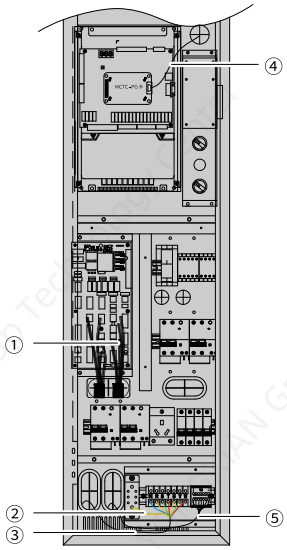


Figure 4-12 Wiring of external interfaces in the MRL control cabinet

No.	Name	No.	Name
①	Interface board terminals wiring	④	Encoder wiring
②	Grounding cable wiring	⑤	Control signal terminals wiring
③	Main circuit terminals wiring	-	-

Power cables, control cables and encoder cables are routed separately to reduce EMC interference.

4.3 Peripheral Cable Selection

For better use of the control cabinet, prepare peripheral cables according to the following table.

Table 4–8 Recommended peripheral cables

Control cabinet power rating (kW)	Circuit breaker (A)	Contactor (A)	Power cable cross section (mm^2)	Control cable cross section (mm^2)	Grounding cable cross section (mm^2)
2.2	20	9	2.5	0.75	0.75
3.7	20	12	2.5	0.75	1.5
5.5	25	18	6	0.75	2.5
7.5	32	18	6	0.75	4
11	40	25	6	0.75	6

Control cabinet power rating (kW)	Circuit breaker (A)	Contactor (A)	Power cable cross section (mm^2)	Control cable cross section (mm^2)	Grounding cable cross section (mm^2)
15	50	32	6	0.75	6
18.5	63	50	10	0.75	10
22	80	65	10	0.75	10
30	100	65	16	0.75	16
37	100	80	16	0.75	16

4.4 Major Electrical Circuits

This section mainly describes the major electrical circuits of the control cabinet. To ensure the normal operation of the entire circuit, read this section and the schematic diagrams of the control cabinet before using the product.

4.4.1 Main Circuit

See *"Figure 7–1 " on page 105* .

Note

- Ensure that the main circuit input cable is a three-phase five-wire cable and the power distribution box is equipped with a built-in quad air switch. Additionally, disconnect the three-phase power supply and neutral wire. Note: The input power supply of the elevator system must be three-phase five-wire. Otherwise, the system cannot operate normally.
- The power distribution box in the machine room is equipped with a car lighting RCD, shaft lighting RCD, and dual-control light switch to implement leakage current protection for the car/shaft lighting and the circuit whose socket voltage exceeds 50 V.
- Inside the control cabinet, the safety circuit RCD and door operator circuit RCD are the standard configuration with the leakage current limit of 30 A.

4.4.2 Safety and Door Lock Circuits

For the schematic diagram of the safety circuit, see *"Figure 7–2 " on page 106* .

The MCB is designed with four high voltage detection points (X25, X26, X27, and X28) which are used for safety detection, door lock stuck detection, door lock detection, and door lock stuck detection respectively. Internally, it is added with three safety circuit high voltage detection points used for indicating the on/off state of the control cabinet safety circuit, pit safety circuit, and machine room safety circuit. This allows users to locate the safety circuit fault on the site conveniently. The safety circuit is

powered by the cabinet transformer with standard voltage of 110 VAC. The safety circuit is disconnected in the following conditions.

The emergency stop switch in the control cabinet operates; The electrical switch controlling safety components is off.

At startup, the elevator runs normally only when the four high voltage inputs are normal (that is, both the safety circuit and door lock circuit are normal).

4.4.3 Inspection and EEO Circuits

EEO Parameters

Param.	Name	Parameter setting
F5-04	X4 function selection	118: Door lock bypass NC input
F5-09	X9 function selection	116: EEO NC input
F5-10	X10 function selection	09: EEO up NO input
F5-11	X11 function selection	10: EEO down NO input

Schematic Diagram

The following figure shows the inspection circuit of the elevator system.

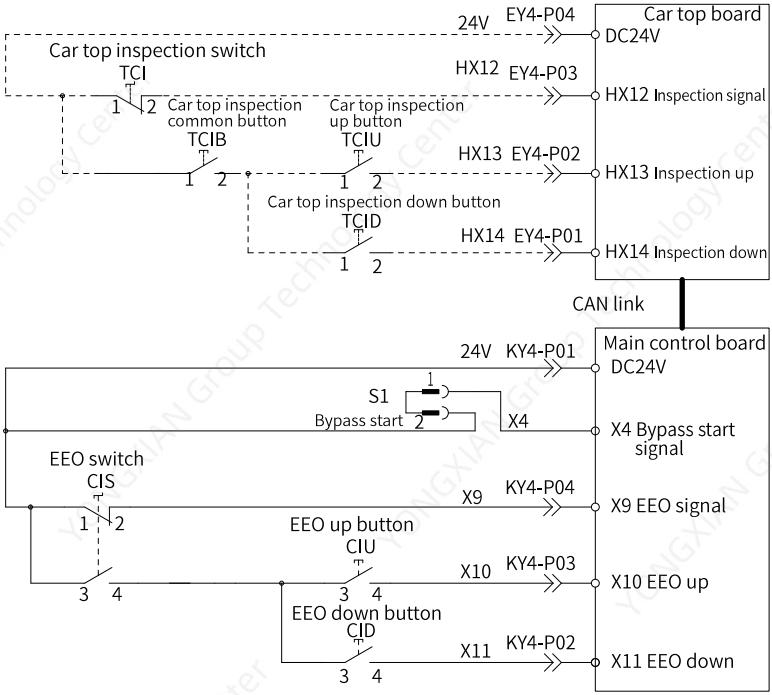


Figure 4-13 Schematic diagram of inspection and EEO circuits

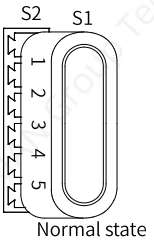
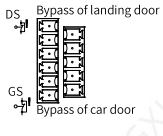
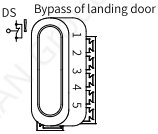
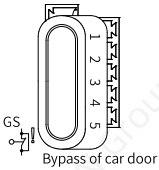
You can control the elevator to enter the EEO and inspection states by operating the EEO switch in the control cabinet and the car top inspection switch respectively. After the car top inspection knob is turned to inspection position, the car top inspection signal (X12) becomes active and the safety circuit is disconnected by the inspection switch. When you press the inspection common button and the direction (up/down) button, the safety circuit becomes on and the elevator runs in the inspection state. Similarly, after the EEO switch operates, you can move the car only by pressing the EEO and direction (up/down) buttons. The inspection knob overrides the EEO switch by disconnecting the safety circuit.

4.4.4 Bypass Circuit

Bypass plugs and plug-in units are added in the interface board circuit for control cabinet door lock bypass function requirements. See *"Figure 7–3 " on page 107* for more details.

Using bypass function:

State Description of Bypass Devices

S1/S2 state	S1: ON	S1: OFF		
	S2: OFF	S2: OFF	S2 left part ON	S2 right part ON
Signal state of input terminal	X4: ON	X4: OFF		
Corresponding elevator state	Automatic/ normal	Forced EEO	Bypass of landing door lock circuit	Bypass of car door lock circuit
Corresponding state illustrated				

Note

Note: S1 and S2 are ON when the bypass plug is inserted into them and are OFF when the bypass plug is pulled out from them.

Operation Instruction for Bypass Devices

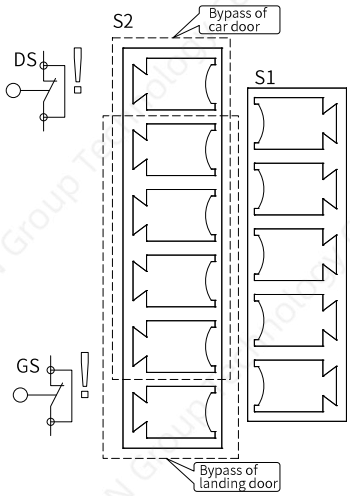


Figure 4-14 Diagram for using bypass function

1. Pull out the bypass plug from S1 to let the elevator enter the EEO and bypass states. Then, insert the bypass plug into S2 (for the corresponding position, see "State Description of Bypass Devices") to short the landing/car door lock circuit. The elevator is allowed to run only under EEO and inspection in the door close limit state. The sound and light alarm device will act during running.
2. After the operations are complete, insert the bypass plug into S1. Then, the elevator returns to the normal state.

4.4.5 Brake Circuit

The following figure shows the brake circuit of the NICE3000-B elevator control system.

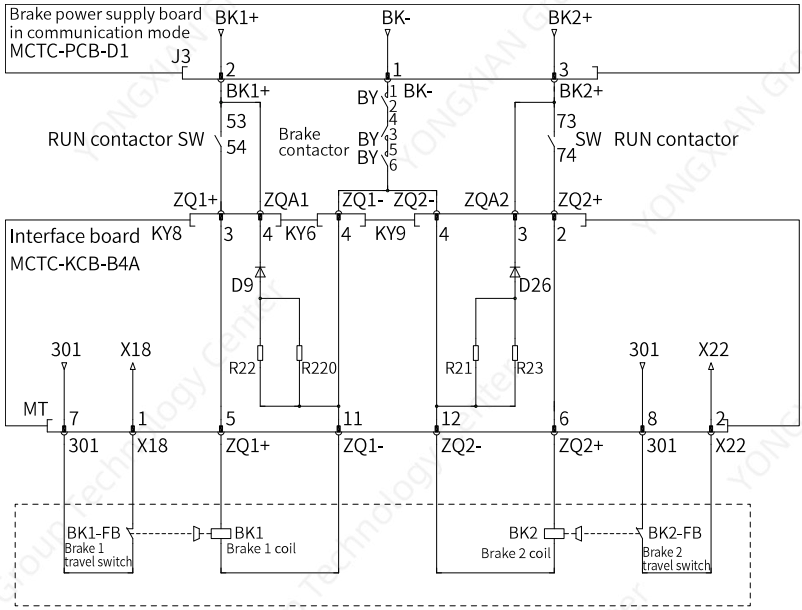


Figure 4-15 Brake circuit

In the figure above, BK1+, BK2+, and BK- are the DC voltages provided by the brake power supply board. After running through the contacts of the RUN contactor and the brake contactor, they are connected to KY6/KY8/KY9 of the interface board and externally connected to the brake coil through MT.

Caution

The positive and negative connections of the left and right brakes must be completely separated.

Note

- This brake circuit is only for use with standard DC brake applications. For AC applications, a customized interface board is needed.
- The DC brake follow current circuit and device are configured on the interface board. You need to ask for customization to cancel the circuit if it is not required or is applied in other AC circuit applications.

4.4.6 ARD Circuit

The integrated control cabinet can be used with the automatic rescue device MCTC-ARD-C with easy and user-friendly circuit. For more details, see *"Figure 7–4 " on page 108* .

Note

The MNK control system must be used with an ARD with 220 V output. Otherwise, the system cannot operate normally.

4.4.7 Leveling Signal System Circuit

Leveling signal devices, including the leveling switches and leveling plates, are connected to the input terminals of the controller. They enable the car to land on each floor accurately.

The leveling switches are generally installed on the top of the car. The NICE3000^{new} system supports the installation of 4 leveling switches. The leveling plates are installed on the guide rails, with one plate at each floor. Make sure that the length and verticality of all the leveling plates are the same.

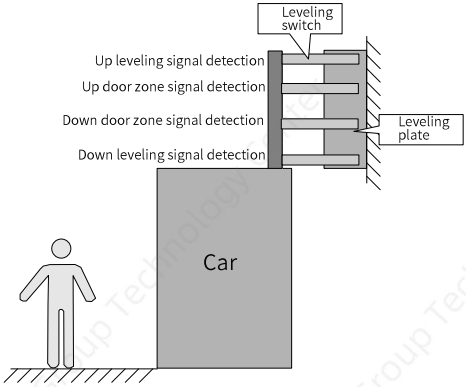
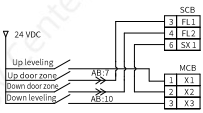
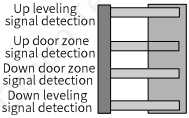
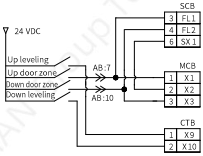


Figure 4-16 Installation of the leveling switches

Table 4–9 Description of installation positions of the leveling switches

Installation method	Connecting to interface board, controller input terminals	Parameter setting	State monitoring
		F5-01 = 1 F5-02 = 3 F5-03 = 2 F6-52 bit6 = 0 (disable)	FA-26 bit1: up leveling state monitoring FA-26 bit2: down leveling state monitoring FA-26 bit3: door zone signal monitoring
		F5-01 = 1 F5-02 = 3 F5-03 = 2 F6-52 bit6 = 1 (enable) F5-25 bit9 = 1 (NO) F5-25 bit10 = 1 (NO)	FA-33 bit10: up leveling state monitoring FA-33 bit11: down leveling state monitoring FA-26 bit3: door zone signal monitoring FA-26 bit1: up door zone signal monitoring FA-26 bit2: down door zone signal monitoring

Note

- The advance door opening (ADO) feature is a standard function of the control system. All leveling switches must be NO.
- After the up/down door zone signal is transmitted to the machine room control system, it must be transmitted to the ADO system in which a door zone signal is generated and sent to the main control system.
- When there are three or more leveling switch signals, the up and down leveling signals must be sent to the car top board (CTB).

4.5 Overall System Wiring Diagram

See *"Figure 7–5 " on page 109* .

5 System Commissioning

This chapter describes the basic commissioning guide of the NICE300new. By following the instruction, you can perform complete commissioning on the elevator system and implement all basic normal running functions of the elevator.

5.1 Trial Run Commissioning Flowchart

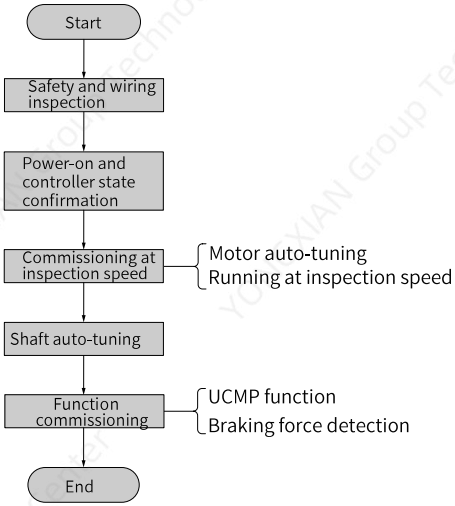


Figure 5-1 Commissioning flowchart

5.2 Safety and Wiring Inspection

The following figure shows the flowchart of system wiring safety inspection.

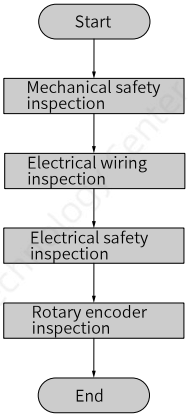


Figure 5-2 Flowchart of wiring and safety inspection before power-on

Note

The I/O ports of the NICE3000^{new} have default function allocations and settings. You can change the allocations and settings based on your usage habits. The application examples in this user guide are all based on the default settings.

1. Mechanical safety inspection
   Check for a totally clear shaft, car and car roof to create a safe operating environment for the elevator.

2. Electrical wiring inspection
   The operator is responsible for performing checks including but not limited to those listed in the following table in accordance with the recognized technical rules in the country of installation and with applicable regional guidelines. Tick after each check of the item.

☑	No.	Item
☐	1	Ensure that the power input terminals (R/S/T/N) are connected correctly and securely.
☐	2	Ensure that motor cables (U/V/W) are connected to the controller correctly and securely.
☐	3	Ensure that the controller (control cabinet) and motor are grounded correctly.
☐	4	The safety circuit is conducted, and the emergency stop buttons and switches in the control cabinet and the machine room can be enabled.
☐	5	Ensure that the door lock circuit is energized and that the door lock circuit is disconnected when the car door or any landing door opens.

Danger

To guarantee safe elevator running:

- Short the safety circuit with caution. If you start the elevator when the safety circuit is shorted, severe personal injuries or even death may be caused.
- Before commissioning, confirm that nobody is in the shaft. Failure to comply may result in personal injuries.
- Never perform running at normal speed when the safety circuit is shorted.
- Never start the elevator when the door lock circuit is shorted. Failure to comply will result in severe personal injuries or even death.

3. Electrical safety inspection

The operator is responsible for performing checks including but not limited to those listed in the following table in accordance with the recognized technical rules in the country of installation and with applicable regional guidelines. Tick after each check of the item.

☑	No.	Item
☐	1	Ensure that the user power line voltage is within the range of 380 V to 440 V and that the phase unbalance degree does not exceed 3%.
☐	2	Ensure that the total lead-in wire gauge and total switch capacity meet the requirements.
☐	3	Ensure that input power supply (R/S/T) is not short-circuited between phases or to ground.
☐	4	Ensure that the inter-phase short circuit or short circuit to ground does not occur in the UVW phases of the controller, and short circuit to ground does not occur in the UVW phases of the motor.
☐	5	Ensure that the short circuit to ground does not exist on the output side of the transformer.
☐	6	Ensure that the 220 V user power supply is not short-circuited between phases or to ground.
☐	7	Ensure that the 24 V switched-mode power supply has no short circuit to ground or between positive and negative output.
☐	8	Ensure that there is no short circuit between the CAN/Modbus communication cable and the ground or 24 V power supply.

4. Rotary encoder inspection

The operator is responsible for performing checks including but not limited to those listed in the following table in accordance with the recognized technical rules in the country of installation and with applicable regional guidelines. Tick after each check of the item.

☑	No.	Item
☐	1	Ensure that the encoder is installed securely and connected reliably.
☐	2	The encoder signal cables and high-voltage cables are laid in different ducts to prevent interference.
☐	3	The encoder cables are preferably directly connected to the control cabinet. If the cable is not long enough and an extension cable is required, the extension cable must be shielded and preferably welded to the original encoder cables by using the soldering iron.
☐	4	Ensure that the shield of the encoder is reliably grounded on the controller side. (Single-end grounding is recommended to prevent interference.)

5.3 Power-on and Controller State Confirmation

5.3.1 Checking Power-on State

The operator is responsible for performing checks including but not limited to those listed in the following table in accordance with the recognized technical rules in the country of installation and with applicable regional guidelines. Tick after each check of the item.

☑	No.	Item
☐	1	After power-on, check whether the line voltage of the three-phase controller input power supply (R/S/T) is within 380 V to 440 V, with the phase unbalance factor not exceeding 3%. If the voltage is abnormal, turn the power off and check the user power supply and the wiring of input power supply (R/S/T).
☐	2	Check whether the input voltage of the MCB power supply terminal CN3 is 24 VDC±15%. If the voltage is abnormal, turn the power off and check the switched-mode power supply and the wiring of 24 VDC circuit.

5.3.2 Checking the State at Normal Power-on

The operator is responsible for performing checks including but not limited to those listed in the following table in accordance with the recognized technical rules in the country of installation and with applicable regional guidelines. Tick after each check of the item.

☑	No.	Item
☐	1	After power-on, check whether the LEDs have a display. If the LEDs do not light up, check the controller power supply.
☐	2	If the input signal indicators shown in the preceding figure become ON, it indicates that the 24 VDC power supply is normal, and the X input terminals work properly. If none of the indicators is ON, it indicates that the 24 VDC power supply is abnormal, and you need to eliminate the problem.

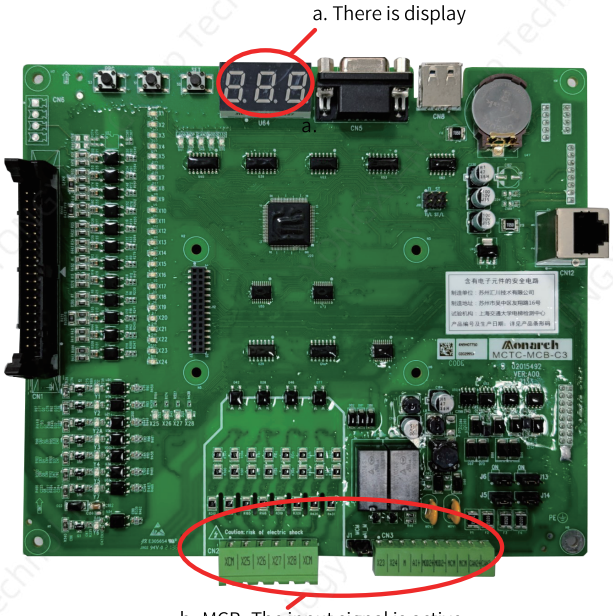


Figure 5-3 MCB display after normal power-on

5.3.3 Controller State and Fault Handling Before Commissioning

During commissioning, especially at first-time power-on, certain faults may occur because the conditions for automatic elevator running are not met or some peripheral signals are not connected. Such faults include E35, E41, E42, E51, E52, and E58. The following table describes the troubleshooting solutions before commissioning at inspection speed.

Table 5–1 Fault handling before commissioning at inspection speed

Fault	Name	Description	Solution
E41	Safety circuit fault	• At this fault, the elevator cannot run or be commissioned. • By default, the safety circuit input signal is connected to terminals X4 and X25.	Observe whether the signal indicator of input terminals X4 and X25 is ON. If this indicator is OFF, the safety circuit is disconnected. In this case, you need to repair the safety circuit. Then, you can perform commissioning at inspection speed.
E42	Door lock circuit fault	• At this fault, the elevator cannot run or be commissioned. • By default, the door lock circuit signal is connected to terminals X5, X26, and X27.	Observe whether the signal indicator of terminals X5, X26, and X27 is ON. If this indicator is OFF, the door lock circuit is disconnected. In this case, you need to repair the door lock circuit. Then, you can perform commissioning at inspection speed. Never short the door lock circuit for commissioning.
E35	Shaft auto-tuning data abnormal	This fault is reported at each power-on before shaft auto-tuning is performed. It does not affect commissioning at inspection speed.	Press MF.K on the operating panel to hide the fault display. Then, you can perform inspection at inspection speed.
E51	CAN communication fault	• This fault does not affect commissioning at inspection speed, and it affects only commissioning at normal speed. • The COP indicator is OFF at this fault.	
E52	HCB communication abnormal	• This fault does not affect motor auto-tuning or commissioning at inspection speed. • The HOP indicator is OFF at this fault.	

Fault	Name	Description	Solution
E58	Shaft position switches abnormal	• The elevator cannot run. You need to rectify the fault first and then perform commissioning at inspection speed. • The fault cause may be: The feedback inputs of both up and down slow-down switches 1 are active; feedback inputs of both up and down limit switches are active simultaneously.	• Connect X14 and X15 to slow-down switches 1 (NC inputs) and check whether they are OFF simultaneously. Additionally, confirm whether slow-down switches 1 are connected to the MCB and act properly. • Terminals X12 and X13 are connected to the up and down limit switches (NC input). Observe whether the signal indicators of both X12 and X13 are OFF. Check whether limited switches act properly.

5.4 Commissioning at Inspection Speed

Caution

- Before starting commissioning at inspection speed, make sure that all installations and wirings comply with the technical specifications for electrical safety.
- During auto-tuning with the car, pay attention to the motor running direction to prevent the elevator from getting too close to terminal floors. It is recommended to start commissioning at inspection speed at a floor at least two floors away from terminal floors.
- For certain cabinets, "emergency electric RUN" is used instead of "inspection RUN". Note that "emergency electric RUN" shorts certain safety circuit in the shaft, So when performing EEO during commissioning at inspection speed, take care when the car runs in a position close to the top/bottom terminal floor.

Danger

To guarantee safe elevator running:

- The motor may rotate during auto-tuning. Keep a safe distance from the motor to prevent personal injuries.
- During with-load auto-tuning, make sure that nobody is in the shaft. Failure to comply will cause personal injuries or even death.

The commissioning at inspection speed includes two stages: motor auto-tuning and running at inspection speed.

5.4.1 Motor Auto-tuning

Parameters

Param.	Description	Note
F1-25	Motor type	0: Asynchronous motor 1: Synchronous motor
F1-00	Encoder type	0: Sin/Cos encoder 1: UVW encoder 2: ABZ encoder 3: ECN413/1313 absolute encoder
F1-12	Encoder PPR	0 to 10000
F1-01 to F1-05	Rated motor power/voltage/ current/ frequency/speed	Model dependent, manually input
F0-01	Command source selection	0: Operating panel control 1: Distance control
F1-11	Auto-tuning mode	0: No operation 1: With-load auto-tuning 2: No-load auto-tuning 3: Shaft auto-tuning 1 4: Shaft auto-tuning 2 5: Synchronous motor static auto-tuning

Motor Auto-tuning Flowcharts

- Synchronous motor with-load auto-tuning (motor driving the car supported)

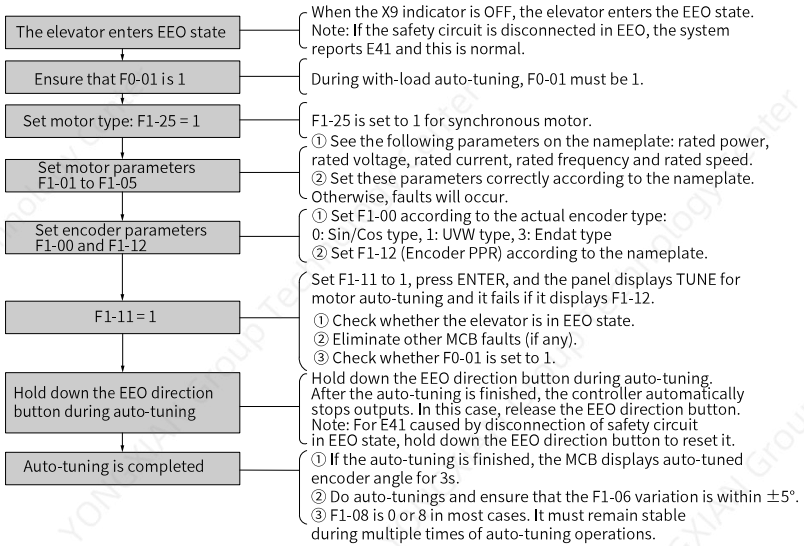


Figure 5-4 Synchronous motor with-load auto-tuning

- Synchronous motor static auto-tuning (motor driving the car supported, brake not released and motor not rotating)

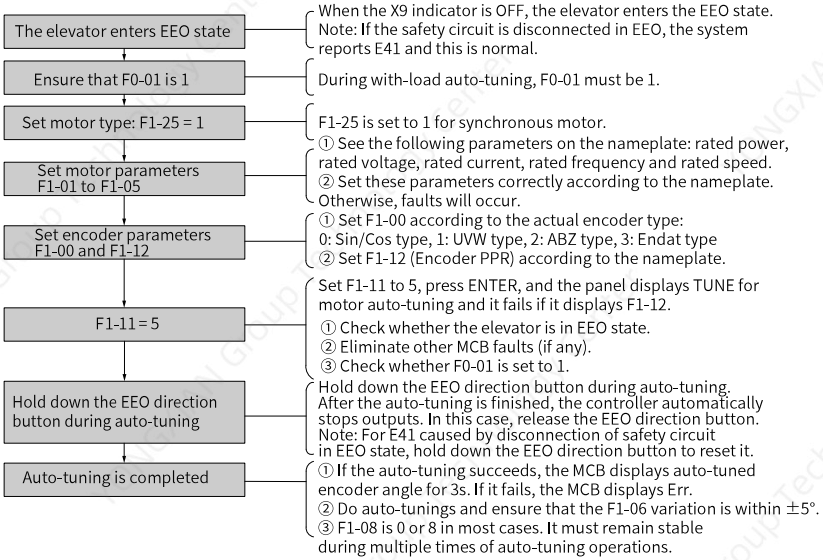


Figure 5-5 Synchronous motor static auto-tuning

- Synchronous motor no-load auto-tuning (motor disconnected from the car)

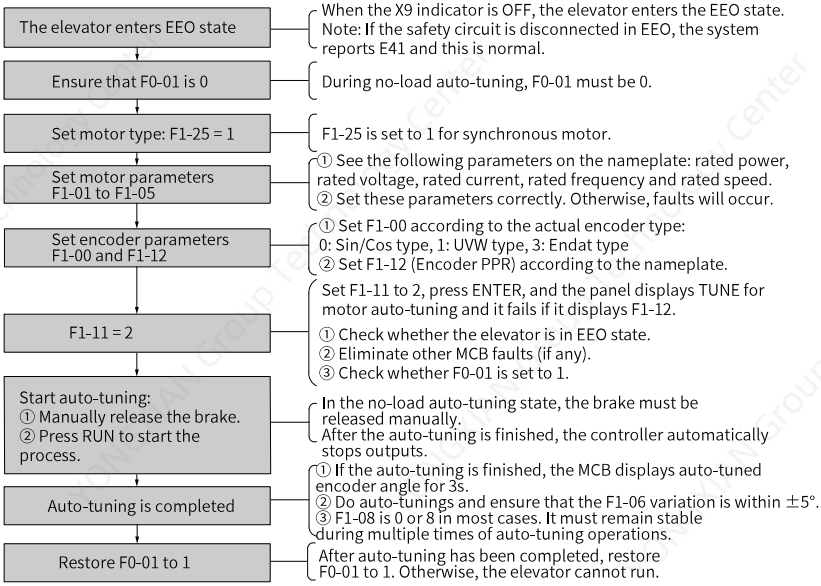


Figure 5-6 Synchronous motor no-load auto-tuning

Caution

- Synchronous motor auto-tuning learns the initial motor pole angle, initial encoder angle, motor wiring mode, and D-axis and Q-axis inductance.
- Perform three or more times of auto-tuning. Compare the obtained values of F1-06 (Encoder initial angle), and ensure a difference of within ±5°.
- Each time the encoder, encoder cable connection or motor wiring sequence as well as rated motor current, frequency and speed is changed, perform motor auto-tuning again.
- You can modify F1-06 manually. The modification takes effect immediately. After replacing the MCB, therefore, you can directly run the controller by manually setting F1-06 to the previous value, without performing motor auto-tuning.

- Asynchronous motor with-load auto-tuning (motor driving the car supported)

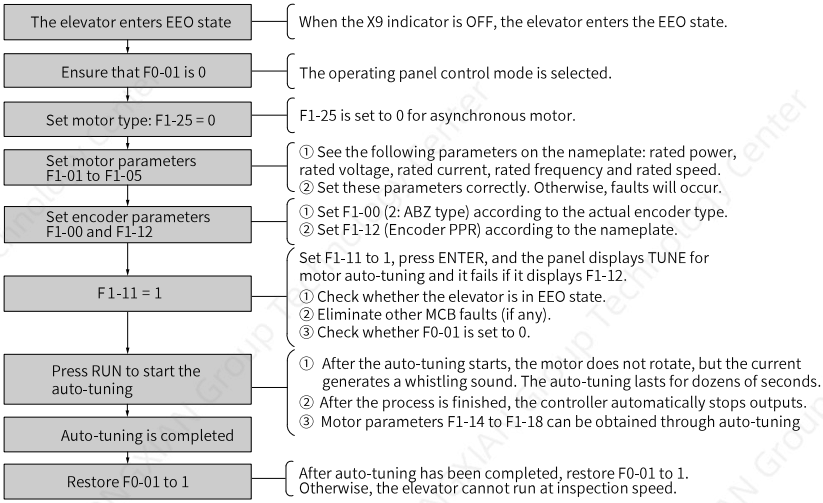


Figure 5-7 Asynchronous motor with-load auto-tuning

- Asynchronous motor no-load auto-tuning (motor disconnected from the car)

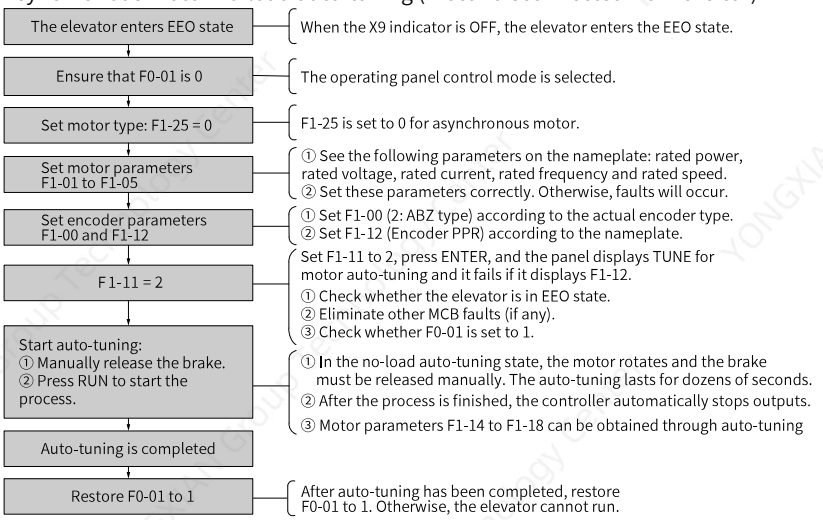


Figure 5-8 Asynchronous motor no-load auto-tuning

Caution

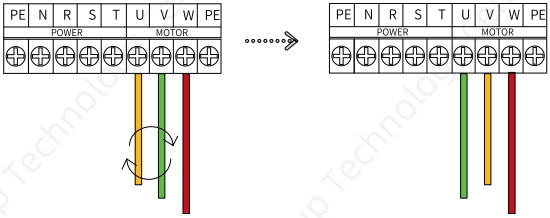
- The A/B phase sequence of the encoder must be correct. If the sequence is incorrect, fault E38 is reported. To solve this problem, interchange the A/B phase of the encoder.
- The system handles the output commands to the RUN contactor or brake contactor differently in different motor auto-tuning modes, as described in the following table.

Table 5–2 Output state of RUN and brake contactors and motor state

Auto-tuning/ Working mode/ Control object	No-load auto-tuning		With-load auto-tuning		
	Synchro-nous motor	Asynchro-nous motor	Synchro-nous motor	Synchro-nous motor static	Asynchro-nous motor
RUN contactor	Working	Working	Working	Working	Working
Brake contactor	Not working	Not working	Working	Not working	Not working
Motor	Yes	Yes	Yes	No	No

Possible Faults and Handling

Issue	Symptom	Solution
Auto-tuning failure	E19	• Check whether the encoder cable is broken or replace a new PG card before auto-tuning again. • Check the three-phase motor cables and output contactor.
Auto-tuning failure	E20	• Check to ensure that the encoder signal cables and high-voltage cables are laid in different ducts to prevent interference. • Check whether the brake is fully opened. If not, check whether the brake power supply and supply circuit are normal. • Check whether the encoder cable is broken. • Check whether the encoder cable suffers interference because it is too close to the motor cables. • Check whether the encoder is in good condition and installed securely. • The low-power motor (such as P ⩽ 5.5 kW) may jitter after auto-tuning starts. If this occurs, decrease F2-00 properly to a value within 10 to 40.

Issue	Symptom	Solution
Incorrect motor wiring	E20 and E33	Change the motor wiring sequence and perform auto-tuning again. The following figure shows how to interchange motor phases.  Description of fault symptoms • During no-load auto-tuning, if the motor wiring sequence is incorrect, the system reports E20 (E0-00) with fault subcode (E0-01) 3 • During with-load auto-tuning, if the motor wiring sequence is incorrect, the synchronous motor jitters abnormally during auto-tuning, the system reports E33, and auto-tuning stops.For the asynchronous motor, there is no prompt during auto-tuning, but E33 is reported during inspection running.

Note

- When the preceding two problems occur, change the sequence of motor cables connected to the controller.
- Adjustment principle of motor wiring sequence: interchange any two adjacent motor cables once.

5.4.2 Running Test at Inspection Speed

Parameters

Param.	Description	Note	Default
F2-10	Elevator running direction	0: Running direction unchanged 1: Running direction reversed	0
F3-25	Elevator speed in the EEO state	0.100m/s to 0.600m/s	0.250m/s

Running Test Process at Inspection Speed

1. Check that the motor running direction is correct

After the auto-tuning is complete, perform trial run at inspection speed to check whether the actual motor running direction is consistent with the command direction. If not, change the motor direction by setting F2-10 (Elevator running direction).

2. Check that the motor running current is normal
   In the inspection state, the motor current during no-load running is much smaller than the rated motor current, and does not exceed the rated motor current during with-load running at a constant speed in most cases. After multiple times of auto-tuning, if the difference between two adjacent auto-tuned encoder angles is very small but the motor current during with-load running at a constant speed exceeds the rated motor current, check the following items:
   - Check whether the brake is fully released.
   - Check whether the elevator balance coefficient is normal.
   - Check whether the guide shoes for the car or counterweight are too tight.
3. Confirm that the car top inspection is valid
   Confirm that the car top inspection signal is active and the EEO is inactive when the car top inspection signal is active. That is, the car top inspection takes precedence over the EEO.
4. Confirm that the shaft is unobstructed.
   Check that the shaft is unobstructed without any obstacles, so that the car will not be damaged.
5. Confirm that the slow-down switches and limit switches are active.
   Check whether the slow-down switches and limit switches are active when the car moves to a terminal floor. Take care in this process. Avoid too long running time and distance each time because overtravel will cause mechanical damage to the car.

5.5 Shaft Auto-tuning

Preparations

1. Check whether shaft switches act properly.
   The shaft switches include final limit switches, limit switches, slow-down switches, and leveling switches.
2. Check that the acting sequence of the leveling switches is correct.
   Installing one leveling switch is recommended. If multiple leveling switches are installed, check that the acting sequence is correct. For example, if three leveling switches are installed:
   - Acting sequence at inspection up: up leveling switch → up door zone switch → down door zone switch → down leveling switch

- Acting sequence at inspection down: down leveling switch → down door zone switch → up door zone switch → up leveling switch

3. Confirm that CAN communication is normal.
   Ensure that CAN communication between the MCB and CTB is normal (the signal indicator CAN1 flashing and E51 not reported). If CAN communication is abnormal, see E51 in *"5.3.3 Controller State and Fault Handling Before Commissioning" on page 86*.

Parameters

Param.	Description	Range	Default	Remark
F0-04	Rated speed	0.250 m/s to 4.000 m/s	1.600 m/s	-
F6-00	Top floor of the elevator	F6-01 to F6-48	9	Actual number of floors (Actual number of leveling plates installed)
F6-01	Bottom floor of the elevator	1 to F6-00	1	-
F3-26	Shaft auto-tuning speed	0.250 to 0.630	0.250	-

Note

After modifying F0-04, perform shaft auto-tuning again. Otherwise, the elevator runs improperly.

Conditions for Shaft Auto-tuning

- The elevator is in EEO state.
- The elevator runs to a position below the leveling position of the bottom floor and at least one leveling switch is disconnected from the leveling plate. (This condition is specific to two-floor elevators.)
- The down slow-down switch 1 signal input to the MCB is active. (This condition is specific to two-floor elevators.)
- The system is not in the fault state. If there is a fault, press 

to reset the fault.

Perform Shaft Auto-tuning

When the preceding conditions are met, start shaft auto-tuning in any of the following methods:

- Set F1-11 to 3 on the operating panel and switch EEO to normal state.

- Set F7 to 1 on the keypad of the MCB. Switch emergency drive to normal.

After shaft auto-tuning starts, the elevator runs at the speed set in F3-26 (Shaft auto-tuning speed). It automatically runs down to the limit position at the bottom floor and then runs up to the leveling plate of the top floor and stops. If the keypad on the MCB displays the current floor number (top floor) at this time, it indicates that shaft auto-tuning succeeds.

If E35 is reported during shaft auto-tuning, it indicates that shaft auto-tuning fails. You need to perform troubleshooting according to Chapter E35 Shaft Auto-tuning Fault in *NICE3000^{new} Integrated Elevator Controller Troubleshooting Guide* and implement shaft auto-tuning again.

Running Test at Normal Speed

After shaft auto-tuning has been completed successfully, the running at normal speed may fail because the door operator controller and full-load and overload functions are not commissioned. To solve this problem, enable the door open forbidden and overload functions by setting parameters before performing a running test at normal speed.

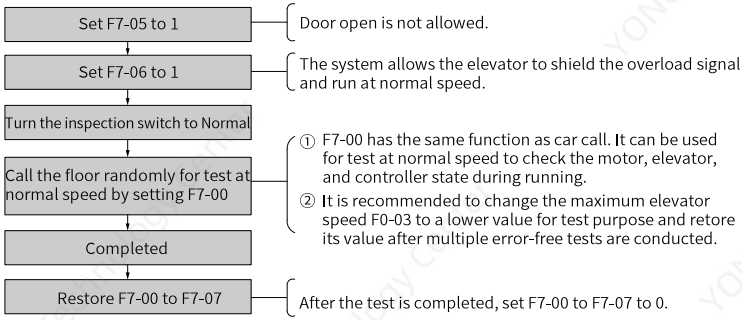


Figure 5-9 Flowchart of running test at normal speed

Note

After power-off and then power-on, F7-00/ F7-01/ F7-02/ F7-05/ F7-06/ F7-07 will be restored to 0. If you need to continue the test at normal speed, set these parameters again.

5.6 Function Commissioning

5.6.1 UCMP Function

Function (Default) Description

When the landing door is unlocked and the car door is not closed, accidents may be caused by unintended car movement at the landing level if any component guaranteeing safe running fails. The UCMP device will stop the elevator to ensure the passengers' safety.

Table 5–3 Selection of the detection component

Item	Synchronous motor	Asynchronous motor
	Without auxiliary brake	With auxiliary brake
Model	MCTC-SCB-A1 or MCTC-SCB-A4	MCTC-SCB-D or MCTC-SCB-D4

Note

- Only MCTC-SCB-D can be used for the through-type door and asynchronous motor.
- Use MCTC-SCB-D or MCTC-SCB-D4 for elevators with synchronous motor and through-type door.

Installation of Switches

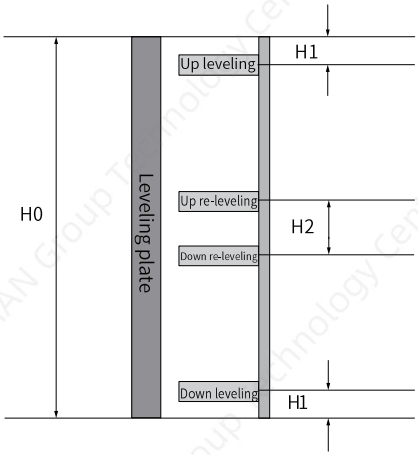


Figure 5-10 Recommended installation of Monarch UCMP switch

Requirements for UCMP switch installation:

- H1 ⩽ 20 mm, H2 = 60 mm
- The recommended leveling plate length is 300 mm.
- Two door zone switches are required. The length of leveling plates is determined by the actual door open area (door vane length) of the elevator.
- Door zone switches of NO type must be used.

Parameters

Param.	Name	Range
F-8	Test Function	7: Enter the UCMP test using the keypad
F3-24	Program function selection	0: Reserved 1: Slip experiment enabled 2: Manual test of UCMP

Param.	Name	Parameter setting
F5-01	X1 function selection	01: Up leveling signal NO
F5-03	X3 function selection	02: Down leveling signal NO
F5-02	X2 function selection	03: Door zone signal NO
F5-08	X8 function selection	22: Shorting door lock circuit relay feedback NO
F5-30	Y5 function selection	03: Shorting door lock circuit contactor output

Test Method:

- In the EEO state, the elevator stops in the door zone with door lock closed.
- Set F-8 to 7 or F3-24 to 2 using the keypad, and the system displays E88 and enters the UCMP test function. At this moment, the door lock circuit is open.
- Press and hold down the EEO up or down button. Then the system has shorting door lock circuit relay output and the elevator enters EEO running.
- After the elevator is divorced from the door zone (the door zone signal is invalid), the hardware UCMP module will cancel door lock shorting. At this moment, the elevator reports E65 (UCMP fault) and stops running.

Note

- When the elevator is not in the inspection state or the door zone, the setting of F-8 to 7 or F3-24 to 2 is invalid.
- After F-8 is set to 7 or F3-24 is set to 2, clearing is automatically performed after one running and after power failure.
- In the UCMP test mode, the elevator linearly accelerates to the inspection speed at the acceleration rate set by F3-08 after startup.
- Automatic resetting cannot be performed in case of the fault E65 or getting power back on after power-off.
- The fault E65 can be manually reset only in the inspection state.

5.6.2 Braking Force Detection

Function (Default) Description

To prevent motor brake failure for safe running, check whether the braking force meets the requirements periodically. The control system will monitor the braking force regularly.

Parameters

Param.	Description	Range	Default	Remark
F2-32	Torque output duration	1s to 10s	5	When it is set to 0, 5s is used by default
F2-33	Torque amplitude	50% to 150% of rated motor torque	110	When it is set to 0, 80% of the rated motor torque is used by default
F2-34	Number of pulses for detected abnormality	1 to 100 encoder feedback pulses	0	When it is set to 0, 30 encoder feedback pulses are used by default
F2-35	Threshold of excessive slip distance	1°to 20°(mechanical motor rotation angle)	0	When it is set to 0, the system uses 5° for synchronous motors and 10° for asynchronous motors by default
F-8	Test function	8: Manual test of braking force	0	Use the keypad to start the braking force test

Param.	Description	Range	Default	Remark
F7-09	Braking force detection result	0 to 2	0	-
F7-10	Countdown time for braking force detection	0 to 1440	1440	The countdown time is automatically restored to 1440 after the test finishes

Manual Test

1. The system is in the EEO state, and the EEO switch is active.
2. The elevator stops in the door zone.
3. Set F-8 to 8 using the keypad;
4. When the system enters the test state, the MCB displays E88;
5. The shorting motor stator and RUN contactors have output, and the brake contactor has no output;
6. The system starts testing according to the output torque related to the braking force;
7. E88 disappears on the MCB and the test is completed. F7-09 indicates the test result. If F7-09 = 2, E66 (braking force unqualified) is reported immediately, then the elevator stops running, and the fault cannot be reset.

Note

For safety circuit disconnection in EEO state, switch the EEO back to its normal state.

Automatic Test

After the test condition 1 is met for braking force detection, the system automatically enters the test state. The steps are the same as steps 4, 5, 6, and 7 of the manual test.

Fault E66 cannot be reset through power-off and can be automatically reset only when a new braking force test is performed with qualified results.

Countdown function: After 12 hours pass, the system starts to judge whether the following condition 1 is met. If the braking force test has been performed, the countdown parameter (F7-10) restores to 24 hours. If not, the system proceeds to condition 2 (forced test).

During the automatic braking force test, no fault is reported for hall calls. The keypad displays E88 to indicate the test state. Hall calls can be registered, but the elevator does not respond to them. After the test is completed, the system returns to normal state and responds to registered hall calls, but the car calls are canceled. The elevator doors cannot be opened or closed.

Test conditions:

- Condition 1: Normal braking force test. Under the condition of no car and hall calls, the braking force test is performed after the elevator energy-saving time is reached or after 3 minutes.
- Condition 2: Forced braking force test. The system makes a judgment 10 minutes ahead. When the time set in F7-10 is 10 minutes or below, the buzzer tweets for 30s. In this case, the registered hall calls are kept, but the car calls are canceled. The elevator doors can be opened or closed. The system starts the braking force test after door close.

6 Inspection and Maintenance

6.1 Routine Inspection

As an important part of the elevator system, the control cabinet must be inspected and maintained according to national laws and regulations and industrial requirements.

6.1.1 Routine Inspection Items

The operator is responsible for performing checks including but not limited to those listed in the following table in accordance with the recognized technical rules in the country of installation and with applicable regional guidelines. Tick after each check of the item.

☑	No.	Routine Inspection Items
☐	1	Ensure that no abnormal noise exists when the motor is running.
☐	2	Ensure that the motor does not vibrate excessively.
☐	3	Ensure that the installation environment of the control cabinet remains unchanged.
☐	4	Ensure that the control cabinet does not overheat.
☐	5	Ensure that the electrical components inside the control cabinet work properly.
☐	6	Ensure that there is no condensation on the control cabinet.
☐	7	Ensure that the screws in the control cabinet do not come loose.
☐	8	Ensure that no abnormal noise exists in contactors inside the control cabinet during elevator running.

6.1.2 Routine Cleaning Items

The operator is responsible for performing checks including but not limited to those listed in the following table in accordance with the recognized technical rules in the country of installation and with applicable regional guidelines. Tick after each check of the item.

☑	No.	Routine cleaning items
☐	1	Clean the control cabinet periodically.
☐	2	The IP rating of the control cabinet is IP20. Protect the control cabinet from water and dust while cleaning.
☐	3	Remove the dust on the surface of the control cabinet to prevent the dust from entering the control cabinet.

6.2 Periodic Maintenance

Perform periodic maintenance on the items that are difficult to check during running.

6.2.1 Periodic Inspection Items

The operator is responsible for performing checks including but not limited to those listed in the following table in accordance with the recognized technical rules in the country of installation and with applicable regional guidelines. Tick after each check of the item.

☑	No.	Routine Inspection Items
☐	1	Ensure that the screws are not loose.
☐	2	Ensure that there are no scratches on the terminals.
☐	3	Ensure that the electrical components work properly.
☐	4	Ensure that cables inside the control cabinet are not exposed.

6.2.2 Replacement of Quick-Wear Parts

The quick-wear parts in the control cabinet mainly include such electrical components as the transformer fuse, the fuse in fuse protector, and the air switch. Additional fuses are provided in the control cabinet to prevent damage of fuse in the case of an emergency.

The general service life of the air switch and the contactor is 2 to 3 years. Regularly replace the quick-wear parts according to the service life and the actual operation condition.

7 Appendix

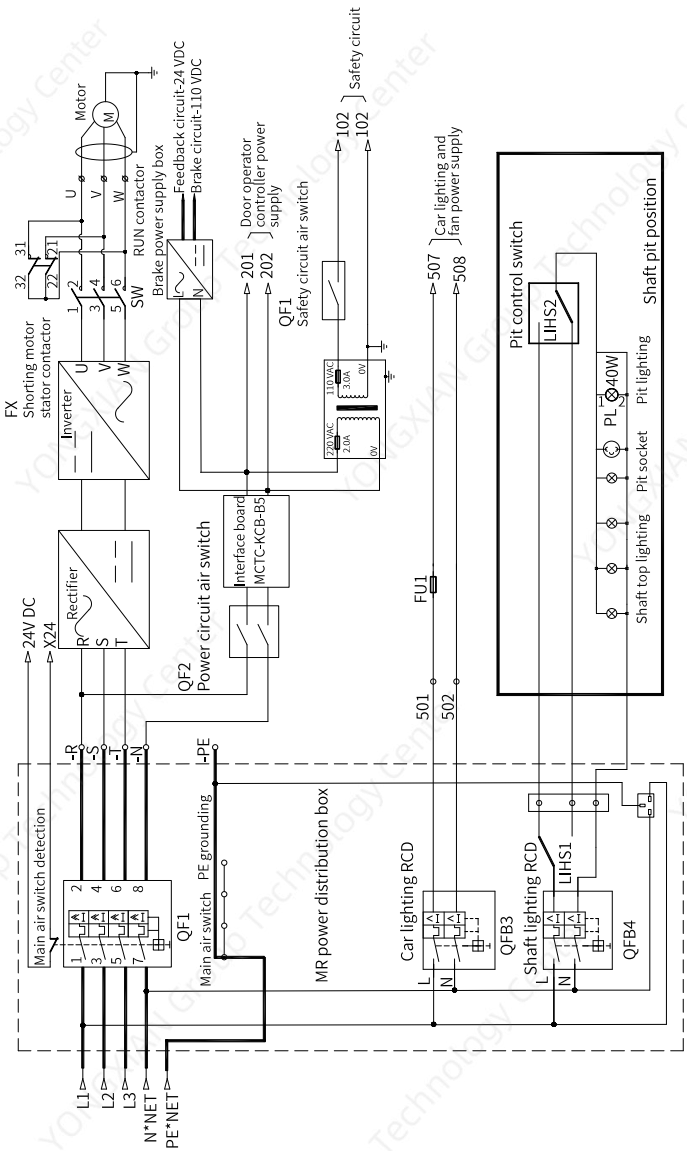


Figure 7-1 Main circuit diagram

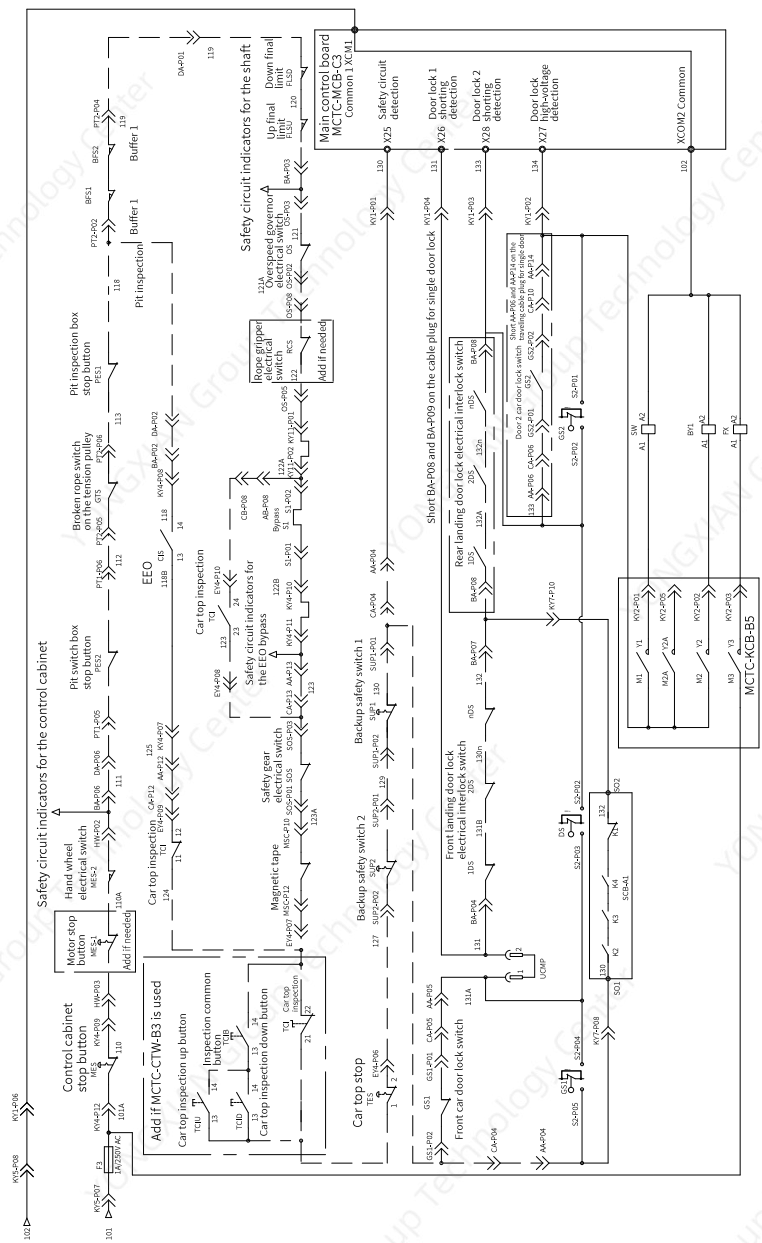


Figure 7-2 Safety circuit diagram

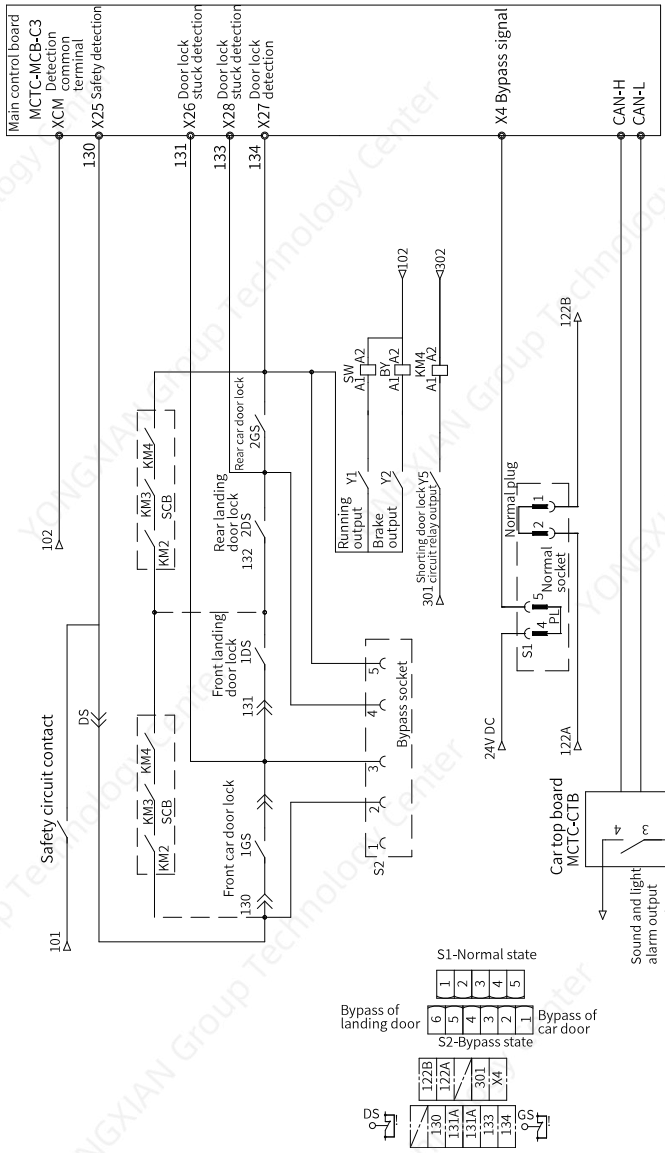


Figure 7-3 Bypass circuit diagram

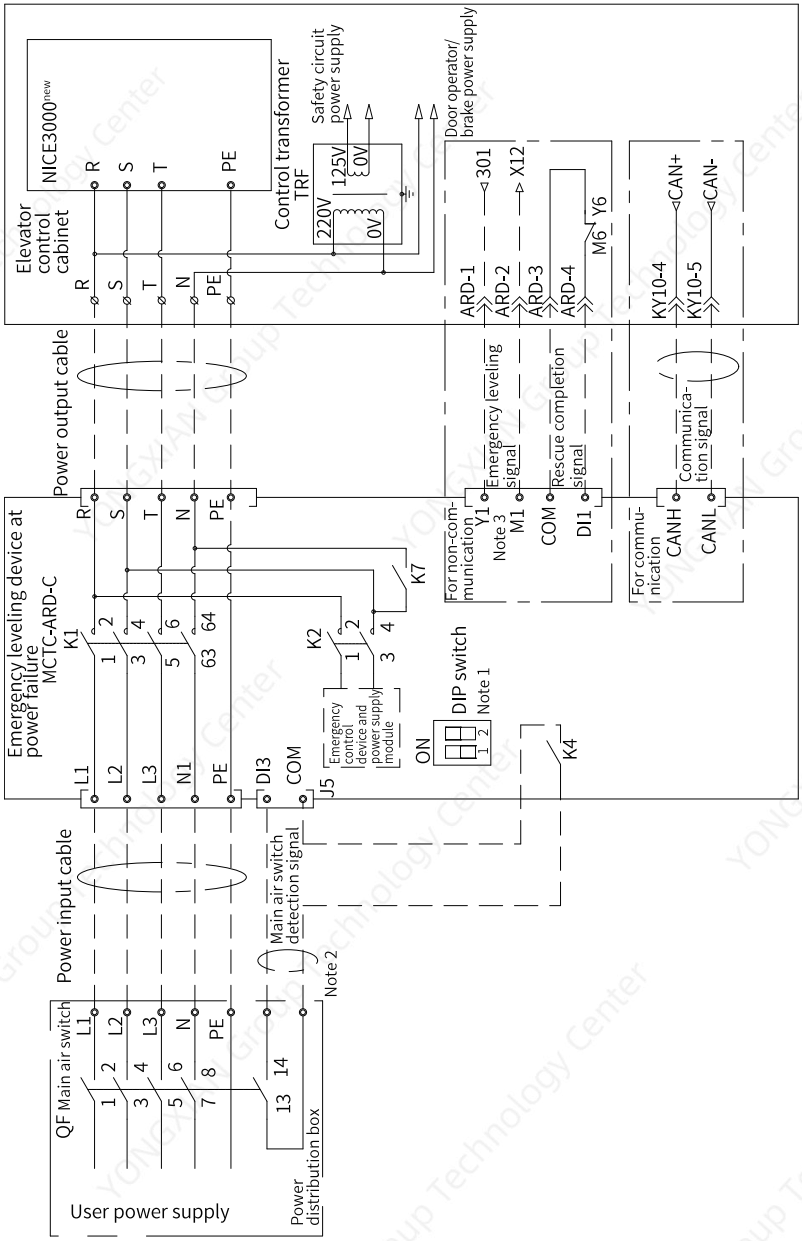


Figure 7-4 ARD circuit diagram

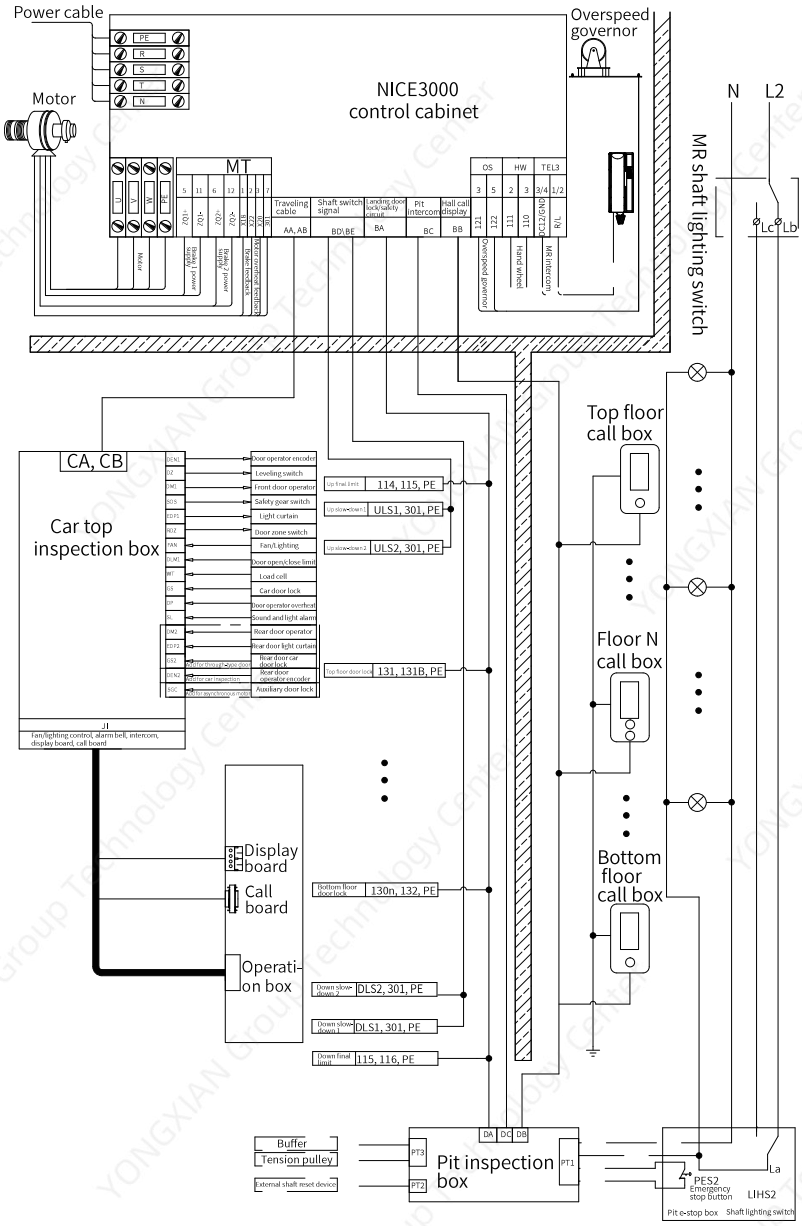


Figure 7-5 Overall system wiring diagram

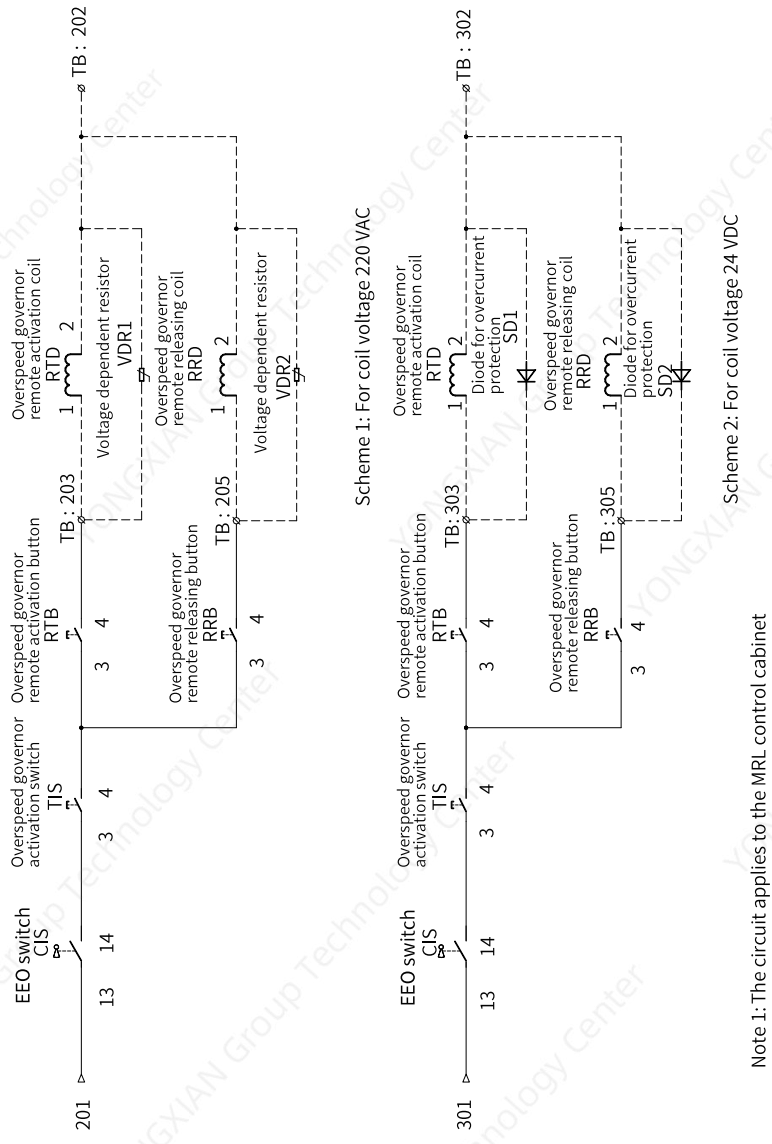


Figure 7-6 MRL overspeed governor operation wiring diagram

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