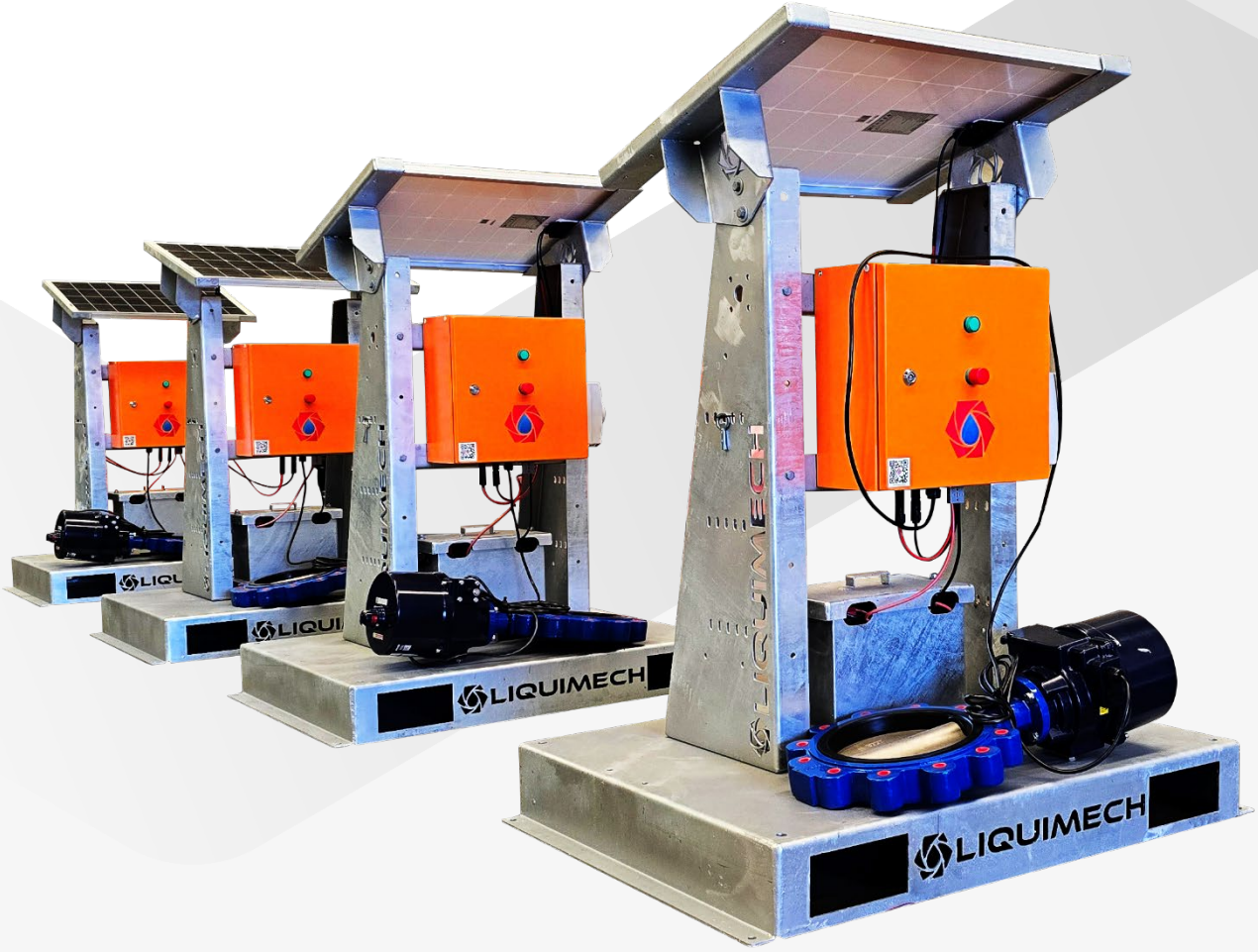
LIQUIMECH©

User Manual

REMOTE VALVE CONTROL SYSTEM

Liquimech Connect

Mobile App & Hardware



V1.0.2

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1. Introduction

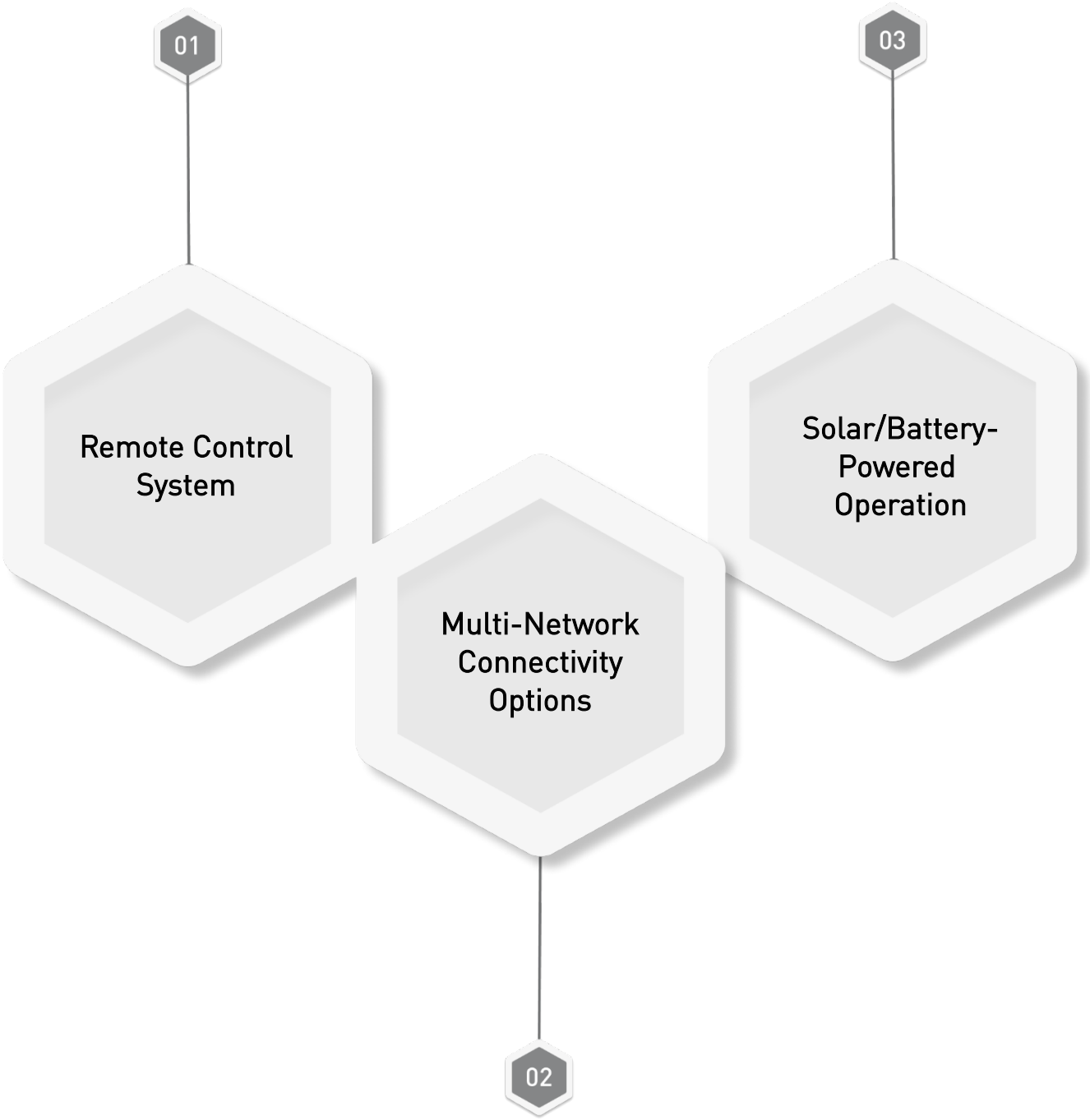
1.1. Overview

The Liquimech Remote Valve Control System (RVC) is a smart control unit designed to remotely operate a wireless valve control system. The system offers a safe and easy-to-use interface combining physical buttons and/or app-based interaction for field operators. The system is designed to enhance efficiency and user experience at your filling station.

Product Variations

Variation*	Controlled via	Requires	References
RVC with 4G/5G and/or solar battery backup	Liquimech Connect Mobile App	Client supplies SIM card	• App Interfacing Guide *page 3* • Battery Changeover Procedure *page 23* • Solar Panel and Battery Storage System *page 25* • Safety Manual for 240V AC-Powered Liquid Management Systems *page 33*
RVC with WiFi	Liquimech Connect Mobile App	Client provides Wi-Fi access	• App Interfacing Guide *page 3* • Battery Changeover Procedure *page 23* • Solar Panel and Battery Storage System *page 25*
RVC with Local Control	Liquimech Connect Mobile App within short ranges	No network or SIM required	• App Interfacing Guide *page 3* • Battery Changeover Procedure *page 23* • Solar Panel and Battery Storage System *page 25* • Resetting Victron MPPT Settings *page 29*
RVC with RF	Air Key / IR dongle	No app or internet needed	• Battery Changeover Procedure *page 23* • Solar Panel and Battery Storage System *page 25* • Safety Manual for 240V AC-Powered Liquid Management Systems *page 33* • *AKRX64-S Receiver Instructions – Programming / Pairing the Airkey. 20*

NOTE | * All units have an OM Series quarter turn electrical actuator attached. Please refer to the Liquimech actuator operation manual for specifications.


01
Remote Control System
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Solar/Battery-Powered Operation
Multi-Network Connectivity Options
02

1.2. Purpose

This user manual provides a step-by-step guide, from downloading to operating the Liquimech Connect Mobile App – Remote Valve Control System.

2. Getting Started

2.1 Downloading

Download the **Liquimech Connect** mobile app from the App Store (iOS) or Google Play Store (Android).

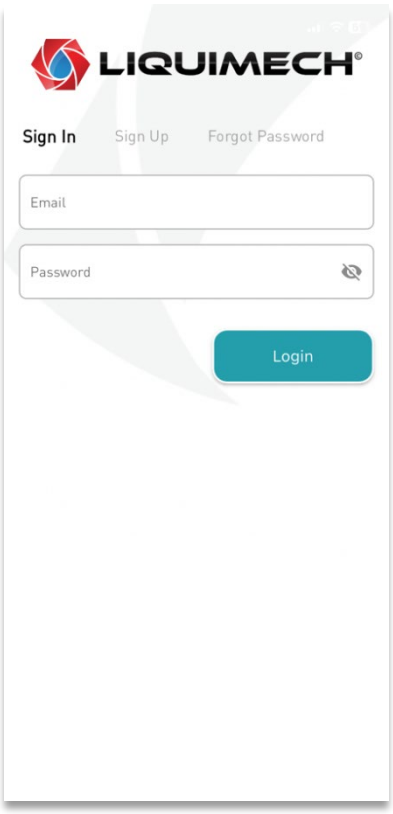
App Store

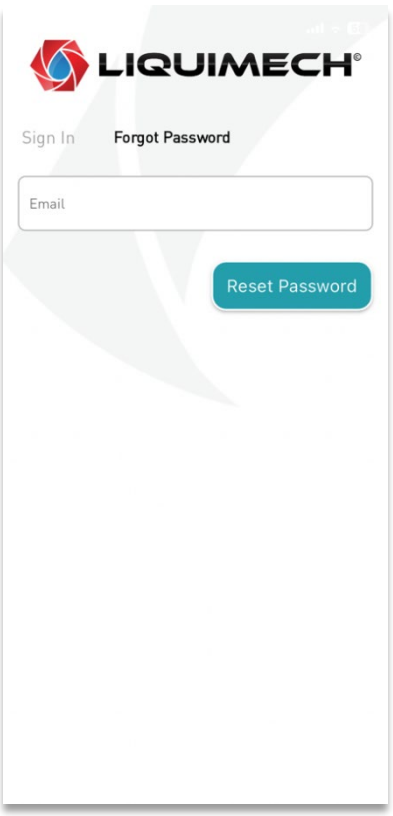
Google Play Store

3. Functionalities

3.1 Login Screen

The app's login screen allows users to sign in, recover forgotten passwords, or create new accounts. Below are screenshots of the respective pages:


LIQUIMECH
Sign In
Sign Up
Forgot Password
Email
Password
Login


LIQUIMECH
Sign In
Forgot Password
Email
Reset Password

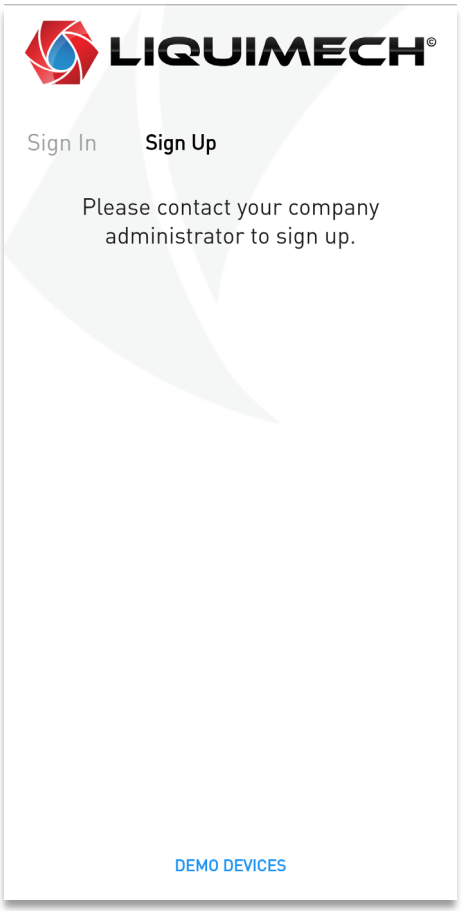


Figure 1: Screenshots of the sign-in, forgot password and sign-up pages.

❑ User Login

- Launch the app and enter your registered username and password.
- Tap "Login" to access the app.

❑ Forgot Password

- If you forget or want to reset your password, tap "Forgot Password" on the login screen.
- Enter your registered email address and follow the instructions to reset your password.

3.2 Landing Screen

The landing screen consists of the following pages, which can be navigated using the navigation rail at the bottom of the page.

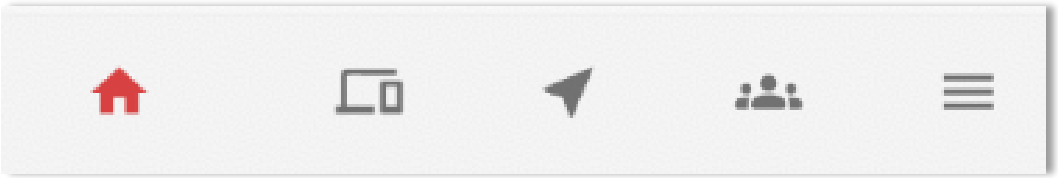
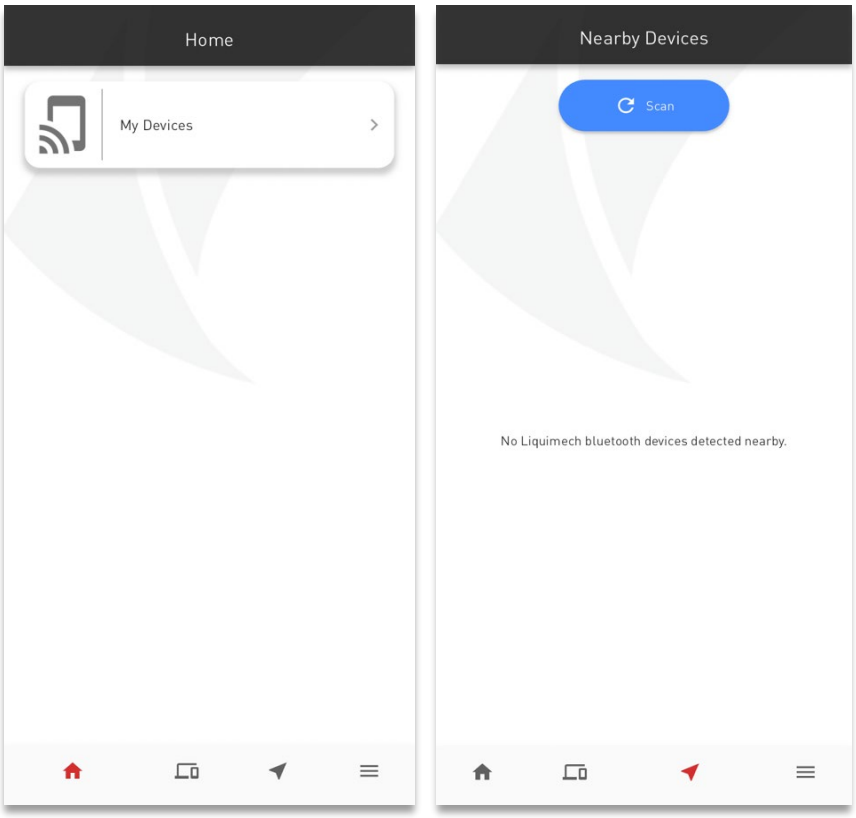


Figure 2: Navigation rail, from left to right: Home, Devices, Nearby Devices, Users and Settings.



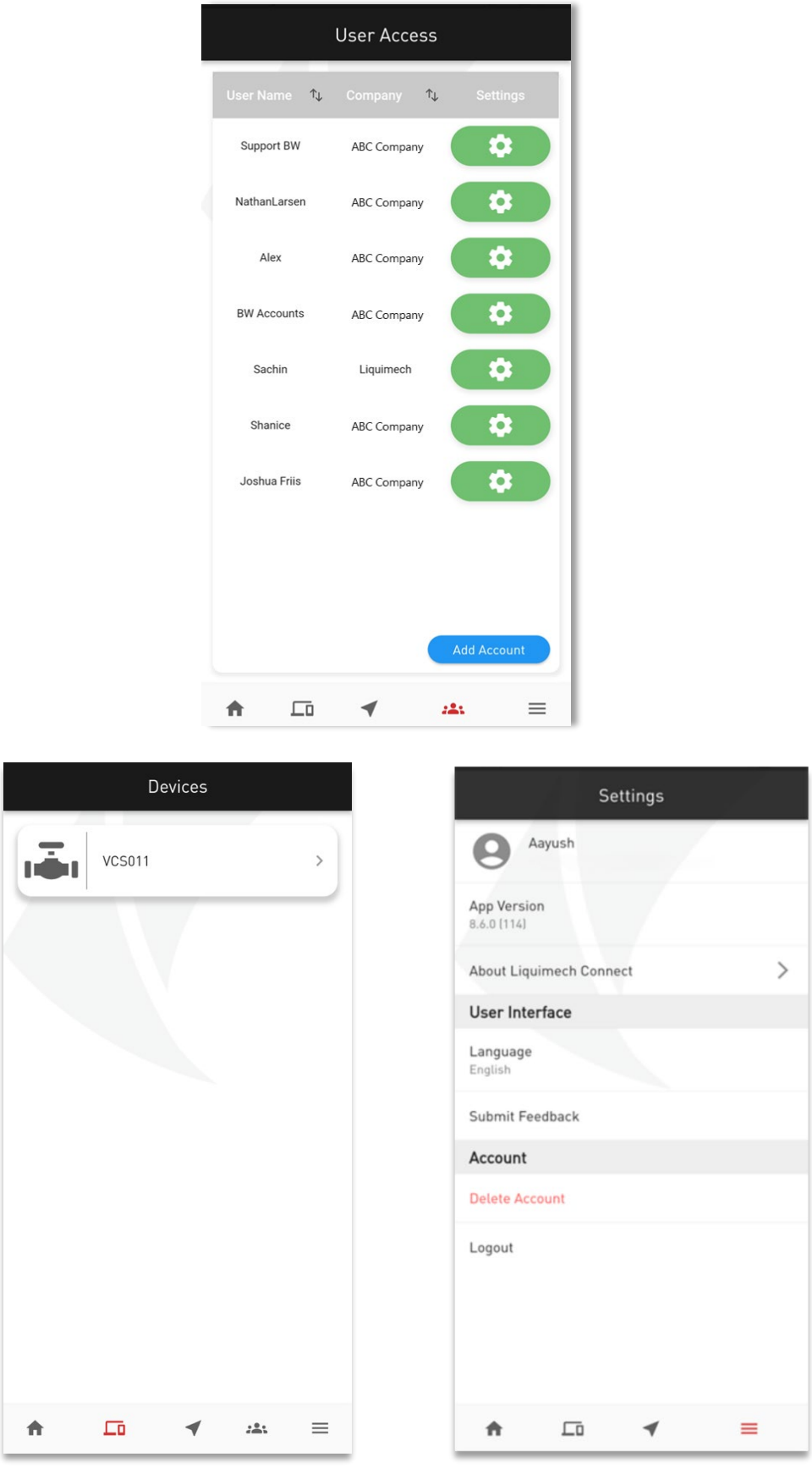


Figure 3: Screenshots showing, in order: Home page, Devices page, Nearby devices page, User Management page, and Settings page.

3.3 Device Connection

❑ Tap the remote valve control system icon corresponding to your device in the Devices list.

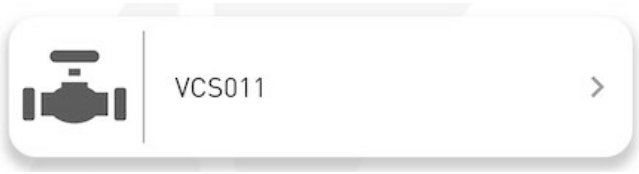


Figure 4: Valve Control System icon.

❑ When the icon is selected, the app will attempt to connect to the device if it is nearby.

❑ When a device is selected, permission is requested to establish a connection.

❑ After granting permission, the following message will be displayed:

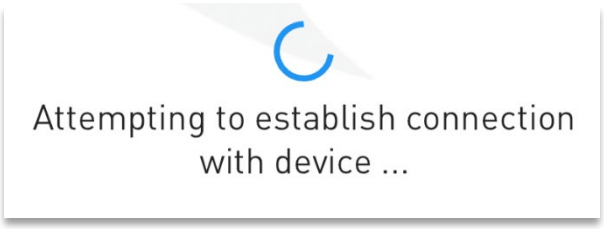


Figure 5: Message after granting the permission.

❑ When connected successfully, the following screen will be shown:

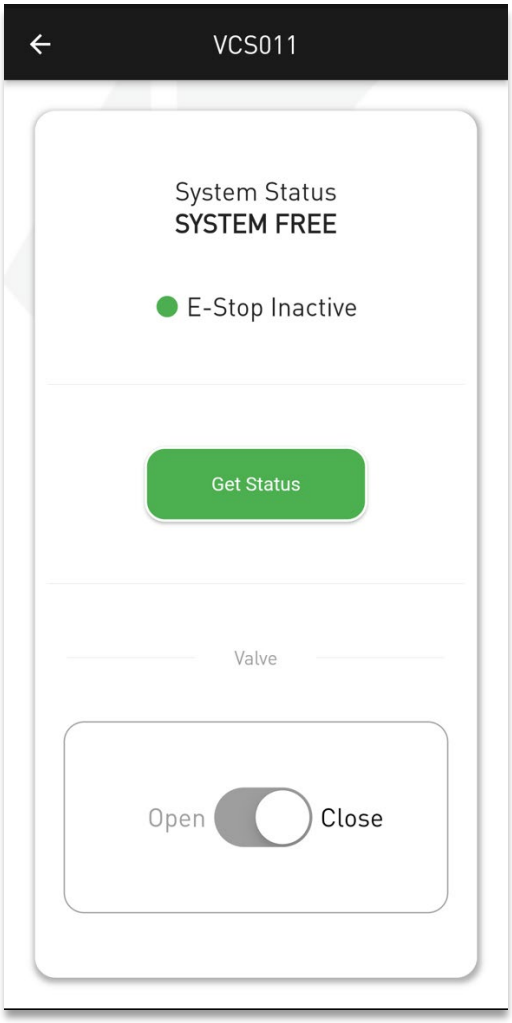


Figure 6: The valve control system page.

❑ If the app is unable to connect to the device, the following screen will appear.

❑ To reconnect, press the 'Connect' button.

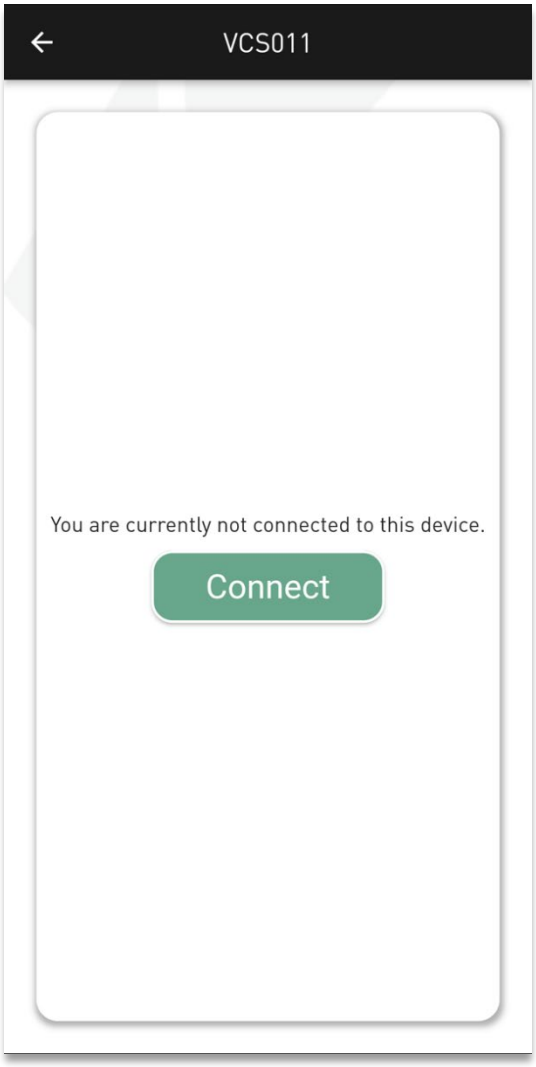


Figure 7: The screen displayed when the app cannot connect to the device.

3.4 Features

❑ Device Status

On the page, indicators inform the operator about different devices statuses, such as whether the system is free/busy, whether the estop is active sensor, and whether the valve is open/closed. Depending on the unit model, additional status variables may also be shown.

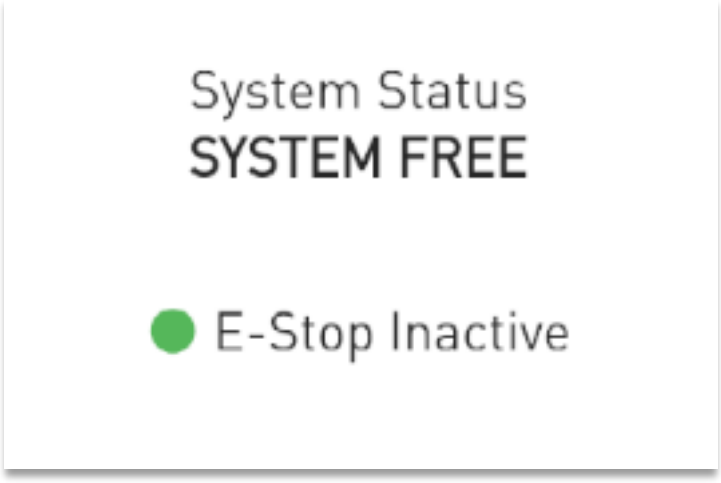


Figure 8: Status variable indicators.

Status	Meaning
System Free	The system is idle and available for commands.
System Busy	The system is running a process and is unavailable for alternative commands.
Process Started	The system has just started a fill process. The system is now busy.
Process Completed	The system has just completed a fill process. The system is now free.

❑ **Valve toggle**

The switch widget allows the operator to toggle the valve.

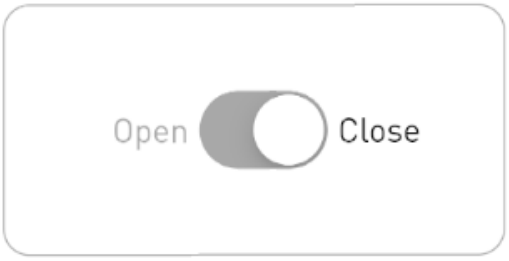


Figure 9: Valve toggle

❑ Sensor Readings

- The “Get Status” button fetches the current sensor status recorded by the field device.
- The dashboard changes to display the updates received.

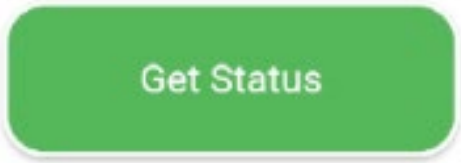


Figure 10: Get status button.

3.5 User Account Management

The user management page allows an operator with the right access level to provide access to their device to other users.

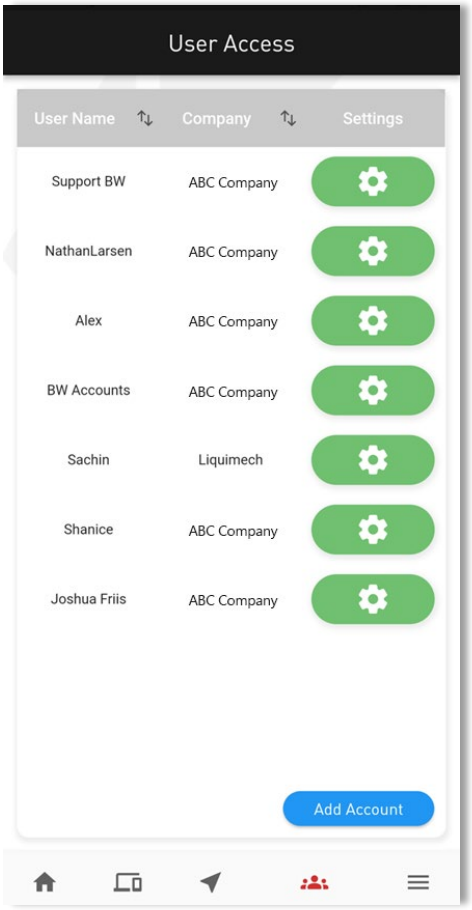


Figure 11: User access screen.

The username, email, and access level can be entered. A target operator may not be given an access level equal to or greater than the access level of the operator using the app.

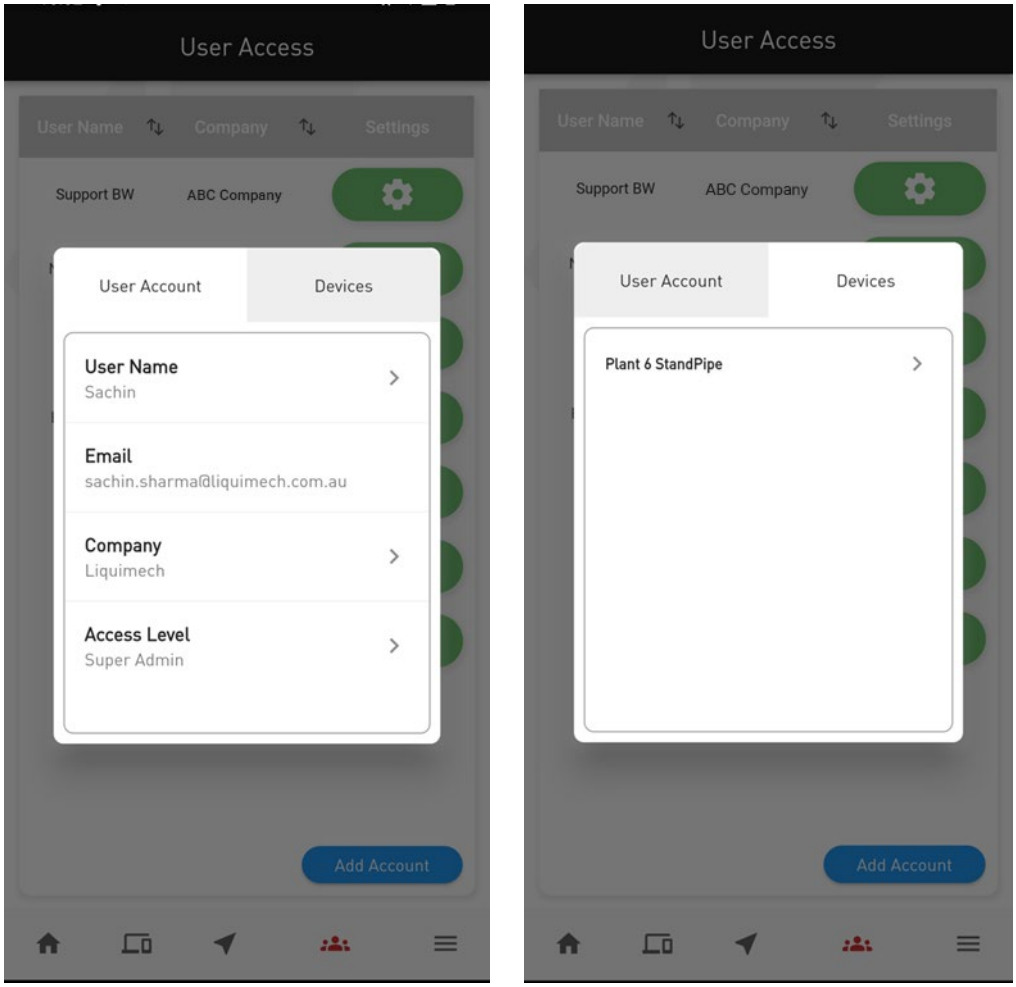


Figure 12: User access screens with a dialog box for user account and devices.

Access levels

The following table lists all the access levels:

Access Level	Access Title	Description
1	Super-admin	Complete system access with user management capabilities. Usually, the account that Liquimech hands over the product to.
2	Admin	Can modify system settings and view all user activities. Usually delegated by the super-admin to perform day-to-day tasks.
3	Technician*	Limited permission to change settings; can view system status only.
4	Operator*	Basic day-to-day access; can view system status only.

NOTE

Depending on the company's organisational structure and the field device's capabilities, a technician and operator may have essentially the same features. For the purposes of most organisations, both access levels may indicate accounts with read-only access.

4. Troubleshooting Guide

4.1 Unable to connect to field device:

Please ensure that you are standing within 10 metres of the device. If you are still unable to connect, try the following:

- Allow Bluetooth permissions through your phone settings,
- Toggle the device isolator on and off, or
- Restart the mobile app

NOTE	Some devices may only allow a single user to be connected at one time. Please ensure that no other user is connected before attempting to connect. Alternatively, restarting the device via the isolator will disconnect all users if they are unable to disconnect themselves.

4.2 Device list does not contain a required device:

Please contact your company admin to know if you have been given access to this device. If you are a company admin, please contact Liquimech Support.

4.3 Able to connect to the device, but the device does not respond when messages are sent to it:

Try restarting it using the isolator. Upon restart, if the device still does not respond as expected, contact your company admin.

Frequently Asked Questions

- Why does the app take a while to get the device status after connecting?
  The app waits for the connection to be fully stabilised before requesting the current device status.

- How do I modify who can access my device?
  You can do this using the "User Management" page. Here, you can view all the users under your company. By selecting each user, you can modify their access for each device you have listed under your company. You can also change their access level.

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Remote Valve Control System

Hardware Operator's Manual

5. Remote Valve Control System (Hardware Pack)

DISCLAIMER:
This system is supplied preconfigured for valve operation. Any modifications to the receiver, remote pairing, or software setup are outside the scope of support and may void warranty.

Operation & Safety Manual

5.1. Introduction

This manual provides guidance on the safe and correct operation of the Liquimech Remote Valve Control (RVC) System.
The system is available in two versions:

- ❑ Local **RF Version (Airkey)** – operated using an Airkey remote control and receiver.
- ❑ Phone App Version – operated using a mobile application for valve control.

Both versions are designed to enable reliable remote valve operation while ensuring safety and durability.

5.2. System Overview

- ❑ Airkey Remote & Transceiver **(Local RF Version)**
  - **Airkey** four-channel remote paired with a dedicated receiver for valve operation.
  - Supplied ready for use with no additional setup required.
  - For troubleshooting or if re-pairing of Airkey is required, refer to "AKRX64-S Receiver Instructions – Programming / Pairing the Airkey".
- ❑ Phone App (App Version)
  - Mobile phone interface with a toggle function to open and close the valve.
  - Note: For setup and pairing instructions, please refer to the Software section of this manual.
- ❑ Valve Control
  - Activated using Button 1 on the **Airkey** remote **(RF Version)**
    or by toggling the valve control switch on the Phone App (App Version).
- ❑ Control Panel
  - Emergency Stop (E-Stop): Provides immediate shutdown capability.
  - Pilot Light: Indicates valve status (ON when open).
- ❑ Power Sources
  - Solar Isolator and Battery Isolator: Must be switched ON for the system to operate and allow battery charging.

5.3. Operation

5.3.1 Powering the System

1. Ensure Solar Isolator is switched ON.
2. Ensure Battery Isolator is switched ON.

3. Confirm that the system is powered and ready for operation.

IMPORTANT NOTES

- Both isolators must remain ON to allow battery charging and ensure reliable operation.
- If the Battery Isolator is ON but the Solar Isolator is OFF, the battery will discharge and eventually deplete.
- **We will not be responsible for any damage or failures caused by incorrect isolator settings or battery depletion due to improper operation.**

5.3.2 Operating the Valve

1. Opening the Valve
    - Press Button 1 on the **Airkey** remote **(RF Version)** or activate the valve control toggle on the Phone App (App Version).
    - Pilot Light illuminates green, indicating the valve is open.
2. Closing the Valve
    - Press Button 1 again on the **Airkey** remote **(RF Version)** or deactivate the valve control toggle on the Phone App (App Version).
    - Pilot Light switches off, indicating the valve is closed.

5.3.3 Emergency Stop (E-Stop) Function

- Pressing the E-Stop immediately closes the valve and disables remote operation.
- For the **Airkey Version**, the remote will remain disabled while the E-Stop is engaged.
- For the Phone App Version, the app will display a notification indicating the E-Stop has been pressed and valve operation is disabled.
- To resume remote operation:
    1. Release (depress) the E-Stop.
    2. Resume normal operation via the **Airkey** remote or Phone App.

5.4. Safety Considerations

- Always verify that both the Solar Isolator and Battery Isolator are switched ON before operating.
- Isolators should always remain ON to allow battery charging and prevent power depletion.
- Use the E-Stop only in emergency situations requiring immediate shutdown.
- Do not attempt to manually override the valve or control system while powered.
- Regularly check the remote battery and system indicators for reliable operation.

5.5. Maintenance

- Inspect the control panel and pilot light for signs of damage or malfunction.
- Test the E-Stop functionality at regular intervals to ensure proper operation.
- Keep the Airkey remote secure and dry when not in use.
- For the Phone App Version, ensure your phone software is up to date and paired properly (refer to the Software manual).

5.6. Additional Note for App Users

For Phone App setup, pairing, and operation details, please refer to the App Software Manual provided separately.

AKRX64-S
Receiver Instructions

Programming/ Pairing the Airkey

6. AKRX64-S Receiver Instructions – Programming / Pairing the Airkey

Description

The AKRX64-S is a self-contained 433.92MHz rolling key receiver designed to be directly interfaced with any devices or controllers able to utilise a dry contact relay signal. With it's 4 on-board 1 Amp (max resistive) 125 VAC rated dry contact relay outputs, this receiver can be connected across existing push buttons connected to various door and gate controllers or used to switch power directly to a vast number of electrical or electronic products.

Power Supply Configuration

This receiver is capable of being powered with voltages ranging from 12 – 28 volts AC or DC. To operate receiver on 12-28VAC or >=12VDC, place the power link (near the heatsink) on HV. To operate on a 12V battery, place the power link on LV. This will enable the relays to continue operating with a supply voltage down to 10V.

Channel Settings

The receiver can learn up to 340 unique (2, 4, or 6-button) transmitters.
The table below shows all possible configuration options that can be set by selectively placing links across the **M1, M2, and FF pins**.

The factory default setting of the AKRX64-S with all links removed is for the left-hand button of an AKTX2 or top left-hand button of an AKTX4 or button 1 of an AK2TX4 or AK2TX6 activating relay 1. The right-hand button of an AKTX2 or the top right-hand button of an AKTX4 or button 2 of an AK2TX4 or AK2TX6 activating relay 2. The bottom left-hand button of an AKTX4 or button 3 of an AK2TX4 or AK2TX6 activating relay 3 and the bottom right hand button of an AKTX4 or button 4 of an AK2TX4 or AK2TX6 activating relay 4.

Relay & Function Table

Links (M1 M2 FF)	Operating Function	Ch 1	Ch 2	Ch 3	Ch 4
OFF OFF OFF	Momentary	1	2	3	4
ON OFF OFF	Pulse	3	4	5	6
OFF ON OFF	Hold Output	1	2	3	4

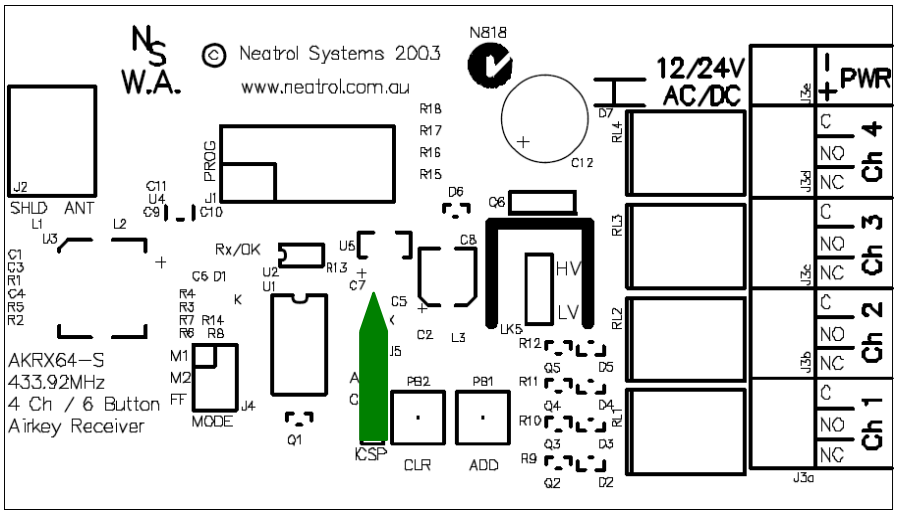
Links (M1 M2 FF)	Operating Function	Ch 1	Ch 2	Ch 3	Ch 4
ON ON OFF		3	4	5	6
OFF OFF ON	Flip-Flop	1	2	3	4
ON OFF ON		3	4	5	6
OFF ON ON	Momentary & Flip-Flop	1 (Mom)	2 (Mom)	3 (FF)	4 (FF)
ON ON ON		3 (Mom)	4 (Mom)	5 (FF)	6 (FF)

NOTES

- **Momentary output:** Relay triggers for 300 ms.
- **Flip-Flop:** Relay toggles its state each time the button is pressed the relay will maintain it's new state indefinitely until triggered by another button press
- **Hold:** Relay stays active for up to 20 s while the button is pressed and the transmitter is transmitting.

Programming / Pairing the Airkey

The AKRX64-S has a remote learning function allowing users to add new Airkeys into a receiver without direct access to the receiver itself. This function is invoked when the 5 pin green socket is plugged into the 5 pin ICSP header with the bevelled end pointing towards the centre of the receiver as below:



The remote learning socket must be removed before connecting an Airkey Programmer, Airkey Manager or using the manual ADD or CLEAR buttons. The remote learning socket comes pre-fitted in the factory and can be removed at any time to either disable the remote learning feature of the Airkey receiver or when connecting other peripherals. The learning socket should be fitted when power to the receiver has been disconnected. If this is not convenient, simply press and hold the ADD button while carefully installing the remote programming socket.

Local programming with the remote learning socket removed

Before any transmitters are learnt into the receiver for the first time, press and hold the CLR button on the receiver for about 5 seconds. The red light on the receiver will illuminate to indicate that all memory locations have been cleared and the receiver is ready to accept transmitters. Next press and hold the ADD button. The red light will illuminate for as long as the ADD button is depressed. To learn in transmitters, simply press one of the buttons of the transmitters to be added. If the transmitter is newly learnt, the red light will blink off for half a second to indicate a successful learn. If the transmitter has already been learnt or is faulty, the light will not blink and that transmitter will not be added. Up to 340 transmitters in total can be added if and when required. A new transmitter can be added at any time by simply pressing the ADD button and one of the transmitter's buttons. An alternative method of adding transmitters is to fit a jumper or dry contact switch across pins 2 and 3 (labelled A) on the ICSP connector.

Remote programming with the remote learning socket fitted

Once at least one Airkey has been learnt into the receiver by the local programming method as above, it and any other learnt Airkeys can be used to facilitate the learning-in of additional Airkeys without having to gain direct access to the receiver. While within the operational range of the Airkey receiver, simultaneously (and briefly) press buttons 1 and 2 of an already learnt Airkey and then press any one button of a new Airkey within 2 seconds to learn the new key into the receiver. If further Airkeys need to be programmed, simply repeat the aforementioned procedure until all the Airkeys are learned.

Antenna

An ideal antenna for this receiver is an insulated wire 160mm in length connected to the ANT terminal of the receiver.

Battery Changeover Procedure

IMPORTANT

This procedure must be followed with caution, as the solar panel can still provide power even when the battery isolator is OFF. Take appropriate precautions to prevent electric shock or short circuits.

Steps:

1. Switch OFF the Battery Isolator: Set the battery isolator switch to the OFF position to disconnect the battery from the system.
2. Be Aware of Live Solar Input: Note that solar panel input may still be active, and its terminals may remain live. Do not touch or short the solar input wiring under any circumstance.
3. Carefully Remove the Old Battery: Disconnect the negative (-) terminal first, followed by the positive (+) terminal.
4. Install the New Battery: Connect the positive (+) terminal first, then the negative (-) terminal. Ensure correct polarity is maintained (positive to positive, negative to negative).
5. Inspect Connections: Confirm all terminals are tight, secure, and correctly aligned.
6. Switch ON the Battery Isolator: Restore power to the system by switching the battery isolator to the ON position.
7. Verify System Operation: Confirm the system is powered correctly and all equipment operates as expected.

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Solar Panel and Battery Storage System

Maintenance & Operations Manual

7. Solar Panel and Battery Storage System

7.1 Introduction

This manual outlines the correct procedures for the operation, inspection, and maintenance of a solar PV system integrated with a battery energy storage system (BESS). It is designed to ensure optimal system performance, extended service life, and safe operation.

7.2 System Overview

Components:

- ❑ Photovoltaic (PV) panels
- ❑ Mounting frames and brackets
- ❑ DC combiner box
- ❑ Inverter/charger unit
- ❑ Battery storage ($LiFePO_4$ or AGM)
- ❑ Battery Management System (BMS)
- ❑ Isolation switches and circuit protection
- ❑ Monitoring system (optional: via Liquimech Connect)
- ❑ Cabling and connectors

7.3 General Safety Precautions

- ❑ Only qualified personnel should perform electrical maintenance.
- ❑ Always isolate power supply before inspection or service.
- ❑ Use insulated tools and PPE, including gloves and eye protection.
- ❑ Never short circuit battery terminals or bypass safety systems.
- ❑ Treat batteries as hazardous energy sources – risk of electric shock, fire, or explosion.
- ❑ Avoid working on wet surfaces or during inclement weather.
- ❑ Do not disassemble or modify system components.
- ❑ Observe MSDS guidelines for battery chemical handling (if applicable).

7.4 Daily Operational Checks

Checkpoint	Expected Condition
PV Module Surface	Clean, free from dust, dirt, bird droppings or snow
Inverter Display or Monitoring App	Operational, no warnings or fault codes
Battery State of Charge (SOC)	Within optimal range (typically 40–95%)
System Alerts or Fault Logs	No active faults or alarms
Cooling and Ventilation (if indoor)	Vents unobstructed, adequate airflow
Wiring and Connectors	Visually intact, no exposed wires or loosened joints

7.5 Weekly Maintenance Tasks

- ❑ Wipe down solar panels with a soft cloth and distilled water (if accessible).
- ❑ Check battery terminals for corrosion or loose connections.
- ❑ Verify grounding system integrity.
- ❑ Inspect isolators and breakers for signs of arcing or overheating.
- ❑ Ensure monitoring systems are communicating correctly with dashboards or apps.

7.6 Monthly Preventive Maintenance

- ❑ Log energy generation and battery usage to detect performance decline.
- ❑ Test inverter operation and firmware status.
- ❑ Inspect all mechanical mountings and panel alignment.
- ❑ Check surge protectors and fuses for wear or failure.
- ❑ Confirm firmware updates have been applied (if applicable).

7.7 Bi-Annual Service Schedule (Every 6 Months)

- ❑ Full thermal scan of connections and cable terminations.
- ❑ Measure battery impedance and capacity (especially for aged systems).
- ❑ Calibrate inverter and charge controllers if necessary.
- ❑ Inspect BMS logs and run diagnostics for anomalies.
- ❑ Check roof penetrations and frame fixtures for water ingress or corrosion.
- ❑ Verify lightning arrestors and grounding resistance.

7.8 Troubleshooting Guide

Symptom	Possible Cause	Remedial Action
Low system output	Dirty panels, shading, inverter error	Clean panels, remove shading, check inverter
Inverter not responding	Blown fuse, tripped breaker, low voltage	Inspect protection devices, check voltages
Battery not charging	BMS fault, wiring issues, bad cells	Check BMS, test batteries individually
High battery temperature	Ventilation issue, overload	Improve airflow, reduce load if needed
SOC shows zero or 100% constantly	Sensor fault, firmware error	Restart controller, recalibrate sensors
Repeated inverter faults	Firmware, grid sync issue	Check grid parameters, update firmware

7.9 Battery Maintenance (LiFePO$_4$ or AGM)

- ❑ Best Practices
  - Avoid deep discharge (<20% SOC) unless required by design.
  - Maintain ambient temp between 15–30°C for longevity.
  - Store batteries at ~50% SOC if unused for extended periods.
  - Follow manufacturer-specific charge/discharge cycles.

- ❑ Inspection Points
  - No bulging, swelling, or leakage.
  - Terminals are tight and clean.
  - Cables are secure and properly rated.
  - BMS readings are consistent across cells.

7.10 Record Keeping & Logs

Maintain the following logs:

- ❑ Daily system status checklist
- ❑ Maintenance and cleaning logs
- ❑ Energy generation and consumption trends
- ❑ Battery cycle history
- ❑ Incident reports or faults

7.11 Decommissioning and Disposal

- ❑ Follow local environmental and safety regulations.
- ❑ Solar panels are recyclable — arrange with certified recyclers.
- ❑ Batteries, especially lithium-based, must be disposed of at hazardous waste facilities.
- ❑ Remove and label all conductors before system disassembly.
- ❑ Notify relevant authorities for grid-disconnected systems.

7.12 Emergency Procedures

In case of fire:

- ❑ Don't use water on electrical fires.
- ❑ Use Class C or D fire extinguishers (check battery type).
- ❑ Disconnect system at isolation point if safely accessible.
- ❑ Evacuate and contact emergency services.

In case of electric shock:

- ❑ Isolate the power.
- ❑ Do not touch the person with bare hands.
- ❑ Administer CPR if trained and contact emergency services immediately.

7.13. Support Guide: Resetting Victron MPPT Settings

When to Use This Guide
If the battery has been replaced and no power is observed at the field device, the Victron SmartSolar MPPT may have entered an error or disabled state. This typically occurs when:

- ❑ A battery swap was performed without isolating solar input
- ❑ MPPT entered protection mode due to incorrect voltage detection
- ❑ Charger settings became misconfigured during reconnection

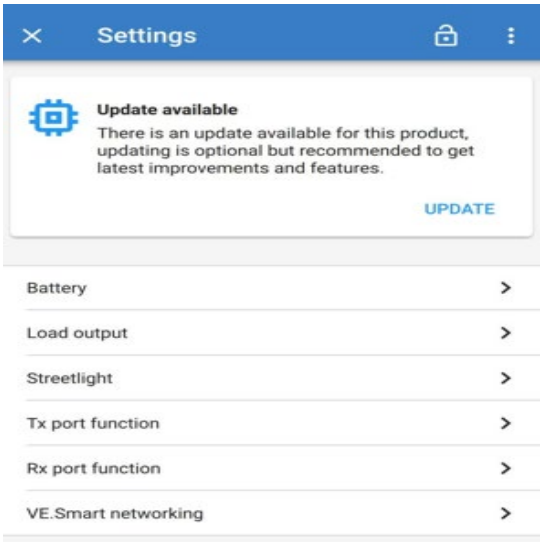
In such cases, follow this Liquimech MPPT Reset Procedure using the VictronConnect App to restore normal operation.

1. Open the VictronConnect App
Launch the app on your mobile device and allow it to scan for nearby Victron devices.

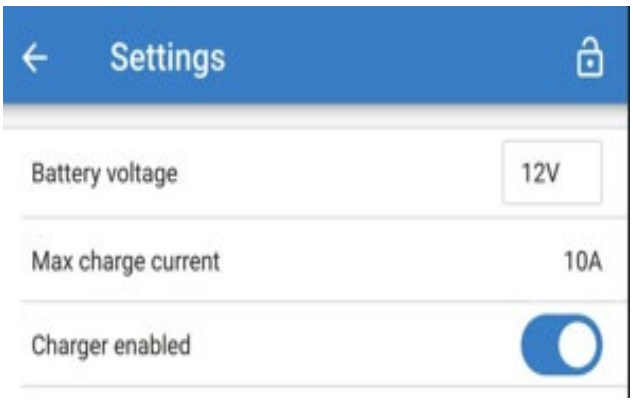
2. Select Your SmartSolar MPPT Device
Tap on the detected *SmartSolar MPPT* from the list.
🔒 If prompted for a password, enter the default PIN: 000000 (six zero) unless you have been provided with a specific custom PIN.

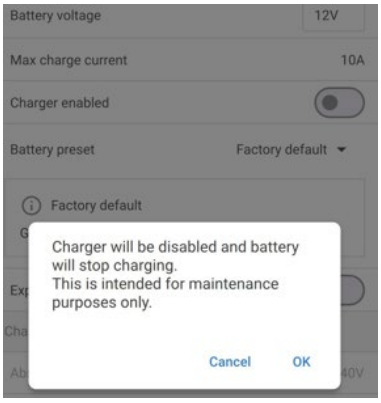
3. Access Settings
Once connected, tap the **gear icon (⚙)** in the top-right corner of the screen.

4. Tap on "Battery"
From the settings list, tap **Battery** to view battery configuration options.

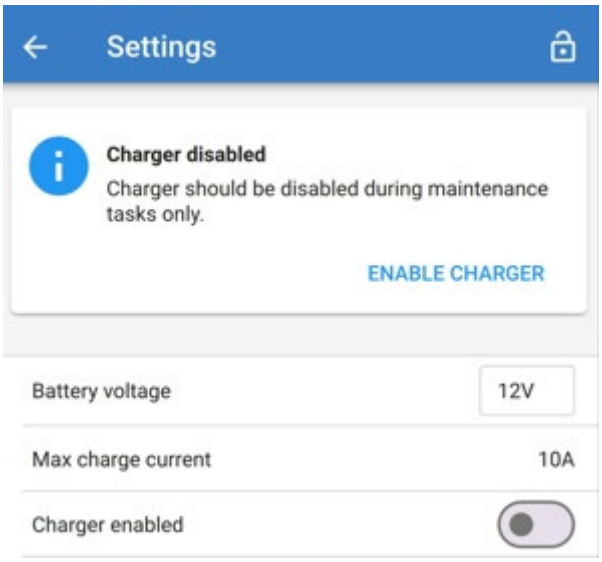


5. Disable Charging Temporarily
- ❑ Toggle **"Charger enabled"** to **Off**.
- ❑ A confirmation pop-up will appear – tap **OK** to proceed.

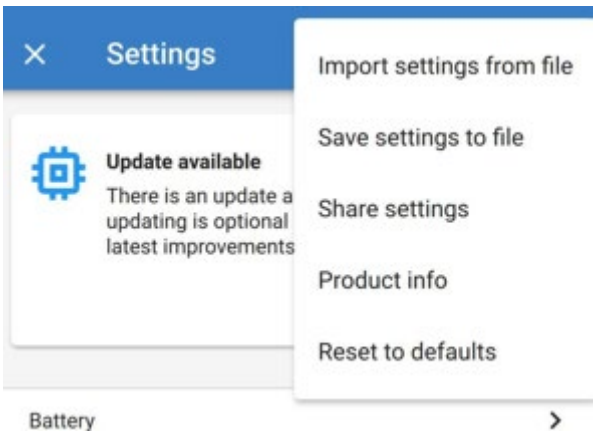




6. Re-enable Charging
   - ❑ After disabling, **wait 20-30 seconds and toggle "Enable Charger" back to On** to restore charging functionality.



7. Open the Options Menu
   - ❑ Return to the **main Settings screen**.
   - ❑ Tap the **three vertical dots (⋮)** in the top-right corner.

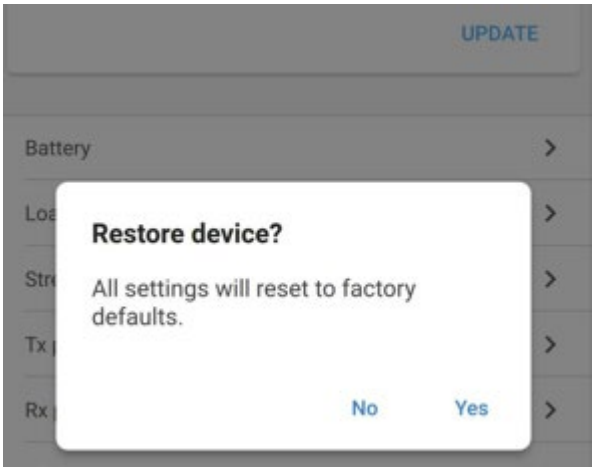


8. Select “Reset to Defaults”

From the dropdown menu, tap **Reset to defaults**.

9. Confirm the Reset

A confirmation dialog will appear. Tap **YES** to complete the reset process.



10. Final Check

Ensure “Charger enabled” remains **On**.

Safety Manual for 240V AC

Powered Liquid Management Systems

8. Safety Manual for 240V AC-Powered Liquid Management Systems

8.1. Introduction

Liquimech Group Pty Ltd, a proudly Australian-owned and operated leader in liquid management, delivers innovative, high-quality solutions for mining, civil, and agricultural industries. Our 240V AC-powered systems—pumps, valves, standpipes, hydration stations, and more—are engineered for harsh Australian conditions, prioritizing safety, efficiency, and reliability. This manual empowers employees, contractors, and clients to safely operate and maintain these systems, ensuring compliance with Australian Standards.

Purpose: To provide clear, actionable guidance for managing 240V AC-powered liquid management systems, minimizing risks in wet environments, and upholding Liquimech's safety and quality standards.

8.2. Understanding 240V AC in Australia

- **Standard Voltage**: 230V (commonly referred to as 240V) at 50Hz, per AS/NZS 60038.
- **Socket Type**: AS/NZS 3112 (Type I) three-pin configuration.
- **Applications in Liquimech Systems**: Powers critical liquid management equipment, including pumps, standpipe controllers, filtration units, etc.

8.3. Regulatory and Compliance Framework

Liquimech Group aligns with Australia's rigorous electrical safety regulations, ensuring our systems meet the highest standards:

- **Electrical Safety Acts and Regulations**: State-specific regulations under the national Work Health and Safety (WHS) framework.
- **Key Standards**:
  - AS/NZS 3000:2018 – Electrical Installations (Wiring Rules).
  - AS/NZS 3760:2022 – In-service safety inspection and testing of electrical equipment.
  - AS/NZS 3012:2019 – Electrical installations for construction and demolition sites.
  - AS/NZS 3017:2022 – Electrical installations testing and verification.
  - AS/NZS 60529: Degrees of protection provided by enclosures (IP ratings for wet environments).
- **Regulatory Authorities**:
  - NSW: SafeWork NSW
  - VIC: Energy Safe Victoria
  - QLD: Electrical Safety Office
  - WA: Building and Energy
  - SA: SafeWork SA
  - TAS: WorkSafe Tasmania
  - NT: NT WorkSafe

- ❑ **Liquimech Compliance Commitment**: Our integrated quality management system ensures all 240V AC-powered equipment complies with these standards.

8.4. Liquimech Group's Safety and Compliance Policies

- ❑ **Licensed Electricians**: Only licensed electricians may install, repair, or modify 240V AC systems.
- ❑ **Safety Device Integrity**: Bypassing Residual Current Devices (RCDs), circuit breakers, or fuses is strictly prohibited.
- ❑ **Equipment Testing**: All 240V AC-powered equipment undergoes mandatory testing per AS/NZS 3760, ensuring reliability in harsh environments.
- ❑ **Training**: Employees and contractors receive annual training on electrical safety, wet environment protocols, and Liquimech Connect system operation.
- ❑ **Risk Assessments**: Site-specific risk assessments are conducted for all projects involving 240V AC, focusing on water-related hazards.
- ❑ **Incident Reporting**: All electrical incidents must be reported within 24 hours to Liquimech Group.

8.5. Safety Guidelines for 240V AC-Powered Systems

8.5.1 General Safety Rules

- Never contact live wires or components, especially near water.
- Disconnect power at the source before servicing equipment.
- Avoid overloading power points or power boards connected to Liquimech systems.
- Report and remove damaged cords, plugs, or equipment immediately.

8.5.2 Extension Leads

- Use heavy-duty, IP66-rated leads (minimum 1.5mm² conductor) for liquid management applications in wet or outdoor settings.
- Keep leads clear of water, chemicals, and moving equipment.
- Inspect for wear, cuts, or corrosion before each use.

8.5.3 Power Boards

- Use IP54-rated power boards with overload and surge protection for pumps and control units.
- Do not connect multiple power boards in series ('piggybacking').
- Position cords to avoid submersion or interference with water flow.

8.6. Residual Current Devices (RCDs)

- **Requirement**: Mandatory for all 240V AC circuits with socket outlets ⩽20A, per AS/NZS 3000, critical for wet environments.
- **Testing**: Test RCDs quarterly using the test button.
- **Replacement**: Faulty RCDs must be replaced immediately by a licensed electrician.

8.7. Safe Integration of 240V AC in Liquid Management Systems

- **Design Excellence**: Liquimech systems feature isolated 240V AC circuits and IP66-rated enclosures to prevent water ingress, ensuring durability in harsh conditions.
- **Pumps and Standpipes**: Use IP66-rated enclosures for pumps and controllers, with robust materials like stainless steel or HDPE, as per Liquimech's standards.
- **Installation**: Install 240V AC components above flood levels or in waterproof enclosures compliant with AS/NZS 60529.
- **Risk Mitigation**: Assess risks of 240V AC near water sources, ensuring proper earthing and insulation.

8.8. Equipment Use and Maintenance

8.8.1 New Equipment Checks

- Verify equipment (e.g., pumps, controllers) is rated for 230–240V and 50Hz.
- Confirm the Australian Regulatory Compliance Mark (RCM) is present.
- Review manufacturer's safety and installation instructions for water-specific applications.

8.8.2 In-Service Testing (Tag & Test)

- Mandatory for all 240V AC-powered equipment, per AS/NZS 3760, with testing intervals of 3–12 months based on environmental conditions.
- Conducted by a competent person using a portable appliance tester.
- Colour-coded tags indicate test date and retest due date.

8.8.3 Faulty Equipment

- Unplug and label as 'Do Not Use' with a fault tag.
- Repairs must be performed by qualified personnel or returned to the manufacturer.
- Dispose of in accordance with e-waste or local council guidelines.

8.9. Portable and Site Power Use

- ❑ **Worksite Requirements**:
  - Use RCD-protected portable generators or outlets for 240V AC-powered equipment.
  - Install IP66-rated weatherproof outlets for outdoor or wet environments.
  - Display safety signage and barriers in areas with public or worker access.

8.10. Generator Use for 240V AC

- ❑ Use Australian-certified generators compliant with AS/NZS 3010.
- ❑ Isolate generators from mains supply to prevent back-feeding.
- ❑ Ensure proper earthing of generator frames, especially in wet environments.
- ❑ Never operate generators indoors or near water sources due to carbon monoxide risks.

8.11. Solar and Inverter Systems (240V AC Output)

- ❑ Grid-connected systems must be installed by Clean Energy Council (CEC)-accredited installers.
- ❑ Inverters must comply with AS/NZS 4777 for safe grid connection.
- ❑ Hybrid/off-grid systems require RCDs, IP66-rated enclosures, and clear signage.

8.12. Emergency Procedures

8.12.1 Electric Shock

- Do not touch a person in contact with a live source, especially in wet conditions.
- Safely disconnect power at the source.
- Call emergency services (000).
- Administer CPR if trained and necessary.

8.12.2 Fire from Electrical Source

- Use Class C or dry powder fire extinguishers only.
- Do not use water on electrical fires, especially near liquid management systems.
- Evacuate and contact fire services (000).

8.13. Labelling and Signage

- ❑ Switchboards, pumps, and control panels must be labelled with circuit details.
- ❑ Display safety signs compliant with AS 1319 near switchboards, pump stations, and high-risk areas.
- ❑ Use 'Isolate Before Working' signage during maintenance.

8.14. Common Infractions to Avoid

- ❑ Performing unauthorized DIY wiring or equipment modifications.
- ❑ Using international equipment without certified adaptors.
- ❑ Operating multiple devices on low-rated power boards in wet environments.
- ❑ Neglecting RCD test schedules.
- ❑ Using damaged cords or untagged equipment.

8.15. Maintenance Schedule

Item	Frequency	Responsible Party
RCD Test	Every 3 months	Owner/User
Equipment Test & Tag	3–12 months (per AS/NZS 3760)	Competent person
Switchboard Inspection	Annually	Licensed Electrician
Power Board Condition Check	Monthly	User/Facility Manager
Generator Earth Check	Before each use	Operator

8.16. Contact Details and Reporting

- **NSW**: SafeWork NSW – 13 10 50
- **VIC**: Energy Safe Victoria – 1800 800 158
- **QLD**: Electrical Safety Office – 1300 362 128
- **WA**: Building and Energy – 1300 489 099
- **SA**: SafeWork SA – 1300 365 255
- **TAS**: WorkSafe Tasmania – 1300 366 322
- **NT**: NT WorkSafe – 1800 019 115

8. 17. Legal Disclaimer

This manual is provided by Liquimech Group Pty Ltd for informational purposes only. It does not substitute professional electrical advice or services. Liquimech Group assumes no liability for misuse of this information. Always consult a licensed electrician for electrical work and refer to relevant Australian Standards.

8.18. Conclusion

Liquimech Group's 240V AC-powered liquid management systems are designed to deliver safety, reliability, and efficiency, tailored to your needs. 240V electricity is powerful and efficient but mishandling it can result in severe injury or death. Always treat electrical systems with care, comply with Australian laws and standards, and use licensed professionals for all electrical work. Stay alert, stay compliant, and stay safe.

LIQUIMECH©

Quarter Turn Electrical Actuator

Operation Manual
OM Series

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OVERVIEW

Our electric quarter-turn actuators offer a range of 35N·m to 4500N·m torque.
Product design is based on a self-locking worm drive principle, which provides for a smooth running, dependable, robust drive system. All models are ISO 5211 compliant, have a visual position indicator on top of the actuator cover and manual override except BM-2 and OMA. The manual operation is a **non-clutch** design that can be operated without any lever, clutch or brake upon power outage. This design has already won the new Patent in Taiwan, U.S.A. and China.

Features

- ✓ 30% duty cycle at rated torque.
- ✓ Self-locking function.
- ✓ Built-in thermal protection prevents motor burning out. The AC motor is 125°C (257°F) and 90°C (194°F) for DC motor. (The 75% duty cycle actuator uses DC motor.)

Model	Max. Torque		Weight		Manual Override
	N·m	lb·in	Kg	lb	
OM-A	50	443	3	6.61	N/A
OM-A-M	50	443	3	6.61	Lever
OM-1	35	310	2	4.41	
BM-2	120	1063	5.5	12.13	N/A
OM-F	65	576	11	24.25	Hand-wheel
OM-2	90	797	11	24.25	
OM-G	90	797	11	24.25	
OM-3	150	1328	11	24.25	
OM-4	400	3542	20	44.09	
OM-5	500	4427	20	44.09	
OM-6	650	5756	20	44.09	
OM-7	1000	8855	32	70.55	
OM-8	1500	13282	32	70.55	
OM-9	2000	17709	71	156.53	
OM-10	2500	22137	71	156.53	
OM-11	3000	26564	72	158.73	
OM-12	3500	30991	72	158.73	
OM-13	4500	39846	106	233.69	

IMPORTANT NOTICES

CAUTION!

For the 3-Phase on-off controller actuator, please use the hand-wheel to turn the actuator to 45 degrees before testing.

** If the direction is opposite after supplying power, please change any two of the U, V, W.

1. Check for correct voltage prior to wiring.
2. Turn the power off before servicing or for maintenance purposes.
3. Use sealant to seal conduit connections after wiring to prevent dusting or water contamination.
4. The angle of electric actuator installation must be between 0~180 degrees. Do not install upside down or below the horizontal.
5. When more than one electric actuator is needed to operate simultaneously, please connect with the individual cables or install the coupling board.
6. Not intended for vacuum spaces and avoid installing near explosive atmospheres.
7. Actuators should be placed in a clean and dry place for storage and protected with an outer carton from being affected by great temperature differences or serious vibration.
8. To avoid functional failure caused by static, do not touch any components on the PCB with metal tools or bare hands.
9. Please connect the ground wire to PE inside the electric actuator.
10. The warranty period of our products is one year.

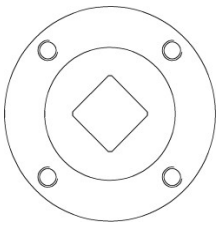
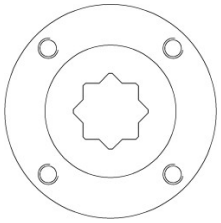
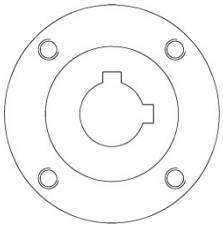
Duty Cycle – compliance to IEC standard

"Duty cycle" means the starting frequency.
The formula: Running Time ÷ (Running time + Rest Time) × 100% = duty cycle
Rest Time = Running Time × (1- duty cycle) ÷ duty cycle

For example： The running time for OM-2 is 15 sec.
30% duty cycle 15 × [(1 – 30%) / 30%] = 35 → The rest time will be 35 sec.
75% duty cycle 15 × [(1 – 75%) / 75%] = 5 → The rest time will be 5 sec.

If the duty cycle is higher, the rest time will be shortened. It means the starting frequency will be higher.

STANDARD MOUNTING

Model		Mounting Flange	Shaft		Depth of shaft		Key	
		(ISO 5211)	mm	inch	mm	inch	mm	inch
BM-2		F07	22	0.87	30	1.18	N/A	
OM-A		F05 / F07	17	0.67	20	0.78	N/A	
OM-A-M		F05 / F07	17	0.67	20	0.78	N/A	
OM-1		F03 / F05	14	0.55	17	0.67	N/A	
OM-F, OM-G		F07	22	0.87	30	1.18	N/A	
OM-2~OM-3		F07	22	0.87	30	1.18	N/A	
OM-4~OM-6		F10	36	1.38	40	1.57	N/A	
OM-7~OM-8		F12 or F14	35	1.38	60	2.36	10 ×10	0.39×0.39
OM-9~OM-12		F14 or F16	75	2.95	100	3.94	12 ×10	0.47×0.39
OM-13		F16 / F25	72	2.83	110	4.33	20 ×12	0.79×0.47

SPECIFICATION

12V/24V

Model No.	Max Torque		Speed (90°)	Motor Power	12V DC/AC			24V DC/AC		
	Nm	lb-in			Run	Start	Lock	Run	Start	Lock
BM-2	-	-	-	-	-	-	-	-	-	-
OM-A	50	443	20s	10W	1.3A	1.5A	2.8A	0.8A	0.9A	1.6A
OM-A-M	50	443	20s	10W	1.3A	1.5A	2.8A	0.8A	0.9A	1.6A
OM-1	35	310	15s	10W	1.9A	2.0A	2.8A	1.1A	1.1A	1.6A
OM-2	90	797	15s	40W	3.4A	5.2A	16.5A	2.2A	4.5A	14.5A
OM-F	65	576	6s	60W	-	-	-	2.6A	3.8A	11.0A
OM-3	150	1328	22s	40W	4.4A	4.9A	16.5A	2.4A	5.0A	14.5A
OM-G	120	1063	8s	60W	-	-	-	4.4A	4.8A	11.0A
OM-4	400	3542	16s	80W	16.1A	16.1A	33.0A	8.5A	9.2A	30.0A
OM-5	500	4427	22s	80W	14.1A	13.5A	33.0A	7.5A	9.0A	30.0A
OM-6	650	5756	28s	80W	12.3A	12.5A	33.0A	7.0A	8.5A	30.0A
OM-7	1000	8855	46s	80W				6.8A	7.8A	30.0A
OM-8	1500	13282	46s	80W	25A	26A	59A	8.1A	8.0A	30.0A
OM-9	2000	17709	58s	80W				8.8A	11.0A	26.0A
OM-10	2500	22137	58s	80W	28A	60A	59A	11.8A	11.0A	26.0A
OM-11	3000	26564	58s	220W				15.1A	11.0A	33.0A
OM-12	3500	30991	58s	220W				17.8A	12.0A	33.0A

Single Phase

Model No.	Max Torque		Speed (90°)		Motor Power	110V Current			220V-240V Current		
	Nm	lb-in	60 Hz	50 Hz		Run	Start	Lock	Run	Start	Lock
BM-2	120	1063	8s	10s	40W	1.3A	1.6A	1.6A	0.6A	0.9A	0.9A
OM-A	50	443	20s	24s	10W	0.6A	0.6A	0.7A	0.3A	0.4A	0.5A
OM-A-M	50	443	20s	24s	10W	0.6A	0.6A	0.7A	0.3A	0.4A	0.5A
OM-1	35	310	12s	13s	10W	0.6A	0.6A	0.7A	0.3A	0.4A	0.4A
OM-2	90	797	15s	17s	40W	1.0A	1.8A	1.6A	0.5A	0.8A	0.9A
OM-F	65	576	6s	6s	60W	1.4A	2.1A	3.1A	0.7A	1.0A	1.5A
OM-3	150	1328	22s	26s	40W	1.2A	1.8A	1.6A	1.0A	1.2A	0.9A
OM-G	120	1063	8s	8s	60W	1.6A	3.0A	3.1A	0.8A	1.2A	1.5A
OM-4	400	3542	16s	18s	80W	1.9A	3.8A	3.6A	1.1A	2.0A	2.2A
OM-5	500	4427	22s	25s	80W	2.0A	3.8A	3.6A	1.1A	2.0A	2.2A
OM-6	650	5756	28s	31s	80W	2.1A	3.8A	3.6A	1.1A	2.0A	2.2A
OM-7	1000	8855	46s	55s	120W	3.1A	8.5A	9.0A	1.4A	4.1A	5.0A
OM-8	1500	13282	46s	55s	120W	3.3A	9.0A	9.0A	1.6A	4.4A	5.0A
OM-9	2000	17709	58s	70s	180W	3.3A	5.8A	5.9A	2.1A	3.8A	3.6A
OM-10	2500	22137	58s	70s	180W	4.0A	6.5A	5.9A	2.3A	4.0A	3.6A
OM-11	3000	26564	58s	70s	180W	4.5A	3.5A	5.9A	2.5A	4.2A	3.6A
OM-12	3500	30991	58s	70s	220W	4.0A	8.0A	7.5A	2.4A	4.4A	4.8A
OM-13	4500	39846	80s	95s	220W	4.2A	8.0A	7.5A	2.4A	4.8A	4.8A

SPECIFICATION

Three Phase

Model No.	Max Torque		Speed (90°)		Motor Power	220V Current			380V Current			440V Current		
	Nm	lb-in	60Hz	50Hz		Run	Start	Lock	Run	Start	Lock	Run	Start	Lock
BM-2	120	1063	8 s	10 s	40W	0.8A	1.4A	1.5A	0.4A	0.9A	0.7A	0.4A	0.5A	0.6A
OM-1	-		-	-	-	-	-	-	-	-	-	-	-	-
OM-A	-		-	-	-	-	-	-	-	-	-	-	-	-
OM-A-M	-		-	-	-	-	-	-	-	-	-	-	-	-
OM-2	90	797	15s	17s	40W	0.8A	1.4A	1.5A	0.4A	0.7A	0.7A	0.4A	0.9A	0.6A
OM-3	150	1328	22s	26s	40W	0.8A	1.4A	1.5A	0.4A	0.7A	0.7A	0.4A	0.9A	0.6A
OM-4	400	3542	16s	18s	80W	1.0A	1.8A	2.3A	0.7A	1.3A	1.5A	0.6A	1.4A	1.4A
OM-5	500	4427	22s	25s	80W	1.0A	1.8A	2.3A	0.7A	1.3A	1.5A	0.6A	1.4A	1.4A
OM-6	650	5756	28s	31s	80W	1.0A	1.8A	2.3A	0.7A	1.3A	1.5A	0.6A	1.4A	1.4A
OM-7	1000	8855	46s	55s	120W	0.9A	2.0A	2.2A	0.7A	1.2A	1.4A	0.5A	1.3A	1.3A
OM-8	1500	13282	46s	55s	120W	1.0A	2.4A	2.6A	0.7A	1.5A	1.5A	0.6A	1.2A	1.2A
OM-9	2000	17709	58s	70s	180W	1.3A	3.7A	3.9A	0.7A	2.0A	2.3A	0.7A	2.0A	2.2A
OM-10	2500	22137	58s	70s	180W	1.3A	3.4A	3.9A	0.7A	2.0A	2.4A	0.7A	2.0A	2.2A
OM-11	3000	26564	58s	70s	180W	1.3A	3.5A	3.9A	0.7A	2.0A	2.4A	0.7A	2.0A	2.2A
OM-12	3500	30991	58s	70s	220W	1.5A	4.8A	5.4A	0.9A	2.5A	2.5A	0.8A	2.6A	2.4A
OM-13	4500	39846	80s	95s	220W	1.5A	4.9A	5.4A	1.0A	2.5A	2.5A	0.8A	2.6A	2.4A

NOTE:
Run: Full Load Ampere
Lock: Locked Rotor Ampere

STORAGE INFORMATION

Receiving/Inspection

Carefully inspect for shipping damage. Damage to the shipping carton is usually a good indication that it has received rough handling. Report all damage immediately to the freight carrier and your seller.

After unpacking the product and information packet, please take care to save the shipping carton and any packing material in case of product return or replacement. Verify that the item on the packing list or bill of lading is the same as your own documentation. If there is any discrepancy, please contact the seller.

Storage

If the actuator cannot be installed immediately, store it in a dry place, it must be protected from excess moisture, dust, and weather until you are ready to connect cables.

If the actuator has to be installed but cannot be cabled, please don’t remove the plastic transit cable entry plugs. When the actuator has to be cabled, it is recommended to replace to suitable water-proof plugs with IP protection.

LUBRICATION

The gear train has been permanently lubricated at the factory sufficiently.

INSTALLATION

1. Before mounting the actuator, verify that the torque requirement is less than the output torque of the actuator. (The suggested safety factor is 30% of the max. torque of valve.)

   For example :

   If the maximum torque of 5" valve is 80N·m → 80 × 1.3(safety factor) ＝104N·m

   104N·m ＜ 150N·m (OM-3) → **OK**!

   104N·m ＞ 90N·m (OM-2) → **NO**!
2. Check if the output shaft fits into the stem of the valve before inserting it into the actuator. Please use the mounting plate or adaptor to connect if it does not match.
3. Insert the output shaft adaptor into the actuator. Make sure it fits satisfactorily.
4. Determine that the actuator position, open or closed, matches with position of the equipment prior to mounting. Use manual override to change position if necessary.
5. Remove valve's manual device and mount it on the proper connection.

   CAUTION: Don't remove any necessary parts for the proper operation of the valve.
6. Check again that the valve and actuator are in the same position.
7. Install the actuator to valve directly or with mounting kits, then tighten all screws and nuts.
8. Remove actuator cover.

   CAUTION: Be sure power is off at the main power box.
9. Wire actuator using the wiring diagram inside cover.

   CAUTION: For the 3-Phase on-off controller actuator, please use the hand-wheel to turn the actuator to 45 degree before test. If the operating direction is opposite after supplying power, please change any two of the U, V, W.
10. Supply power to the actuator.

    CAUTION: Use remarkable mark warning "there are live circuits that could cause electrical shock or death.
11. Make sure if it is needed to calibrate the fully-open or fully-closed position of the actuator. Refer to the P49~P52 to set the fully-open or fully-closed position and mechanical stops.
12. If the actuator is a modulating type, refer to P53~P70 to set the functions.

    CAUTION: Turn power off before changing any setting.
13. Replace cover and secure cover screws.

WIRING DIAGRAM

1. MC1 & MC2：Electromagnetic contactor.
2. NFB：No fuse breaker.
3. C.S.：Control switch.
4. C：Capacitor.
5. N：Neutral.
6. L：Live Wire.
7. PE：Protective Earth.
8. O.L.：Over-load relay.
9. H：Heater.
10. LS：Limit switch.
11. TS：Torque switch.
12. Switch(1)：Local/Remote Control.
    Switch(2)：Open/Stop/Close select.
13. Duty cycle (Standard Model)：
    BM-2, OM-A, OM-A-M, OM-F, OM-G, OM-1~OM-13：30% duty cycle.
    Extended duty cycle：
    OM-A, OM-A-M, OM-1~OM-8：75% duty cycle.
    OM-9~OM-13：50% duty cycle.
14. LS1：Limit switch for open.
    LS2：Limit switch for close.
15. The usage for 2 additional limit switches：

OM-1, OM-A, OM-A-M

LS3 Fully-Open：Terminal “A” connects to terminal “B”.
LS4 Fully-Closed：Terminal “A” connects to terminal “E”.

OM-1, OM-A, OM-A-M (Option: MODBUS)

LS3 Fully-Open：Terminal “A” connects to terminal “C”.
LS4 Fully-Closed：Terminal “D” connects to terminal “F”.

BM-2, OM-A, OM-AM, OM-F, OM-G, OM-2~OM-13

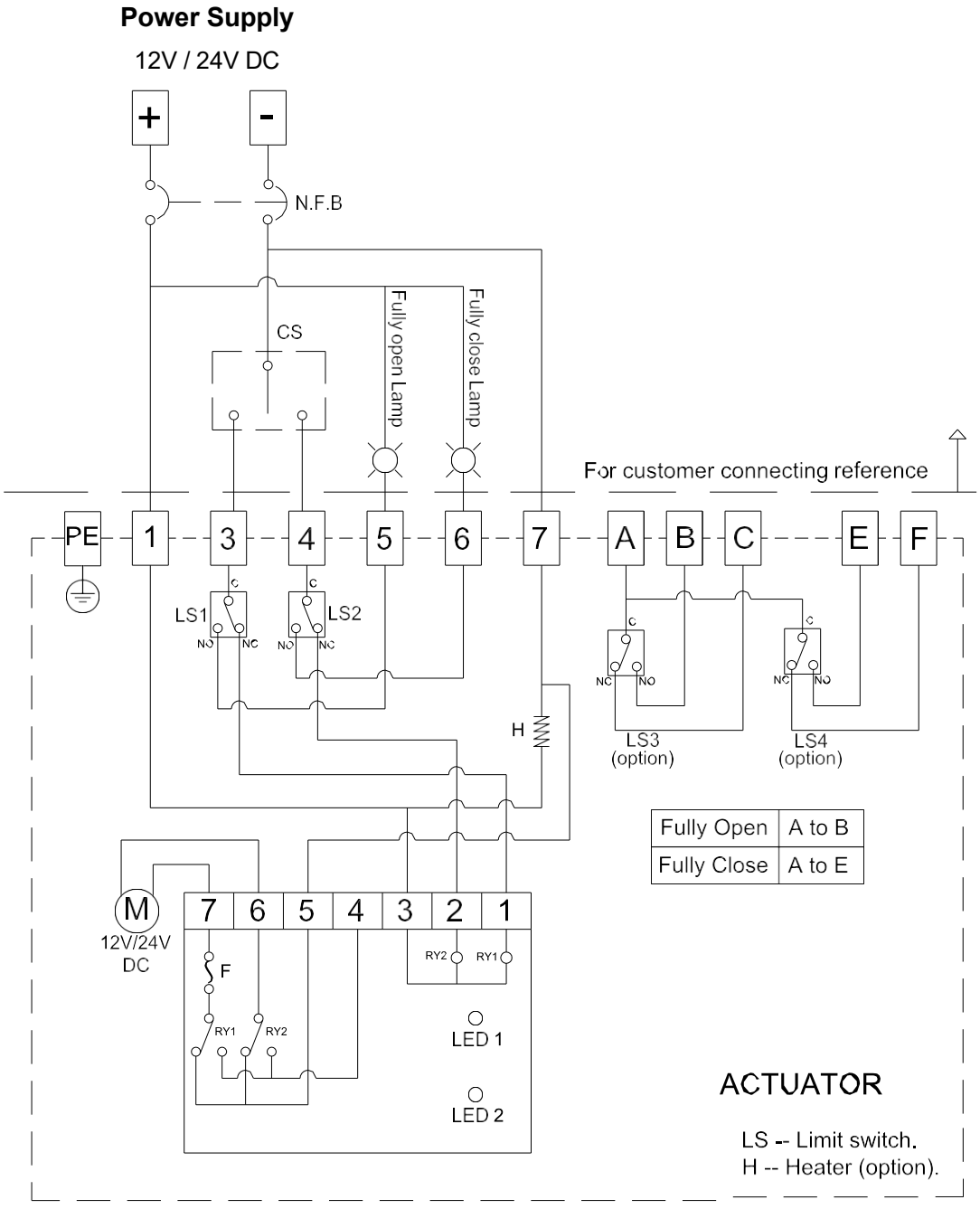
LS3 Fully-Open：Terminal “A” connects to terminal “C”.
LS4 Fully-Closed：Terminal “D” connects to terminal “F”.

NOTE:
When a set of control wire or switch needs to control two or more actuators at the same time, please refer to P48 or install the coupling board.

WIRING DIAGRAM – Quarter Turn Actuator

OM-1 , OM-A , OM-A-M 12V , 24V DC

On-Off Controller



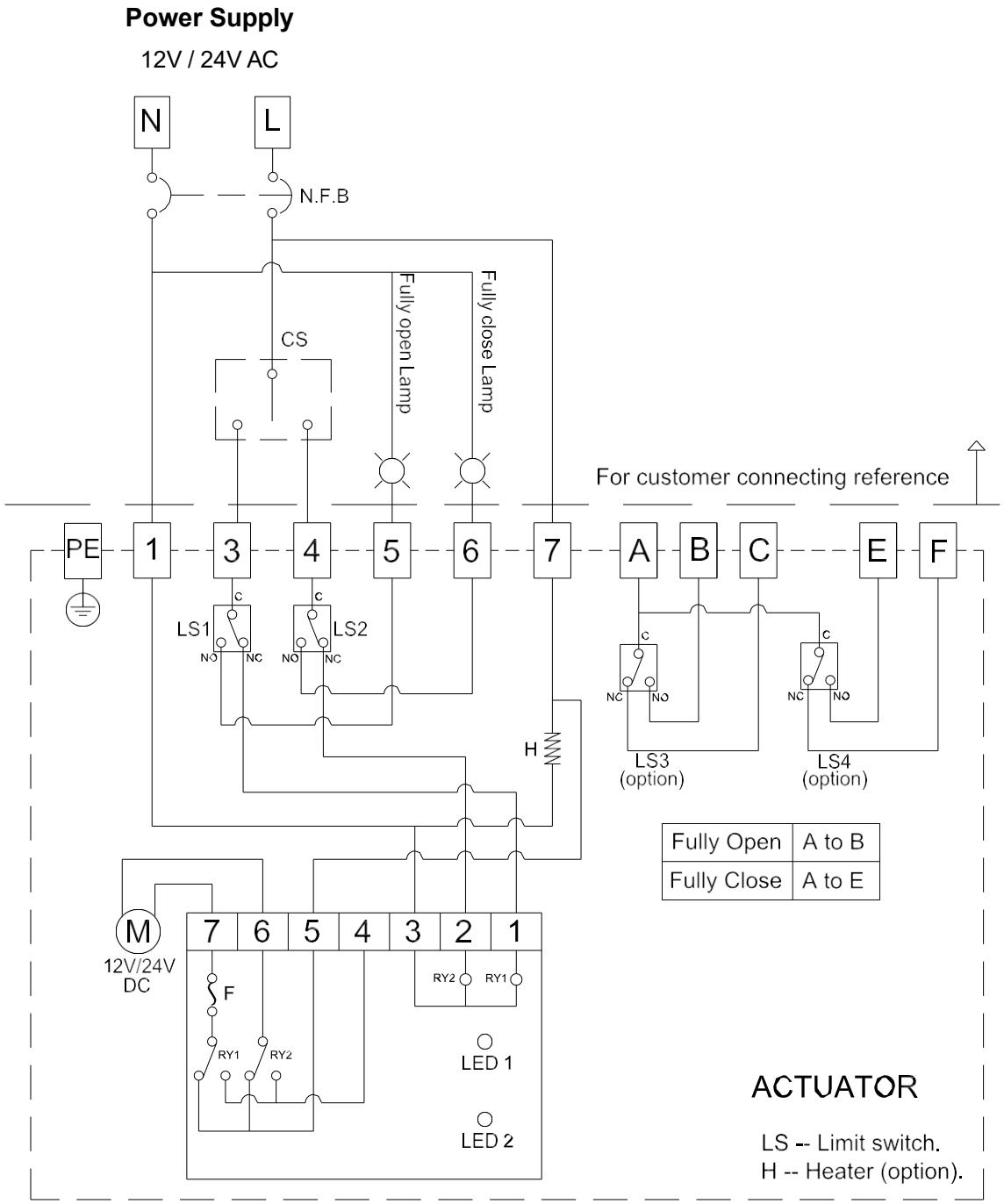
NOTE:

1. "+" connects to #1, "–" connects to #7.
2. "–" connects to #3 for "OPEN", "–" connects to #4 for "CLOSE".
3. Using less than 3A current for "A, B, C, E, F".
4. Using battery to supply power for DC units.

WIRING DIAGRAM – Quarter Turn Actuator

OM-1 , OM-A , OM-A-M 12V , 24V AC

On-Off Controller

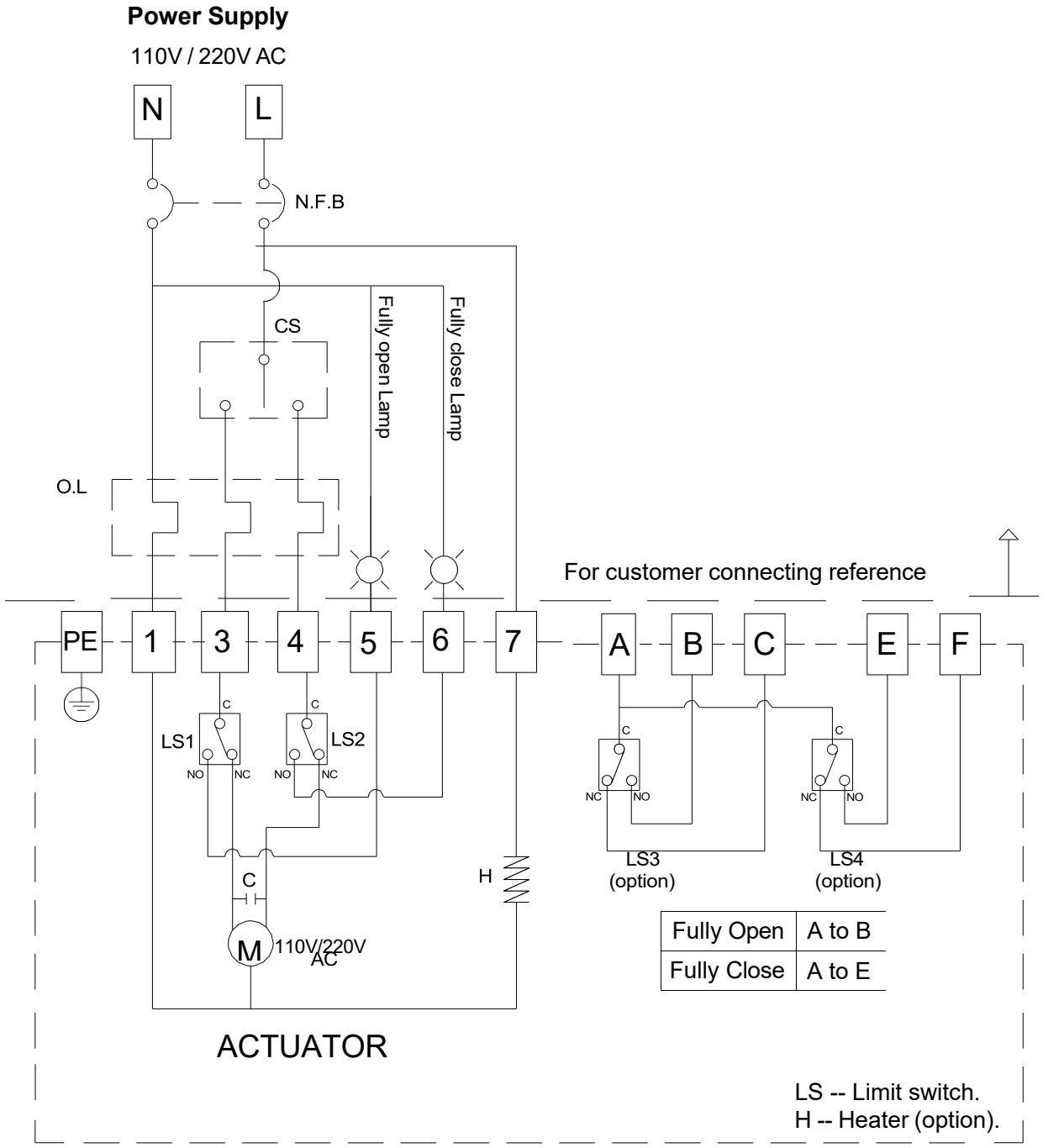


NOTE:
1. “N” connects to #1, “L” connects to #7.
2. “L” connects to #3 for “OPEN”, “L” connects to #4 for “CLOSE”.
3. Using less than 3A current for “A, B, C, E, F”.

WIRING DIAGRAM – Quarter Turn Actuator

OM-1 , OM-A , OM-A-M 110V , 220V AC 1-Phase

On-Off Controller

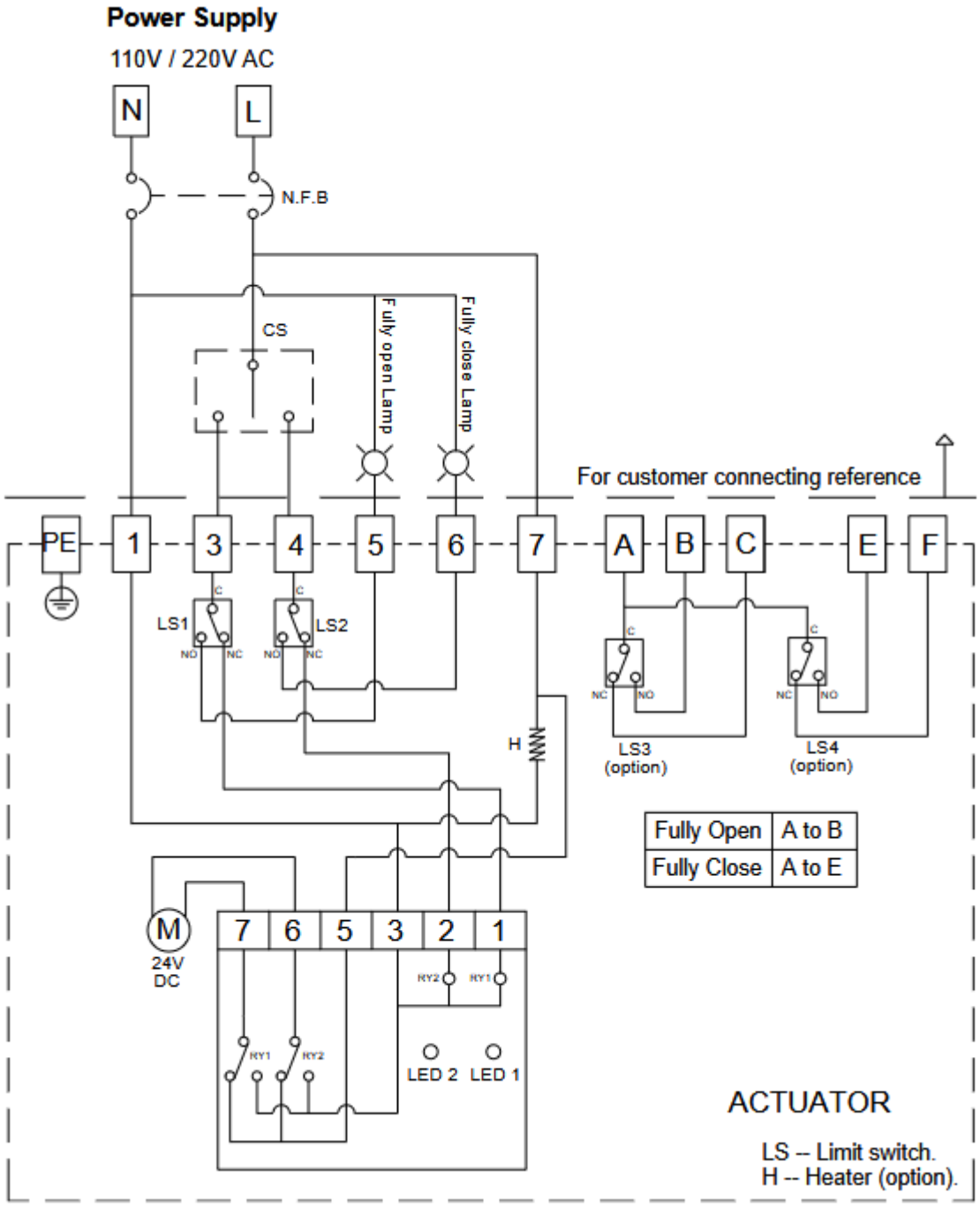


NOTE:
1. “N” connects to #1, “L” connects to #7.
2. “L” connects to #3 for “OPEN”, “L” connects to #4 for “CLOSE”.
3. Using less than 3A current for “A, B, C, E, F”.

WIRING DIAGRAM – Quarter Turn Actuator

OM-1 , OM-A , OM-A-M 110V , 220V AC 1-Phase

On-Off Controller, 75% duty cycle

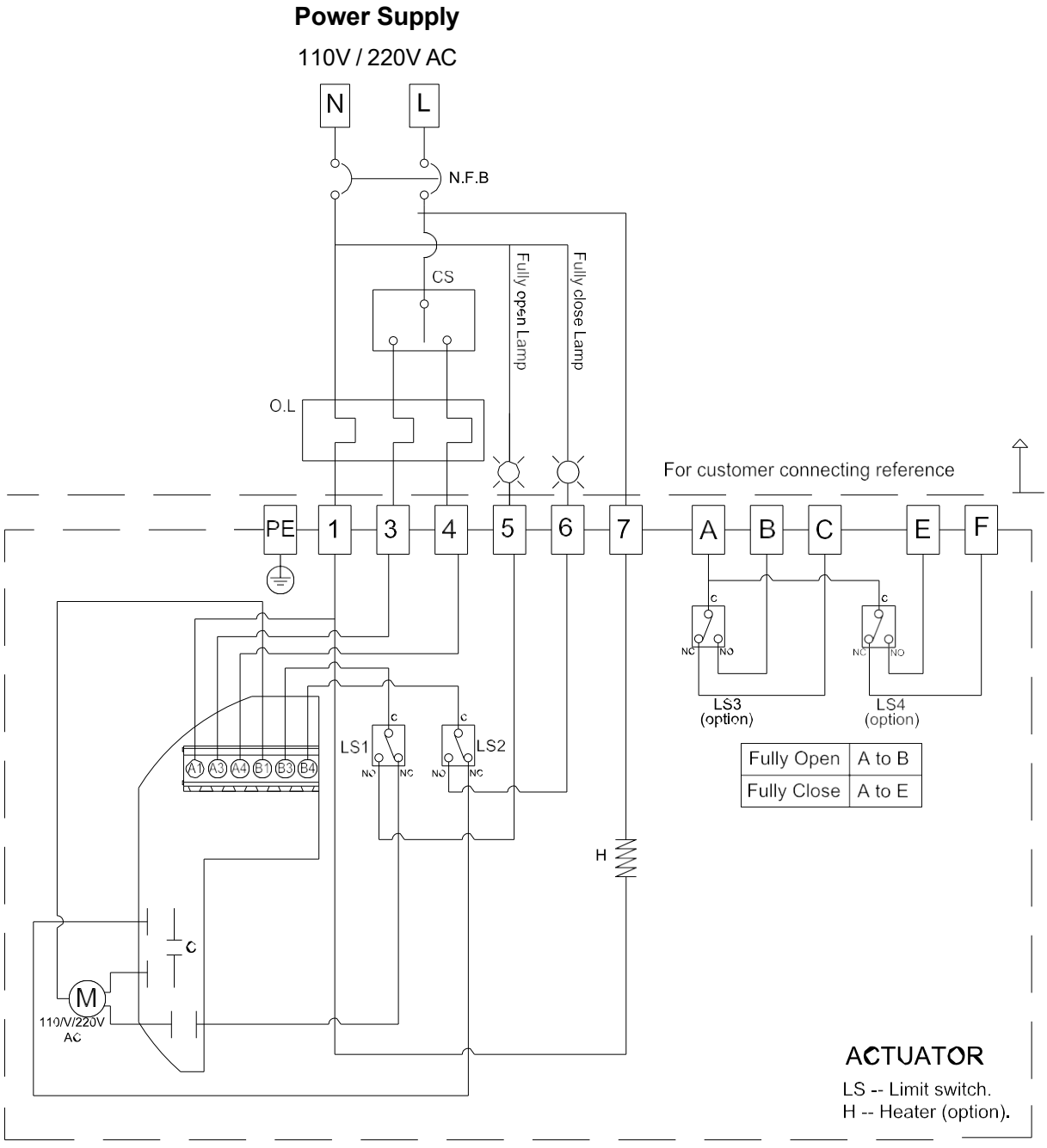


NOTE:
1. “N” connects to #1, “L” connects to #7.
2. “L” connects to #3 for “OPEN”, “L” connects to #4 for “CLOSE”.
3. Using less than 3A current for “A, B, C, E, F”.

WIRING DIAGRAM – Quarter Turn Actuator

OM-1 , OM-A , OM-A-M 110V , 220V AC 1-Phase

On-Off Controller, Coupling Board



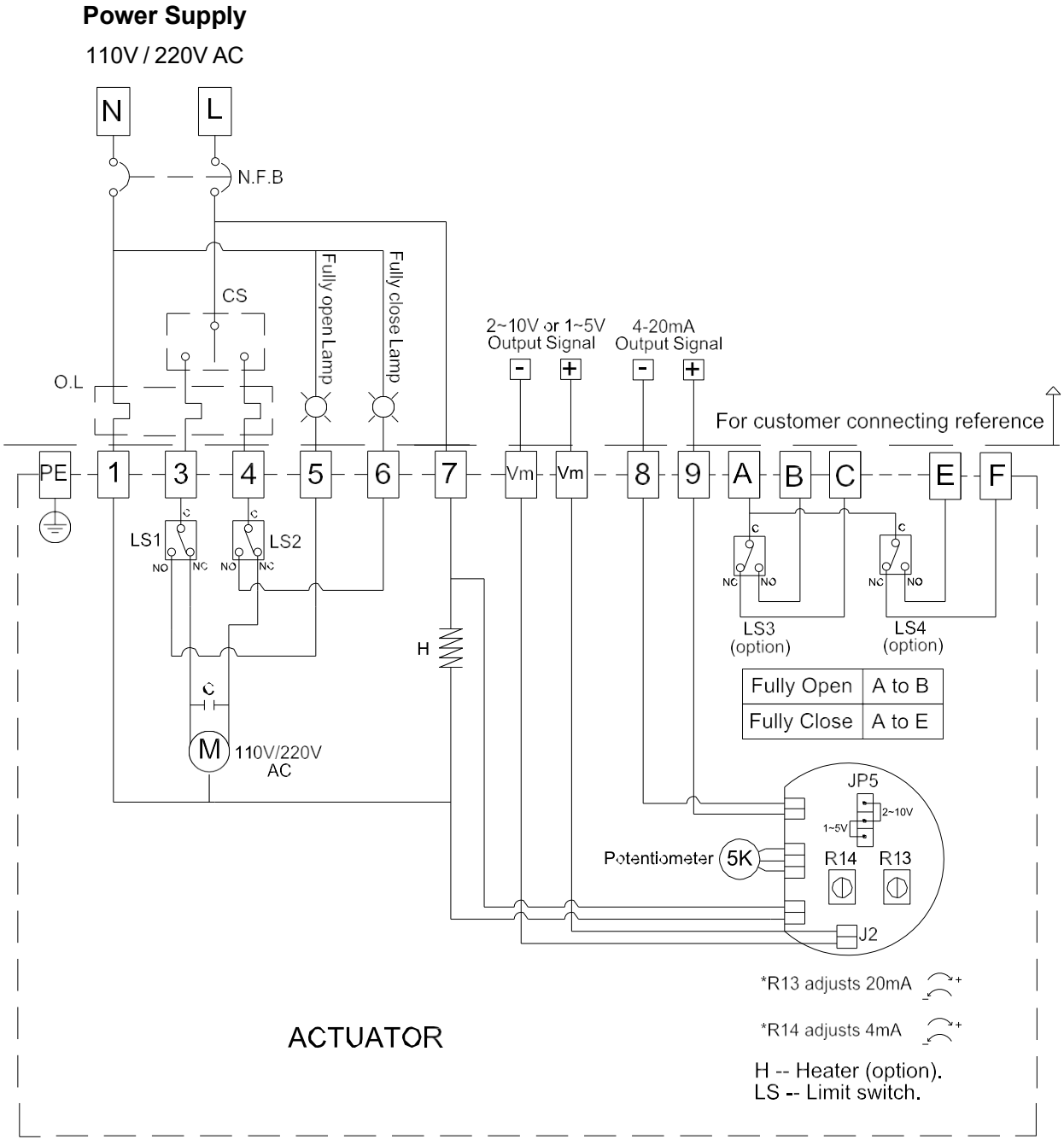
NOTE:

1. "N" connects to #1, "L" connects to #7.
2. "L" connects to #3 for "OPEN", "L" connects to #4 for "CLOSE".
3. Using less than 3A current for "A, B, C, E, F".

WIRING DIAGRAM – Quarter Turn Actuator

OM-1 , OM-A , OM-A-M 110V , 220V AC 1-Phase

On-Off Controller, Analog Signal Output



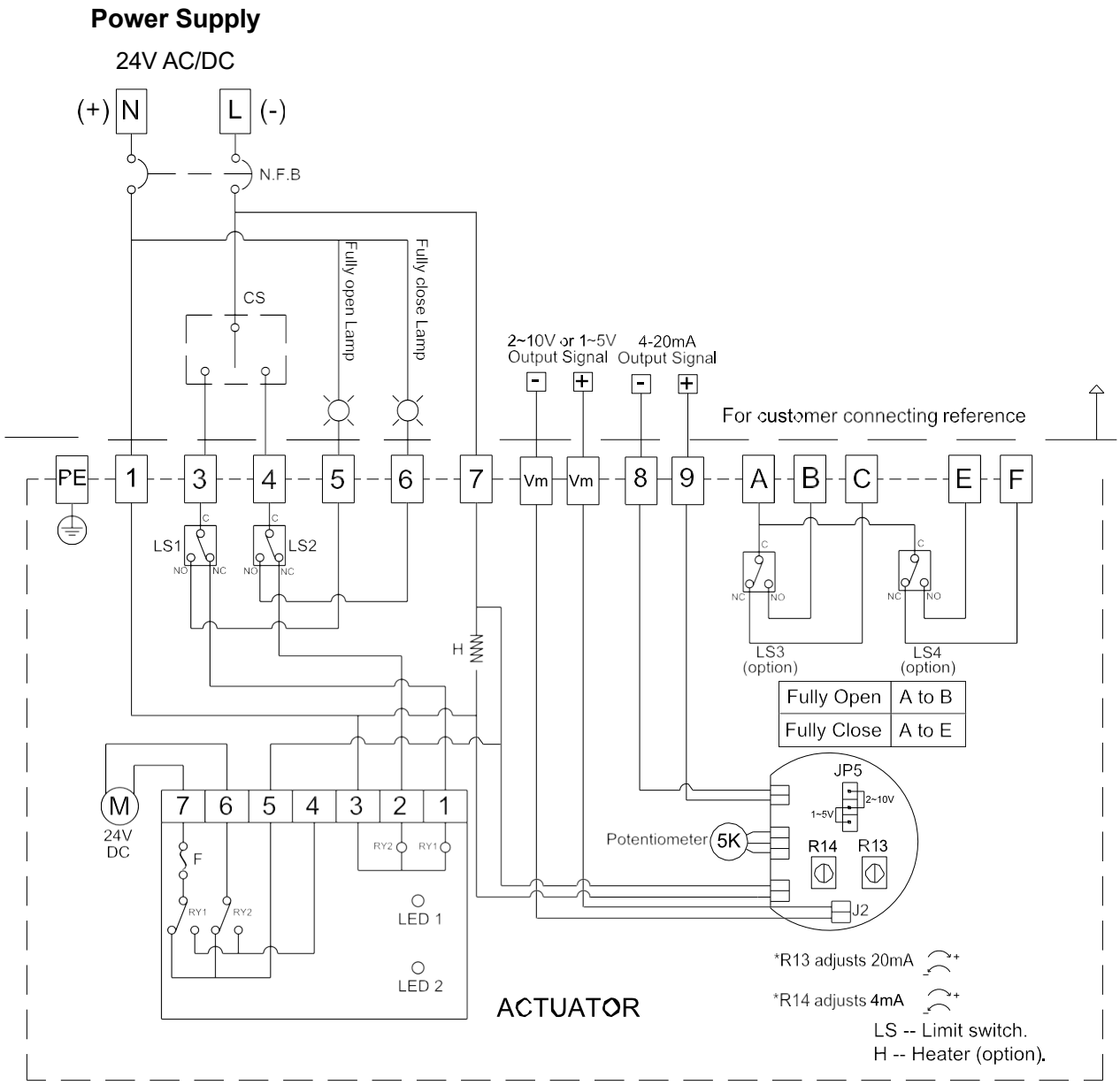
NOTE:

1. "N" connects to #1, "L" connects to #7.
2. "L" connects to #3 for "OPEN", "–" connects to #4 for "CLOSE".
3. Using less than 3A current for "A, B, C, E, F".
4. JP5：2~10V or 1~5V output mode；J2：2~10V or 1~5V output signal.

WIRING DIAGRAM – Quarter Turn Actuator

OM-1 , OM-A , OM-A-M 24V AC/DC

On-Off Controller, Analog Signal Output



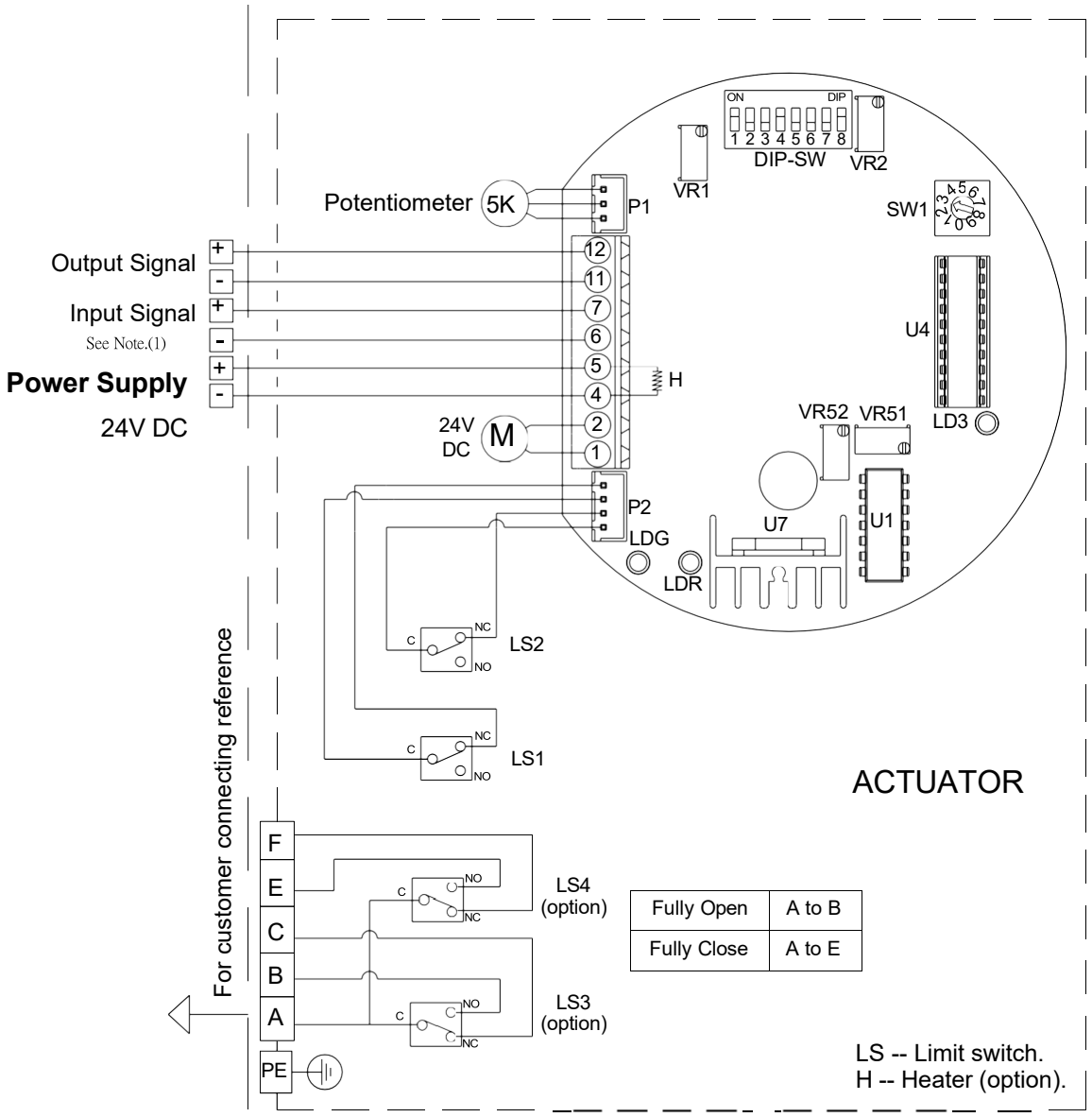
NOTE:

1. “N” connects to #1, “L” connects to #7.
2. “L” connects to #3 for “OPEN”, “–” connects to #4 for “CLOSE”.
3. Using less than 3A current for “A, B, C, E, F”.
4. JP5：2~10V or 1~5V output mode；J2：2~10V or 1~5V output signal.

WIRING DIAGRAM – Quarter Turn Actuator

OM-1 , OM-A , OM-A-M 24V DC

Modulating Controller



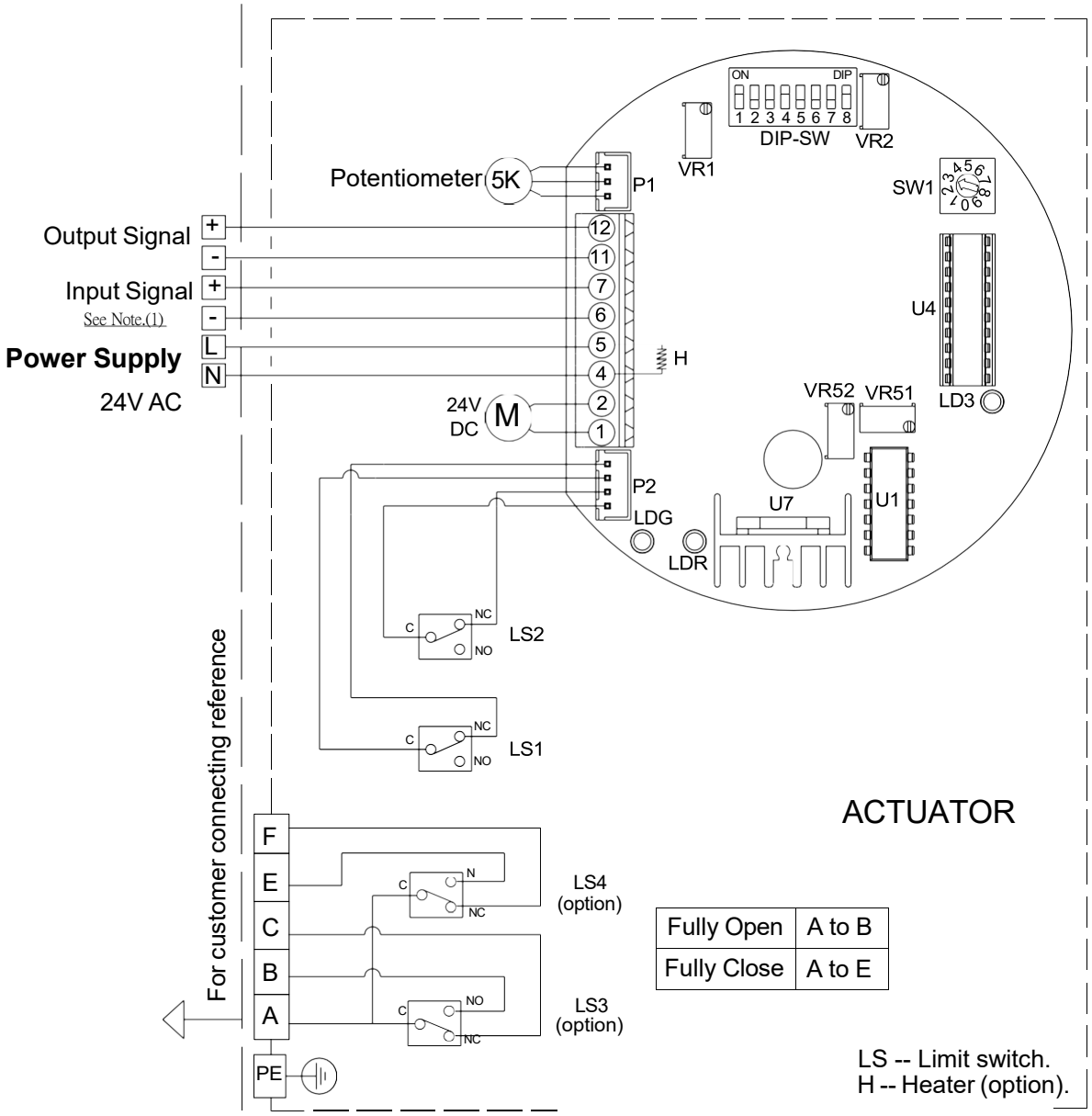
NOTE:

1. **Modulating Board**
   a. Input Signal：4~20mA, 1~5V, 2~10V
   (It is suggested to use the shielding wire, and its length should not exceed 30m.)
   b. Output Signal：4~20mA, 2~10V
2. Using less than 3A current for “A, B, C, E, F”.
3. Using a battery to supply power for DC units.

WIRING DIAGRAM – Quarter Turn Actuator

OM-1 , OM-A , OM-A-M 24V AC

Modulating Controller



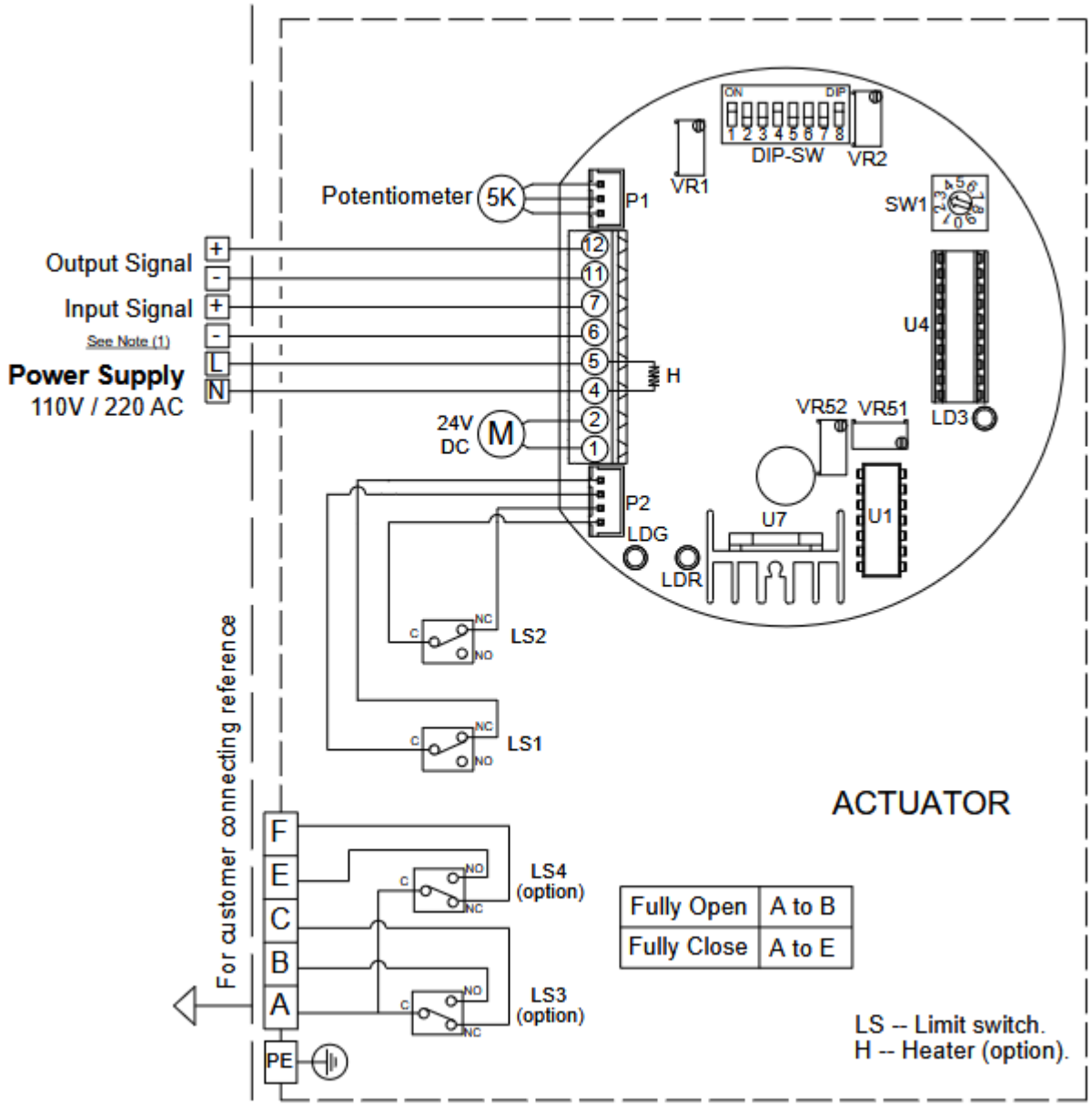
NOTE:

1. **Modulating Board**
   a. Input Signal：4~20mA, 1~5V, 2~10V
   (It is suggested to use the shielding wire and its length should not exceed 30m.)
   b. Output Signal：4~20mA, 2~10V
2. Using less than 3A current for “A, B, C, E, F”.

WIRING DIAGRAM – Quarter Turn Actuator

OM-1 , OM-A , OM-A-M 110V , 220V AC 1-Phase

Modulating Controller



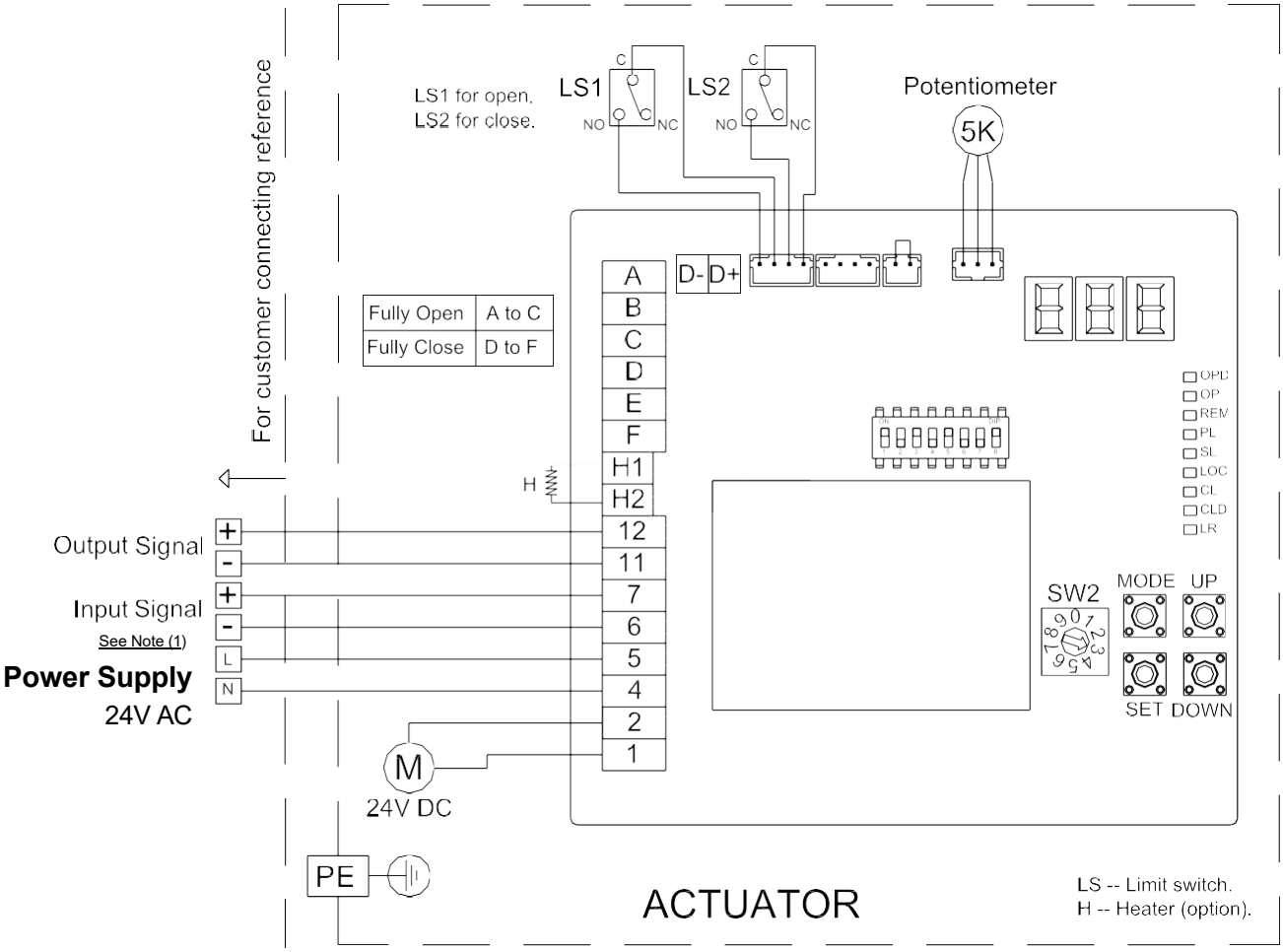
NOTE:

1. **Modulating Board**
   a. Input Signal：4~20mA, 1~5V, 2~10V
   (It is suggested to use the shielding wire and its length should not exceed 30m.)
   b. Output Signal：4~20mA, 2~10V
2. Using less than 3A current for “A, B, C, E, F”.

WIRING DIAGRAM – Quarter Turn Actuator

OM-1 , OM-A , OM-A-M 24V AC

Modulating Controller, MODBUS



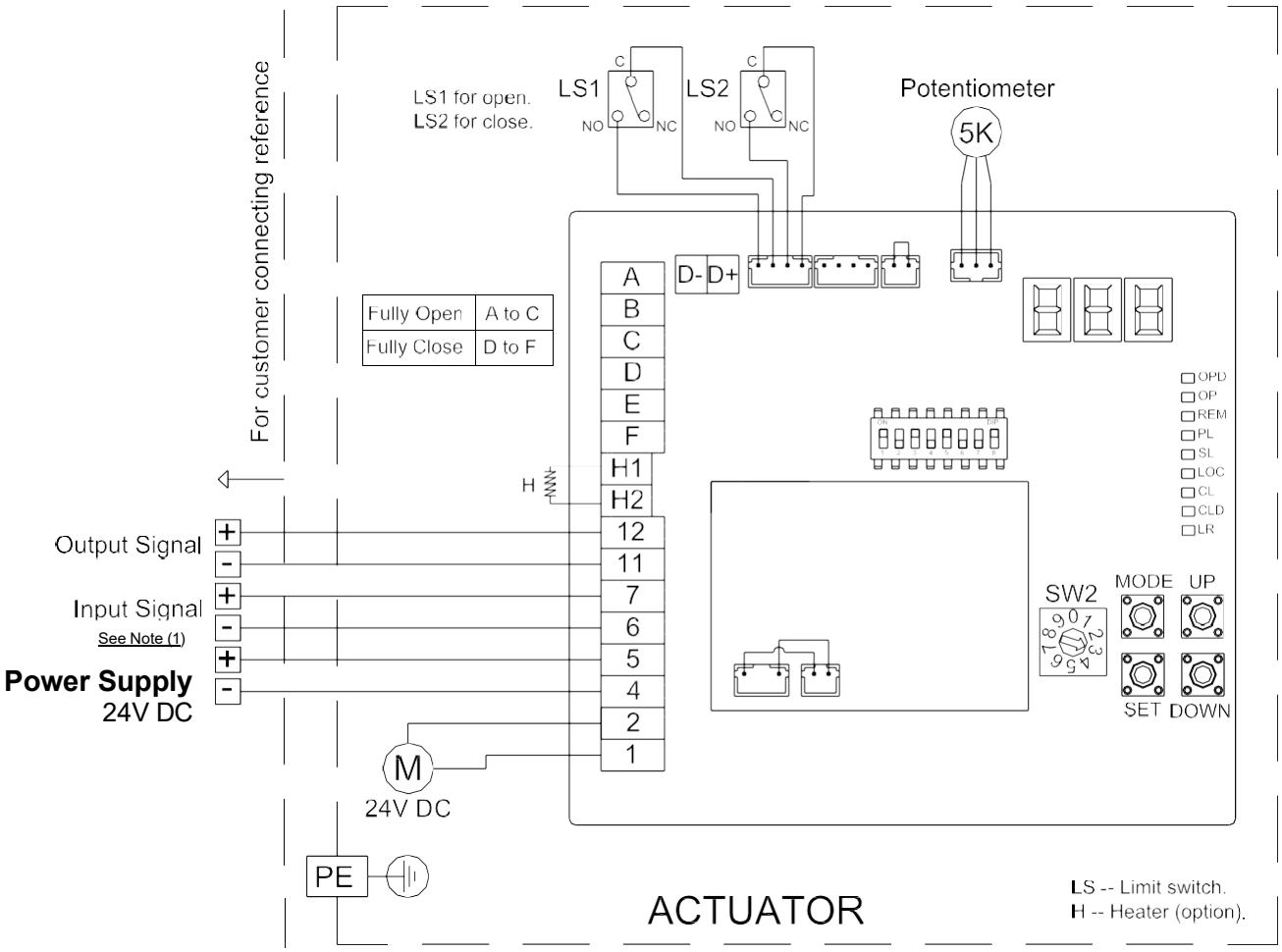
NOTE:

1. **Modulating Board**
   a. Input Signal：4~20mA, 1~5V, 2~10V
   (It is suggested to use the shielding wire and its length should not exceed 30m.)
   b. Output Signal：4~20mA, 2~10V
2. Using less than 3A current for “A, B, C, E, F”.

WIRING DIAGRAM – Quarter Turn Actuator

OM-1 , OM-A , OM-A-M 24V DC

Modulating Controller, MODBUS



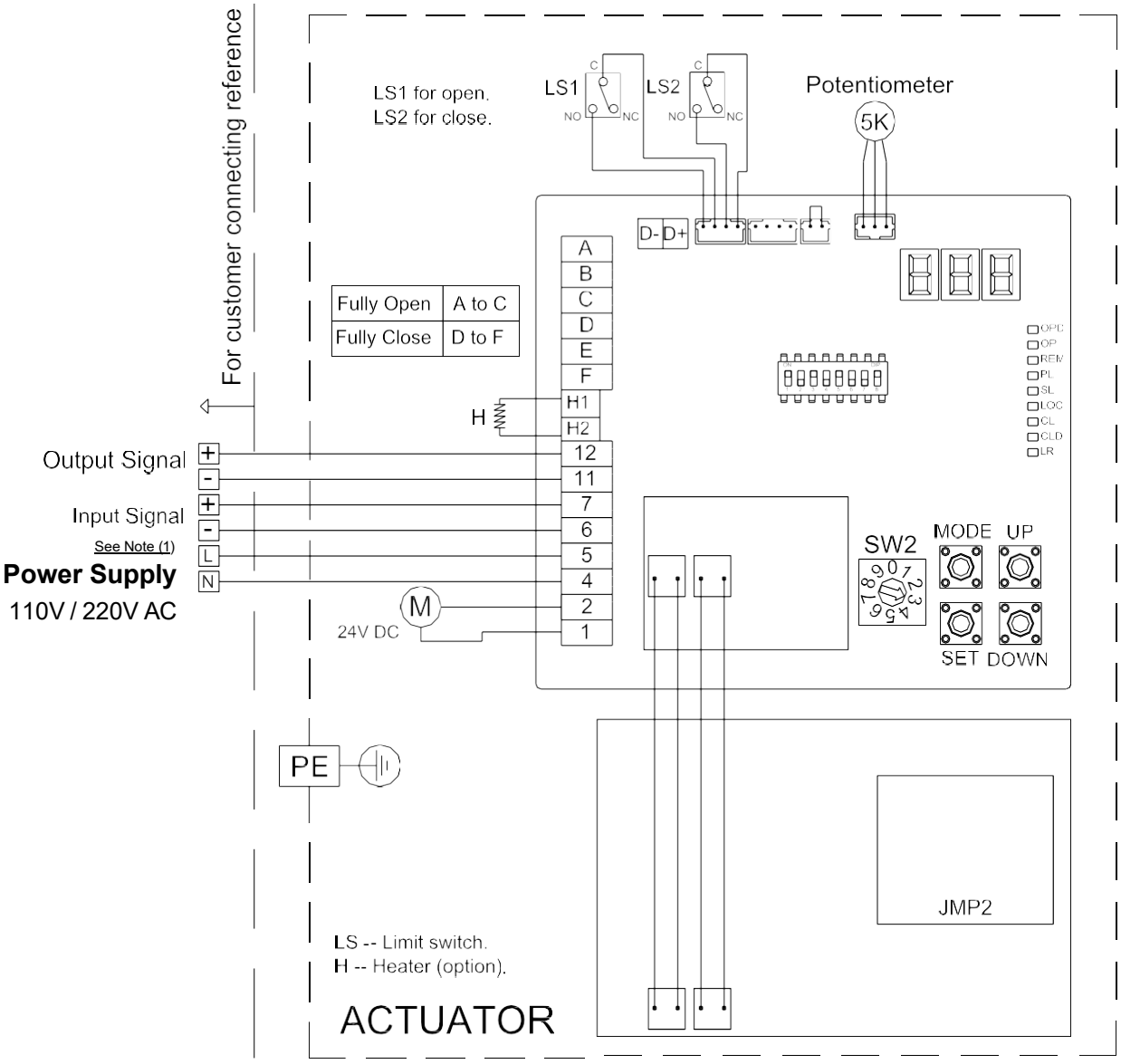
NOTE

1. **Modulating Board**
   a. Input Signal：4~20mA, 1~5V, 2~10V
   (It is suggested to use the shielding wire and its length should not exceed 30m.)
   b. Output Signal：4~20mA, 2~10V
2. Using less than 3A current for “A, B, C, E, F”.
3. Using a battery to supply power for DC units.

WIRING DIAGRAM – Quarter Turn Actuator

OM-1 , OM-A , OM-A-M 110V , 220V AC 1-Phase

Modulating Controller, MODBUS



NOTE:

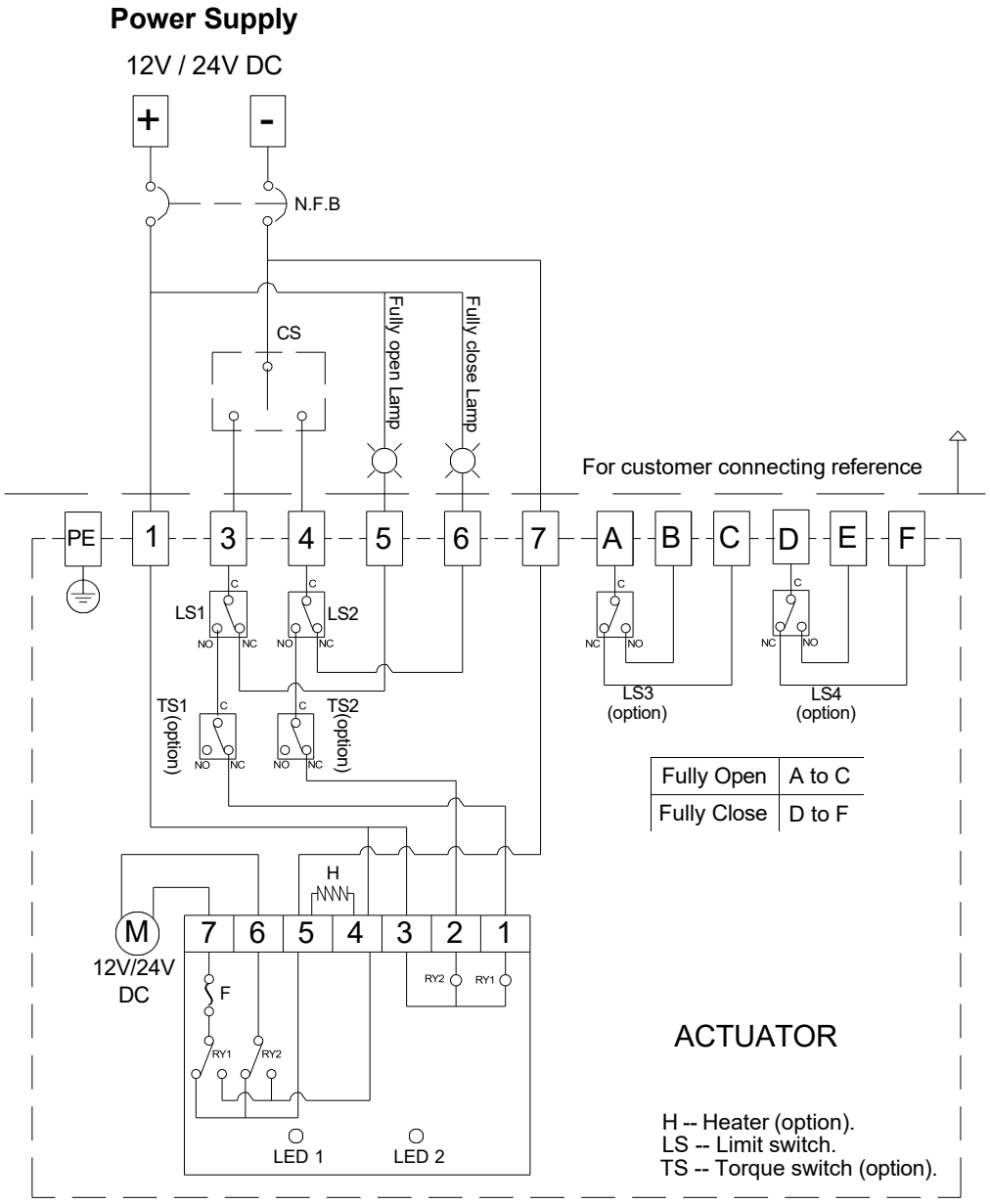
1. **Modulating Board**
   a. Input Signal：4~20mA, 1~5V, 2~10V
   (It is suggested to use the shielding wire and its length should not exceed 30m.)
   b. Output Signal：4~20mA, 2~10V
2. Using less than 3A current for “A, B, C, E, F”.

WIRING DIAGRAM – Quarter Turn Actuator

OM-2 ~ OM-6 12V DC

OM-2 ~ OM-12 , OM-F , OM-G 24V DC

On-Off Controller



NOTE:

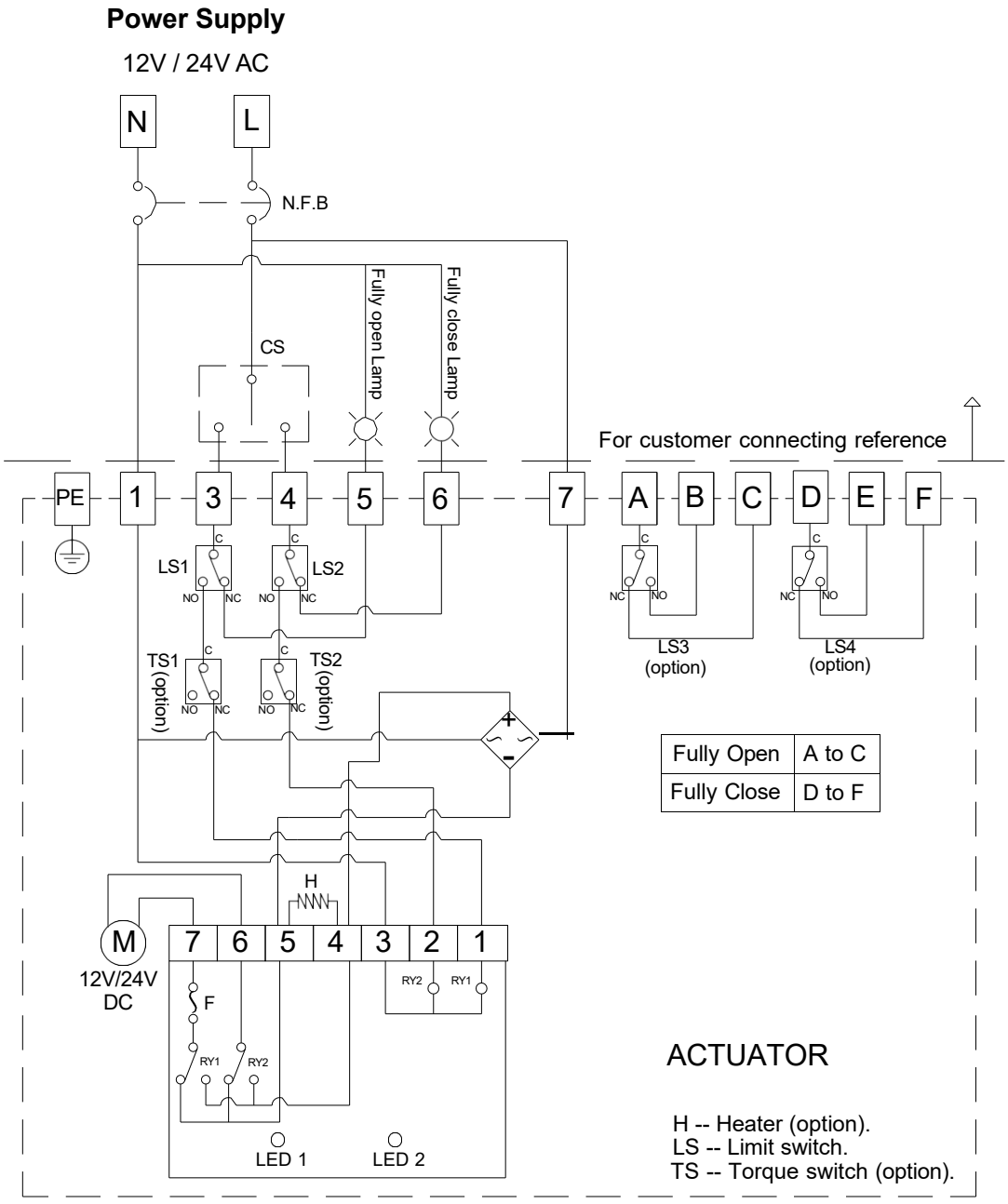
1. "+" connects to #1, "–" connects to #7.
2. "–" connects to #3 for "OPEN", "–" connects to #4 for "CLOSE".
3. Using less than 5A current for "A, B, C, D, E, F".
4. Using battery to supply power for DC units.

WIRING DIAGRAM – Quarter Turn Actuator

OM-2 ~ OM-6 12V AC

OM-2 ~ OM-12 , OM-F , OM-G 24V AC

On-Off Controller



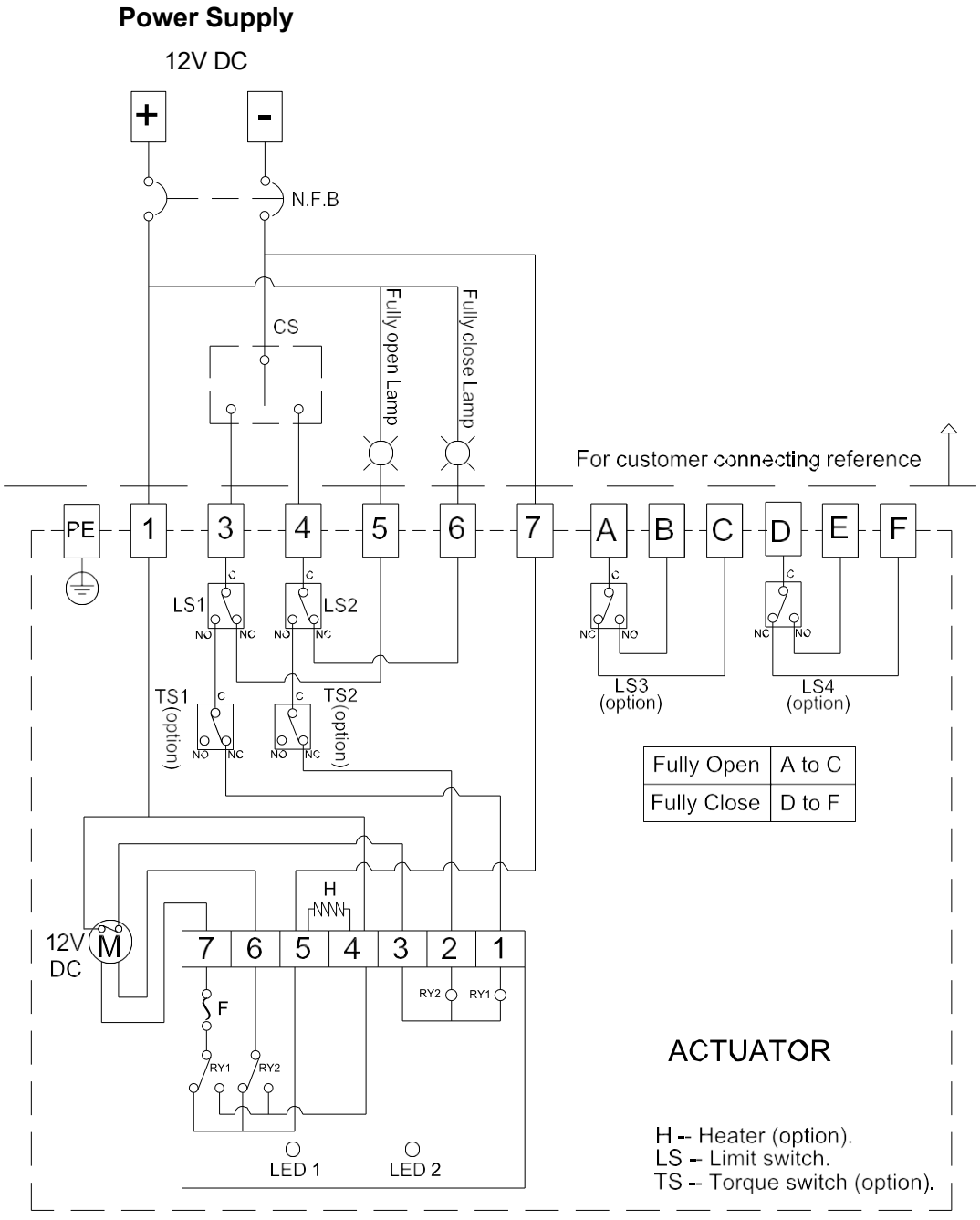
NOTE:

1. "N" connects to #1, "L" connects to #7.
2. "L" connects to #3 for "OPEN", "L" connects to #4 for "CLOSE".
3. Using less than 5A current for "A, B, C, D, E, F".

WIRING DIAGRAM – Quarter Turn Actuator

OM-7 ~ OM-10 12V DC

On-Off Controller



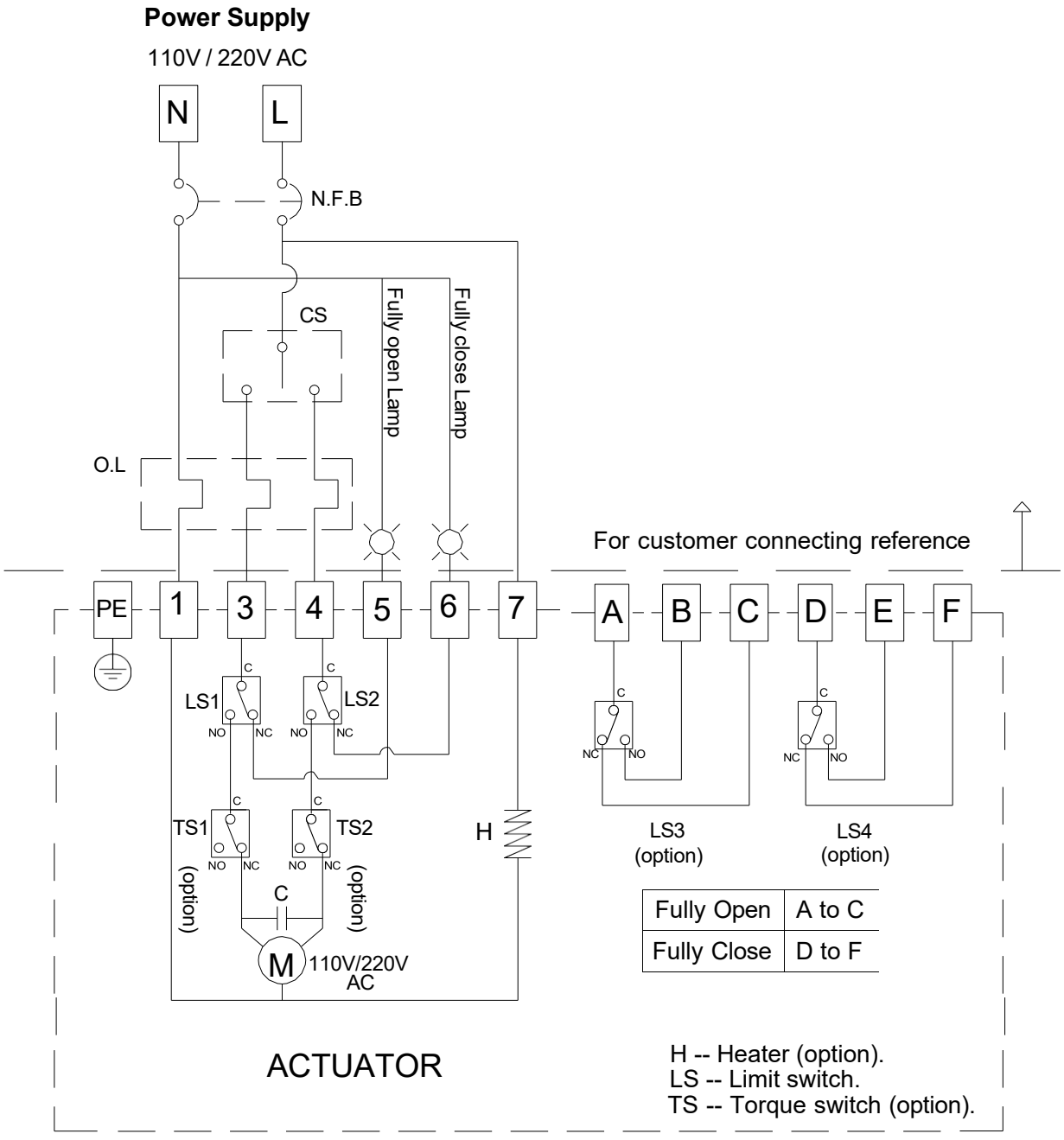
NOTE:

1. "+" connects to #1, "–" connects to #7.
2. "–" connects to #3 for "OPEN", "–" connects to #4 for "CLOSE".
3. Using less than 5A current for "A, B, C, D, E, F".
4. Using battery to supply power for DC units.

WIRING DIAGRAM – Quarter Turn Actuator

BM-2 , OM-2~OM-13 , OM-F , OM-G 110V , 220V AC 1-Phase

On-Off Controller



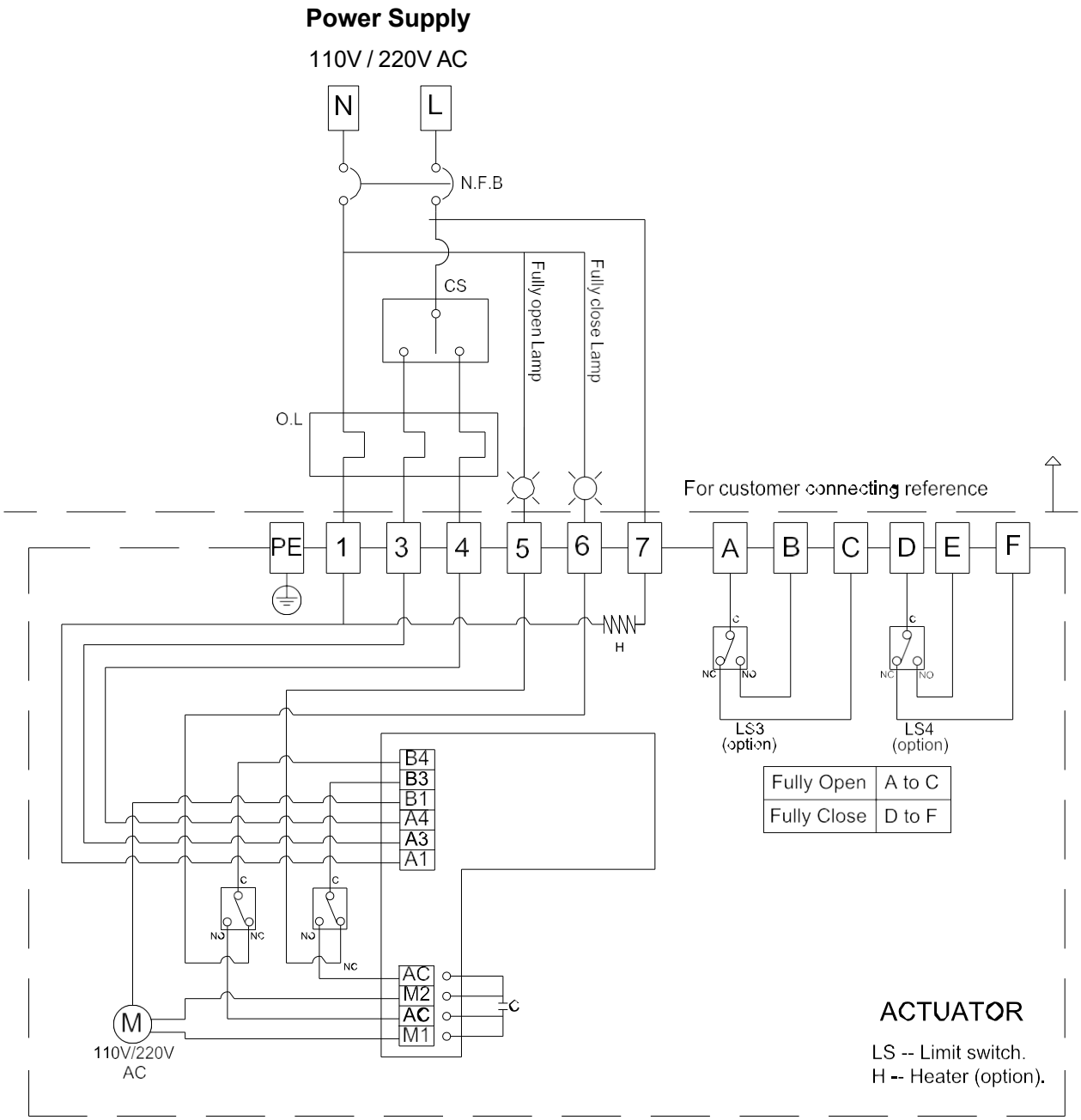
NOTE:

1. "N" connects to #1, "L" connects to #7.
2. "L" connects to #3 for "OPEN", "L" connects to #4 for "CLOSE".
3. Using less than 5A current for "A, B, C, D, E, F".
4. BM-2 could not install torque switches.

WIRING DIAGRAM – Quarter Turn Actuator

OM-2 ~ OM-13 , OM-F , OM-G 110V , 220V AC 1-Phase

On-Off Controller, Coupling Board



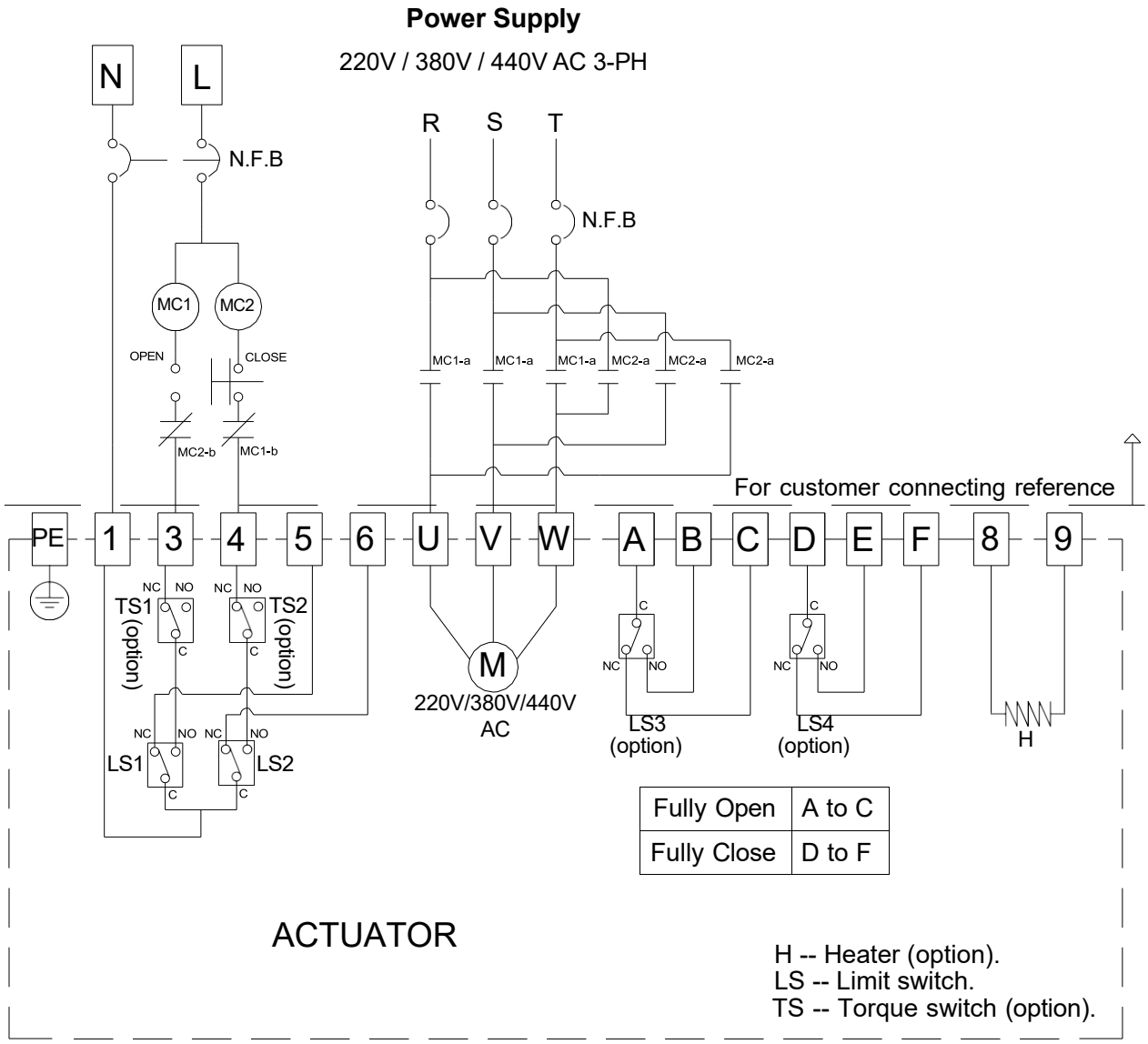
NOTE:

1. "N" connects to #1, "L" connects to #7.
2. "L" connects to #3 for "OPEN", "L" connects to #4 for "CLOSE".
3. Using less than 5A current for "A, B, C, D, E, F".

WIRING DIAGRAM – Quarter Turn Actuator

BM-2 , OM-2 ~ OM-13 220V , 380V , 440V AC 3-Phase

On-Off Controller



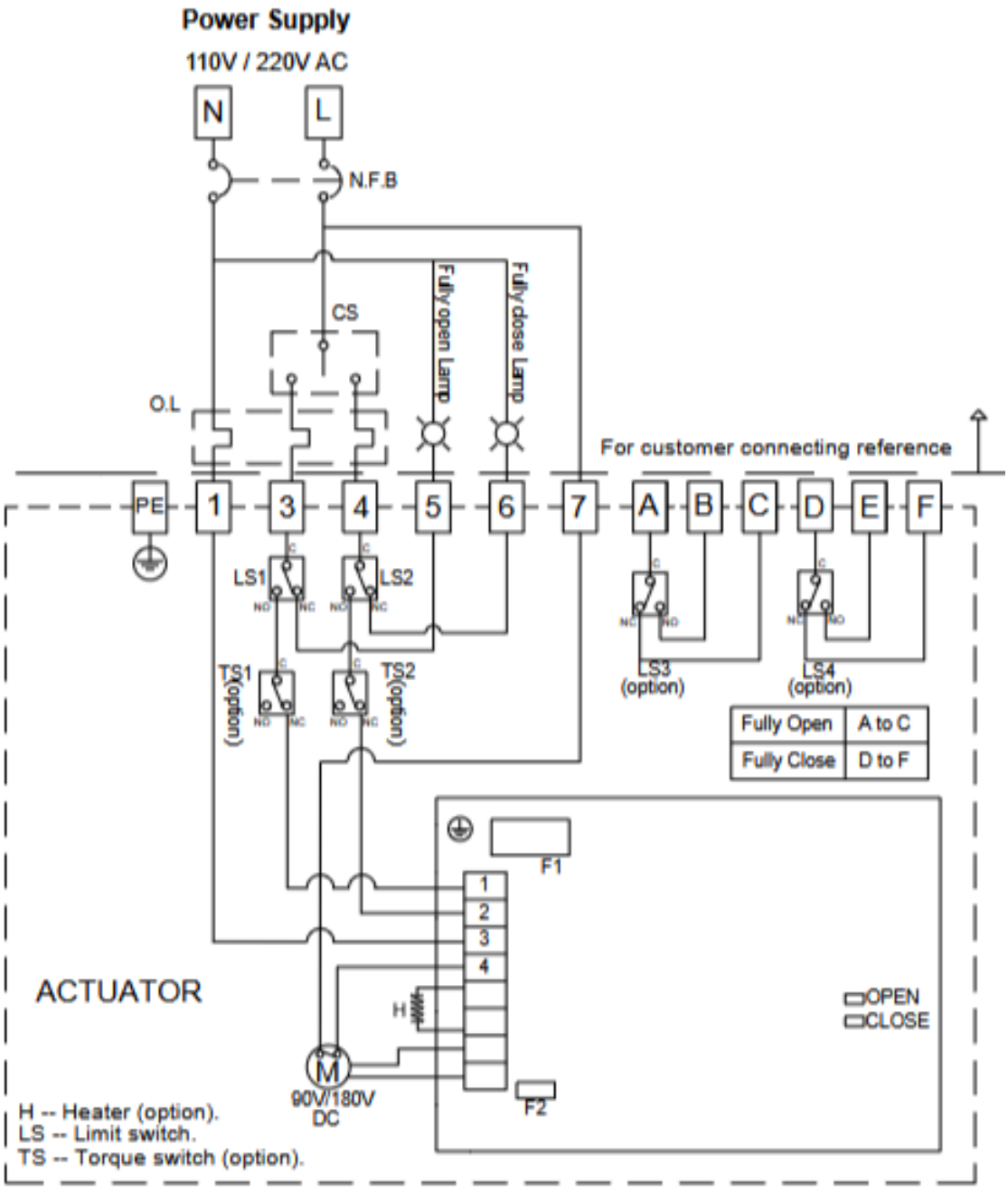
NOTE:

1. Using the hand-wheel to turn the actuator to 45 degrees before the test. If the operating direction is opposite after supplying power, please change any two of the U, V, W.
2. Using less than 5A current for “A, B, C, D, E, F”.
3. BM-2 could not install torque switches.

WIRING DIAGRAM – Quarter Turn Actuator

OM-2 ~ OM-8 110V , 220V AC 1-Phase

On-Off Controller, 75% duty cycle



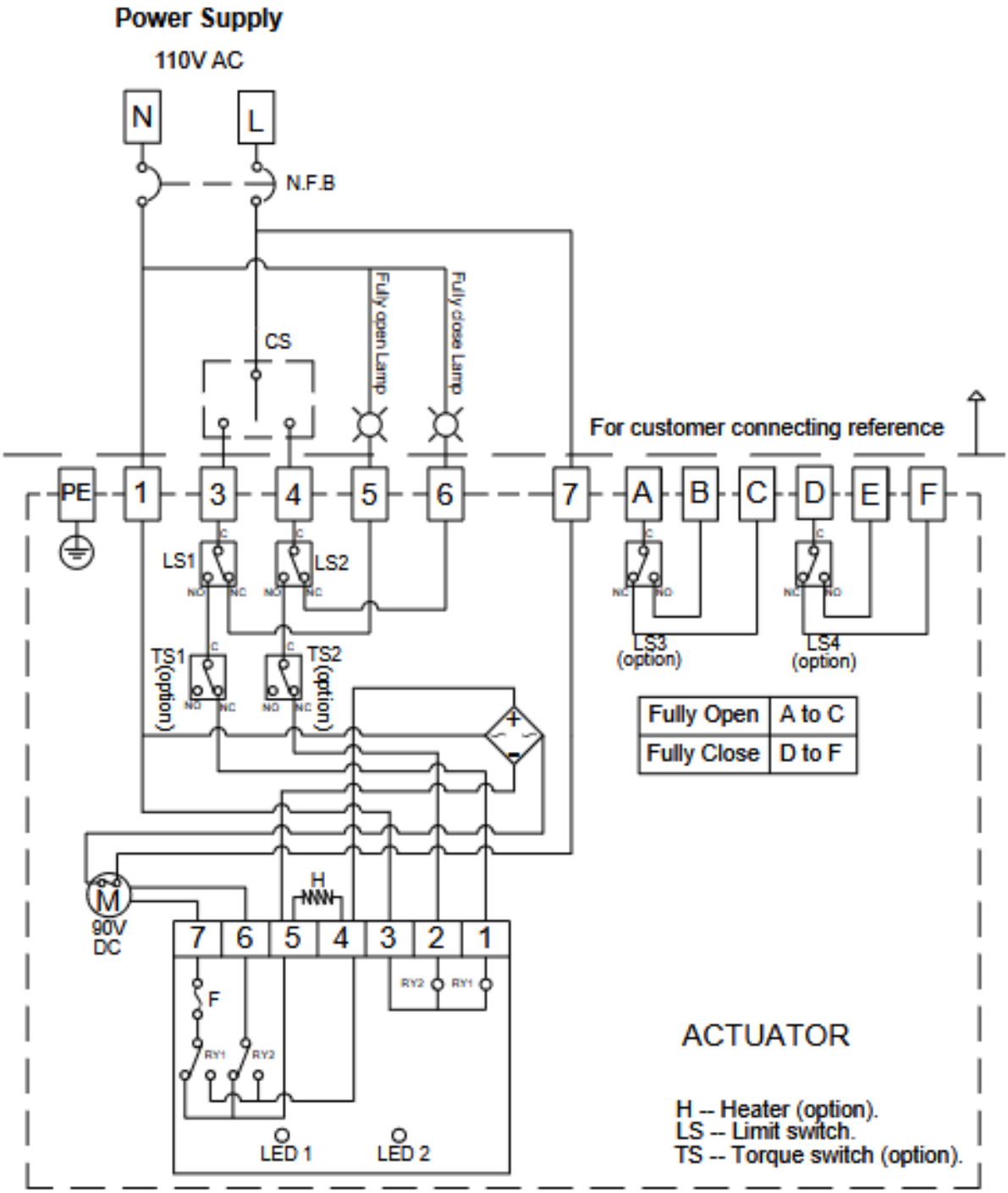
NOTE:

1. “N” connects to #1, “L” connects to #7.
2. “L” connects to #3 for “OPEN”, “L” connects to #4 for “CLOSE”.
3. Using less than 5A current for “A, B, C, D, E, F”.

WIRING DIAGRAM – Quarter Turn Actuator

OM-9 ~ OM-13 110V AC 1-Phase

On-Off Controller, 50% duty cycle



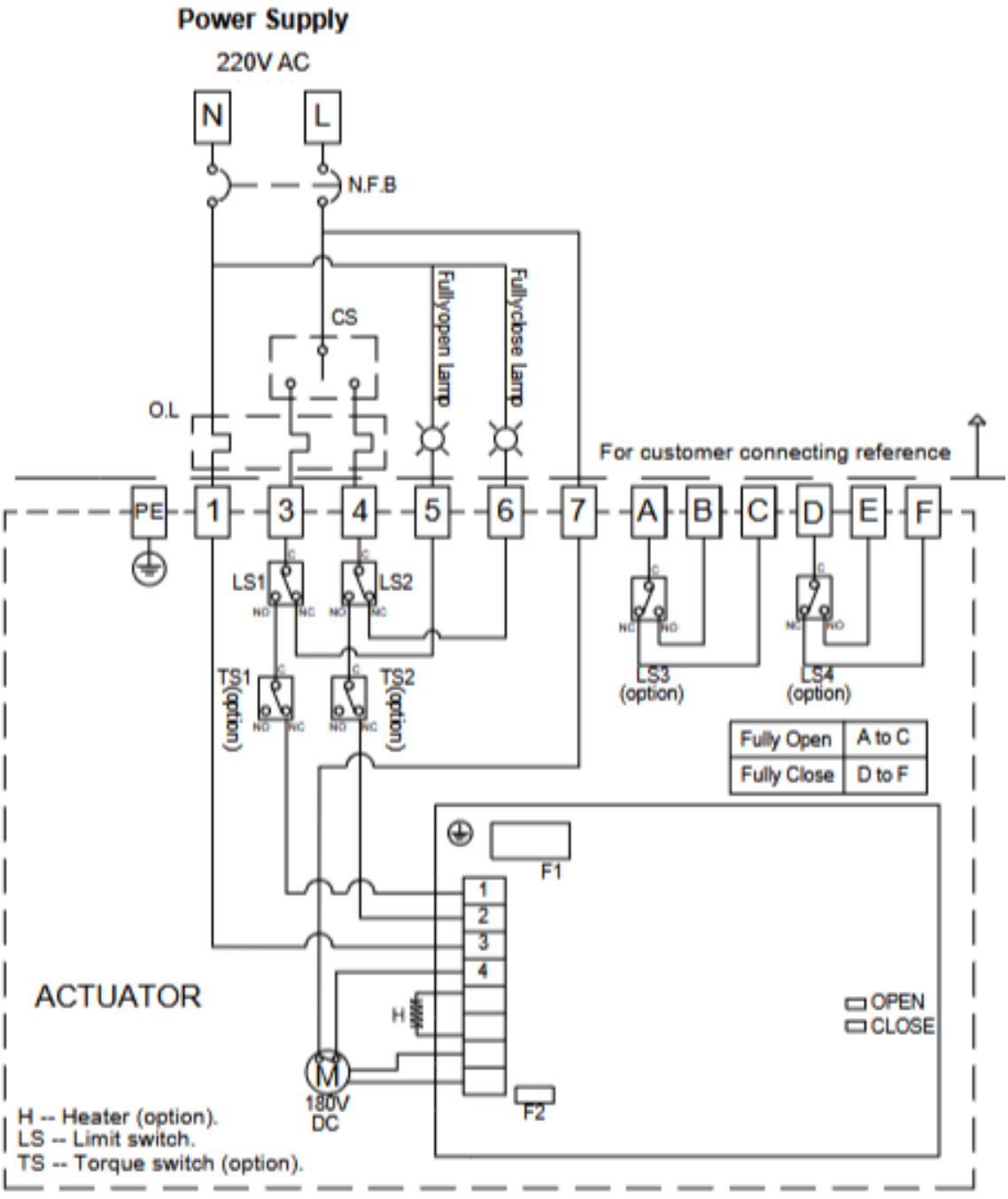
NOTE:

1. "N" connects to #1, "L" connects to #7.
2. "L" connects to #3 for "OPEN", "L" connects to #4 for "CLOSE".
3. Using less than 5A current for "A, B, C, D, E, F".

WIRING DIAGRAM – Quarter Turn Actuator

OM-9 ~ OM-13 220V AC 1-Phase

On-Off Controller, 50% duty cycle



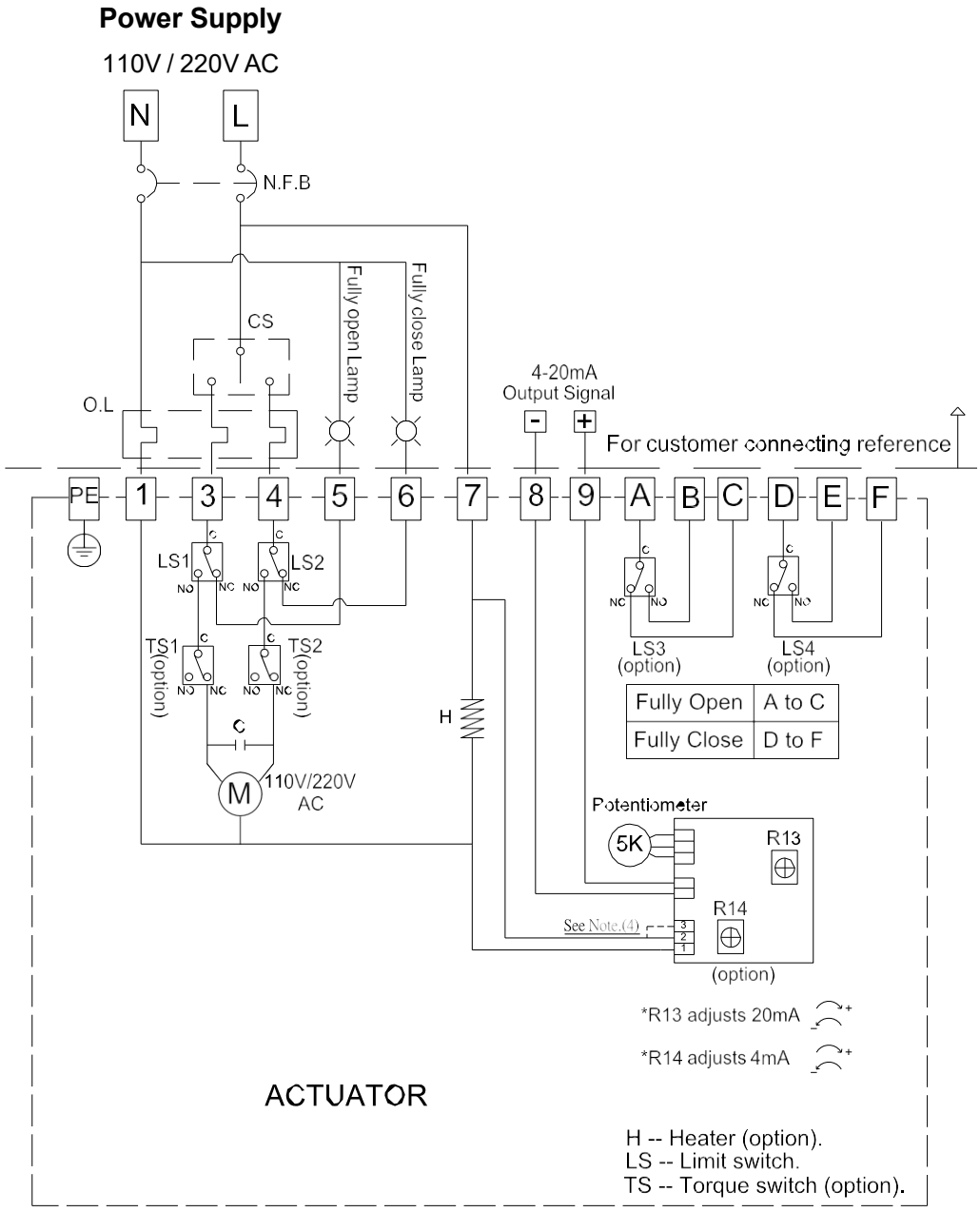
NOTE:

1. "N" connects to #1, "L" connects to #7.
2. "L" connects to #3 for "OPEN", "L" connects to #4 for "CLOSE".
3. Using less than 5A current for "A, B, C, D, E, F".

WIRING DIAGRAM – Quarter Turn Actuator

OM-2 ~ OM-13 110V , 220V AC 1-Phase

On-Off Controller, Analog Signal Output



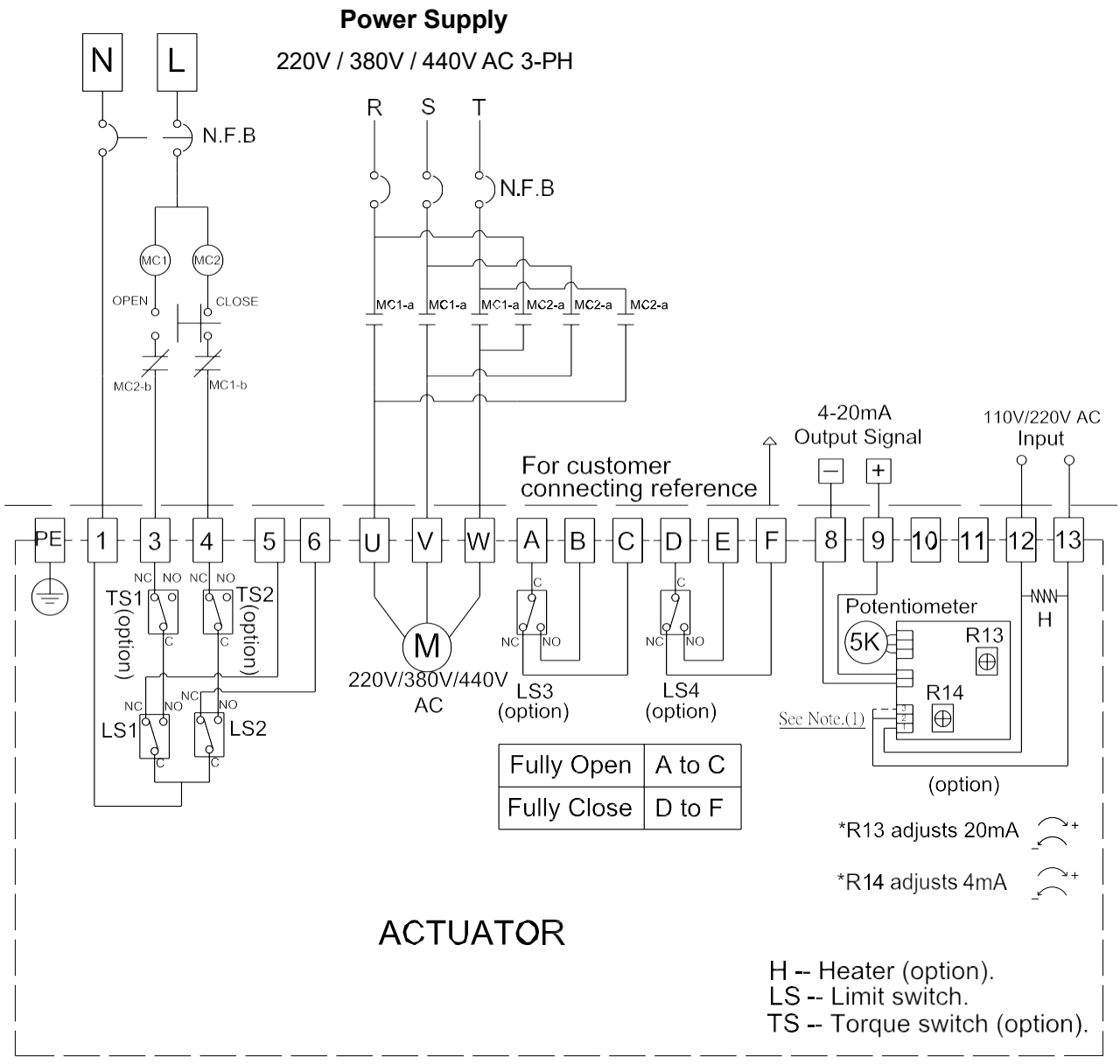
NOTE:

1. "N" connects to #1, " L " connects to #7.
2. "L" connects to #3 for "OPEN", "L" connects to #4 for "CLOSE".
3. Using less than 5A current for "A, B, C, D, E, F".
4. If the control power is 220V AC, N & L connect to #1 & #3.
   If the control power is 110V AC, N & L connect to #1 & #2 or #2 & #3.

WIRING DIAGRAM – Quarter Turn Actuator

OM-2 ~ OM-13 220V , 380V , 440V AC 3-Phase

On-Off Controller, Analog Signal Output



NOTE:

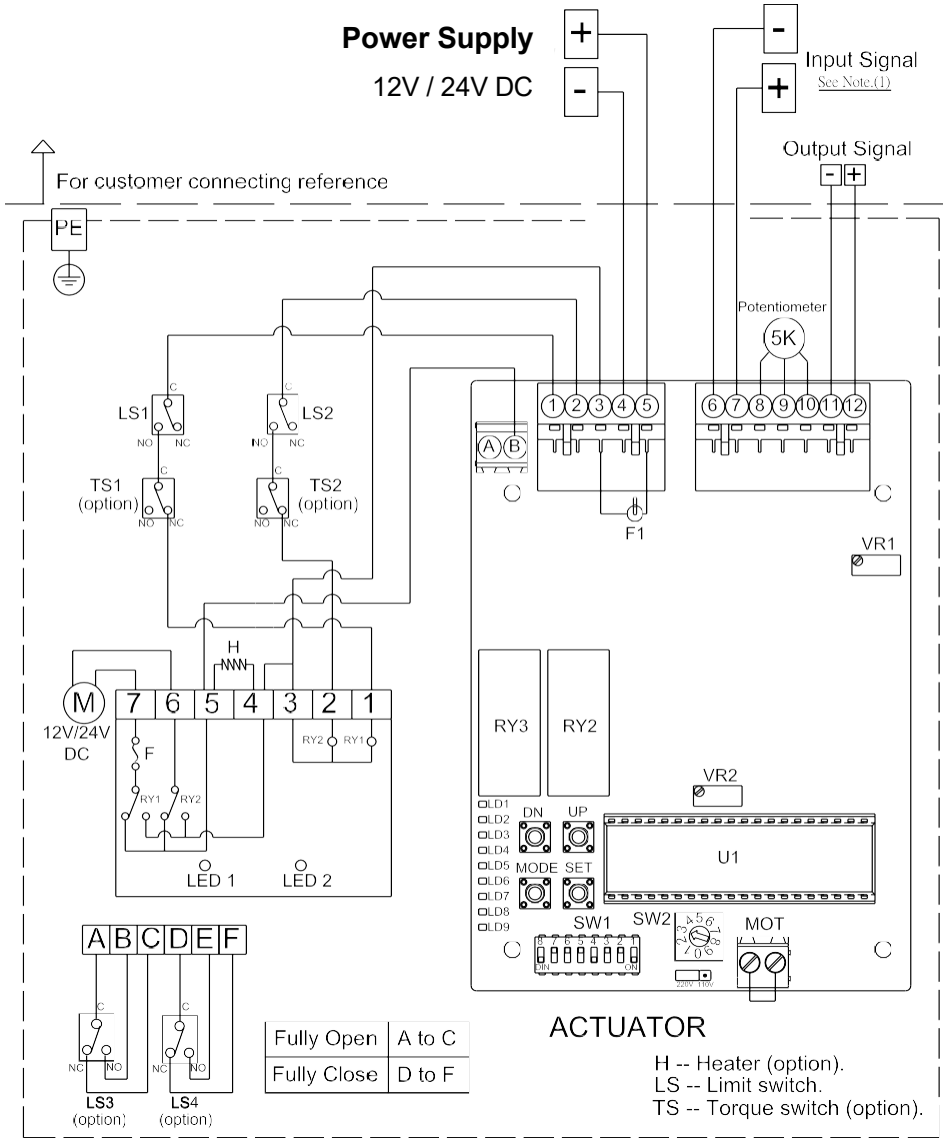
1. If the control power is 220V AC, N & L connect to #1 & #3.
   If the control power is 110V AC, N & L connect to #1 & #2 or #2 & #3.
2. Using the hand-wheel to turn the actuator to 45 degrees before the test. If the operating direction is opposite after supplying power, please change any two of the U, V, W.
3. Using less than 5A current for “A, B, C, D, E, F”.

WIRING DIAGRAM – Quarter Turn Actuator

OM-2 ~ OM-6 12V DC

OM-2 ~ OM-12 , OM-F , OM-G 24V DC

Modulating Controller



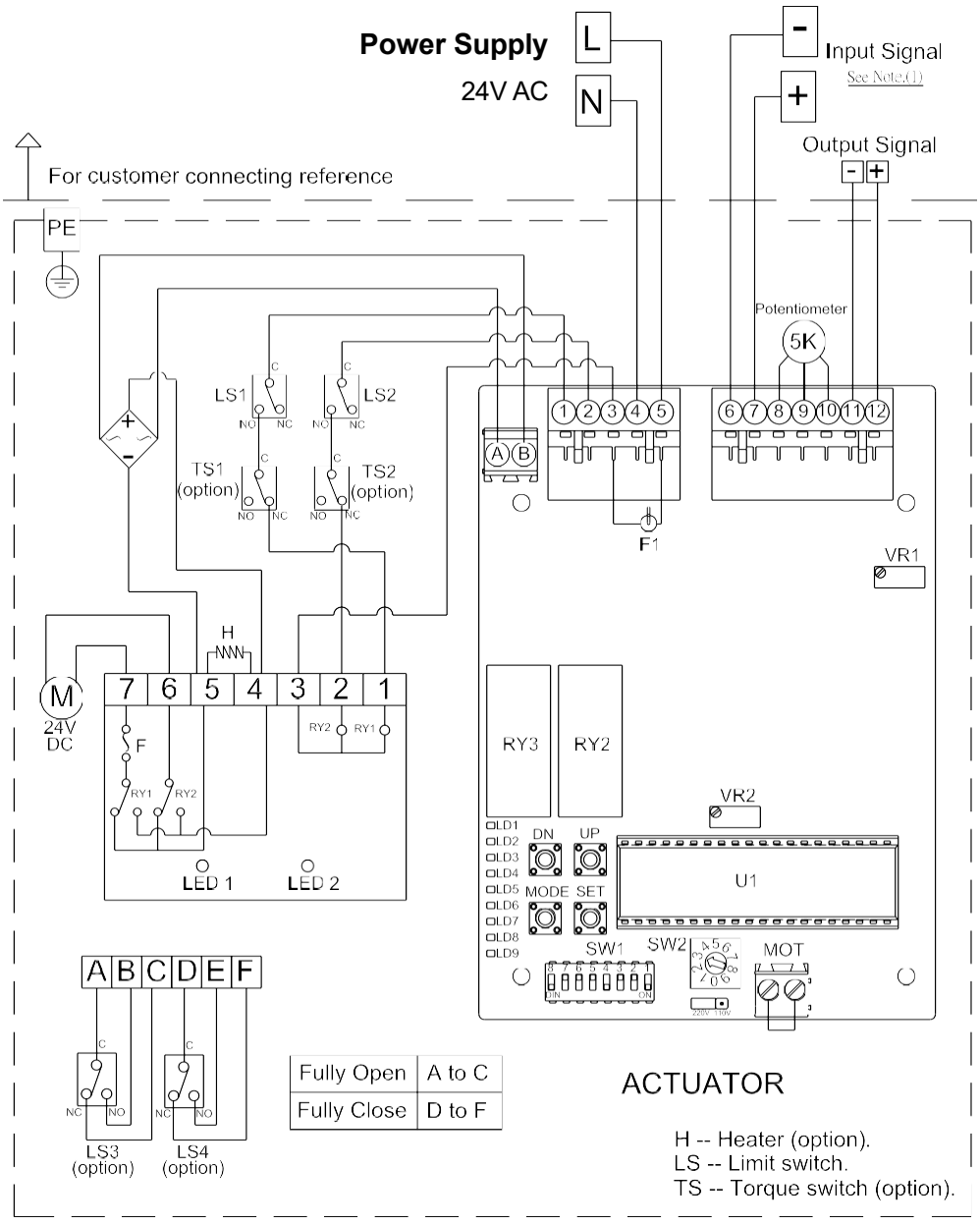
NOTE:

1. **Modulating Board**
   a. Input Signal：4~20mA, 1~5V, 2~10V
   (It is suggested to use the shielding wire and its length should not exceed 30m.)
   b. Output Signal：4~20mA, 2~10V
2. Using less than 5A current for “A, B, C, D, E, F”.
3. Using battery to supply power for DC units.

WIRING DIAGRAM – Quarter Turn Actuator

OM-2 ~ OM-12 , OM-F , OM-G 24V AC

Modulating Controller



NOTE:

1. Modulating Board

a. Input Signal：4~20mA, 1~5V, 2~10V

(It is suggested to use the shielding wire and its length should not exceed 30m.)

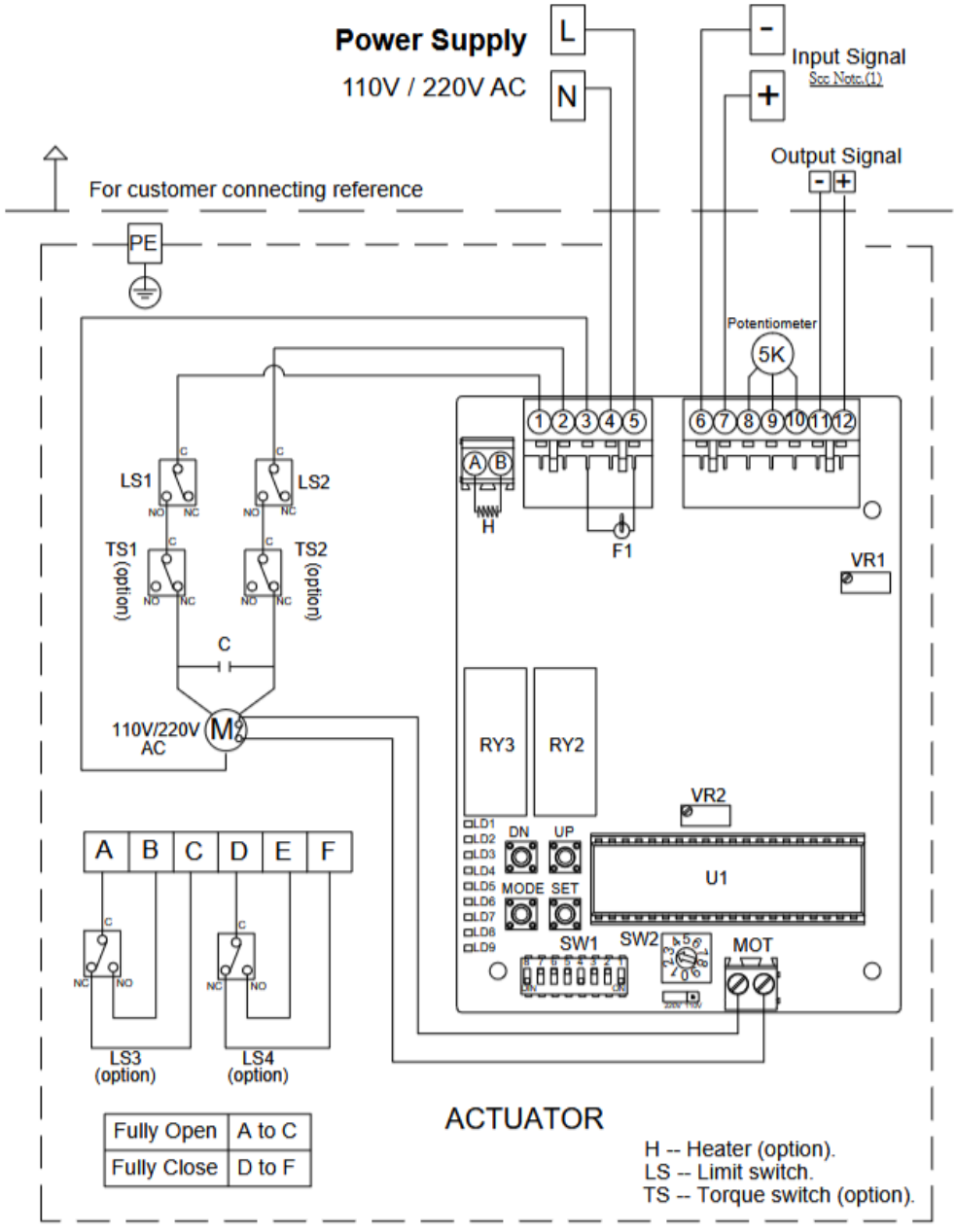
b. Output Signal：4~20mA, 2~10V

2. Using less than 5A current for “A, B, C, D, E, F”.

WIRING DIAGRAM – Quarter Turn Actuator

OM-2 ~ OM-8 , OM-F , OM-G 110V , 220V AC 1-Phase

Modulating Controller



NOTE:

1. Modulating Board

a. Input Signal：4~20mA, 1~5V, 2~10V

(It is suggested to use the shielding wire and its length should not exceed 30m.)

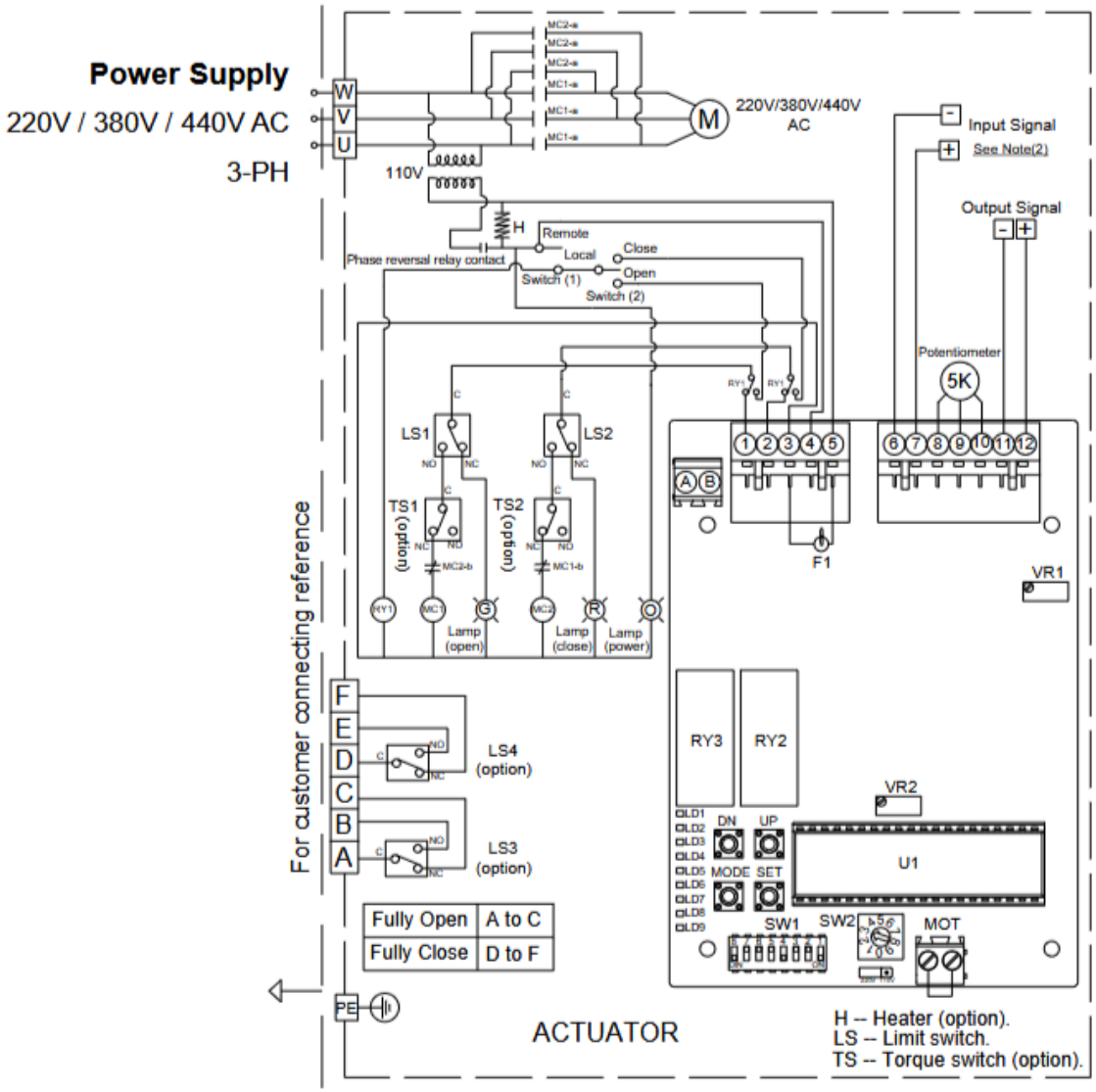
b. Output Signal：4~20mA, 2~10V

2. Using less than 5A current for “A, B, C, D, E, F”.

WIRING DIAGRAM – Quarter Turn Actuator

OM-2 ~ OM-13 220V , 380V , 440V AC 3-Phase

Modulating Controller



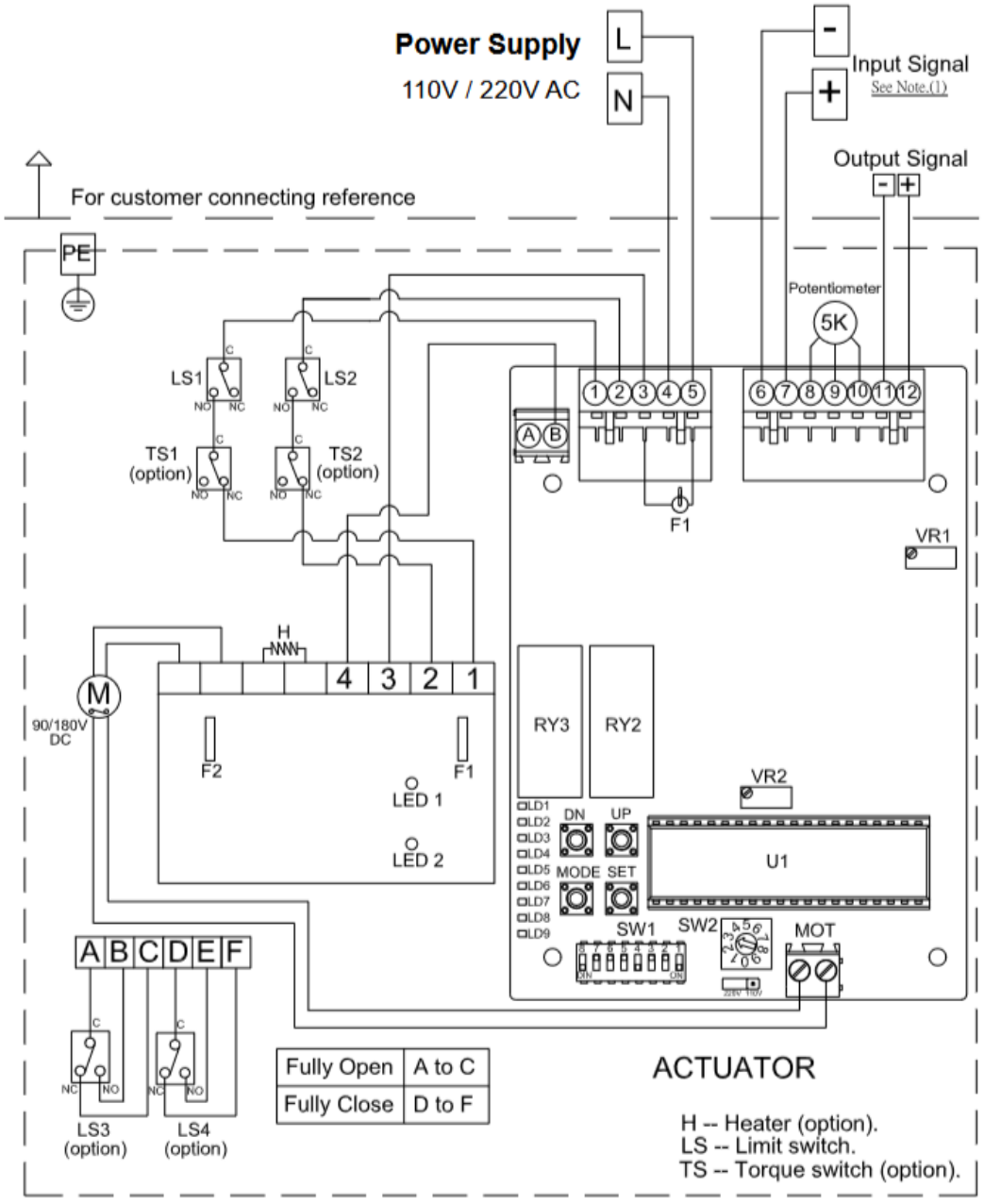
NOTE:

1. Please change any two of the U, V, W when the power lamp is off.
2. **Modulating Board**
   a. Input Signal: 4~20mA, 2~10V, 1~5V
   (It is suggested to use the shielding wire, and its length should not exceed 30m.)
   b. Output Signal: 4~20mA, 2~10V
3. **Local / Remote Switches**
   a. Select “Remote”：Controlled by signal.
   b. Select “Local”：Controlled by switch (2).
4. Using less than 5A current for “ A, B, C, D, E, F”.

WIRING DIAGRAM – Quarter Turn Actuator

OM-2 ~ OM-8 110V , 220V AC 1-Phase

Modulating Controller, 75% duty cycle



NOTE:

1. Modulating Board

a. Input Signal：4~20mA, 1~5V, 2~10V

(It is suggested to use the shielding wire and its length should not exceed 30m.)

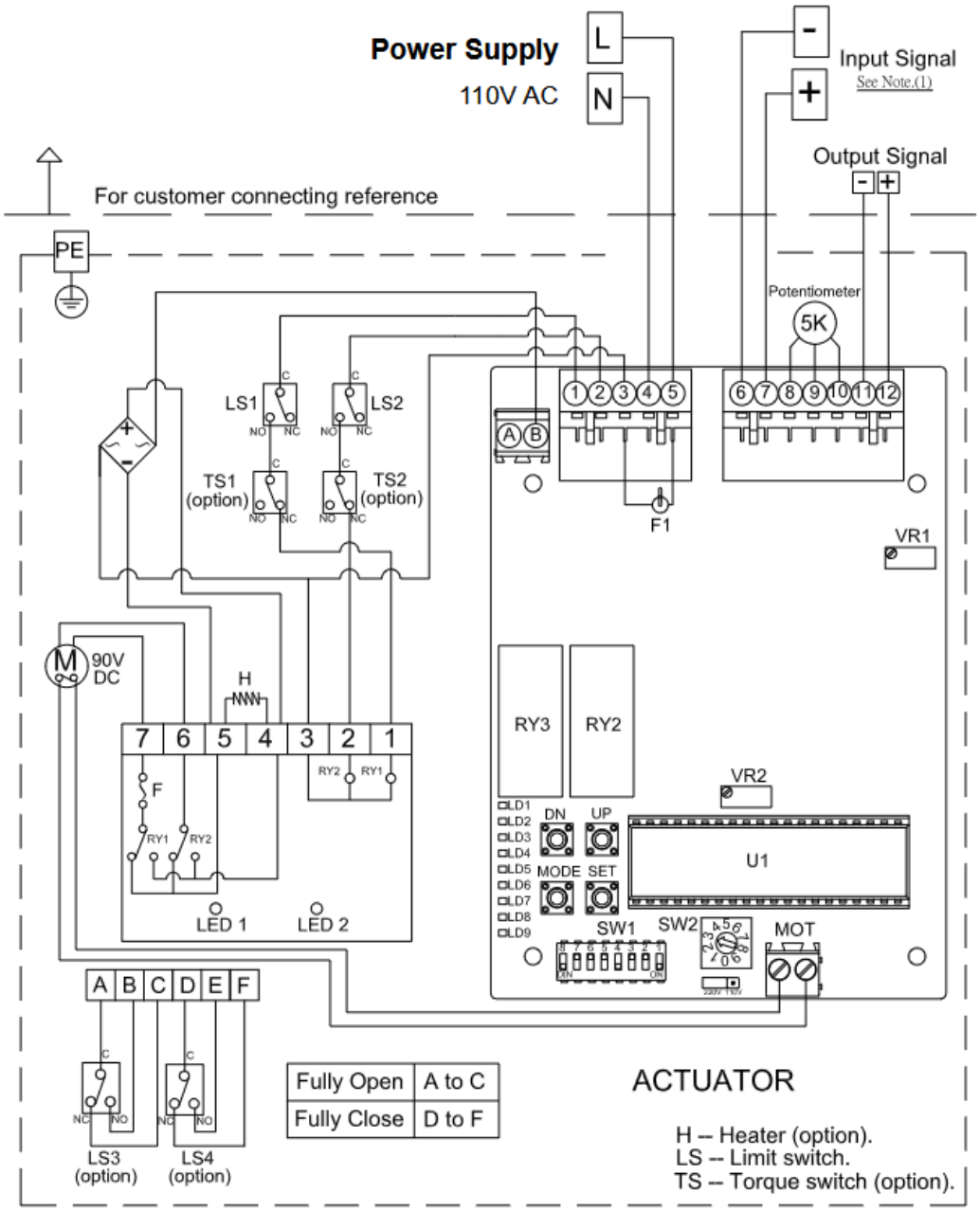
b. Output Signal：4~20mA, 2~10V

2. Using less than 5A current for “A, B, C, D, E, F”.

WIRING DIAGRAM – Quarter Turn Actuator

OM-9 ~ OM-13 110V AC 1-Phase

Modulating Controller, 50% duty cycle



NOTE:

1. Modulating Board

a. Input Signal：4~20mA, 1~5V, 2~10V

(It is suggested to use the shielding wire and its length should not exceed 30m.)

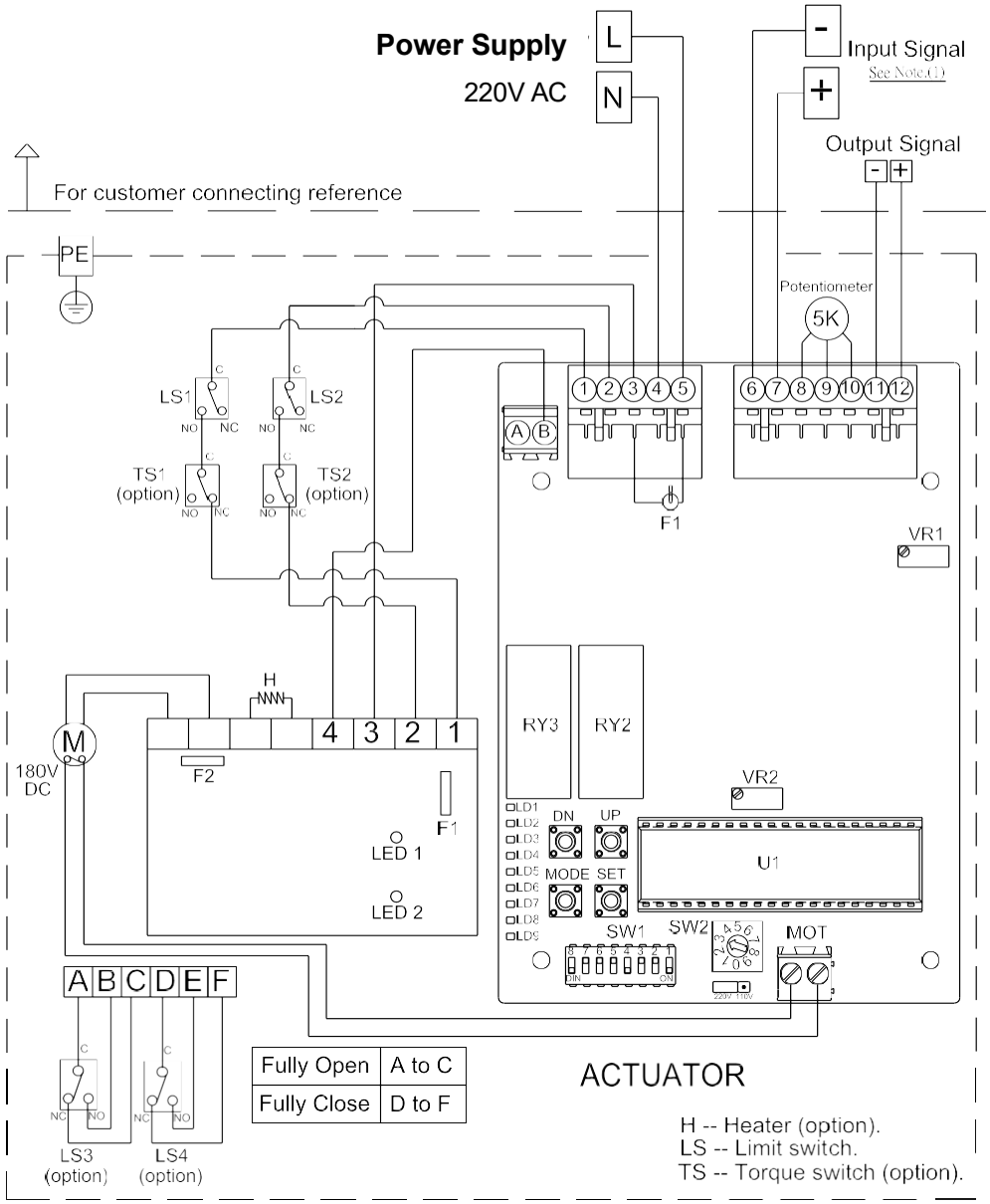
b. Output Signal：4~20mA, 2~10V

2. Using less than 5A current for “A, B, C, D, E, F”.

WIRING DIAGRAM – Quarter Turn Actuator

OM-9 ~ OM-13 220V AC 1-Phase

Modulating Controller, 50% duty cycle



NOTE:

1. Modulating Board

a. Input Signal：4~20mA, 1~5V, 2~10V

(It is suggested to use the shielding wire and its length should not exceed 30m.)

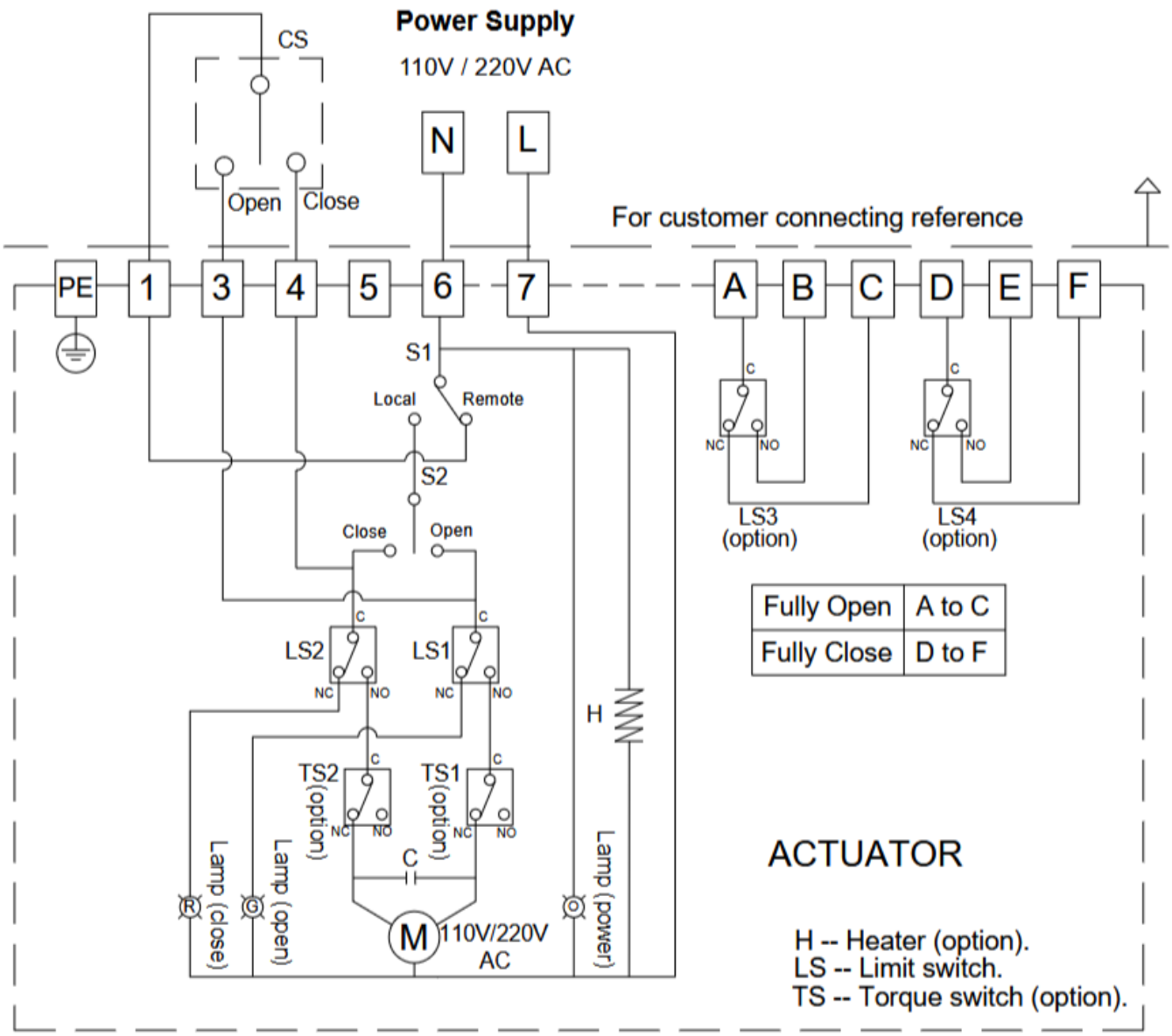
b. Output Signal：4~20mA, 2~10V

2. Using less than 5A current for “A, B, C, D, E, F”.

WIRING DIAGRAM – Quarter Turn Actuator

OM-2 ~ OM-13 110V , 220V AC 1-Phase

On-Off Controller, Local Control Unit



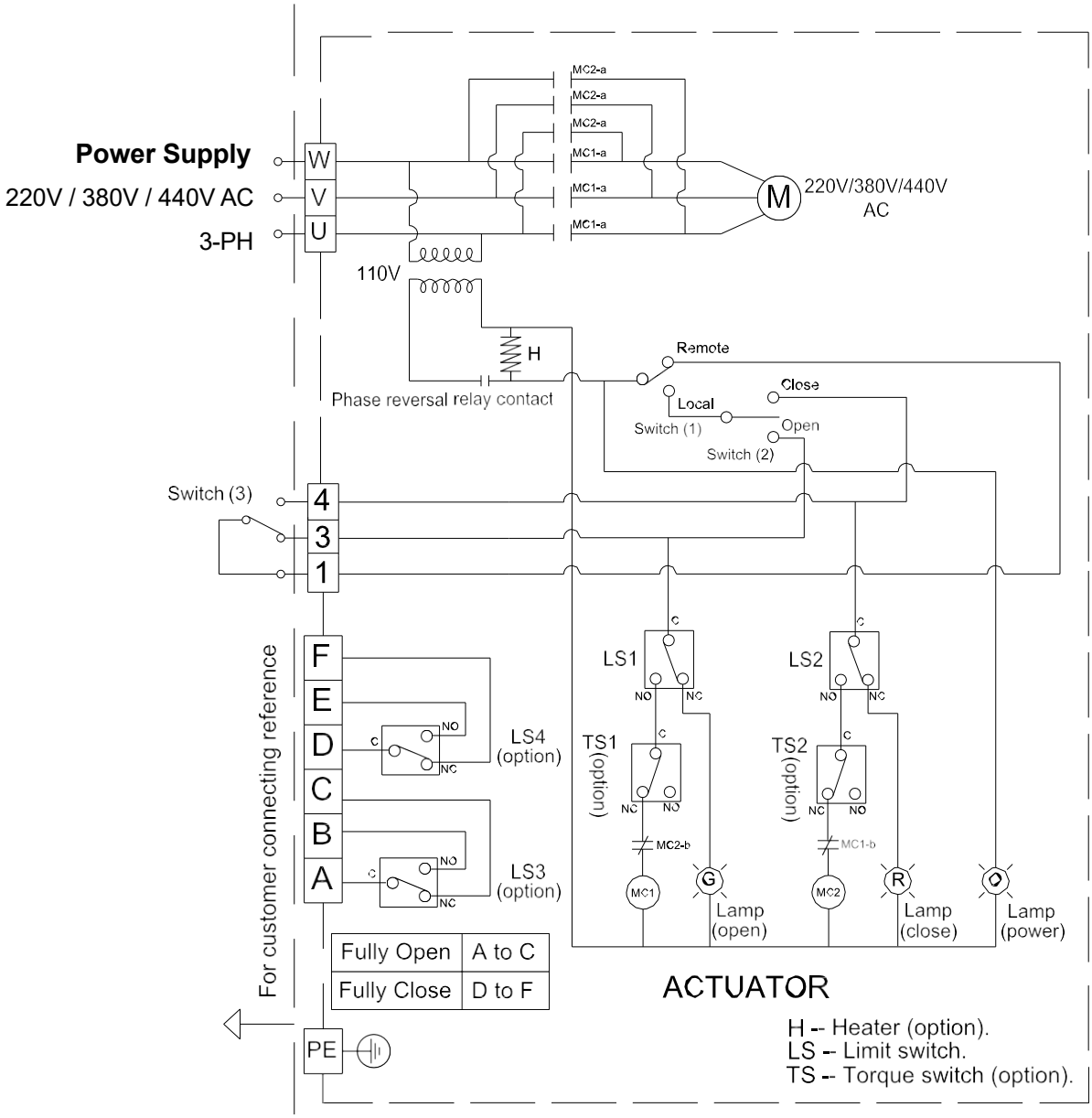
NOTE:

1. Using less than 5A current for “A, B, C, D, E, F”.

WIRING DIAGRAM – Quarter Turn Actuator

OM-2 ~ OM-13 220V , 380V , 440V AC 3-Phase

On-Off Controller, Local Control Unit



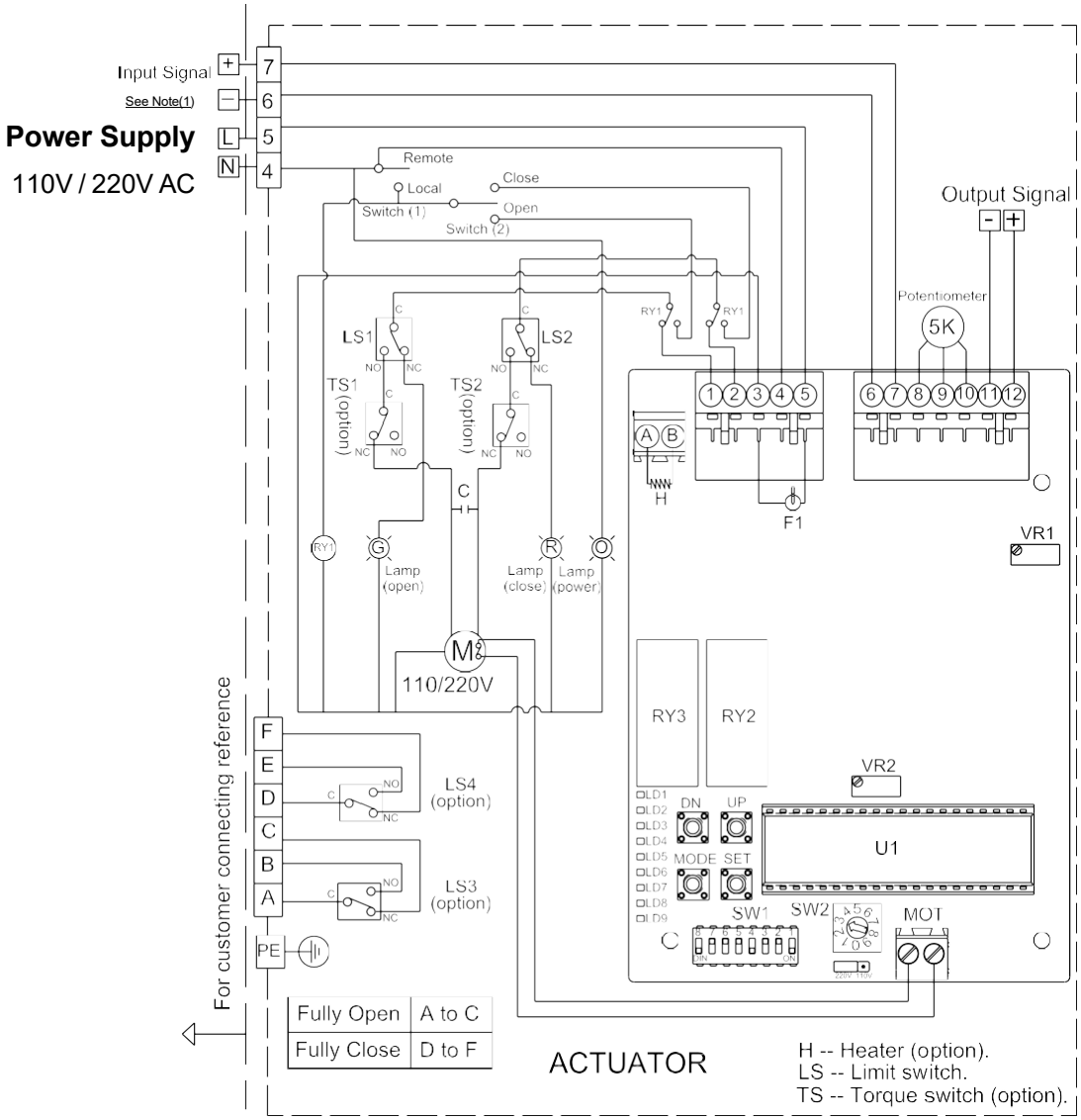
NOTE :

1. Please change any two of the U, V, W when the power lamp is off.
2. Switch (3) is the switch of the remote control (provided by the user).
   a. Connecting #1 & #3 for OPEN.
   b. Connecting #1 & #4 for CLOSE.
   c. #1, #3, #4 cannot connect together at the same time.
3. Using less than 5A current for " A,B, C, D, E, F".

WIRING DIAGRAM – Quarter Turn Actuator

OM-2 ~ OM-8 110V , 220V AC 1-Phase

Modulating Controller, Local Control Unit



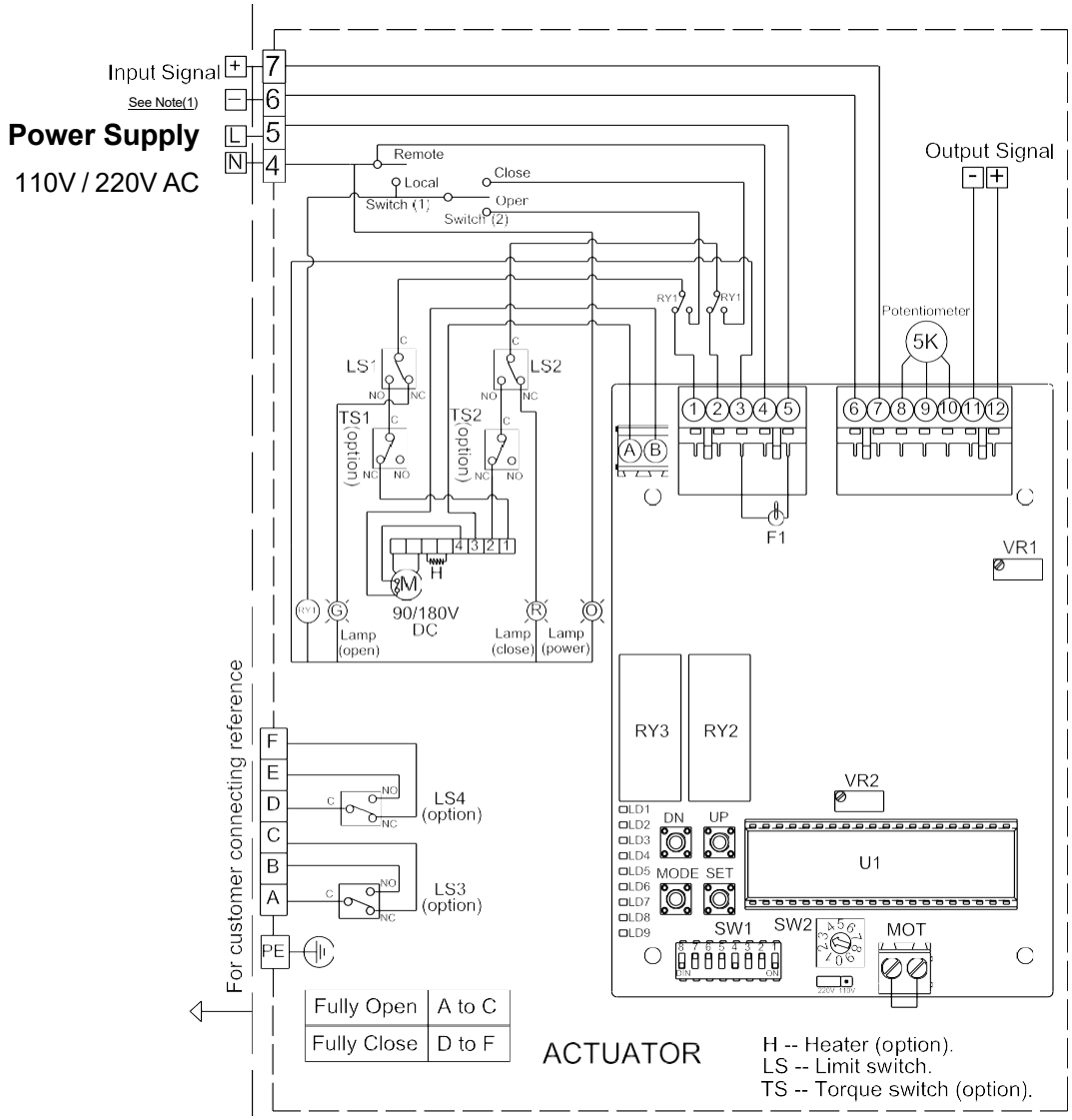
NOTE:

1. **Modulating Board**
   a. Input Signal：4~20mA, 1~5V, 2~10V
   (It is suggested to use the shielding wire and its length should not exceed 30m.)
   b. Output Signal：4~20mA, 2~10V
2. **Local / Remote Switches**
   a. Select “Remote”：Controlled by signal.
   b. Select “Local”：Controlled by switch (2).
3. Using less than 5A current for “A, B, C, D, E, F”.

WIRING DIAGRAM – Quarter Turn Actuator

OM-2 ~ OM-8 110V , 220V AC 1-Phase

Modulating Controller, Local Control Unit, 75% duty cycle



NOTE :

1. Modulating Board

a. Input Signal：4~20mA, 1~5V, 2~10V
(It is suggested to use the shielding wire and its length should not exceed 30m.)

b. Output Signal：4~20mA, 2~10V

2. Local / Remote Switches

a. Select “Remote”：Controlled by signal.

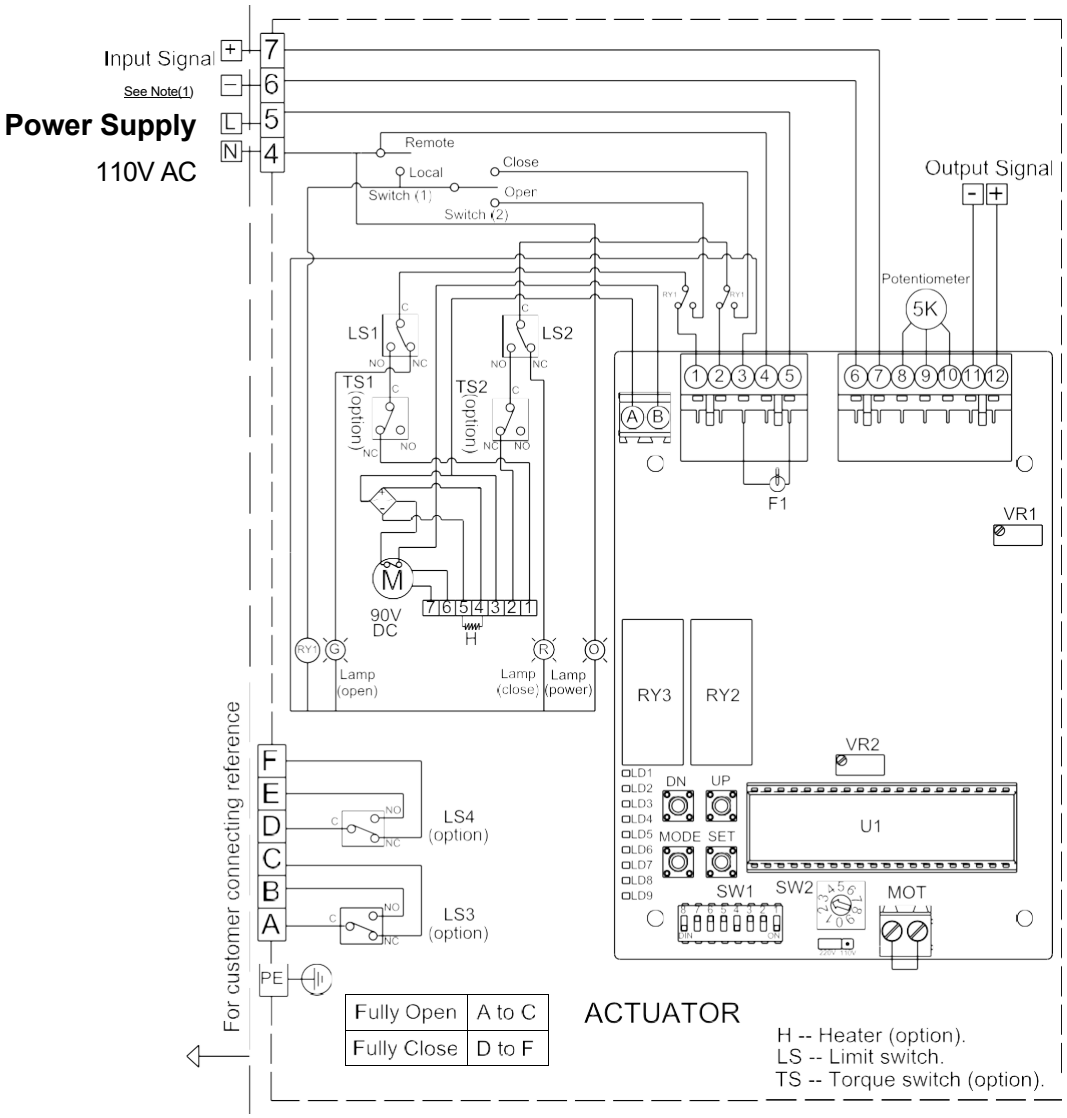
b. Select “Local”：Controlled by switch (2).

3. Using less than 5A current for “A, B, C, D, E, F”.

WIRING DIAGRAM – Quarter Turn Actuator

OM-9 ~ OM-13 110V AC 1-Phase

Modulating Controller, Local Control Unit, 50% duty cycle



NOTE:

1. Modulating Board

a. Input Signal：4~20mA, 1~5V, 2~10V
(It is suggested to use the shielding wire and its length should not exceed 30m.)

b. Output Signal：4~20mA, 2~10V

2. Local / Remote Switches

a. Select “Remote”：Controlled by signal.

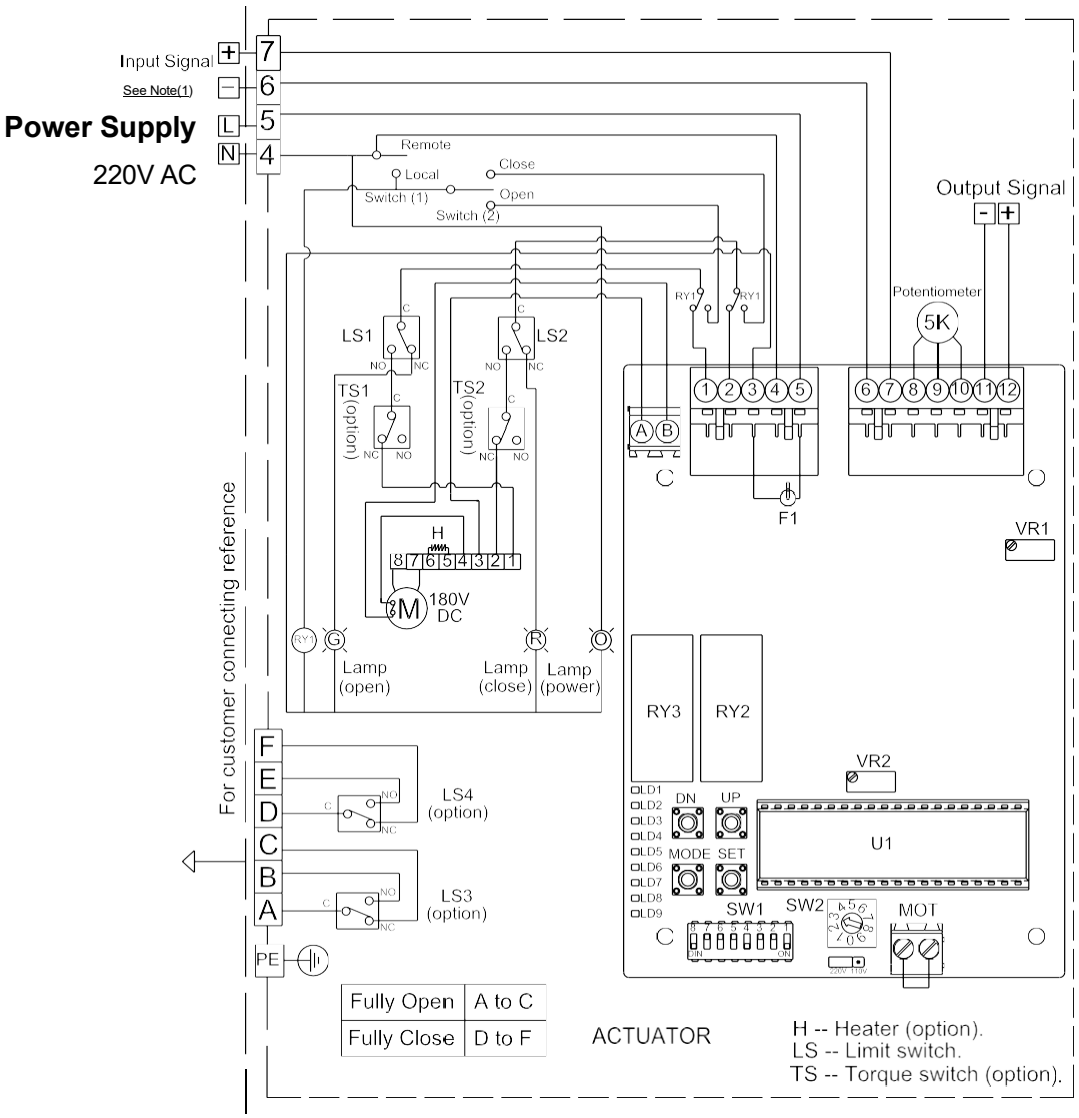
b. Select “Local”：Controlled by switch (2).

3. Using less than 5A current for “A, B, C, D, E, F”.

WIRING DIAGRAM – Quarter Turn Actuator

OM-9 ~ OM-13 220V AC 1-Phase

Modulating Controller, Local Control Unit, 50% duty cycle



NOTE:

1. Modulating Board

a. Input Signal：4~20mA, 1~5V, 2~10V
(It is suggested to use the shielding wire and its length should not exceed 30m.)

b. Output Signal：4~20mA, 2~10V

2. Local / Remote Switches

a. Select “Remote”：Controlled by signal.

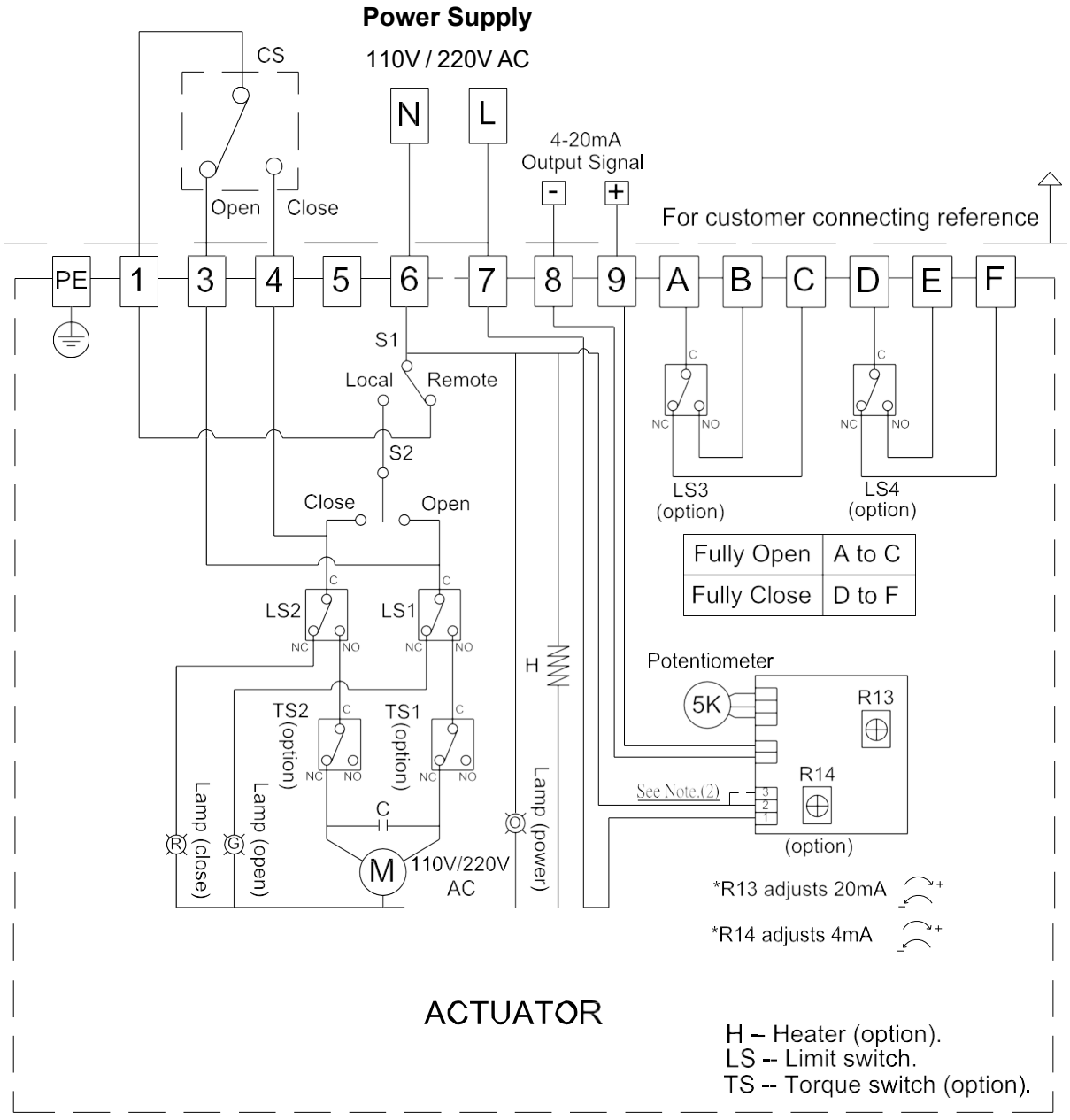
b. Select “Local”：Controlled by switch (2).

3. Using less than 5A current for “A, B, C, D, E, F”.

WIRING DIAGRAM – Quarter Turn Actuator

OM-2 ~ OM-13 110V , 220V AC 1-Phase

On-Off Controller, Local Control Unit, Analog Signal Output



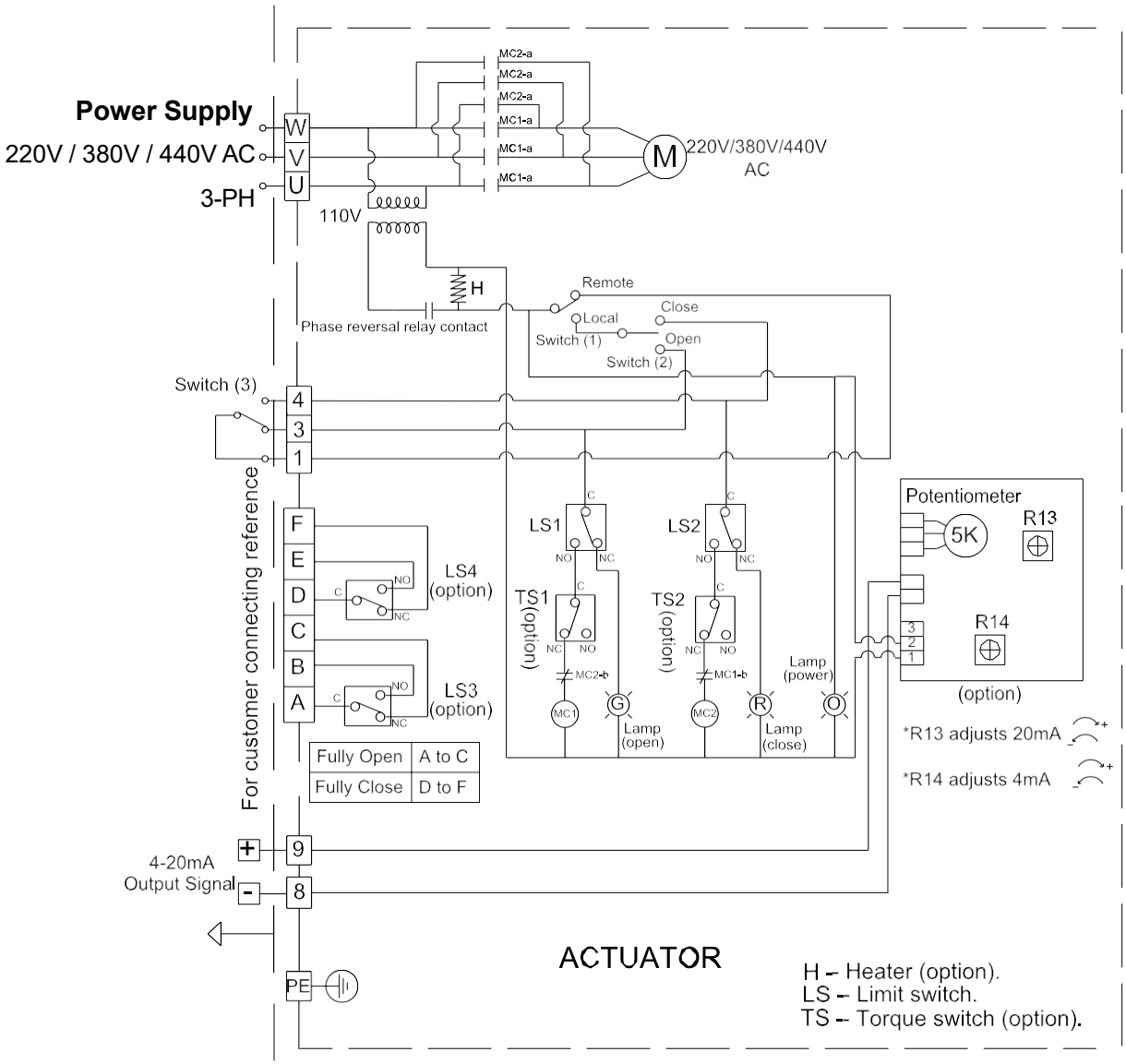
NOTE:

1. Using less than 5A current for “A, B, C, D, E, F”.
2. If the control power is 220V AC, N & L connect to #1 & #3.
   If the control power is 110V AC, N & L connect to #1 & #2 or #2 & #3.

WIRING DIAGRAM – Quarter Turn Actuator

OM-2 ~ OM-13 220V , 380V , 440V AC 3-Phase

On-Off Controller, Local Control Unit, Analog Signal Output



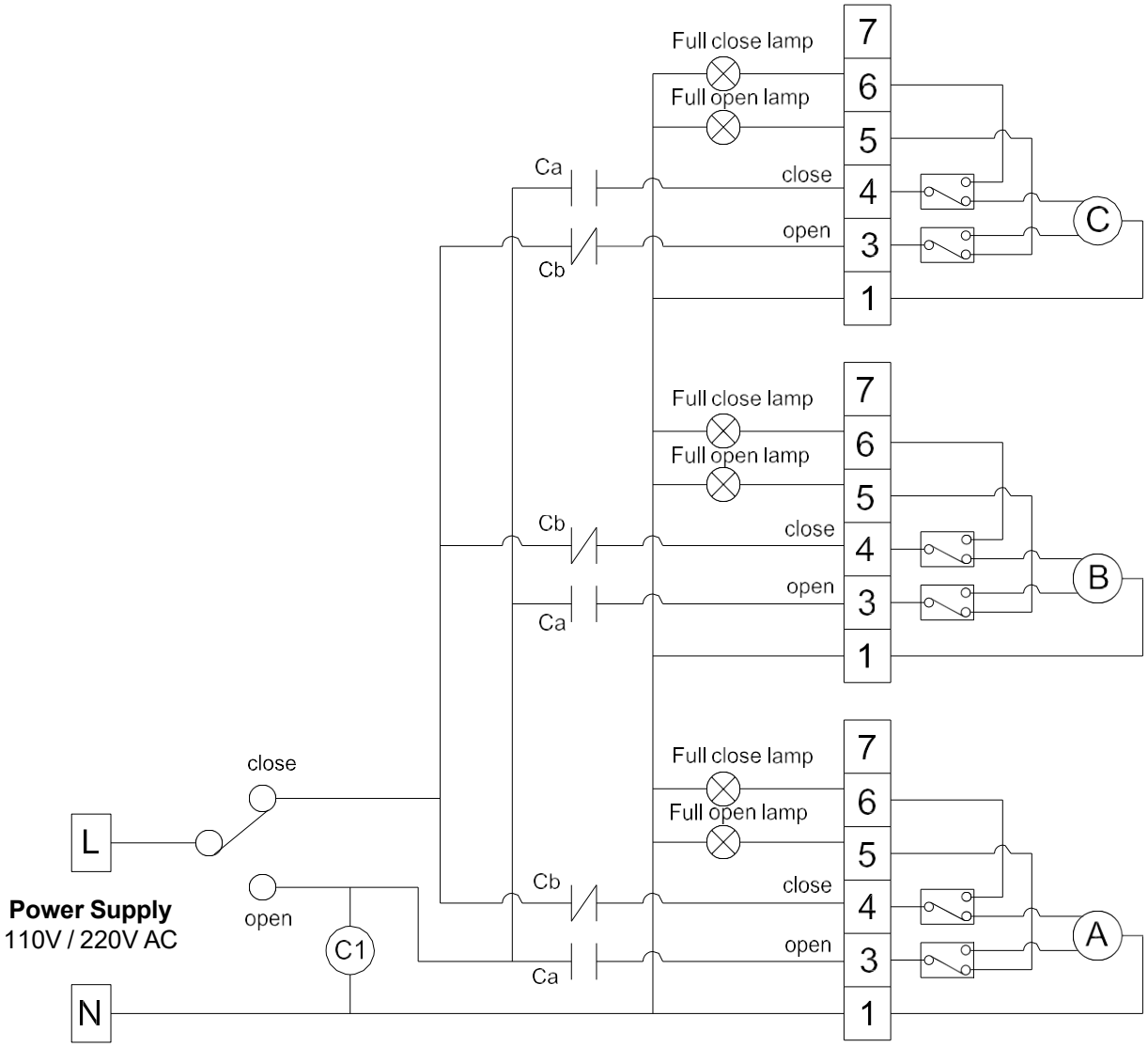
NOTE:

1. Please change any two of the U, V, W when the power lamp is off.
2. Switch (3) is the switch of the remote control (provided by the user).
   a. Connecting #1 & #3 for OPEN.
   b. Connecting #1 & #4 for CLOSE.
   c. #1, #3, #4 cannot connect together at the same time.
3. Using less than 5A current for " A,B, C, D, E, F".

WIRING DIAGRAM – Quarter Turn Actuator

BM-2, OM-A, OM-A-M, OM-1~OM-13, OM-F, OM-G 110V, 220V AC 1-Phase

Same Switch Coupling Wiring



NOTE :

1. The wiring is based on 3 sets of actuators for one switch – 1 set is open and 2 sets are close. (If more sets, the rest can be done by this logic.)
2. When a set of control wire or switch needs to control two or more actuators at the same time, please refer to the wiring diagram.
3. Add one contactor for separation to prevent the interference of the compression coupling.
4. C1=3a3b contactor

ADJUSTMENT – Travel Cam & Limit Switches

NOTE:
If LS3 & LS4 are fitted, they should be set to trip prior to LS1 & LS2 to avoid over-travel.

The travel cams are set to control the open and closed position of the valve. The position is set to stop the travel of the actuator when the travel cams activate the limit switch. Standard is two limit switches (LS1 & LS2), one for open, one for closed. LS1 & LS2 limit the maximum range by disabling the electric motor. LS3 & LS4 are optional. They allow external equipment to confirm that the valve has reached the fully open and fully closed positions.

The travel cams can be adjusted with a 2.5mm Allen key. The cams are preset at the factory. When additional adjustments are needed, follow the steps described below.

OM-A, OM-A-M

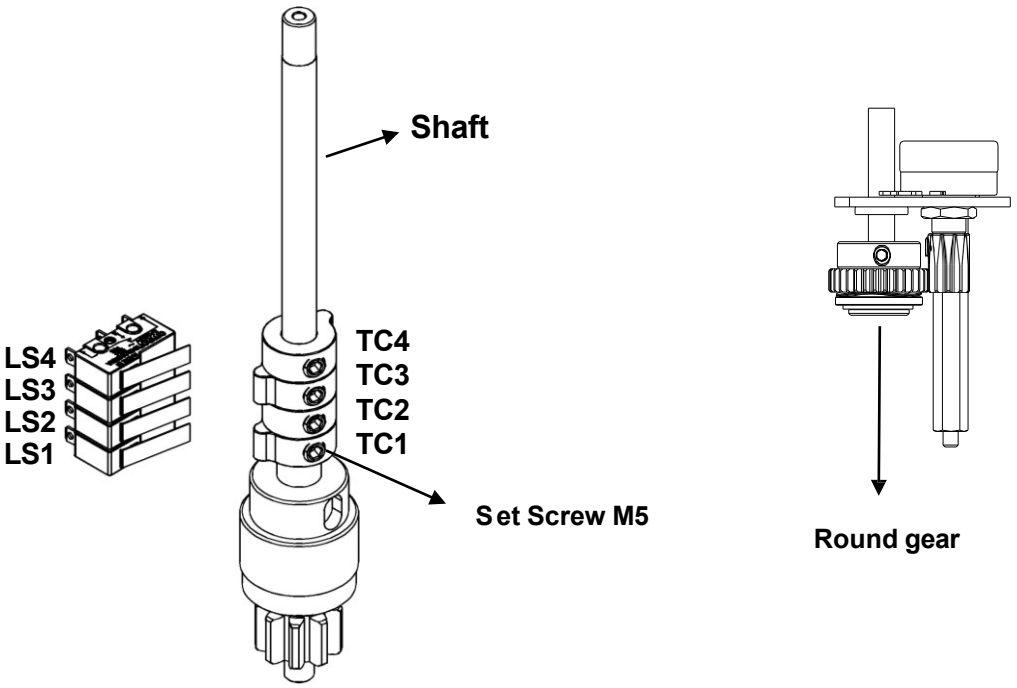
1. **To set the open position:**
   a. Turn the power off.
   b. Use manual override to turn valve to the fully open position.
   c. Remove cover and loosen the M5 set screw on the TC1 with a 2.5mm Allen Key.
   d. Rotate cam(TC1) counterclockwise to contact with switch.
   e. Slowly rotate cam(TC1) clockwise until a light click is heard.
   f. Securely tighten the M5 set screw and apply power to check the travel position. If the position is not correct, please repeat steps a ~ f.
   g. After the adjustment is completed, check again the M5 set screw is securely tightened.

2. **To set the close position:**
   a. Turn the power off.
   b. Use manual override to turn valve to the fully closed position.
   c. Loosen the M5 set screw on the TC2 with a 2.5mm Allen key.
   d. Rotate cam(TC2) clockwise to contact with switch.
   e. Slowly rotate cam(TC2) counterclockwise until a light click is heard.
   f. Securely tighten the set screw and apply power to check the traveling position. If the position is not correct, please repeat steps a ~ f.
   g. After the adjustment is completed, check again the M5 set screw is securely tightened.

Modulating type: Loosen M5 set screw on round gear before setting, after completing fully open and fully-closed calibration, run the actuator to fully-closed position, then rotate round gear counterclockwise to the end and tighten M5 set screw.

ADJUSTMENT – Travel Cam & Limit Switches

【OM-A, OM-A-M】



TC 4 **Synchronous turn with TC2 (optional).**

TC 3 **Synchronous turn with TC1 (optional).**

TC 2 **"CLOSE"** **Clockwise: increase closing degree to fully closed.**

Counterclockwise: decrease closing degree.

TC 1 **" OPEN"** **Clockwise: decrease opening degree.**

Counterclockwise: increase opening degree to fully open.

OM-1, BM-2, OM2~13, OM-F, OM-G

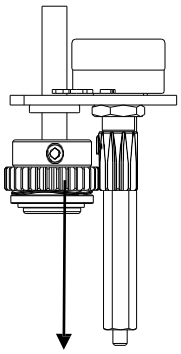
1. To set the open position:

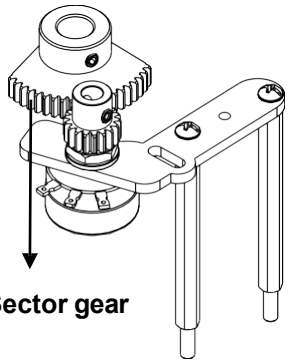
a. Turn power off and loosen both mechanical stops (Please refer to P52 and except OM-A, BM-2, OM-A, OM-A-M).
b. Use manual override to turn valve to the fully-open position.
c. Remove cover and loosen the M5 set screw on the TC1 with a 2.5mm Allen key.
d. Rotate cam(TC1) clockwise to contact with switch.
e. Slowly rotate cam(TC1) counterclockwise until a light click is heard.
f. Securely tighten the set screw and apply power to check the travel position. If the position is not correct, please repeat steps a ~ f.
g. After the adjustment is completed, check again the M5 set screw is securely tightened.

ADJUSTMENT – Travel Cam & Limit Switches

2. To set the close position:

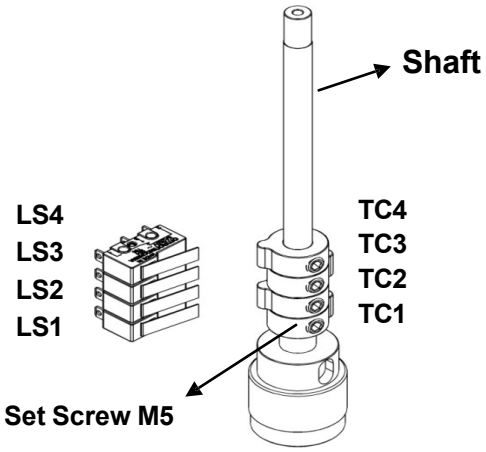
a. Turn the power off.
b. Use manual override to turn valve to the fully closed position.
c. Loosen the M5 set screw on the TC2 with a 2.5mm Allen key.
d. Rotate cam(TC2) counterclockwise to contact with switch.
e. Slowly rotate cam(TC2) clockwise until a light click is heard.
f. Securely tighten the set screw and apply power to check the travel position.
If the position is not correct, please repeat steps a ~ f.
g. After the adjustment is completed, check again the M5 set screw is securely tightened.
h. Tighten both mechanical stops and per P52.



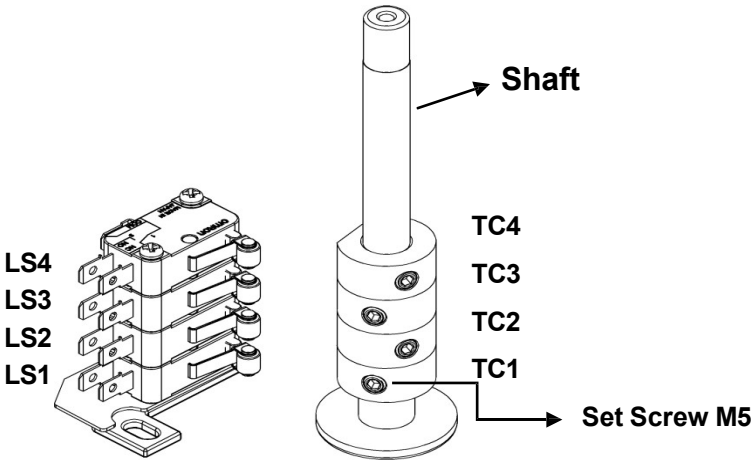


Modulating type: Loosen M5 set screw on sector gear (Round gear) before setting, after completing fully-open and fully closed calibration, run the actuator to fully closed position, then rotate sector gear (Round gear) clockwise to the end and tighten M5 set screw.

【OM-1】



【BM-2, OM-2~13, OM-F, OM-G】



TC 4 Synchronous turn with TC2 (optional).
TC 3 Synchronous turn with TC1 (optional).
TC 2 "CLOSE" Clockwise: decrease closing degree.
Counterclockwise: increase closing degree to fully closed.
TC 1 " OPEN" Clockwise: increase opening degree to fully open.
Counterclockwise: decrease opening degree.

ADJUSTMENT – Mechanical Stops

CAUTION !

Mechanical stops should only be reached during manual operation.

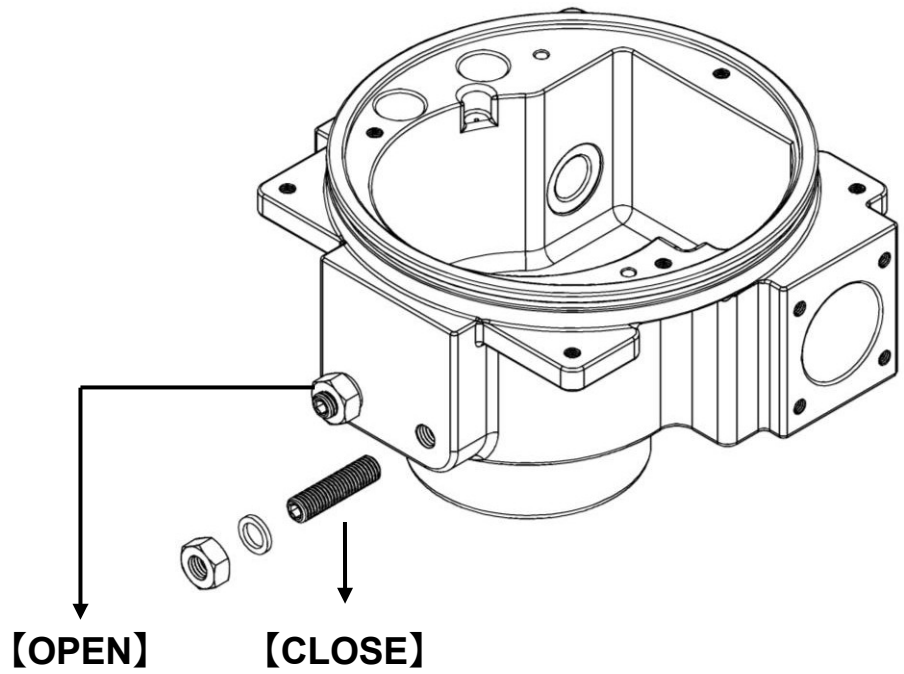
The Mechanical stops are factory set, though in some cases, adjustment may be required once a valve is fitted.

1. For Electric Operation

   Please refer to “Adjustment – Travel Cam & Limit Switches”.

2. For Manual Operation

   a. Turn power off.
   b. Loosen locknut and unwind it a few turns.
   c. For modulating type, loosen the set screw on the sector gear first.
   d. Use manual override to turn the actuator to desired limit position.
   e. For modulating type, rotate the sector gear clockwise to the end. Then tighten set screw.
   f. Tighten the mechanical stop screw until it reaches the shaft, then reverse one cycle.
   g. Tighten locknut.
   h. Check that the electrical limit switches can still be reached.

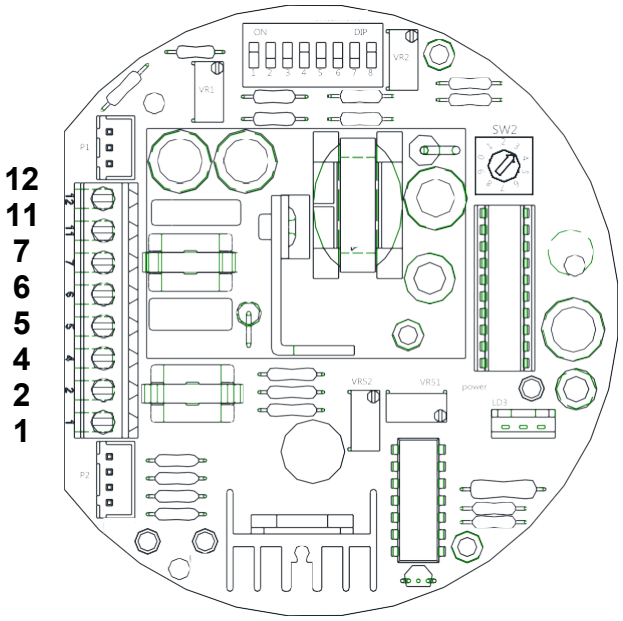


ADJUSTMENT – Modulating Control Board

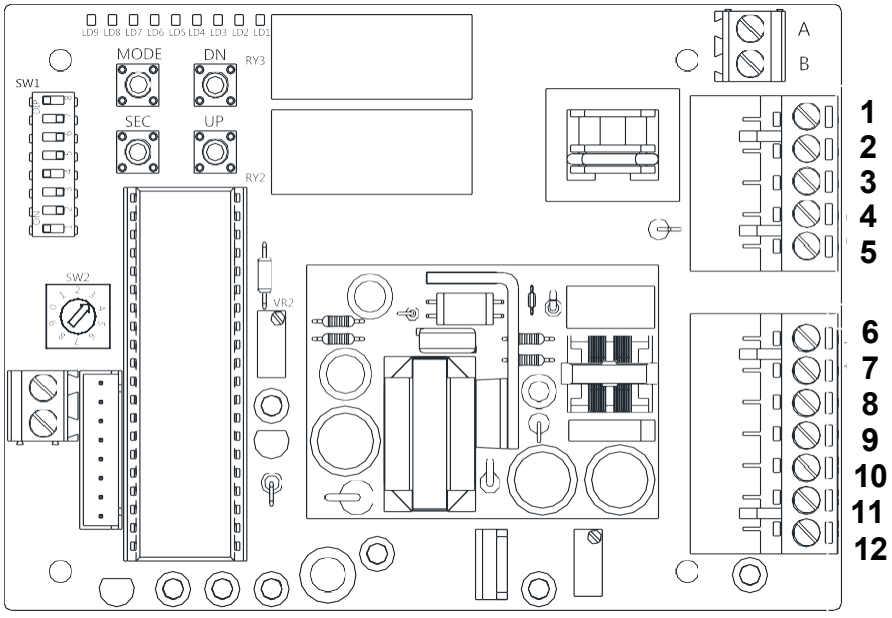
Part A: Suitable for OM-1~OM-13、OM-A、OM-A-M、OM-F、OM-G

1. Surface <u>The surface is based on the actuator in 110 / 220V voltage.</u>

OM-1、OM-A、OM-A-M



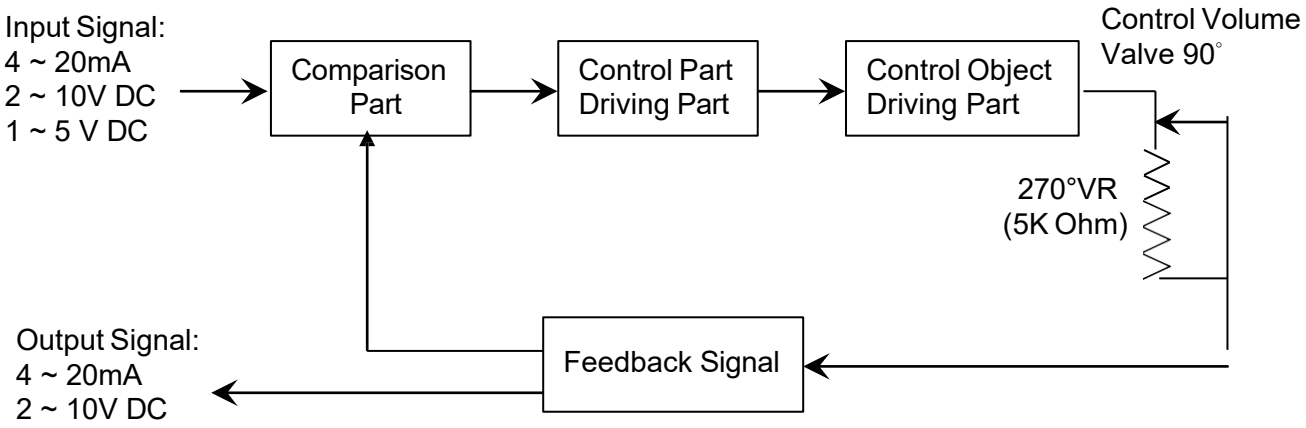
OM-2~OM-13、OM-F、OM-G



ADJUSTMENT – Modulating Control Board

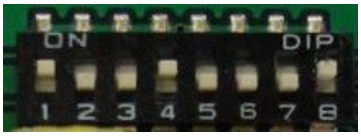
Part A: Suitable for OM-1~OM-13、OM-A、OM-A-M、OM-F、OM-G

2. Procedure



Supplied Voltage: 24V DC / AC, 110V / 220V AC 1- Phase

3. DIP-SWITCH SETTING (SW1)



⇧ ON

⇩ OFF

	1	2	3	4	5	6	7	8
Factory setting	ON	OFF	OFF	ON	OFF	OFF	OFF	ON
4~20mA input	ON	OFF						
1~5V input	OFF	OFF						
2~10V input	OFF	ON						
4~20mA output			OFF	ON	OFF			
2~10V output			ON	OFF	ON			
20mA / 5V / 10V means valve fully-open						OFF		
20mA / 5V / 10V means valve fully-closed						ON		
Close valve if input signal disconnected (when S6 sets " OFF")							OFF	ON
Open valve if input signal disconnected (when S6 sets " OFF")							ON	OFF
The actuator will not operate if the input signal is disconnected (when S6 sets " OFF")							ON OFF	ON OFF

NOTE:

1. After completing dip-switch setting, restart the actuator.
2. The standard factory presetting is 1, 4, 8 for ON and 2, 3, 5, 6, 7 for OFF.

ADJUSTMENT – Modulating Control Board

Part A: Suitable for OM-1~OM-13、OM-A、OM-A-M、OM-F、OM-G

	FUNCTION	SETTING
S1, 2	INPUT SIGNAL SELECT.	"4~20mA" set 1-ON / 2-OFF. "1~5V" set 1-OFF / 2-OFF. "2~10V" set 1-OFF / 2-ON.
S3, 4, 5	OUTPUT SIGNAL SELECT.	"4~20mA" set 3-OFF / 4-ON / 5-OFF. "2-10V" set 3-ON / 4-OFF / 5-ON.

When S6 sets "ON "

S6	INPUT SIGNAL SELECT： 4mA, 2V, 1V →valve fully-open. 20mA, 10V, 5V →valve fully-closed.	Set 6-ON.
S7, 8	POSITION SELECT. (When the input signal fails.)	"valve fully-closed" set 7-ON / 8-OFF. "valve fully-open" set 7-OFF / 8-ON. "valve stops" set 7-ON / 8-ON. or 7-OFF/ 8-OFF.

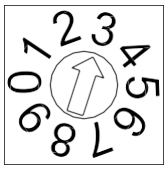
When S6 sets "OFF "

S6	INPUT SIGNAL SELECT： 4mA, 2V, 1V →valve fully-closed. 20mA, 10V, 5V→valve fully-open.	Set 6-OFF.
S7, 8	POSITION SELECT. (When the input signal fails.)	"valve fully-closed" set 7-OFF / 8-ON. "valve fully-open" set 7-ON / 8-OFF. "valve stops" set 7-ON / 8-ON. or 7-OFF / 8-OFF.

ADJUSTMENT – Modulating Control Board

Part A: Suitable for OM-1~OM-13、OM-A、OM-A-M、OM-F、OM-G

4. Sensitivity Switch Setting(SW2)



a. When switching to “1”: The Highest Sensitive and the 0~90 degree can be divided up to around 50 times movement.
b. When switching to “0”: The Lowest Sensitive and the 0~90 degree can be divided up to around 10 times movement.
c. The sensitivity decreases 5 times movement by sectors from SW1 to SW2, SW2 to SW3, SW3 to SW4 and so on.

5. Settings for OPEN and CLOSE (OM-1, OM-A, OM-A-M)

The settings are set at factory, though in some cases re-set may be required when a particular rate of signal is requested.

Adjust the output signal/input signal

VR1— Adjust 10V, 20mA (Input signal: fully-open)
VR51— Adjust 10V, 20mA (Output signal: fully-open)
VR2 — Adjust 2V, 4mA (Input signal: fully-closed)
VR52 — Adjust 2V, 4mA (Output signal: fully-closed)

} The function of VR

Note: If it is necessary to adjust VR51 and VR52, VR1 and VR2 also need to be adjusted accordingly.

a. Rotate VR1 counterclockwise until a light click is heard, then supply 10V (or 20mA) to the modulating board. Slightly rotate VR1 clockwise until the green LED keeps on. Adjust VR51 to complete.

VR51： ↻ Clockwise: decreasing signal.
↺ Counterclockwise: increasing signal.

b. Rotate VR2 clockwise until a light click is heard, then supply 2V (or 4mA) to the modulating board. Slightly rotate VR2 counterclockwise until the red LED keeps on. Adjust VR51 to complete.

VR52： ↻ Clockwise: decreasing signal.
↺ Counterclockwise: increasing signal.

ADJUSTMENT – Modulating Control Board

Part A: Suitable for OM-1~OM-13、OM-A、OM-A-M、OM-F、OM-G

6. Settings for OPEN and CLOSE　(OM-2~OM-13、OM-F、OM-G)

The settings are set at factory, though in some cases re-set may be required when a particular rate of signal is requested.

OPEN setting

a. Keep pressing “SET” for 2 seconds, then LD 9 comes on, it will enter to the manual mode.
b. Keep pressing “UP” until the actuator runs to the fully open position, LD2 comes on, then supplies the input signal (5V or 10V or 20mA).
c. Press “MODE” once. The OPEN setting is completed.

CLOSE setting

a. Keep pressing “DOWN”, until the actuator runs to fully closed position, LD1 comes on , then supplies an input signal (1V or 2V or 4mA).
b. Press “MODE” once. The CLOSE setting is completed.

After completing the above settings, press “SET” once

Adjust the output signal

VR2： Clockwise: increasing signal.
Counterclockwise: decreasing signal.

ADJUSTMENT – Modulating Control Board

Part A: Suitable for OM-1~OM-13、OM-A、OM-A-M、OM-F、OM-G

7. Lamp Signal (OM-2~OM-13、OM-F、OM-G)

LD1	Fully-closed	LD6	Motor thermostat turn off
LD2	Fully-open	LD7	Output signal short circuit
LD3	Power	LD8	Motor current is excessive
LD4	Abnormal Voltage	LD9	Manual Mode
LD5	Wrong input signal		

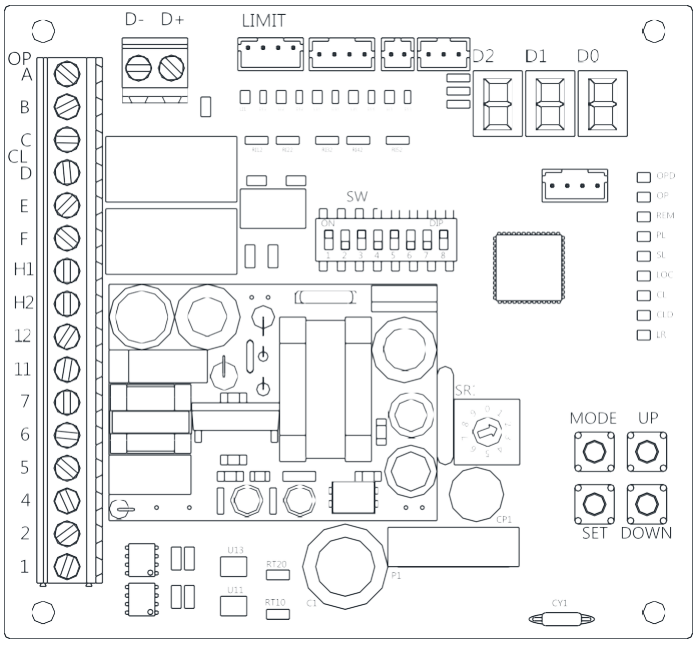
If the LED (LD4~LD9) is flashing under modulating control, refer to the following "Modulating Board Troubleshooting".

Lamp	Possibilities	Solution
No Lamp (LD3 off)	a. No power supply. b. The voltage is over 260V to cause the board burn out. c. Wrong connecting for the #8, #9 of the VR. d. Faulty Modulating board.	a. Check the power supply and wiring (#4 & #5 of modulating board). b. Check the voltage. c. Check the wiring. d. Send back to factory for inspection.
LD5	a. Setting in 2-10V input signal but supply 4-20mA. b. Setting in 2-10V input signal, but the input signal is over 13.5V. ***Setting in 4-20mA but supply 2-10V signal. The actuator could still be operated within 2~7V. But if the signal is over 7.2V the LED5 will come ON.***	Confirm if the input signal is the same as the dip switch setting (refer to P54~P55).
LD 6	Motor thermostat turns off.	a. Too high frequency for rated duty cycle(refer to P2). b. Motor thermostat (MOT) is not connected.
LD7	a. Output signal short circuit. b. Wrong connecting of the 2-10V input signal.	a. Confirm the wiring of output signal #11(-)、#12(+). b. Confirm the input signal for #6(-)、#7(+).
LD8	Motor current is excessive.	a. Too high frequency for rated duty cycle (refer to P2). b. Check the load (refer to P4~P5). c. Check if the motor rotor is locked (For example: Valve is stuck by foreign objects).
LD9	Manual Mode - Setting position for open & close.	After completing the settings, press “SET” once.

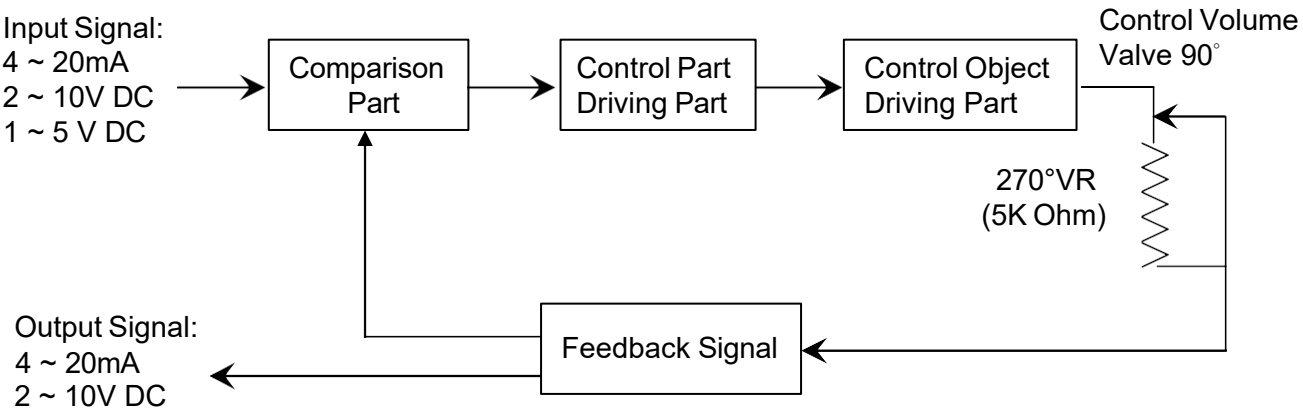
ADJUSTMENT – Modulating Control Board

Part B: Suitable for OM-1、OM-A、OM-A-M (Option: MODBUS)

1. Surface



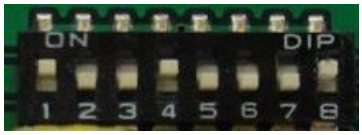
2. Procedure



ADJUSTMENT – Modulating Control Board

Part B: Suitable for OM-1、OM-A、OM-A-M (Option: MODBUS)

3. DIP-SWITCH SETTING (SW)



⇧ ON

⇩ OFF

	1	2	3	4	5	6	7	8
Factory setting	ON	OFF	OFF	ON	OFF	OFF	OFF	ON
4~20ma input	ON	OFF						
1~5V input	OFF	OFF						
2~10V input	OFF	ON						
MODBUS	ON	ON	ON	ON	ON			
4-20mA output			OFF	ON	OFF			
2-10V output			ON	OFF	ON			
20mA / 5V / 10V means valve fully-open						OFF		
20mA / 5V / 10V means valve fully-closed						ON		
Close valve if input signal disconnected (when S6 sets “ OFF”)							OFF	ON
Open valve if input signal disconnected (when S6 sets “ OFF”)							ON	OFF
Actuator will not operate if input signal disconnected (when S6 sets “ OFF”)							ON OFF	ON OFF

NOTE:

1. After completing dip-switch setting, restart the actuator or wait for 5 secs.
2. The standard factory presetting is 1, 4, 8 for ON and 2, 3, 5, 6, 7 for OFF.

ADJUSTMENT – Modulating Control Board

Part B: Suitable for OM-1、OM-A、OM-A-M (Option: MODBUS)

	FUNCTION	SETTING
S1, 2	INPUT SIGNAL SELECT.	“4~20mA” set 1-ON / 2-OFF. “1~5V” set 1-OFF / 2-OFF. “2~10V” set 1-OFF / 2-ON.
S3, 4, 5	OUTPUT SIGNAL SELECT.	“4~20mA” set 3-OFF / 4-ON / 5-OFF. “2-10V” set 3-ON / 4-OFF / 5-ON. “MODBUS” set 3-ON / 4-ON / 5-ON.

When S6 sets “ON”

S6	INPUT SIGNAL SELECT： 4mA, 2V, 1V →valve fully-open. 20mA, 10V, 5V →valve fully-closed.	Set 6-ON.
S7, 8	POSITION SELECT. (When the input signal fails.)	“valve fully-closed” set 7-OFF / 8-ON. “valve fully-open” set 7-ON / 8-OFF. “valve stops” set 7-ON / 8-ON. or 7-OFF/ 8-OFF.

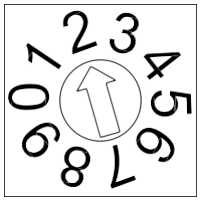
When S6 sets “OFF”

S6	INPUT SIGNAL SELECT： 4mA, 2V, 1V →valve fully-closed. 20mA, 10V, 5V→valve fully-open.	Set 6-OFF.
S7, 8	POSITION SELECT. (When the input signal fails.)	“valve fully-closed” set 7-OFF / 8-ON. “valve fully-open” set 7-ON / 8-OFF. “valve stops” set 7-ON / 8-ON. or 7-OFF / 8-OFF.

ADJUSTMENT – Modulating Control Board

Part B: Suitable for OM-1、OM-A、OM-A-M (Option: MODBUS)

4. Sensitivity Switch Setting (SR1)



a. When switched to “1”: The highest sensitive and can be divided up to around 76 times movement. The accumulative variation for each movement is 0.2mA.

b. When switched to "0": The lowest sensitive and can be divided up to around 15 times the movement. The accumulative variation for each movement is 1.0mA.

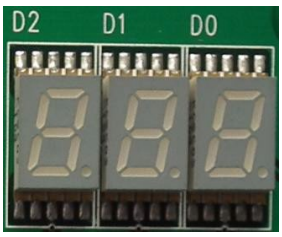
5. Lamp Indication

Lamp	Actuator Status
OPD	Fully-open position
OP	Opening direction
REM	Remote control mode
PL	Alerting signal
SL	Setting mode
LOC	Local control mode
CL	Closing direction
CLD	Fully-closed position

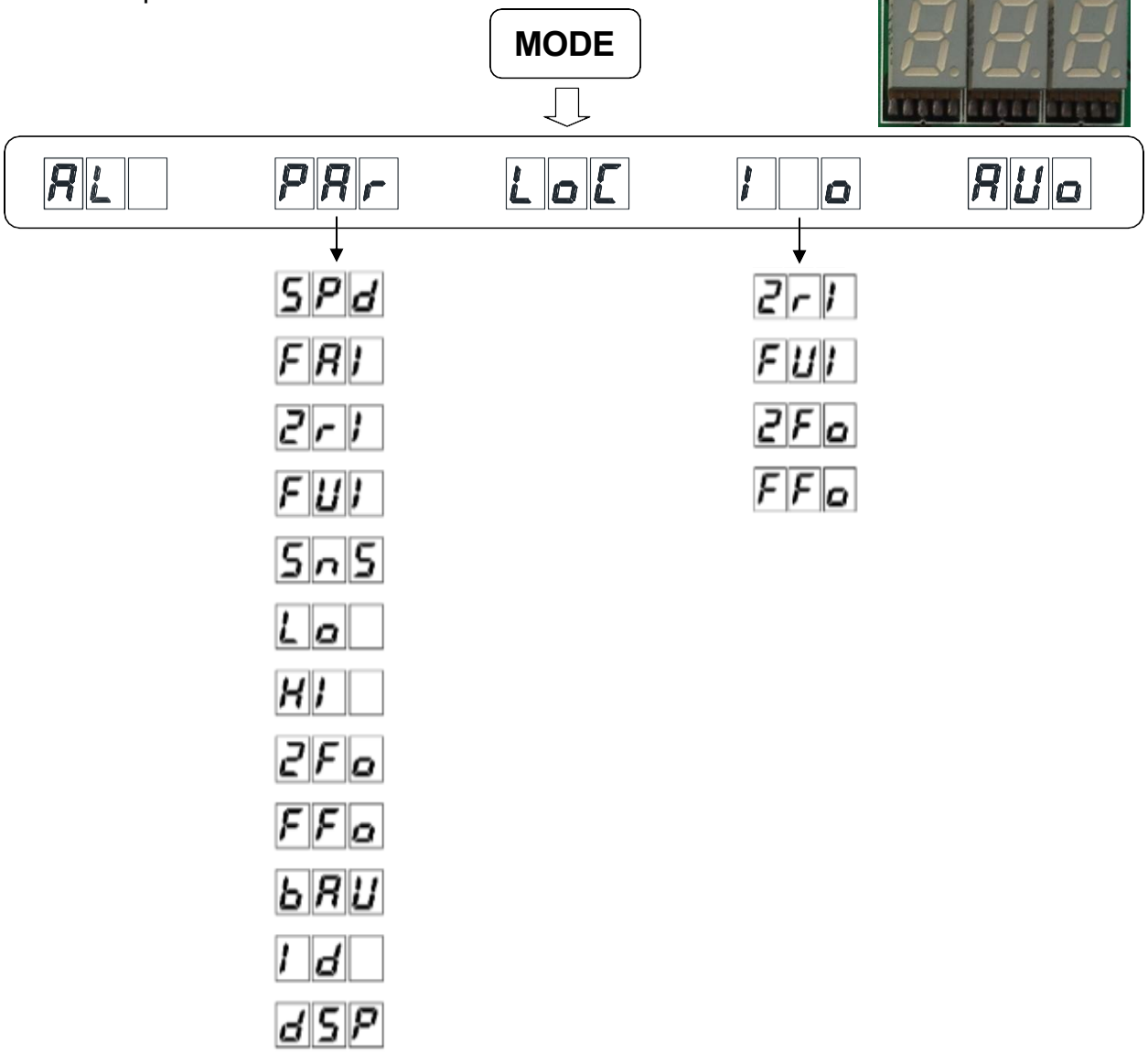
ADJUSTMENT – Modulating Control Board

Part B: Suitable for OM-1、OM-A、OM-A-M (Option: MODBUS)

6. LED Indication



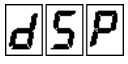
a. Setup flow chart



ADJUSTMENT – Modulating Control Board

Part B: Suitable for OM-1、OM-A、OM-A-M (Option: MODBUS)

b. The function of the LED indication

LED indication	Function
	Error log
	Basic parameter
	Local control
	Fast setting
	Auto run
	Running time setting
	Wrong input signal
	Input signal setting for fully-closed position
	Input signal setting for fully-open position
	Sensitivity Setting
	Fully-closed position setting
	Fully-open position setting
	Output signal setting for fully-closed position
	Output signal setting for fully-open position
	Baud rate setting for MODBUS
	Station setting for MODBUS
	Display setting

ADJUSTMENT – Modulating Control Board

Part B: Suitable for OM-1、OM-A、OM-A-M (Option: MODBUS)

7. Adjustable Speed Setting

a. Press “MODE” several times to get into  , then press “SET” once to enter parameter setting mode.

b. Get into  and keep pressing “SET” (around 3 sec) to enter setting mode.

c. Adjust with “UP” and “DOWN” to the required selection.

Selection	1	2	3	4	5	6	7	8	9	10
Running time (Sec.)	Standard	30	60	80	100	120	150	180	200	200

d. Press “SET” once to complete the adjustable speed setting.

e. Press “MODE” five times to go back to the position indicator to complete the setting.

8. Travel Setting

a. Press “MODE” five times to get into  .

b. Keep pressing “SET” (around 5 sec) until “LOC” comes on, entering the Auto run mode.

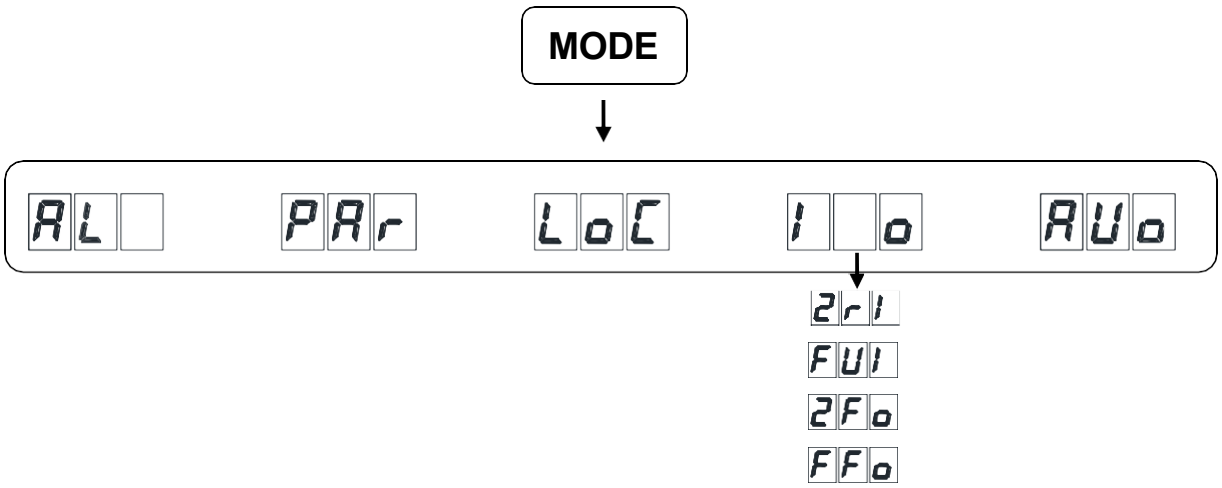
c. When the Auto run is completed, “LOC” comes off and the actuator will stop running. The travel setting is completed.

ADJUSTMENT – Modulating Control Board

Part B: Suitable for OM-1、OM-A、OM-A-M (Option: MODBUS)

9. Signal Setting

> If the travel setting could not satisfy your request, the signal is needed to be adjusted separately, please follow the steps of signal setting.



Input signal setting for fully-closed position

a. Press “MODE” several times until get into I o, then press “SET” once to enter signal setting mode.

b. Get into 2rI, and keep pressing “SET” (around 3 sec) until 2rI is glittering.

c. Supply the input signal according to the dip switch setting (1V or 2V or 4mA).

d. Press “SET” once and “MODE” twice to complete the input signal setting for fully-closed position.

ADJUSTMENT – Modulating Control Board

Part B: Suitable for OM-1、OM-A、OM-A-M (Option: MODBUS)

Input signal setting for fully open position

a. Press “MODE” several times until get into  , then press “SET” once to enter signal setting mode.

b. Adjust with “UP” and “DOWN” until get  .

c. Keep pressing “SET” (around 3 sec) until  is glittering.

d. Supply the input signal according to the dip switch setting (5V or 10V or 20mA).

e. Press “SET” once and “MODE” twice to complete the input signal setting for fully open position.

Output signal setting for fully closed position

Install the ammeter or monitor to correspond to output signal setting

a. Press “MODE” several times until get into  , then press “SET” once to enter signal setting mode.

b. Adjust with “UP” and “DOWN” until get into  .

c. Keep pressing “SET” (around 3 sec).

d. Adjust the output value with “UP” and “DOWN” until the value can fit with your request.

e. Press “SET” once and “MODE” twice to complete the output signal setting for fully closed position.

Output signal setting for fully open position

Install the ammeter or monitor to correspond to output signal setting

a. Press “MODE” several times until get into  , then press “SET” once to enter signal setting mode.

b. Adjust with “UP” and “DOWN” until get  .

c. Keep pressing “SET” (around 3 sec).

d. Adjust the output value with “UP” and “DOWN” until the value can fit with your request.

e. Press “SET” once and “Mode” twice to complete the output signal setting for fully open position.

ADJUSTMENT – Modulating Control Board

Part B: Suitable for OM-1、OM-A、OM-A-M (Option: MODBUS)

10. Warning Message

a. Press ”MODE” once to get into  , then press “SET” once to get into warning message.

b. Adjust with ”UP” and ”DOWN” to review the history log of warning message.

↑ Item ↑ Warning Message

Item (9,8,7…0)	Warning Message	Solution
 (The latest data)          (The oldest data)	 Wrong Input signal.	a. Input signal fails. b. Check if the input signal and dip switch setting are correct.
	 No abnormal records.	

※ The latest data will stay with item 9.

ADJUSTMENT – Modulating Control Board

Part B: Suitable for OM-1、OM-A、OM-A-M (Option: MODBUS)

c. Example

- If you want to check the latest data, press “MODE” several times until get into  → Press “Set” once → The LED display will show the latest data  .
- If you want to check eighth data, press “MODE” several times until get into  → Press “SET” once →Press “DOWN” seven times and the LED display will show the eighth data.

11. MODBUS Setting

> MODBUS and a modulating controller cannot be operated at the same time.

① Adjust the dip switch (SW) Pin1~ Pin5 to “ON” position.

② Baud rate setting

a. Press ”MODE” twice until get into  .

b. Press ”SET” once to get into  .

c. Press ”DOWN” ten times to enter to  .

d. Keep pressing ”SET” (around 3 sec) until the LED indicator is glittering to get into setting mode.

e. Adjust with ”UP” and ”DOWN” to set baud rate for MODBUS. Adjust to your demand value. (default valve #4)

Setting Value	Baud rate
4	9600
5	19200

f. Press “SET” once to complete the setting.

ADJUSTMENT – Modulating Control Board

Part B: Suitable for OM-1、OM-A、OM-A-M (Option: MODBUS)

③ Station Setting

a. Press “DOWN” once to get into  .

b. Keep pressing “SET” (around 3 sec) until the LED indicator is glittering to get into setting mode.

c. Adjust with ”UP” and ”DOWN” to set the station. (Station Range:1~127, default Station: 1)

d. Press “Set” once to complete the setting.

④ Press ”Mode” four times to back to home page.

TROUBLE SHOOTING

ON-OFF Controller

1. Motor does not operate and overheats.

Possibilities	Solution
a. Supply power to #3、#4 simultaneously (Parallel Connection).	a. Check the wiring (For coupling wiring, refer to P48).
b. The capacitor failed (whether the surface of the capacitor deforms).	b. Replace to a new part.
c. Valve's rubber is getting hardened, or the valve's torque is excessive (it takes longer time to reach the fully closed position).	c. Use hand wheel for testing or change to a new valve.
d. Foreign objects in the flow stream.	d. Check if any obstructions
e. Broken motor stem or bearing.	e. Replace to a new part
f. The limit switch for fully closed does not trip.	f. Operate the actuator manually to Fully closed position and confirm if the limit switch trips.

2. The actuator is operated very well but the motor is hot.

Possibilities	Solution
a. Actuator operates too frequently (Starting frequency is too high).	a. Change system bandwidth or replace to a higher duty cycle actuator (refer to P2).
b. Overload.	b. This situation often happens after operating for a long time. It is suggested to replace to a new valve.
c. Under or over-rated voltage.	c. Check the supply circuit (refer to P4~P5).
d. Mechanical stops are reached by the gear train at fully open or fully closed position.	d. Reset the mechanical stops and cam (TC1 & TC2) (refer to P49~P52).
e. Wrong power supply.	e. Check the power supply.

3. When operating two or more actuators simultaneously, the actuator works abnormally some times and the motor gets hot.

Possibilities	Solution
Parallel connection.	a. Check current values and install a relay respectively. (refer to wiring diagram P48)

TROUBLE SHOOTING

4. The valve cannot be fully opened or fully closed by either power supply or hand-wheel.

Possibilities	Solution
a. The actuator does not mount with the valve tightly during installation process.	a. Contact technical department to solve the problem.
b. The torque of valve is larger than the torque of actuator.	b. Replace to a new valve or a larger actuator.
c. The set screw of the cam is loose.	c. Readjust the mechanical stops and limit switches (refer to P49~P52).
d. The installing angle of actuator and valve is not correct.	d. Check the angle of the valve and actuator.

5. The capacitor is failed.

Possibilities	Solution
a. Overload (exceed the rated torque of actuator).	a. Replace to a new part. It's suggested to change a new valve or a larger actuator.
b. Starting frequency is too high or ambient temperature is too high.	b. Replace to a new part and change to 75% duty cycle actuator (refer to P2).
c. Over service life.	c. Check the capacitance and surface every year.

Modulating Controller

1. The LED (LD5~LD9) is flashing after the operating check is completed.

Solution
Refer to P58.

2. The lamps on the modulating board are normal, but the actuator can't work properly during test, or it only can turn to fully open/closed position.

Possibilities	Solution
The signal is connected oppositely (means to signal failure).	Confirm if the input signal and the wiring are correct (terminal #6 connects to "–" and terminal #7 connects to "+").

3. Can not operate by modulating controller.

Possibilities	Solution
a. Faulty VR.	a. Replace to a new VR.
b. The sector gear of the VR is loose.	b. Remove the input signal wires. Operate the actuator to fully-closed. Then readjust the VR (refer to P49~P51).
c. Wrong input signal.	c. Check if the input signal is correct (refer to P49~P51).
d. Faulty modulating board.	d. Send back to factory for inspection.

10. Warranty Conditions & Support

At Liquimech Group Pty Ltd, we are committed to delivering products that meet the highest standards of quality and reliability. Please refer to the Liquimech Warranty Conditions document for complete information on warranty terms, coverage, and claims procedures.

The warranty will be void if:

- The system is modified without approval.
- Damage results from improper operation or maintenance.
- Liquimech was not involved in commissioning and calibration.

If you have not received the warranty document or have any concerns, feel free to reach out to our team.

Please contact us via:

Website: www.liquimech.com.au
Email: sales@liquimech.com.au
Phone: 1300 954 202

You Define, We Design

To discuss your unique operational, technical and budgetary requirements

Phone: 1300 954 202
Email: sales@liquimech.com.au
Address: WA Metro Office
Sultana Road West High Wycombe
Web: www.liquimech.com.au