

# 4.2 Processor Module

Control algorithm calculations are performed in the processor modules.

Three types of processor modules are available: one for V net (Model: SCP401) and the other for Vnet/IP (Model: SCP461/SCP451).

## ■ Configuration

The following diagram shows the front and rear views of processor module.

The batteries are installed behind the front cover.

The DIP switches for setting domain number and station numbers are placed at the rear part of the processor module. When setting the DIP switches, it is necessary to remove the processor module from the safety control unit.

### ● SCP401

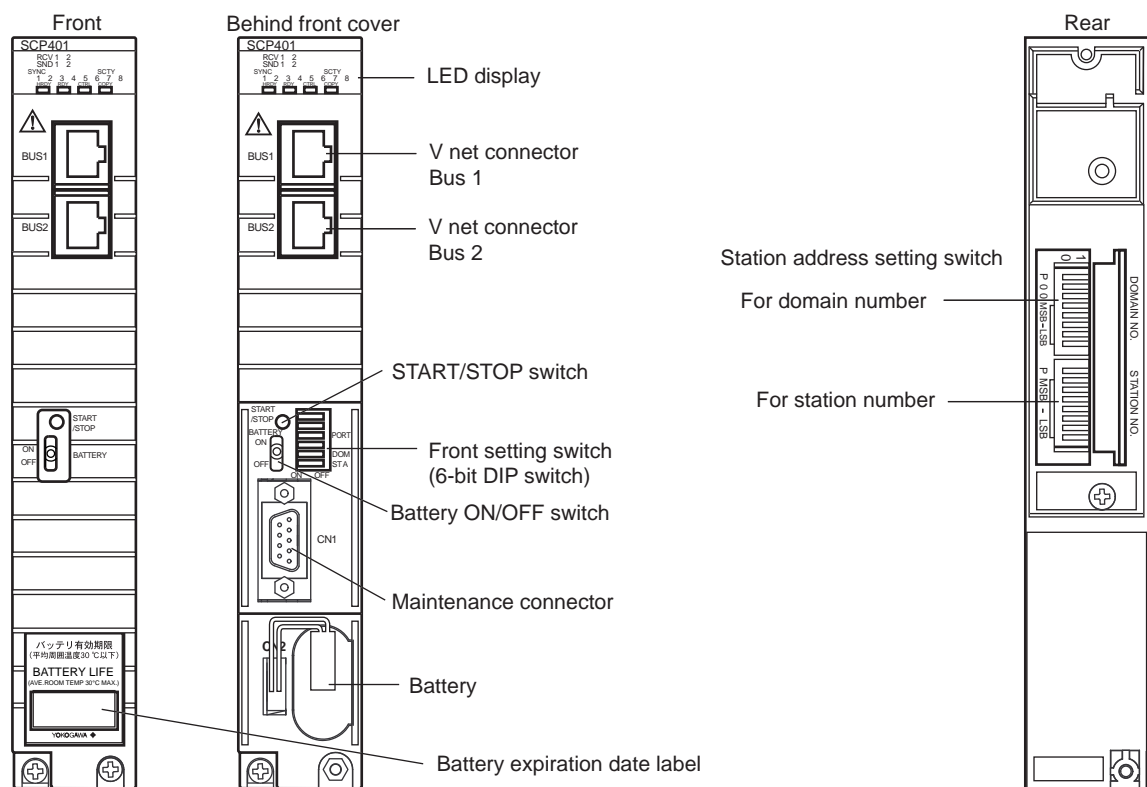


Figure 4.2-1 SCP401 Overview

● SCP461

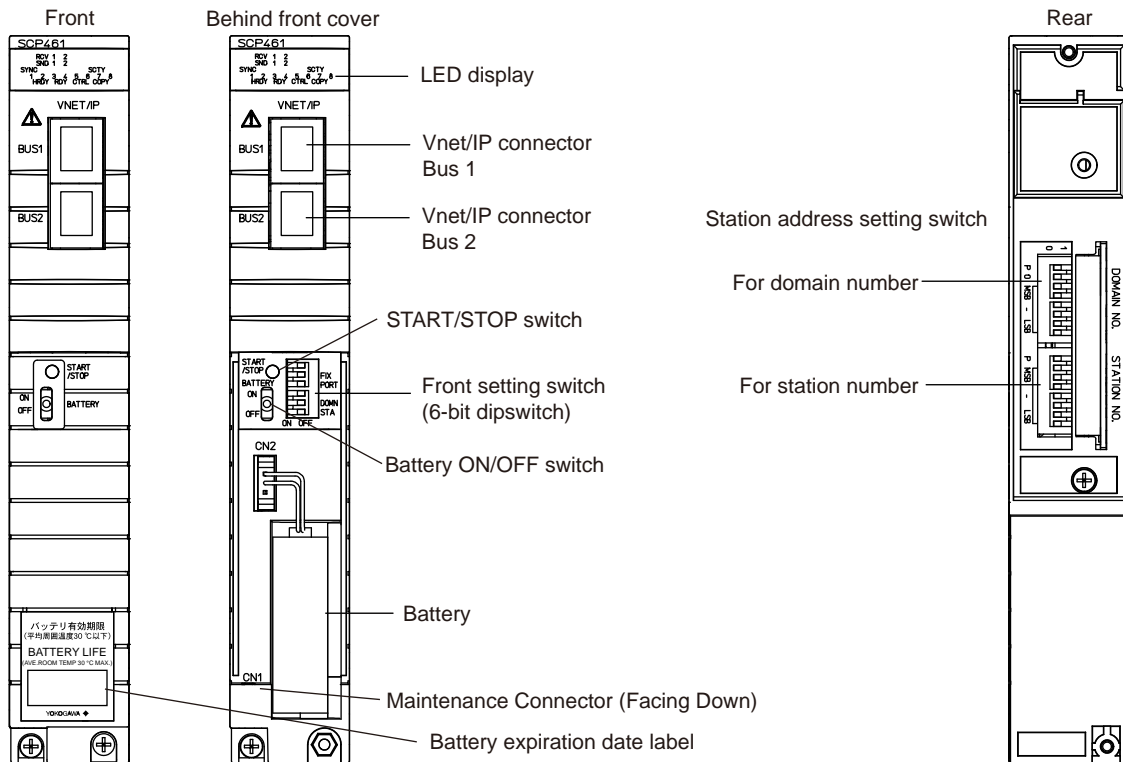


Figure 4.2-2 SCP461 Overview

● SCP451

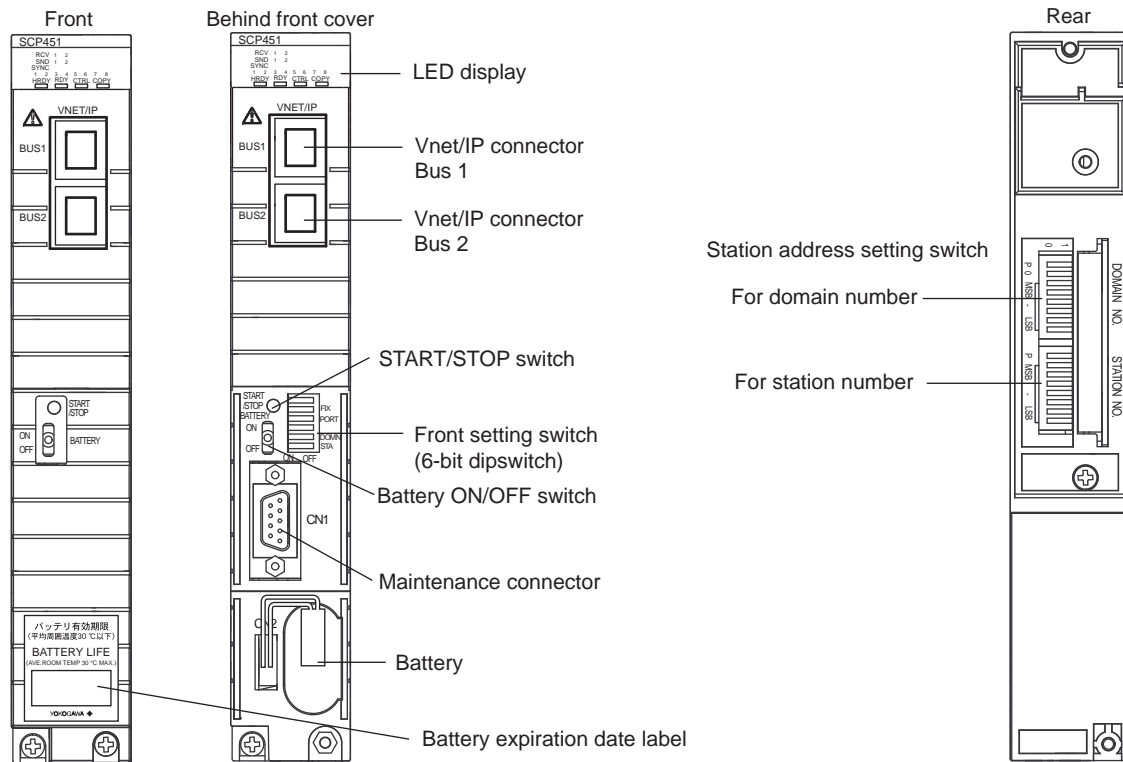


Figure 4.2-3 SCP451 Overview

## 4.2.1 Battery

In order to protect the processor module management information (in the storage memory) during power failure, the Li batteries are used.

Since the application program information is stored in the non-volatile memories, thus battery backup is not required.



### CAUTION

Use batteries specified by Yokogawa Electric.

A label indicating the expiration date of the battery is attached on the lower part of the processor module front cover. This expiration date is valid when the ambient temperature is less than 30 degree Celsius.

The part number of battery pack is S9185FA.

Recommended replacement cycle of battery: Changes according to the ambient temperature as follows:

- Three years if the average ambient temperature is 30 deg. C or less
- One year and a half if the average ambient temperature is 40 deg. C or less
- Nine months if the average ambient temperature is 50 deg. C or less

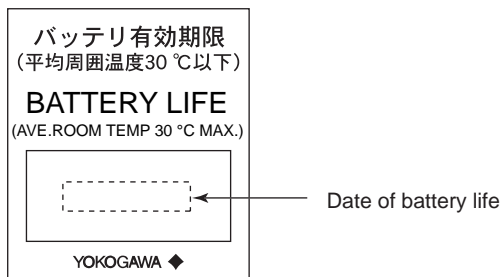


Figure 4.2.1-1 Battery Expiration Date Label

**SEE  
ALSO**

For more information about how to replace the battery, refer to:

[7.7.1, "Replacing Battery" on page 7-34](#)

## 4.2.2 LED Display

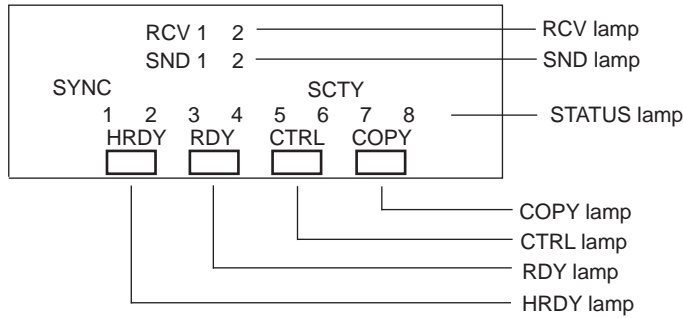


Figure 4.2.2-1 LED Display

- **HRDY:**  
The processor module performs self diagnosis. If the processor module hardware is functioning normally, the green lamp turns on. If abnormality is found, the lamp turns off.
- **RDY:**  
The green lamp turns on if both the hardware and software are functioning normally. If either of them is abnormal, the lamp turns off.
- **CTRL:**  
The green lamp turns on if the processor module is performing control. If the processor module is standby, the lamp turns off.
- **COPY:**  
In the dual-redundant type safety control unit, the green lamp turns on when program copy is executed and turns off when program copy is completed.  
  
When a processor module has been replaced or when the unit is stopped and then started again, the standby-side processor module automatically copies the program of the control-side processor module. When copy is completed, the lamp turns off. It is always off in the basic safety control unit (non-redundant configuration).
- **RCV:**  
Indicates the control bus communication status. 1 stands for bus1 while 2 stands for bus2.
  - **V net:** When receiving communication frames, the green lamp turns on, otherwise the lamp turns off.
  - **Vnet/IP:** When receiving communication frames, the green lamp blinks, otherwise the lamp turns off.
- **SND:**  
Indicates the control bus communication status. 1 stands for bus1 while 2 stands for bus2.
  - **V net:** When sending communication frames, the green lamp turns on, otherwise the lamp turns off.
  - **Vnet/IP:** When sending communication frames, the green lamp blinks, otherwise the lamp turns off.
- **SYNC:**  
Indicates the time synchronization status.
  - **V net:** If the module is synchronizing with V net clock or IRIG-B clock, the green lamp turns on, otherwise the lamp turns off.
  - **Vnet/IP:** If the module is synchronizing with Vnet/IP clock, the green lamp turns on, otherwise the lamp turns off.
- **SCTY:**

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The green lamp turns on when the security level of the SCS is online-level. If the security level of the SCS is offline-level, the lamp turns off.

- STATUS(1,2,3,4,5,6,7,8):  
These lamps are indicating the status of the processor module.
  - When both DOMN and STA bits of the front setting switch (6-bit DIP switch) are off: These lamps are indicating Operating Mode and error status.
  - When the DOMN bit of the front setting switch (6-bit DIP switch) is on: Displays the domain number that was set to the processor module.
  - When the STA bit of the front setting switch (6-bit DIP switch) is on: Displays the station number that was set to the processor module.

### 4.2.3 Setting Switches

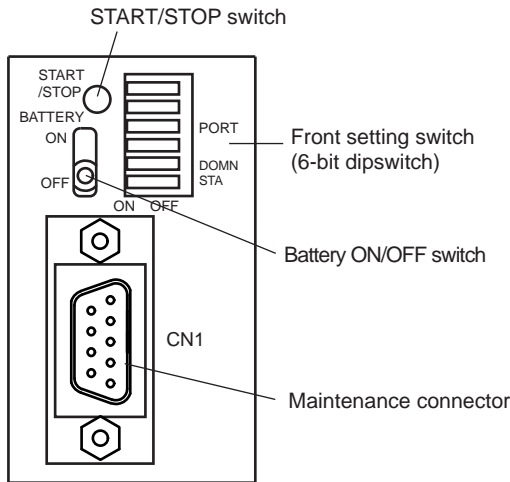


Figure 4.2.3-1 SCP401 Setting Switch

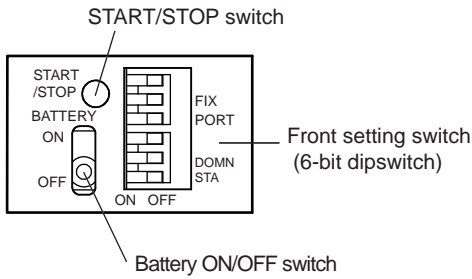


Figure 4.2.3-2 SCP461 Setting Switch

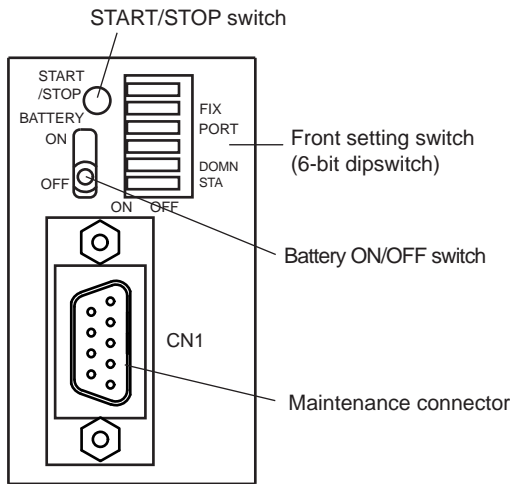


Figure 4.2.3-3 SCP451 Setting Switch

- **START/STOP:**  
This maintenance switch is used for forcing the processor module CPU stop or restart. If this switch is pressed when the processor module is still operating, the CPU will stop. If this switch is pressed when the processor module is not operating, the CPU will restart. This switch is located inside a hole next to the START/STOP sign. Push the switch using a non conductive slender bar of around 1 to 2 mm diameter.
- **Battery ON/OFF switch:**

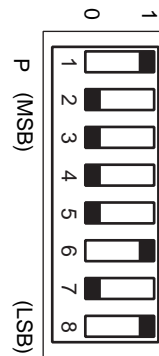
When this switch is on, battery backup is activated for protecting the processor module management information (in the storage memory) during power failure.

ON: Enables the backup. Select this position during normal operation.

OFF: Disables the backup.

- Front setting switch (6-bit DIP switch)
  - PORT: Port for maintenance (In usual operations, set to OFF position).
  - DOMN: Indicates on STATUS LED the domain number that was set to the processor module, if this switch is ON. (In usual operations, set to OFF position).
  - STA: Indicates on STATUS LED the station number that was set to the processor module, if this switch is ON. (In usual operations, set to OFF position).
  - FIX (SCP461/SCP451 only):  
Negotiation (Default : OFF)  
ON : Force  
OFF : Auto

The following figure is an example of STATUS LED indication: If the station number is set as 5 (10000101).



If the station number is set as shown in the right side figure, the LED displays as follows (the numbered bits are lit):



Figure 4.2.3-4 STATUS LED Indication

When both DOMN and STA switches are off, the status lamps display operating mode and error status.

Table 4.2.3-1 Status Lamps Display Operating Mode and Error Status

STATUS lamps	Display	Description
1, 2	Operating Mode	<ul style="list-style-type: none"> <li>• Running mode: 1 and 2 on</li> <li>• Waiting mode: 1 off, 2 on</li> <li>• Others: 1 and 2 off</li> </ul>
3	Security level	Turns on only for security level 2. (*1)
4	Safety control station error (*2)	<ul style="list-style-type: none"> <li>• Error occurred: off</li> <li>• Normal: on</li> </ul>
5, 6, 7	Unused	Always on
8	Writing to flash memories	Writing: off, Otherwise: on

\*1: Security level 0 corresponds to offline level and security levels 1 and 2 correspond to online level.

\*2: This lamp may be linked to the SYS\_DIAG output.