# LLD-ModbusIO-01 Modbus I/O Expandable Control Module (Modbus-RTU) Ver. 1.9

- ☑ **Standard Modbus-RTU communication protocol**
- ☑ **RS-485 remote equipment data transmission communication**
- ☑ **24V DC/AC power supply mode**
- ☑ **Expandable I/O module for various applications**
- ☑ **Provide Relay Output control**
- ☑ **Provide Open Collector Digital Output control**
- ☑ **Provide optically isolated digital input control interface (Isolated DI)**
- ☑ **Provide 12-bit Analog Input control Interface (AI)**
- ☑ **Provide 12-bit Analog Output control interface (AO)**
- ☑ **RS-485 isolation protection (optional)**
- ☑ **Expandable DDC Function**
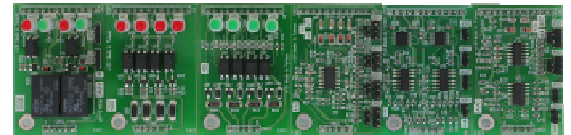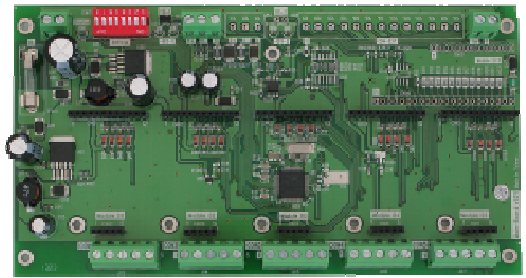
Production introduction

LLD-ModbusIO-01 is a DAM control module with flexibility and high performance-to-price ratio. It has Digital Input/Output and Analog Input/Output common control and acquisition interface for measurement data. The user, depending on application requirements, can select one to five expansion I/O modules (ModIO module series) of different function, providing 20 control points at most. The user can easily obtain the previously mentioned multifunctional combination for control interface; with specific carrier, the control module is commonly seen to be installed on standard guide rail in industrial environment.

☒ Flexible I/O Interface

LLD-ModbusIO-01 provides 5+1 I/O module expansion function. With installation of different modules, the user can obtain different I/O combination, enabling more flexible control and data acquisition functions to meet different requirements.

5 main I/O modules can freely install Digital I/O, Analog I/O and Relay control modules, up to 20 control points.

1 expansion module presently can provide 12 extra Digital Input and Output control points. The interface, allowing to develop other functions in the future, provides LLD-ModbusIO-01 with complete control or communication capability.

☒ Standard Modbus communication interface

LLD-ModbusIO-01 RS-485 Communication Interface provides standard Modbus-RTU communication protocol。 All digital control points could be monitored and controlled by standard coil，all analog signals could be data accessed by standard register。

☒ Dual RS-485 Communication Interface

LLD-ModbusIO-01 provides an optional "2nd RS-485" alternative。Both RS-485 are Modbus-RTU Slave but share same Modbus Address，especially for an additional local host (e.g. HMI) to fulfill with the requirement like the Air-con monitoring and control application.

☒ Diverse Power Configuration

LLD-ModbusIO-01's working voltage could be 24V AC or 24V DC。There is a set of design 15V@200mA DC output in LLD-ModbusIO-01 which is mainly used for power supply of various types of sensors。

The combination characteristics of the 15V DC output and 24V AC input as working voltage can save part of the power converter planning and configuration costs in monitoring system，such as central air conditioning monitoring applications.

☒ Easy Management Tool

LLD-ModbusIO-01 has a simple management tool, window and menu design, easy for setting up LLD-ModbusIO-01. It also provides real time operating status monitoring function, allowing remote monitoring for operating status at each point.
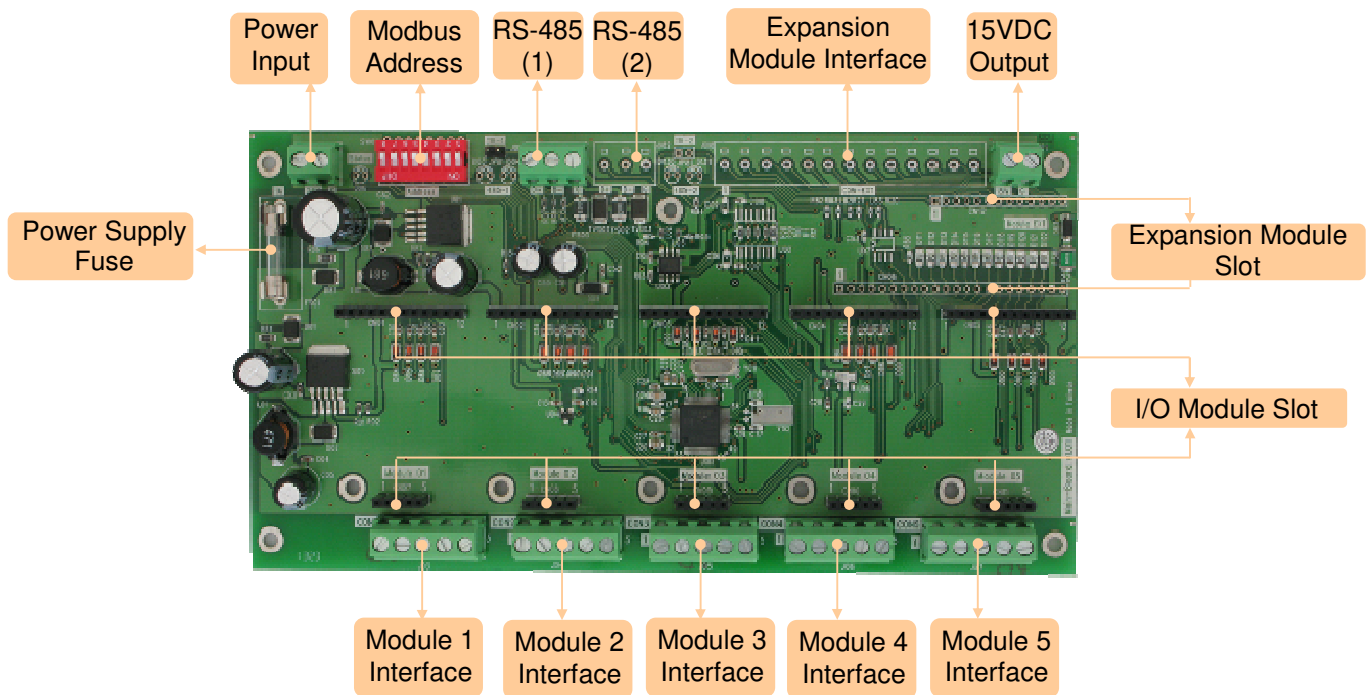
☒ Expandable DDC Function (Direct Digital Control)

LLD-ModbusIo-01 could expand DDC function for input reading、output control、math operations、comparison、time、HVAC、PID…ect. over 50 common functions。 allowing the user to directly develop and debug DDC program with the online menu from the management tool。You can also define an 8-digit password to protect the on-site operating DDC program when you process the upload/download and debug program.

☒ Remote Upgrade Function

The user can monitor computer via the management tool specialized for LLD-ModbusIO-01 and conduct remote software upgrade via RS-485 communication port, which can reduce system operating cost.

LLD-ModbusIO-01 MCU Board
Exterior description

Power Input

Modbus Address

RS-485 (1)

RS-485 (2)

Expansion Module Interface

15VDC Output

Power Supply Fuse

Expansion Module Slot

I/O Module Slot

Module 1 Interface

Module 2 Interface

Module 3 Interface

Module 4 Interface

Module 5 Interface

System Core

▷ MCU：ST STM8L15xR8

▷ Memory：64KB FLASH, 4KB SRAM, 2KB EEPROM

RS-485 Serial Port Interface

▷ Quantity：1 or 2

▷ RS-485 signal：Data+, Data-, GND

▷ Protection：15KV ESD and 400W surge protection, 2KVrms isolation protection **(optional)**

▷ Connector：5.00mm 3-pin terminal block

▷ Baud Rate：4,800 ~ 115,200 bps

▷ Parity：None, Even, Odd

▷ Data Bits：8

▷ Stop Bit：1, 2 bits

IO Module Expansion Slot

▷ Quantity：5

▷ connector A：2.54mm 12-pin pin block

▷ connector B：2.54mm 5-pin pin block

▷ connector C：5.00mm 5-pin terminal block

Reserved Expansion Interface

▷ Quantity：1

▷ Connector A：2.54mm 22-pin pin block

▷ Connector B：2.54mm 13 pin pin block

▷ Connector C：5.00mm 13-pin terminal block

Mechanism

▷ Control board dimensions：200 x 107 x 23 mm

▷ Installed IO module：200 x 107 x 27 mm

▷ Installed IO module and Din-Rail carrier：202 x 121 x 40 mm

Power Supply

▷ Working voltage：24V AC/DC

▷ Power connector：2-pin 5.00mm terminal block

▷ Protection：1A fuse

▷ Power consumption：0.5~10W

Others

▷ LED indicator：power supply, serial port

▷ DIP Switch：MODBUS Slave address

▷ Applicable temperature：0~50℃

▷ Applicable humidity：20%~80% RHG

▷ Certification：CE/FCC

Specified I/O Expansion Module

Common Specifications

▷ Dimension : 35x50mm

▷ Fixation hole : 3.5mm x 1

▷ Pin header A : 2.54mm 12-pin x 1 (connect to carrier MCU)

▷ Pin header B : 2.54mm 5-pin x 1 (connect to carrier exterior connector)

AI/AO Module (ModIO-AIO)
Analog Input / Output Control

▷ AI quantity : 2 points

▷ AO quantity : 2 points

▷ Signal type : 4~20mA / 0-10VDC / NTC (by jumper)

▷ Resolution : 12-bit

▷ Frequency : 10Hz

▷ Protection : OP input/output buffer

▷ Installation limit : 1 (only 1 ModIO-AIO is allowed on each MCU carrier)

AI Module (ModIO-AI)
Analog Input Control

▷ Quantity : 4 points

▷ Signal type : 4~20mA / 0-10VDC / NTC (by jumper)

▷ Resolution : 12-bit

▷ Frequency : 10Hz

▷ Protection : OP input buffer

AO Module (ModIO-AO)
Analog Output control

▷ Quantity : 4 points

▷ Signal type : 4~20mA or 0-10VDC (by jumper)

▷ Resolution : 12-bit

▷ Frequency : 10Hz

▷ Protection : OP output buffer
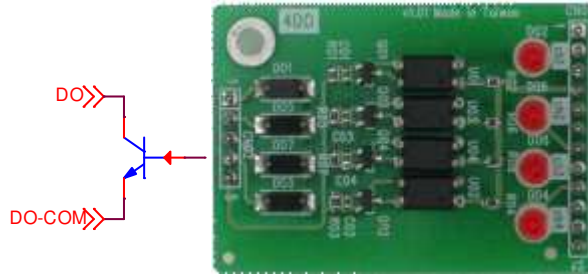
DI Module (ModIO-DI-S)
Digital Input Control

▷ Quantity : 4 points

▷ Mode : wet contact / sink mode

▷ Input voltage range : 5~24VDC

▷ Input protection : 2000Vrms optically isolated protection and 400W surge protection

▷ LED indicator : DI status

DO Module A (ModIO-DO-S)
Digital Output Control

▷ Quantity : 4

▷ Signal type : Open Collector

▷ Load capacity : 5~30 VDC @ 200mA

▷ Signal protection : 2000Vrms optically isolated Protection and 400W surge protection

▷ LED indicator : DO status

## DO Module B (ModIO-Relay)
Relay Output Control

▷ Quantity : 2

▷ Signal type : SPDT relay

　Ch-A : N.O. / COM

　Ch-B : N.O./ N.C. / COM

▷ Control mode : automatic (by S/W) and manual control

▷ Contact capacity : 240VAC@2A / 24VDC@2A

▷ Signal protection : 2000Vrms optically isolated protection

▷ LED indicator : DO status

▷ Manual/ automatic control and status monitoring (by jumper)

Expansion DI Module (ModIO-12DI)
**Digital Input Control (Isolated)**

▷ Quantity : 12

▷ Mode : wet contact / sink mode

▷ Input voltage range : 5~24VDC

▷ Input protection : 2000Vrms optically isolated protection

▷ LED indicator : DI status

▷ Dimensions : 25 x 100mm
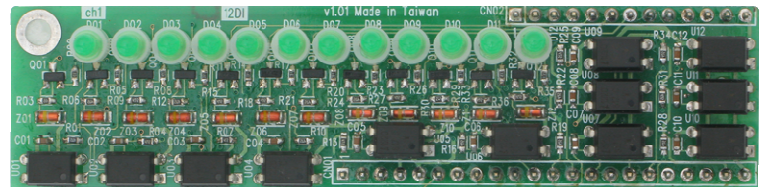
Expansion DO module (ModIO-12DO)
Digital Output control (Isolated)

▷ Quantity : 12

▷ Signal type : Open Collector

▷ Load capacity : 5~30 VDC @ 200mA

▷ Signal protection : 2000Vrms optically isolated protection

▷ LED indicator : DO status

▷ Dimensions : 25 x 106mm
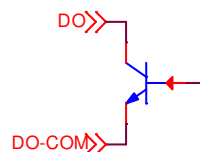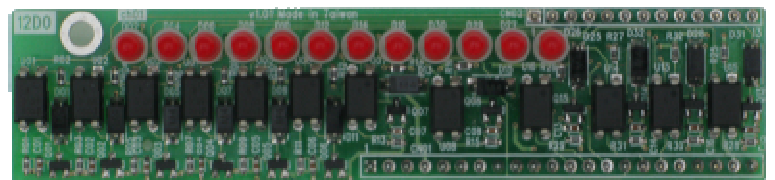
Common Specifications for ModIO-12DI/12DO

▷ Fixation hole : 3.5 mm x 1

▷ Pin header A : 2.54 mm 22-pin x 1 (connect to carrier MCU)

▷ Pin header B : 2.54 mm 13-pin x 1 (connect to the exterior connector of carrier)

LLD-ModbusIO-01 Software Specifications

Basic functions

▷ Support Modbus RTU communication control protocol

▷ Firmware online update function to simplify firmware modification procedure.

Management Tool Functions

▷ Set installed expansion module type

▷ Instant display for Analog Input expansion module input numerical data for each control point

▷ Instant make Analog Output expansion module output numerical data control for each point

▷ Instant display for Digital Input expansion module input status for each control point

▷ Instant make Digital Output expansion module control for each point

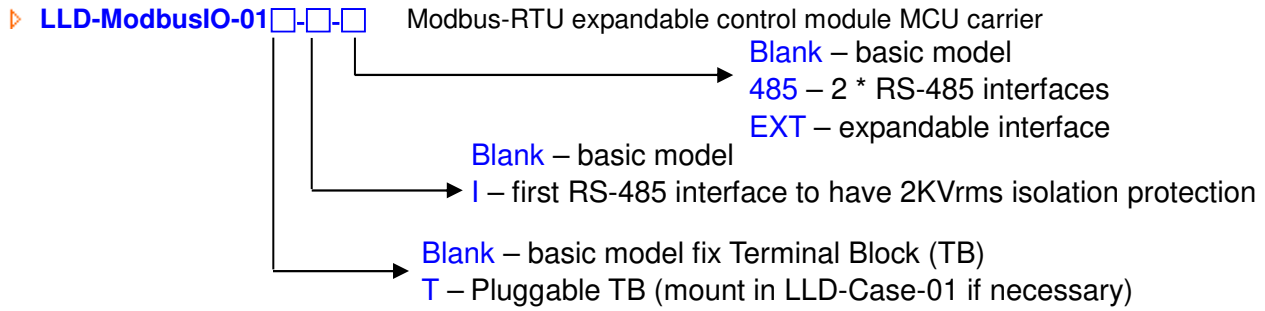▷ RS-485 communication interface basic parameter setup (menu type)
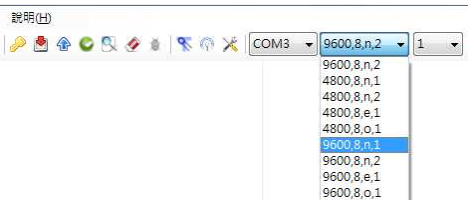
▷ Firmware update function allows online update for firmware at specified address.

▷ Reference screen for management tool

LLD-ModbusIO-01 Product Model Number

Function Carrier

▷ **LLD-ModbusIO-01☐-☐-☐**   Modbus-RTU expandable control module MCU carrier

Blank – basic model
485 – 2 * RS-485 interfaces
EXT – expandable interface

Blank – basic model
I – first RS-485 interface to have 2KVrms isolation protection

Blank – basic model fix Terminal Block (TB)
T – Pluggable TB (mount in LLD-Case-01 if necessary)

Expandable module

▷ **ModIO-AI**
   4-ch 12bit 4~20mA/0~10VDC   Analog Input module

▷ **ModIO-AO**
   4-ch 12bit 4~20mA/0~10VDC   Analog Output module

▷ **ModIO-AIO**
   2+2 12bit 4~20mA/0~10VDC   Analog Input / Analog Output module

▷ **ModIO-DI-S**
   4-ch 5~24VDC isolation & surge protection Digital Input module

▷ **ModIO-DO-S**
   4-ch 5~30VDC isolation & surge protection Open Collector Output module

▷ **ModIO-Relay**
   2-ch 2A DC/AC Relay Output module

▷ **ModIO-12DI**
   12-ch 5~24VDC isolation protection Digital Input module

▷ **ModIO-12DO**
   12-ch 5~30VDC isolation protection Open Collector Output module
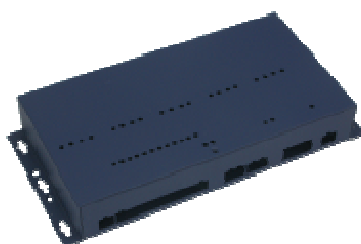
Accessories

▷ **LLD-DDC8**   LLD-ModbusIo-01 DDC SW License
▷ **LLD-CR-01**   Din-Rail carrier used by LLD-ModbusIO-01
▷ **LLD-Case-01**   Iron casing designated for LLD-ModbusIO-01 (no prints and tag)   Note: MoQ required

Figures
LLD-CR-01

I/O module installation
(MCU carrier + I/O module + Din-Rail carrier)

LLD-Case-01