

LC-103H User Manual

Warranty

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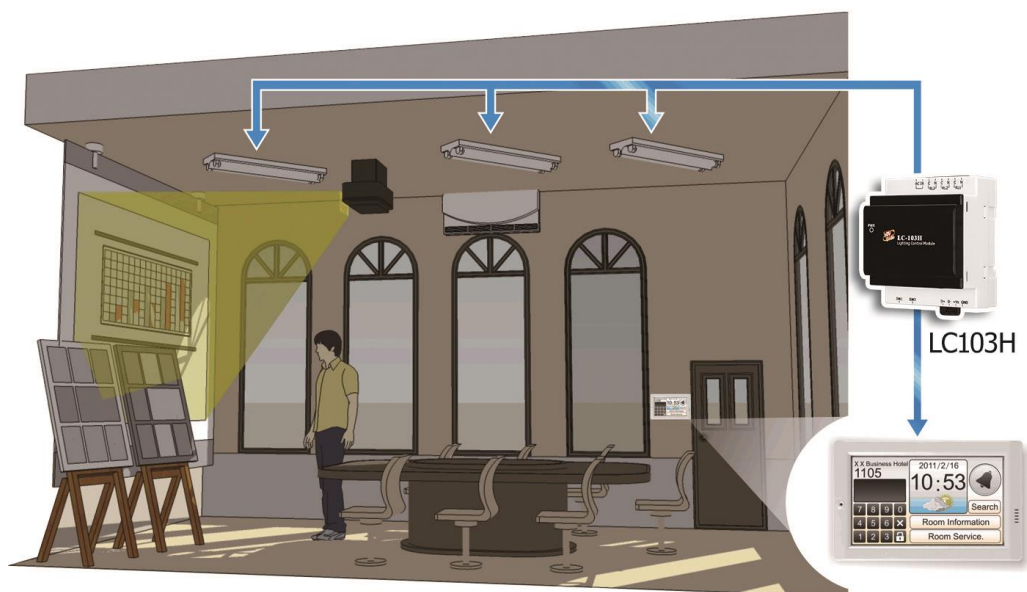
Introduction

The LC-103H is an easy-to-use lighting control module that requires no specialist skills to install and operate, and no software is needed in order to control the DO channels.

The LC-103H provides 1 channel for digital input (photo couple isolation) and 3 channels for relay output. All output channels are form A type relays, while the input channel is based on a sink-type using a wire connection. The input channel can directly control a 3-channel relay ON and OFF sequence without requiring a remote host controller. 4 kV ESD protection and 5000 Vrms intra-module isolation are also provided.

When required, communication with the LC-103H is programmable based on the DCON & Modbus RTU protocol, and an added benefit is that different addresses can be set for DCON & Modbus RTU communication via hardware configuration.

1 Applications



2 Hardware Information

2.1 IO Specifications

Digital Input	
Input Channels	1
Type	90~240VAC
On Voltage Level	65 VAC
Off Voltage Level	56 VAC
Input Impedance	68 K Ω , 1 W
Isolation	5000 Vrms
Function	Local and Remote Direct Control Relay ON/OFF and Remote Status Monitoring
Relay Output	
Output Channels	3
Type	Power Relay, Form A (SPST N.O.)
Operating Voltage	250 VAC or 30 VDC
Max. Load Current	16 A (Res. Load) (1).250 VAC (Recommend Working Current 1.5A)
Operating Time	10 ms Max.
Release Time	5 ms Max.
Electrical Life	100,000 ops

(Resistive load)	
Mechanical Life	5,000,000 ops at no load (300 ops/minute)
Application Specification	(1).Incandescent Lamp: 40W/ 220VAC * 8 Sets (2).LED(Electronic ballast): 40W/ 220VAC * 10 Sets
Safety Approval	UL/CUL, TÜV
Power-on Value	No
Safe Value	No

2.2 System Specifications

Communication	
Interface	RS-485
Format	N,8,1
Baud Rate	9600 bps
Protocol	DCON & Modbus RTU
Node Addresses	1~31
Connector	DINKLE-0177-5104
LED Indicators	
Power	1 LED as Power Indicator
EMS Protection	
ESD (IEC 61000-4-2)	±4 kV Contact for Each Terminal
	±4 kV Air for Random Point
EFT (IEC 61000-4-4)	±2 kV for Power
SURGE(IEC 61000-4-5)	±2 kV for Power
Power Requirements	
Input Voltage Range	10 ~ 30 VDC
Consumption	1.5 W Max.
Connector	DINKLE-0177-5104
Mechanical	
Dimensions (W x L x H)	72 mm x 100 mm x 59 mm
Installation	DIN Rail Mounting
Environment	
Operating Temperature	-25°C ~ +75°C
Storage Temperature	-30°C ~ +75°C
Humidity	10 ~ 95% RH, Non-condensing

2.3 Pin Assignments

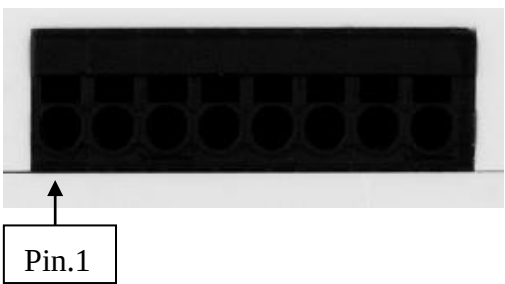


2.3.1 CN1 Connector



No.	Pin	Function
1	GND	Ground
2	VSS	Power Supply
3	D-	RS-485 Data-
4	D+	RS-485 Data+

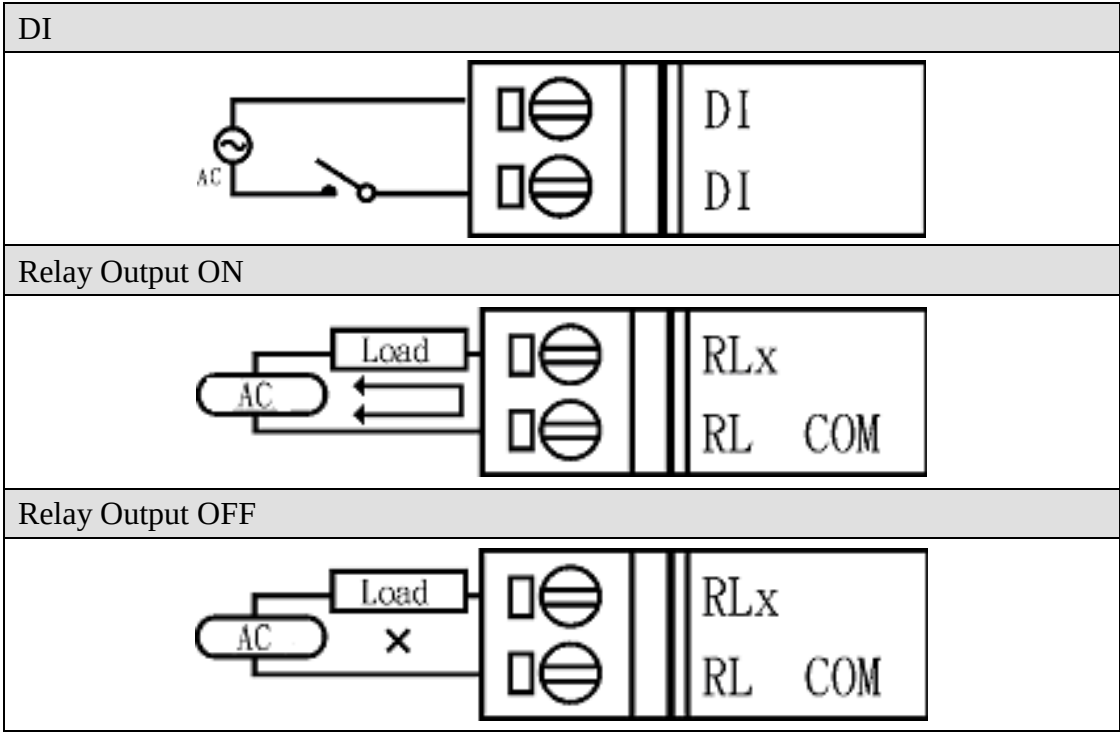
2.3.2 CN2 Connector



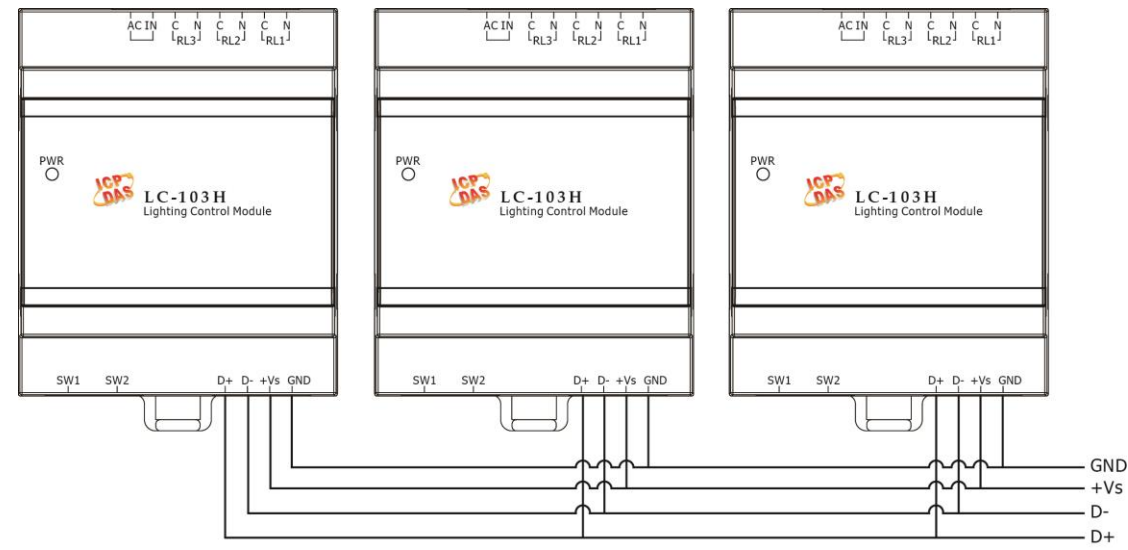
No.	Pin	Function
1	RL.N	DO1 RL1 Relay Output
2	RL.C	
3	RL.N	DO2 RL2 Relay Output
4	RL.C	
5	RL.N	DO3 RL3 Relay Output
6	RL.C	
7	AC_IN	DI Wet Contact Input Channel
8	AC_IN	

2.4 Wire Connections

DIO Wire Connections



2.4.1 Power and communication

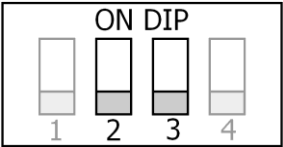
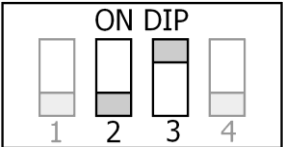


2.5 DIP Switch and Jumper Settings

2.5.1 Configuration(SW2)

SW2  A red DIP switch with four positions labeled 1, 2, 3, and 4. The word "ON" is printed above the switches. All four switches are currently in the "ON" position.	1	Protocol	ON	DCON
			OFF	Modbus RTU
	2	Configuration	ON	By Software
			OFF	By Hardware
	3	Address	ON	Added by 16
			OFF	Added by 0
	4	INIT mode	ON	INIT
			OFF	Normal

2.5.2 Address Settings via Hardware Configuration(SW1)

SW1  A black rotary switch with a white knob. The knob is currently pointing to the letter 'A'. The letters A through F are visible around the knob, along with some numbers.	 A diagram of a 4-position DIP switch labeled 1, 2, 3, and 4. The word "ON DIP" is above it. Switch 1 is up, 2 is down, 3 is down, and 4 is up.	0 ~ F for Addresses 0 ~ 15 (Low Node Address)
	 A diagram of a 4-position DIP switch labeled 1, 2, 3, and 4. The word "ON DIP" is above it. Switch 1 is up, 2 is down, 3 is up, and 4 is up.	0 ~ F for Addresses 16 ~ 31 (High Node Address)

3 Modbus RTU Protocol

The Modbus protocol was originally developed for Modicon controllers by Modicon Inc. Detailed information can be found at <http://www.modicon.com/techpubs/toc7.html>. Visit

<http://www.modbus.org> to find more valuable information.

The LC-103H module supports the Modbus RTU protocol. The communication Baud Rate is 9600bps, and the parity, data bits and stop bits are fixed as no parity, 8 data bits and 1 stop bit.

The following Modbus functions are supported.

Code	Description	Address
0x01	Read coils status	0xxxx
0x02	Read discrete inputs	1xxxx
0x03	Read multiple registers	4xxxx
0x04	Read multiple input registers	3xxxx
0x05	Write to a single coils	0xxxx
0x06	Write to a single register	4xxxx
0x0F	Write to multiple coils	0xxxx
0x10	Write to multiple registers	4xxxx

If the function specified in the message is not supported, then the module responds as follows.

Error Response

00	Address	1 Byte	1 ~ 247
01	Function code	1 Byte	Function code + 0x80
02	Exception code	1 Byte	01

If a CRC mismatch occurs, the module will not respond.

3.1 LC-103H Modbus Address Mappings (Base 1)

Address	Description	Attribute
40481	Firmware version (low word)	R
40482	Firmware version (high word)	R
40483	Module name (low word)	R
40484	Module name (high word)	R
40485	RS-485 module address, 1 to 247	R/W
40486	RS-485 baud rate and parity settings Bits 5:0 Baud rate, valid range: 3 ~ 10 Bits 7:6 00: no parity, 1 stop bit 01: no parity, 2 stop bit 10: even parity, 1 stop bit 11: odd parity , 1 stop bit	R/W
00001	Digital output channel 0	R/W
00002	Digital output channel 1	R/W
00003	Digital output channel 2	R/W
00033	Digital input status of channel 0	R
10001	Digital input status of channel 0	R
00257	Protocol, 0: DCON, 1: Modbus RTU	R/W
00273 10273	Reset status, 1: first read after powered on, 0: not the first read after powered on	R

3.2 LC-103H DCON Command Sets

Command	Description
\$AA2	read configuration
\$AA5	read reset status !AA1 first after power on, !AA0 others
\$AA6	Read the digital output and input status response > 0I0O, where O is digital output and I is digital input
\$AAF	read firmware version
\$AAM	read module name
\$AAP	Read Modbus RTU/DCON protocol response: !AA0 -> DCON !AA1 -> Modbus RTU
\$AAPN	Set Modbus RTU/DCON protocol N-> 0: DCON, 1: Modbus RTU
#AA000h	Set the digital output values, h is a hexadecimal value, where bit 0 corresponds to DO0 and bit 1 corresponds to DO1, etc.
#AA0A0h	Set the digital output values, h is a hexadecimal value, where bit 0 corresponds to DO0 and bit 1 corresponds to DO1, etc.
#AA1c0b	Set a single digital output channel, c specifies the channel 0, 1 or 2, b is 0 for off and 1 for on.
#AAAc0b	Set a single digital output channel, c specifies the channel 0, 1 or 2, b is 0 for off and 1 for on.
%AANNTTCCFF	set configuration, NN: new address, CC: new baud rate FF: new data format
@AA	read the status of digital output and input channels response >0I0O, O is digital output status and I is digital input status
@AAh	set digital output values, h is a hexadecimal value, where bit 0 corresponds to DO0 and bit 1 corresponds to DO1, etc.

Baud Rate Settings (CC)

Code	03	04	05	06	07	08	09	0A
Baud Rate	1200	2400	4800	9600	19200	38400	57600	115200

Data Format Settings (FF)

7	6	5	4	3	2	1	0
CU	CS	Reserved					

Key	Description
CS	Checksum Settings 0: Disabled 1: Enabled
CU	Counter Update: 0: The counter is updated when there is a falling edge in the input signal. 1: The counter is updated when there is a rising edge in the input signal.

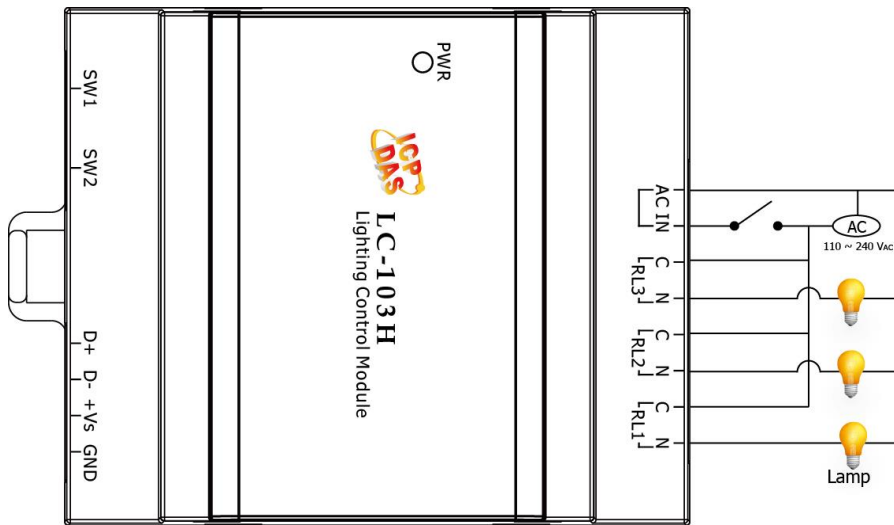
Note: All Reserved bits should be zero.

DIP Switch setting

1	Protocol	ON: DCON, OFF: Modbus RTU
2	Configuration	ON: by software, OFF: by hardware
3	Address	ON: added by 16, OFF: added by 0
4	INIT mode	ON: INIT, OFF: Normal

Base address: 0 (0x0)

4 Function Descriptions



The LC-103H has a single AC input that can be used to connect a lighting control switch and three relay outputs that can be used to connect the lighting, lamp or AC LED lighting etc. Please refer to the above diagram for detailed wire connection information. The input channel of the LC-103H can directly control its 3-channel relay ON and OFF sequence without requiring a remote host controller, so it's very easy to test any lighting circuits for incomplete applications.

If an application requires software control, such as building automation or scenario control, etc., communication with the LC-103H is programmable based on the DCON & Modbus RTU protocol.