Modbus I/O Module | LN820MOD-ATL

PRODUCT SPECIFICATION

FEATURE LIST

- Power Supply: $24V_{AC}$ or $24V_{DC}$
- Modbus RTU RS-485 communication with 1 jumper setting for end-of-line and 2 jumper settings for bias
- DIP switch digit 8 selects baud rate 9600/19200 bps. Auto-search feature removed.
- DIP switch selects 0-127 slave address for Modbus
- All parameters can be monitored and adjusted through Modbus
- Designed for Din-rail installation
- Unpluggable Terminal Blocks

Electrical Interface

Function	Label	Description
Power Supply	24V	$24V_{AC}$ or $24V_{DC}$
	COM	
Analog Output	AO	0 ~$10V_{DC}$ / 4 ~ 20mA
	COM	
R-type Analog Input	AI-R	2 types of sensor characteristic (@) AI-to-COM ratio, 1:1
	COM	
V-type Analog input	AI-V	0 ~$10V_{DC}$ AI-to-COM ratio, 1:1
	COM	
Modbus connection	D+	RS485 interface
	D-	
	Com	
Digital Input	DI1	Sinking (#) DI-to-COM ratio, 1:1
	DI2	
	DI(n)	
	COM	
Digital Output	DO1	$230V_{AC}$ 2A (or $30V_{DC}$ 2A) (^) dry contact individually isolated
	DO2	
	DO(n)	

(#) input signals share the same power and ground with power supply. Refer to Figure 9 on Page 7

(^) primary function – to drive contactors. Refer to Figure 8 on Page 6

(@) AI-R accommodates 2 types of external temperature sensor. See Table 2 and 3 on Page 10.

Dimensions

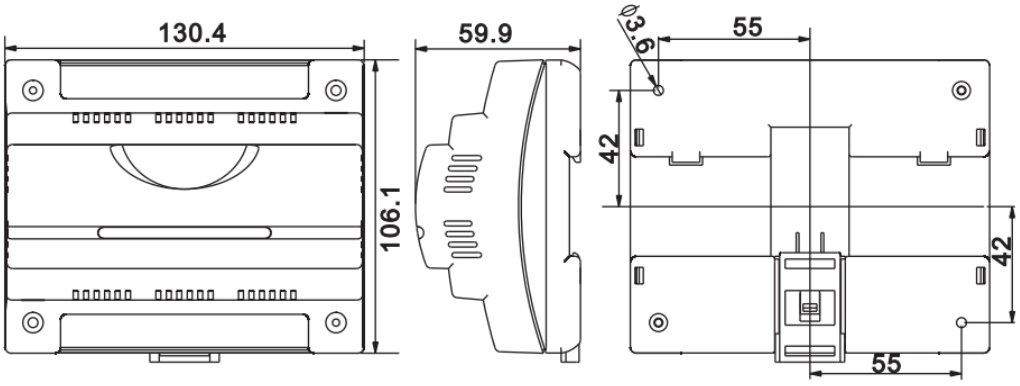


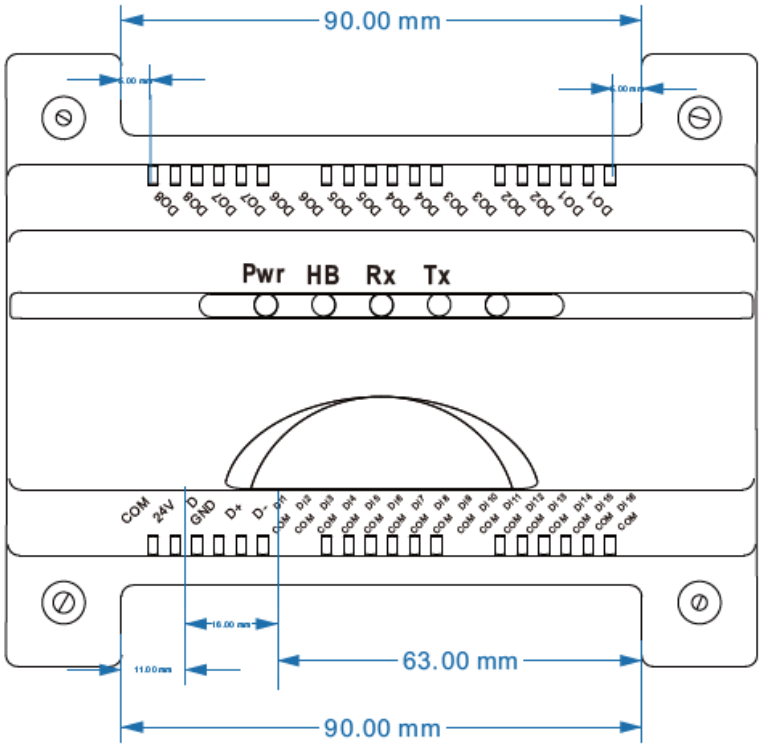
Figure 1 – Outline of LN820MOD-ATL

Versions of LN820MOD-ATL

	AI-R	AI-V	AO	DI	DO
I/O 1	**0**	**0**	**0**	**16**	**8**
I/O 2	**0**	**0**	**0**	**16**	**0**
I/O 8	**1**	**1**	**1**	**8**	**4**
I/O 9	**1**	**0**	**1**	**4**	**2**

Table 1 – I/O Module configuration

Silkscreen printing on I/O 1 and I/O 2



Terminal Diagram of I/O #1

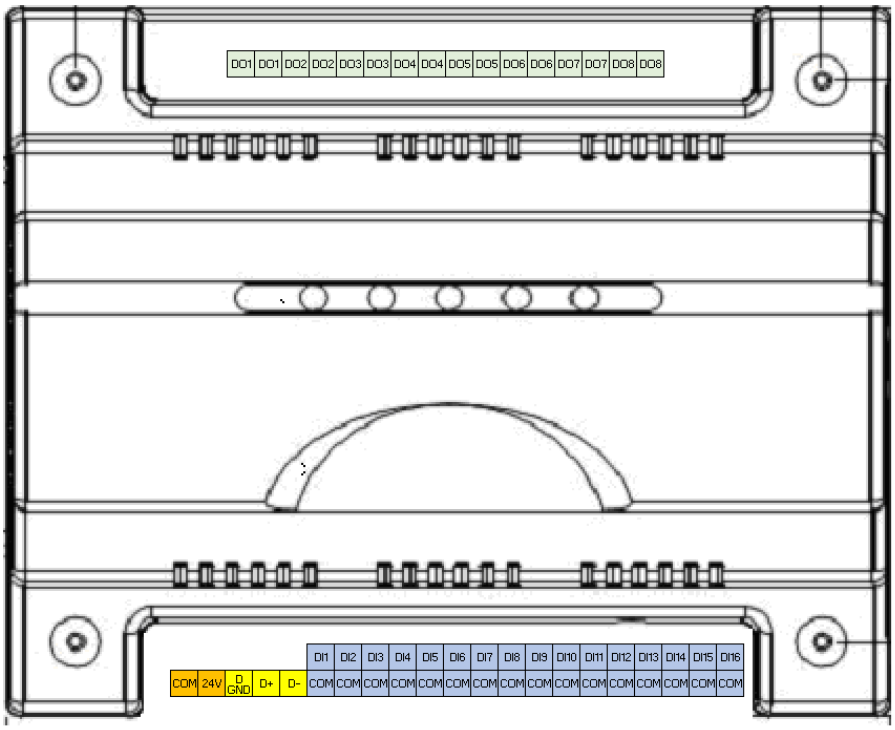


Figure 2a – terminal arrangement in I/O#1

Terminal Diagram of I/O #2

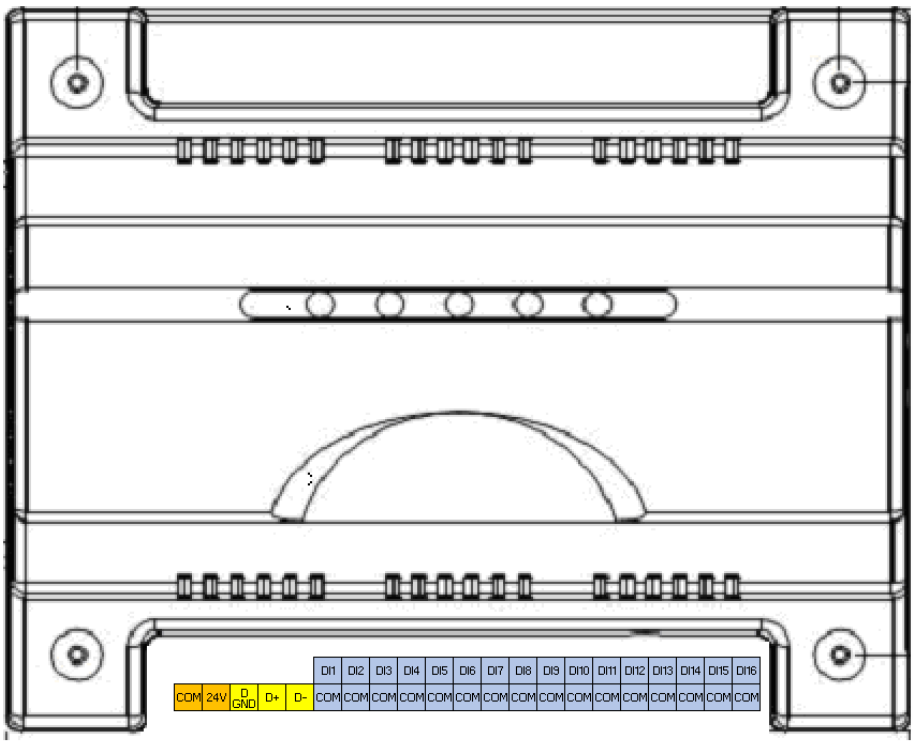


Figure 2b – terminal arrangement in I/O#2

Terminal Diagram of I/O #8

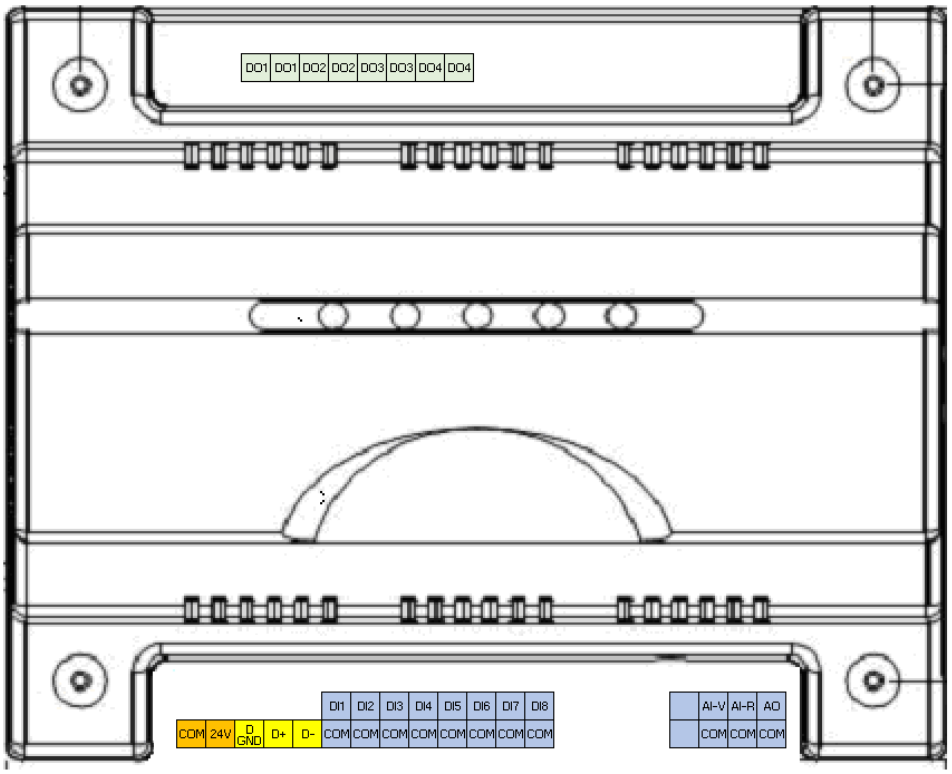


Figure 2c – terminal arrangement in I/O#8

Terminal Diagram of I/O #9

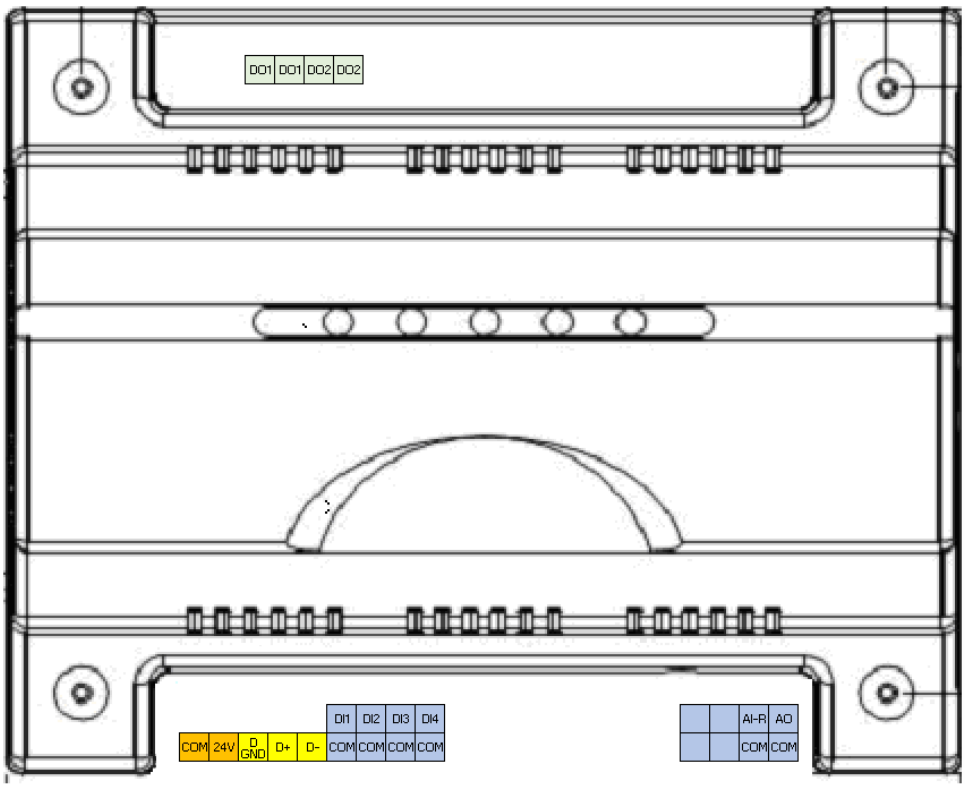


Figure 2d – terminal arrangement in I/O#9

Terminal Blocks

(I) Pluggable, screwless, stacked Vertical Terminal Blocks for DI, AI and AO

Figure 3a – TLPHDC-010V-08P-G12

Figure 3b – TLPSD-010-08P-G12

(II) Pluggable and screwless Vertical Terminal Blocks for D+, D- and D_GND

Figure 4a – TLPH-200V-1112-03P-G12

Figure 4b – TLPS-201V-03P-G12

(III) Pluggable and screwless Vertical Terminal Blocks for $24V_{AC}$ and COM

Figure 5a – TLPH-200V-1112-02P-K (**black** in delivery)

Figure 5b – TLPS-201V-02P-K (**black** in delivery)

(IV) Pluggable with screws, Horizontal Terminal Blocks for DO

Figure 6a – TLPH-200R-1112-02P-G12

Figure 6b – TLPS-207-02P-G12

RS-485 Jumper Setting

Provides flexibility in biasing and end-of-line configuration.

Open the cabinet of LN820MOD-ATL to access the circuitry.

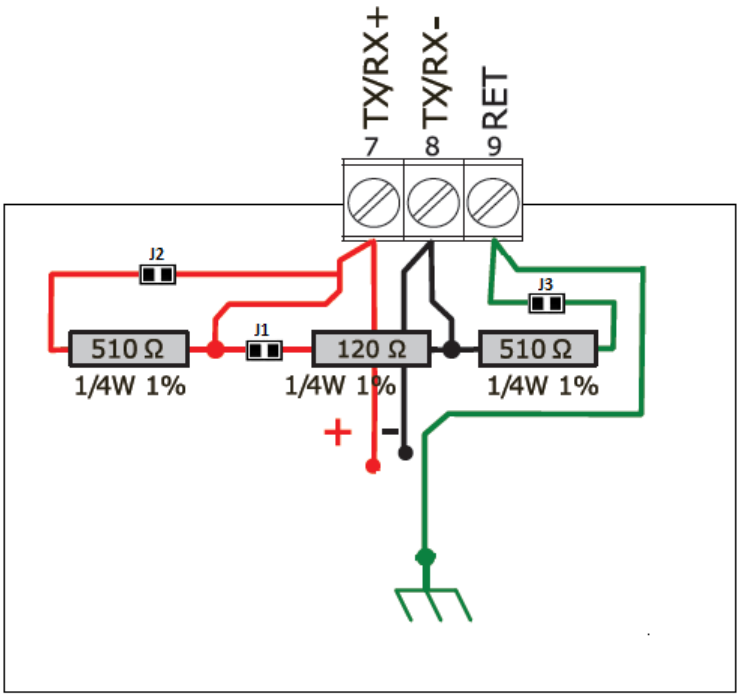


Figure 7 – RS-485 Jumpers. J1 for End of Line (EOL), J2 and J3 for Bias

Digital Output

Provides voltage-free contact for 230V_{AC} 2A or 30V_{DC} 2A.

e.g. power supply at 24V_{DC}, DO drives relay (coil) and the contact allows a maximum of 230V, 2A.

Figure below shows current comes in through **inA** and out to **outA** when contact closes.

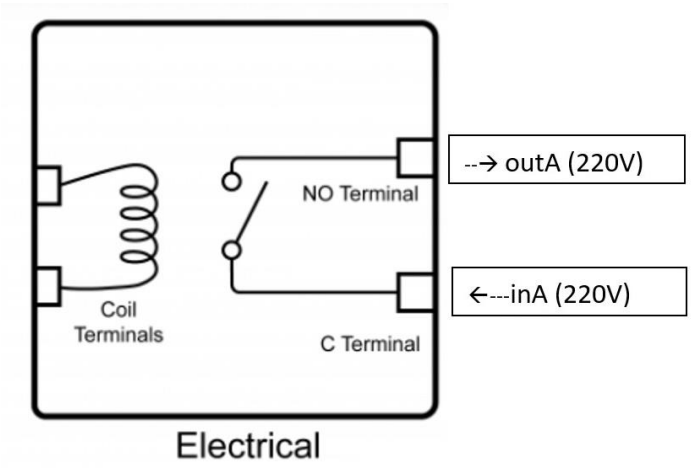
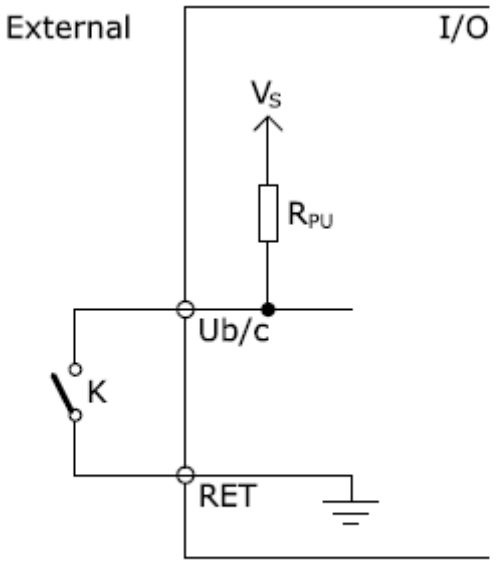


Figure 8 – illustration of DO in action

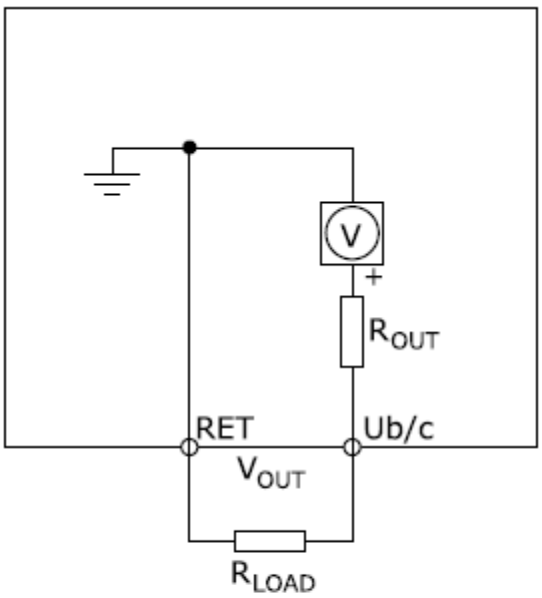
Digital Input



K is the monitored external switch.

Figure 9 – DI Circuit

Analog Output

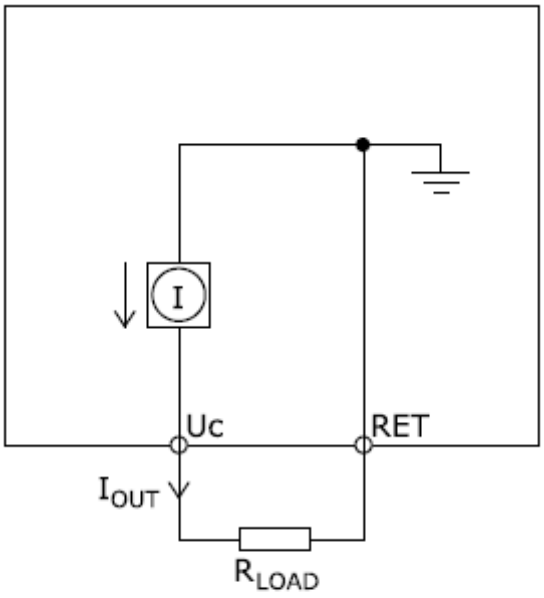


R_{OUT} is approximately equal to 10 ohm.

V_{OUT} range is 0 to 10 VDC.

R_{LOAD} minimum is 5 kohm.

Figure 10 – AO Circuit for Voltage

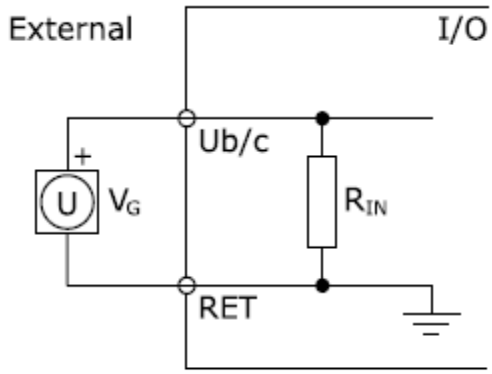


I_{OUT} range is 0 to 20 mA.

R_{LOAD} maximum is 650 ohm.

Figure 11 – AO Circuit for current

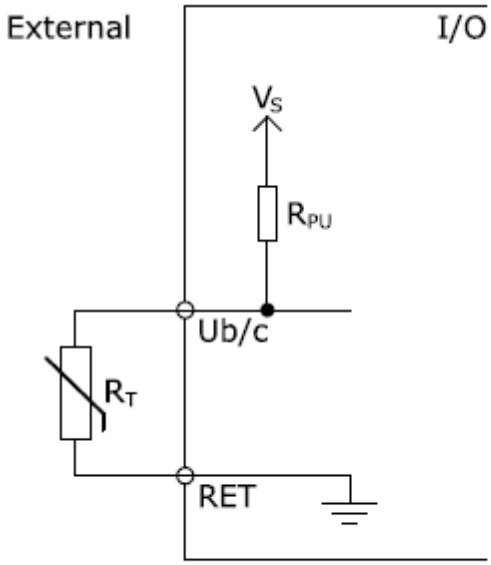
Analog Input



V_G is the monitored external voltage (0 to 10 VDC).

R_{IN} = 100 kohm

Figure 12 – AI Circuit for Voltage source



R_T is the monitored external thermistor.

Figure 13 – AI Circuit for resistive source

Modbus Address / Baud Rate

Figure 14 – Graphical representation of DIP switches on the side of LN820MOD-ATL

Switch to “ON” for “1”. For the other direction, “0”

Digits 1-7 are for Modbus Address

Digit 8 is for Baud Rate.

E.g Dip switch 1, 3, 5 set to “ON”, MAC address is 21 (sum of 1,4 and 16)

Mac Address is limited to 1 – 127. Any other value (include “0”) will be treated as “1”.

When Digit 8 is set to “0”, the baud rate is 9600.

When Digit 8 is set to “1”, the baud rate is 19200.

LN820 reads the dipswitch every 10 seconds so the updated setting (modbus address and baud rate) goes into effect after a maximum of 10 seconds.

LED Indication

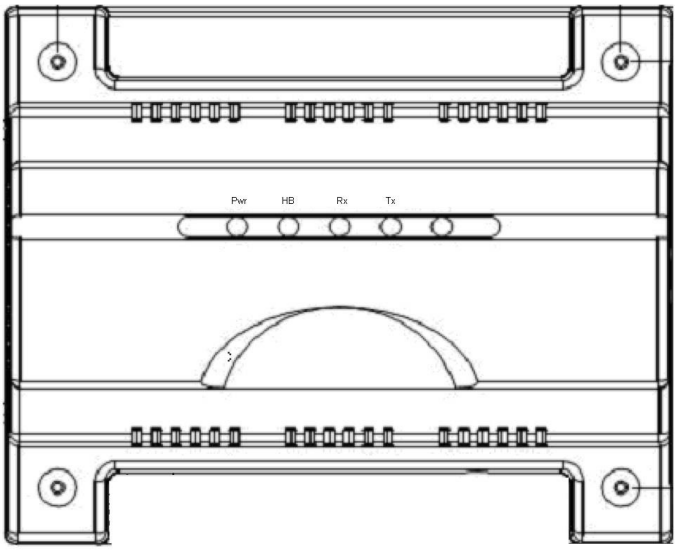


Figure 15 – LED and terminal labelling

Pwr LED: turns solid red when 24Vac/24Vdc is supplied

HB LED: flashes every half a second when controller enters working mode

Rx LED: flashes once when a packet (correct address) is received from the network

Tx LED: flashes once when controller replies a packet

Thermistor Characteristic

Temp	Ohm	Temp	Ohm
0.56	7418	21.67	5338
1.67	7319	22.78	5225
2.78	7218	23.89	5112
3.89	7116	25	5000
5	7012	26.11	4889
6.11	6906	27.22	4778
7.22	6799	28.33	4668
8.33	6691	29.44	4559
9.44	6582	30.56	4450
10.56	6470	31.67	4344
11.67	6359	32.78	4238
12.78	6247	33.89	4134
13.89	6135	35	4031
15	6022	36.11	3930
16.11	5908	37.22	3830
17.22	5794	38.33	3732
18.33	5681	39.44	3635
19.44	5567	40.56	3540
20.56	5452		

Table 2 – Type I thermistor characteristic

Temp	Ohm
0	7660
5	7182
10	6666
15	6125
20	5573
30	4492
35	3986
40	3517

Table 3 – Type II thermistor characteristic

ModBus Map

RS-485 Modbus RTU: Data – 8bit, Stop bit – 1, None parity, Baud rate: 9600/19200, Device: 1-127

Register Address	Parameter Description	Data Type	Value	Range
Function code 04 Read Input Registers				
0001	DI#1 ~ DI#16	Signed 16	0~65536	MSB (Most Significant Bit) refers to DI#16, LSB (Least Significant Bit) refers to DI#1
0002	AI#1(^1)	Signed 16	0-65535	Temperature value that according to table 2/3 and value of function 03 register 0004
0003	AI#2(^2)	Signed 16	0-65535	AI#2 value (i.e. 0-10 volt) multiply by function 03 register 0005 and divided by 10 (e.g. if AI#2=2, Func 03 R0005=50 Value = 2*50 = 100)
Function code 03 Read Holding Registers / 06 Write Holding Registers				
0001	DO#1 ~ DO#8 (^3)	Signed 16	0~255	MSB (Most Significant Bit) refers to DO#8, LSB (Least Significant Bit) refers to DO#1
0002	AO#1_Type(^1)	Bit	0/1	0 cor. V / 1 cor. A
0003	AO#1_cor(^1)	Signed 16	0~100	0~100% cor. 0~10_{DC} / 4~20mA
0004	AI#1 R_Type(^1)	Bit	0/1	0 = Type 1 Thermistor 1 = Type 2 Thermistor
0005	AI#2 V_Scale(^2)	Signed 16	0~6553	0~6553
Function code 02 Read Discrete Inputs				
0001	DI#1	Bit	0/1	Low/High
0002	DI#2	Bit	0/1	Low/High
0003	DI#3	Bit	0/1	Low/High
0004	DI#4	Bit	0/1	Low/High
0005	DI#5	Bit	0/1	Low/High
0006	DI#6	Bit	0/1	Low/High
0007	DI#7	Bit	0/1	Low/High
0008	DI#8	Bit	0/1	Low/High
0009	DI#9	Bit	0/1	Low/High
0010	DI#10	Bit	0/1	Low/High

0011	DI#11	Bit	0/1	Low/High
0012	DI#12	Bit	0/1	Low/High
0013	DI#13	Bit	0/1	Low/High
0014	DI#14	Bit	0/1	Low/High
0015	DI#15	Bit	0/1	Low/High
0016	DI#16	Bit	0/1	Low/High
Function code 01 Read Coils / 05 Write Single Coil (^[3])				
0001	DO#1	Bit	0/1	OFF/ON
0002	DO#2	Bit	0/1	OFF/ON
0003	DO#3	Bit	0/1	OFF/ON
0004	DO#4	Bit	0/1	OFF/ON
0005	DO#5	Bit	0/1	OFF/ON
0006	DO#6	Bit	0/1	OFF/ON
0007	DO#7	Bit	0/1	OFF/ON
0008	DO#8	Bit	0/1	OFF/ON

(^[1]) available only for LN820MOD-ATL 8/9

(^[2]) available only for LN820MOD-ATL 8

(^[3]) available only for LN820MOD-ATL 1/8/9

OPERATING SPECIFICATIONS

- Supply Voltage: $24V_{AC}$+/-15% or $24V_{DC}$ +/-15%
- Power Consumption: (TBA)
- Operating Temperature: 0 – 50 ºC
- Storage Temperature: -10 – 60 ºC
- Operating Humidity Range: 5 – 95 %RH non-condensing
- Terminal Block: 26-14 AWG wire