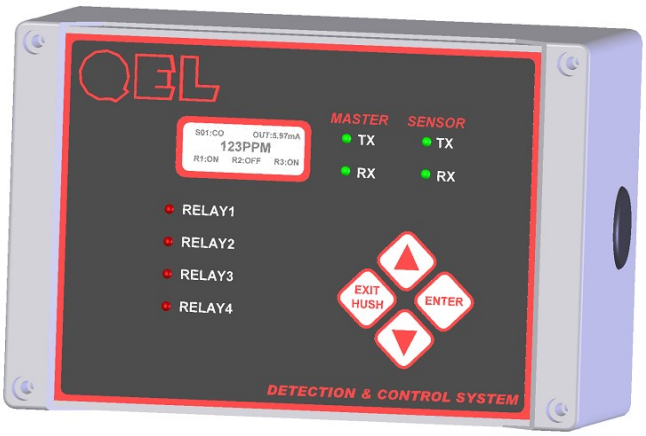
Q4 Controller

Modbus RTU Protocol



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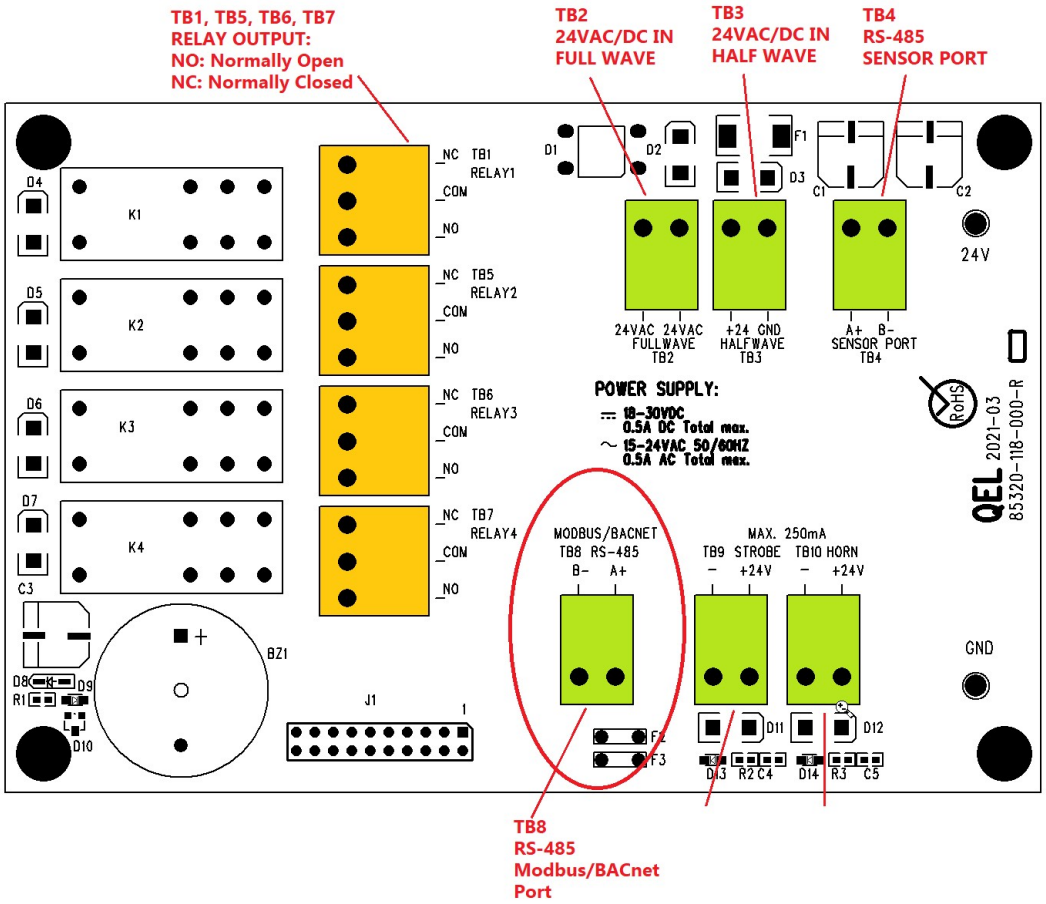
1 MODBUS Protocol Supported by Q4-Controller

1.1 Serial Transmission Mode

- Modbus RTU Slave Mode
- Baud rate: 19.2K, 28.8K, 38.4K, and 57.6K, selectable from Modbus Baud Rate in System Setting Menu.
- Byte parity: no parity (default), Even, Odd
- Data format: One start bit, 8 data bit, no parity bit, one stop bit, LSB first.
- Frame Check: CRC check.



1.2 Function Code Supported by Q4 Controller

- **#03 Read Holding Registers**

Function in Q4 Controller: Read inputs and outputs statuses and readings, such as

- Relay Statuses
- Digital Sensor readings and statuses
- Buzzers and Strobe statuses

Attribute: Read Only.
Broadcast is not supported.

Query:

Slave Address:	xx (Default 03, check Slave address in Q4 Controller)
Function code:	03
Starting addr. Hi:	000
Starting addr. Lo:	xxx (00 to 122)
No. of points Hi:	000
No. of points Lo:	xxx (01 to 123)
CRC check:	xxxxH

Example: to read all holding registers in Q4 Controller (Slave Address: 214)
Query: [214] [003] [000] [000] [000] [123] [023] [206] in unsigned decimal.

Holding Register Address Table

Modbus	Name	Description
40001	Relay1 and Relay 2 Statuses	Relay1 status in High 8 bits, Relay 2 status in Low 8 bits Status Byte Definition: 0: Normal 1: Sensor Alarm 2: Communication Error 3: Offline 4: Sensor Gas type Error 5: Relay/Buzzer/Strobe in On Delay process 6: Relay/Buzzer/Strobe in Off Delay process 7: Relay in Latched Status 8: Relay/Buzzer/Strobe On 9: Relay/Buzzer/Strobe Off 10: Relay/Buzzer/Strobe in On Delay process (same as 5) 11: Relay/Buzzer/Strobe in Off Delay process (same as 6) 12: No Sensor is assigned to Relay/Buzzer/Strobe 13: Buzzer or Buzzer Style Relay is hushed 14: Sensor Fault 15 or 22: Override ON 17 or 23: Override OFF 128: Disabled
40002	Relay3 and Relay4 Statuses	Relay3 status in High 8 bits, Relay 4 status in Low 8 bits Status Byte Definition see 40001
40003 to 40054		
40055	Buzzer1 and Buzzer2 Statuses	Buzzer1 status in High 8 bits, Buzzer2 status in Low 8 bits Status Byte Definition see 40001
40056	Buzzer3 and Strobe Statuses	Buzzer3 status in High 8 bits, Strobe status in Low 8 bits Status Byte Definition see 40001
40057		
40058		
40059	Digital Sensor 0-3 Relay Statuses	Usually, Each Digital Sensor has two Relays onboard: • Relay High (H) and Relay Low (L) bit(1): ON, bit(0): OFF b15…b8= Sensor 3H,3L,2H,2L,1H,1L,0H,0L b7…b0= n/a
40060		
40061		
40062		
40063	Digital Sensor 0 and Sensor 1 Statuses	Sensor 0 in High 8 bits, Sensor 1 in Low 8 bits Byte Status Definition: b7, b3 … b0 is Sensor Status, Status Definition see 40001, b6, b5, b4 is Decimal Position for its Reading in 40083

		example: b6, b5, b4 = 000, The actual reading is Reading in 40083 b6, b5, b4 = 001, The actual reading is Reading / 10 b6, b5, b4 = 010, The actual reading is Reading / 100 b6, b5, b4 = 011, The actual reading is Reading / 1000
40064	Digital Sensor 2 and Sensor 3 Statuses	Sensor 2 in High 8 bits, Sensor 3 in Low 8 bits Byte Status Definition: b7, b3 … b0 is Sensor Status, Status Definition see 40001, b6, b5, b4 is Decimal Position for its Reading in 40083 example: b6, b5, b4 = 000, The actual reading is Reading in 40083 b6, b5, b4 = 001, The actual reading is Reading / 10 b6, b5, b4 = 010, The actual reading is Reading / 100 b6, b5, b4 = 011, The actual reading is Reading / 1000
40065 to 40082		
40083	Digital Sensor 0 Gas Reading without Decimal	The Gas Reading is 16 bits signed integer. The Actual Reading of the sensor should be divided by its Decimal Position, see 40063
40084 to 40086	Digital Sensor1-3 Gas Reading without Decimal	Same as Definition in 40083
40087 to 40122		

40123	Q4 Controller Self Diagnostics Report	Fault Flag Reg. b0 = 0, normal b1 = 0, normal b2 = 1, polling remote sensors fault b2 = 0, normal b3 = 1, remote sensor has fault b3 = 0, normal b4 = 0, normal b5 = 1, no sensor assigned to a buzzer b5 = 0, normal b6 = 1, no sensor assigned to the strobe b6 = 0, normal b7 = 1, no sensor assigned to relays b7 = 0, normal b8 … b15 reserved

- #17(11H) Report Slave ID

Function in Q4 Controller:

Return a description of the type of controller present at the slave address with its specification.

Broadcast is not supported.

Query:

Slave Addr.:	xxH
Function code:	11H
CRC check:	xxxxH

Response:

Slave addr.:	xxH	
Function code:	11H	
Byte count:	86H	
Slave ID:	82H	
Run Indicator status:	FFH	(always ON)
Software Version:	(2 Bytes)	major version first
Controller Serial Number	(2 Bytes)	high byte first
Special Gas Type [8][3]	(24 Bytes)	8 Special Gas Type

Special Unit [8][3]	(24 Bytes)	8 Special Unit
Gas Type	(40 Bytes)	Sensor 0 first, plus 8CH A_In
Unit of Measure	(40 bytes)	Sensor 0 first, plus 8CH A_In
CRC check:	xxxxH	

Note:

1). Slave ID = 80H for M-Controller
Slave ID = 82H for M-Controller II
Slave ID = 42H for Q4-Controller II

2). Each Special Gas Type or Special Unit is composed of 3 characters.

3). Gas type and Units Definition:

Value	Gas Type	Units
00H	O2	%Vol
01H	CO	PPM
02H	CO2	%LEL
03H	H2S	UNITS
04H	SO2	Special Unit 1
05H	NO	Special Unit 2
06H	NO2	Special Unit 3
07H	Hydrogen	Special Unit 4
08H	HCN	Special Unit 5
09H	HCL	Special Unit 6
0AH	NH3	Special Unit 7
0BH	MMH	Special Unit 8
0CH	O3	
0DH	C2H4O	
0EH	Cl2	
0FH	ClO2	
10H	CH4	
11H	C3H8	
12H	H2	
13H	Others	
14H	Special Gas Type 1	
15H	Special Gas Type 2	
16H	Special Gas Type 3	
17H	Special Gas Type 4	
18H	Special Gas Type 5	
19H	Special Gas Type 6	
20H	Special Gas Type 7	
21H	Special Gas Type 8	