1 MODBUS Protocol Supported By Q-Controller

1.1 Serial Transmission Mode

- Modbus RTU Slave Mode
- Baud rate: 19.2K, 28.8K, 38.4K, and 57.6K, selectable from Modbus RS-485 Port Baudrate Setting in System Menu.
- Byte parity: Even parity, Odd parity or None parity.
- Data format: One start bit, 8 data bit, parity bit, one stop bit, LSB first.
- Frame Check: CRC check.

1.2 Function Code Supported by Q-Controller

- **#03 Read Holding Registers**

To read meter parameter values, a Master must send the Slave device a Read Holding Registers request packet.
The Read Holding Registers request packet specifies a start register and a number of registers to read. The start register is numbered from zero (40001 = zero, 40002 = one, etc.).
The Q-Controller responds with a packet containing the values of the registers in the range defined in the request.

Function in the Q-Controller: Read inputs and outputs statuses and readings, such as

- Sensor Readings and statuses
- AI-Box (Analog Input) Reading
- BI-Box (Binary/Switch Input) statuses
- Relay (BO-Box) Statuses,
- Buzzers, Strobe and Horn statuses
- AO-Box (Analog Output) current (mA x 10)

Attribute: Read Only. Broadcast is not supported.

Query:

Slave Address:	xx	(Default 214, check Slave address in Q-Controller)
Function code:	03	
Starting addr. Hi:	xxx	
Starting addr. Lo:	xxx	
No. of points Hi:	xxx	
No. of points Lo:	xxx	
CRC check:	xxxxH	

Example: to read 32 digital sensor registers start 40601in Q-Controller (Slave Address: 214) 600 = 0x 0258 (hex) = (002)(088) (integer)
Query: [214] [003] [002] [088] [000] [032] [214] [094] in unsigned decimal.

Holding Register Address Table

Register Address	Description	Range
40001	Onboard Relay1 to Relay4 Statuses	Bit Mask in Low 8Bits: Bit 0: Relay1 status Bit 1: Relay2 status Bit 2: Relay3 status Bit 3: Relay4 status Bit = 1: ON status Bit = 0: OFF status Bit 4: Relay1 Disabled or Enabled Bit 5: Relay2 Disabled or Enabled Bit 6: Relay3 Disabled or Enabled Bit 7: Relay4 Disabled or Enabled Bit = 0: Enabled Bit = 1: Disabled High 8Bits are BO-Box Running Status: 0: Normal 0xA0 (160) : Offline 5: Fault
40002	BO-Box-0 Relay1 to Relay4 Statuses	Relay1 in BO-Box-0 (BO-Box-0-1) Relay2 in BO-Box-0 (BO-Box-0-2) Relay3 in BO-Box-0 (BO-Box-0-3) Relay4 in BO-Box-0 (BO-Box-0-4) Definition See 40001
40003	BO-Box-1 Relay1 to Relay4 Statuses	Relay1 in BO-Box-1 (BO-Box-1-1) Relay2 in BO-Box-1 (BO-Box-1-2) Relay3 in BO-Box-1 (BO-Box-1-3) Relay4 in BO-Box-1 (BO-Box-1-4) Definition See 40001
40004	BO-Box-2 Relay1 to Relay4 Statuses	Definition See 40001
40005 to 40032	BO-Box-3 to BO-Box-30 Relay1 to Relay4 Statuses	Definition See 40001

40033	Buzzer, Strobe and Horn Statuses	Bit Mask in Low 8Bits: Bit 0: Buzzer status Bit 1: Strobe status Bit 2: Horn status Bit 3: Reserved Bit = 1: ON status Bit = 0: OFF status Bit 4: Buzzer Disabled or Enabled Bit 5: Strobe Disabled or Enabled Bit 6: Horn Disabled or Enabled Bit 7: Reserved Bit = 0: Enabled Bit = 1: Disabled Bit8 - Bit15: Reserved
40034	Scheduler 1 To Scheduler 8 Output Statuses	Bit Mask in Low 8Bits: Bit 0: Scheduler1 status Bit 1: Scheduler2 status Bit 2: Scheduler3 status Bit 3: Scheduler4 status Bit 4: Scheduler5 status Bit 5: Scheduler6 status Bit 6: Scheduler7 status Bit 7: Scheduler8 status Bit = 1: ON status Bit = 0: OFF status Bit Mask in High 8Bits: Bit 8: Scheduler1 Disabled or Enabled Bit 9: Scheduler2 Disabled or Enabled Bit 10: Scheduler3 Disabled or Enabled Bit 11: Scheduler4 Disabled or Enabled Bit 12: Scheduler5 Disabled or Enabled Bit 13: Scheduler6 Disabled or Enabled Bit 14: Scheduler7 Disabled or Enabled Bit 15: Scheduler8 Disabled or Enabled Bit = 0: Enabled Bit = 1: Disabled

Register Address	Description	Range
40101	Onboard Switch1 to Switch4 Statuses	Bit Mask in Low 8Bits: Bit 0: Switch1 status Bit 1: Switch2 status Bit 2: Switch3 status Bit 3: Switch4 status Bit = 1: ON or CLOSED status Bit = 0: OFF or OPEN status Bit 4: Switch1 Disabled or Enabled Bit 5: Switch2 Disabled or Enabled Bit 6: Switch3 Disabled or Enabled Bit 7: Switch4 Disabled or Enabled Bit = 0: Enabled Bit = 1: Disabled High 8Bits are BI-Box Running Status: 0: Normal 0xA0 (160): Offline 5: Fault
40102	BI-Box-0 Switch1 to Switch4 Statuses	Switch1 in BI-Box-0 (BI-Box-0-1) Switch2 in BI-Box-0 (BI-Box-0-2) Switch3 in BI-Box-0 (BI-Box-0-3) Switch4 in BI-Box-0 (BI-Box-0-4) Definition See 40101
40103	BI-Box-1 Switch1 to Switch4 Statuses	Switch1 in BI-Box-1 (BI-Box-1-1) Switch2 in BI-Box-1 (BI-Box-1-2) Switch3 in BI-Box-1 (BI-Box-1-3) Switch4 in BI-Box-1 (BI-Box-1-4) Definition See 40101
40104 to 40132	BI-Box-2 to BI-Box-30 Switch Statuses	Switch1 in BI-Box-30 (BI-Box-30-1) Switch2 in BI-Box-30 (BI-Box-30-2) Switch3 in BI-Box-30 (BI-Box-30-3) Switch4 in BI-Box-30 (BI-Box-30-4) Definition See 40101

Register Address	Description	Range
40201	AI-Box-0 Analog Input CH1 status and Reading x 10	The register value is 16 bits unsigned integer. When the value = 65535, the channel is Disabled. When the value = 65534, the channel is Offline. When the value = 65533, the 4-20mA loop circuit is Disconnected. When the value < 65533, The Actual Reading of the channel should be divided by 10. So the range of the actual reading is 0 to 6553.2
40202	AI-Box-0 Analog Input CH2 status and Reading x 10	Definition See 40201
40203	AI-Box-0 Analog Input CH3 status and Reading x 10	Definition See 40201
40204	AI-Box-0 Analog Input CH4 status and Reading x 10	Definition See 40201
40205	AI-Box-0 Analog Input CH5 status and Reading x 10	Definition See 40201
40206	AI-Box-0 Analog Input CH6 status and Reading x 10	Definition See 40201
40207	AI-Box-0 Analog Input CH7 status and Reading x 10	Definition See 40201
40208	AI-Box-0 Analog Input CH8 status and Reading x 10	Definition See 40201
40209	AI-Box-1 Analog Input CH1 status and Reading x 10	Definition See 40201

40210	AI-Box-1 Analog Input CH2 and Reading x 10	Definition See 40201
40211	AI-Box-1 Analog Input CH3 Reading x 10	Definition See 40201
40212	AI-Box-1 Analog Input CH4 Reading x 10	Definition See 40201
40213	AI-Box-1 Analog Input CH5 Reading x 10	Definition See 40201
40214	AI-Box-1 Analog Input CH6 Reading x 10	Definition See 40201
40215	AI-Box-1 Analog Input CH7 Reading x 10	Definition See 40201
40216	AI-Box-1 Analog Input CH8 Reading x 10	Definition See 40201
40217 To 40224	AI-Box-2 Analog Input CH1 to CH8 Reading x 10	Definition See 40201
40225 To 40232	AI-Box-3 Analog Input CH1 to CH8 Reading x 10	Definition See 40201
40233 To 40328	AI-Box-4 to AI-Box-15 Analog Input CH1 to CH8 Reading x 10	Definition See 40201

Register Address	Description	Range
40341	AI-Box-0 Alarm Status	Bit Mask in Low 8Bits: Bit 0: Channel1 status Bit 1: Channel2 status Bit 2: Channel3 status Bit 3: Channel4 status Bit 4: Channel5 status Bit 5: Channel6 status Bit 6: Channel7 status Bit 7: Channel8 status Bit = 1: ON status, Alarmed Bit = 0: OFF status, No Alarm High 8Bits are not defined
40342	AI-Box-1 Alarm Status	Definition See 40341
40343	AI-Box-2 Alarm Status	Definition See 40341
40344	AI-Box-3 Alarm Status	Definition See 40341
40345	AI-Box-4 Alarm Status	Definition See 40341
40346	AI-Box-5 Alarm Status	Definition See 40341
40347	AI-Box-6 Alarm Status	Definition See 40341
40348	AI-Box-7 Alarm Status	Definition See 40341
40349	AI-Box-8 Alarm Status	Definition See 40341
40350	AI-Box-9 Alarm Status	Definition See 40341
40351	AI-Box-10 Alarm Status	Definition See 40341
40352 To 40356	AI-Box-11 To AI-Box-16 Alarm Status	Definition See 40341

Register Address	Description	Range
40401	AO-Box-0 Analog Output CH1 (mA) x 10	The register value is 16 bits unsigned integer. When the value = 65535, the channel is Disabled. When the value = 65534, the channel is Offline. When the AO-Box is online, the low 8 bits are Analog Output (mA) Value: The actual value (mA) should be divided by 10. So the range of the actual reading is 0 to 25.5mA
40402	AO-Box-0 Analog Output CH2 (mA) x 10	Definition See 40401
40403	AO-Box-0 Analog Output CH3 (mA) x 10	Definition See 40401
40404	AO-Box-0 Analog Output CH4 (mA) x 10	Definition See 40401
40405	AO-Box-0 Analog Output CH5 (mA) x 10	Definition See 40401
40406	AO-Box-0 Analog Output CH6 (mA) x 10	Definition See 40401
40407	AO-Box-0 Analog Output CH7 (mA) x 10	Definition See 40401
40408	AO-Box-0 Analog Output CH8 (mA) x 10	Definition See 40401
40409 To 40416	AO-Box-1 CH1 to CH8 Analog Output (mA) x 10	Definition See 40401

40417 To 40424	AO-Box-2 CH1 to CH8 Analog Output (mA) x 10	Definition See 40401
40425 To 40432	AO-Box-3 CH1 to CH8 Analog Output (mA) x 10	Definition See 40401
40433 To 40440	AO-Box-4 CH1 to CH8 Analog Output (mA) x 10	Definition See 40401
40441 To 40448	AO-Box-5 CH1 to CH8 Analog Output (mA) x 10	Definition See 40401
40449 To 40456	AO-Box-6 CH1 to CH8 Analog Output (mA) x 10	Definition See 40401
40457 To 40528	AO-Box-7 To AO-Box-15 Analog Output (mA) x 10	Definition See 40401

Register Address	Description	Range
40601	Digital Sensor0 Gas Reading x10	The register value is 16 bits unsigned integer. When the value = 65535, the channel is Disabled. When the value = 65534, the channel is Offline. When the value < 65533, The Actual Reading of the channel should be divided by 10. So the range of the actual reading is 0 to 6553.3
40602	Digital Sensor1 Gas Reading x10	Definition See 40601
40603	Digital Sensor2 Gas Reading x10	Definition See 40601
40604	Digital Sensor3 Gas Reading x10	Definition See 40601
40605	Digital Sensor4 Gas Reading x10	Definition See 40601
40606	Digital Sensor5 Gas Reading x10	Definition See 40601
40607	Digital Sensor6 Gas Reading x10	Definition See 40601
40608	Digital Sensor7 Gas Reading x10	Definition See 40601
40609	Digital Sensor8 Gas Reading x10	Definition See 40601
40610 To 40728	Digital Sensor9 To sensor127 Gas Reading x10	Definition See 40601

Register Address	Description	Range
40741	Sensor 0 To Sensor 7 Alarm Status	Bit Mask in Low 8Bits: Bit 0: Sensor 0 status Bit 1: Sensor 1 status Bit 2: Sensor 2 status Bit 3: Sensor 3 status Bit 4: Sensor 4 status Bit 5: Sensor 5 status Bit 6: Sensor 6 status Bit 7: Sensor 7 status Bit = 1: ON status, Alarmed Bit = 0: OFF status, No Alarm High 8Bits are not defined
40742	Sensor 8 To Sensor 15 Alarm Status	Bit Mask in Low 8Bits: Bit 0: Sensor 8 status Bit 1: Sensor 9 status Bit 2: Sensor 10 status Bit 3: Sensor 11 status Bit 4: Sensor 12 status Bit 5: Sensor 13 status Bit 6: Sensor 14 status Bit 7: Sensor 15 status Bit = 1: ON status, Alarmed Bit = 0: OFF status, No Alarm High 8Bits are not defined
40743	Sensor 16 To Sensor 23 Alarm Status	Definition See 40741
40744	Sensor 24 To Sensor 31 Alarm Status	Definition See 40741
40745	Sensor 32 To Sensor 39 Alarm Status	Definition See 40741
40746	Sensor 40 To Sensor 47 Alarm Status	Definition See 40741
40747	Sensor 48 To Sensor 55 Alarm Status	Definition See 40741

40748	Sensor 56 To Sensor 63 Alarm Status	Definition See 40741
40749	Sensor 64 To Sensor 71 Alarm Status	Definition See 40741
40750	Sensor 72 To Sensor 79 Alarm Status	Definition See 40741
40751	Sensor 80 To Sensor 87 Alarm Status	Definition See 40741
40752	Sensor 88 To Sensor 95 Alarm Status	Definition See 40741
40753	Sensor 96 To Sensor 103 Alarm Status	Definition See 40741
40754	Sensor 104 To Sensor 111 Alarm Status	Definition See 40741
40755	Sensor 112 To Sensor 119 Alarm Status	Definition See 40741
40756	Sensor 120 To Sensor 127 Alarm Status	Definition See 40741