

# VEDA MC

## MCD5. Modbus Communication manual



Classified as Business

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## 1. Parameters

### 1.1.1 General

The all parameters of MCD5 soft starter can be set by the panel and by RS485 communication.

### 1.1.2 Main parameter

| Parameter               | MODBUS address (DEC) | Setting range | Default   |
|-------------------------|----------------------|---------------|---|
| F-34: Motor current FLA | 0x0034               | 1 - 9999      | Rated current of softstarter<br>According to lectotype. Factory<br>setting 11A. |

### 1.1.3 Protection parameter

| Parameter                              | MODBUS address (DEC) | Setting range | Default                 |
|--|----------------------|---------------|-------------------------|
| F-11: Over current protection<br>value | 0x0011               | 0 - 400%      | 150%<br>Factory setting |

The soft starter detects that the running current exceeds the set value of F11 during the running process. After reaching the duration of time T, the system stops the operation of the soft-start device for over current protection and shows an over current signal on the display.

If the value is set to 0, the over current protection will be disabled.

| Parameter                 | MODBUS address (DEC) | Setting range | Default              |
|---------------------------|----------------------|---------------|----------------------|
| F-12: Overload protection | 0x0012               | 0 - 4         | 3<br>Factory setting |

For a full description, see the user manual

| Parameter           | MODBUS address (DEC) | Setting range | Default              |
|---------------------|----------------------|---------------|----------------------|
| F-13: Overload mode | 0x0013               | 0 - 1         | 0<br>Factory setting |

If the value is set to 0, overload mode protection is active during soft start and operation of the soft start device.

If the value is set to 1, overload mode protection is active only during operation of the soft starter.

| Parameter                    | MODBUS address (DEC) | Setting range | Default                  |
|------------------------------|----------------------|---------------|--------------------------|
| F-16: Overvoltage protection | 0x0016               | 1000 B        | 480 B<br>Factory setting |

If the voltage in the three-phase system is exceeded, the soft starter determines the actual voltage and compares it with the F-16 setpoint. If the F-16 value is exceeded, the soft starter will give an alarm signal.

If the value is set to 0, the Overvoltage protection will be disabled.

| Parameter                        | MODBUS address (DEC) | Setting range | Default                  |
|----------------------------------|----------------------|---------------|--------------------------|
| F-17: Undervoltage<br>protection | 0x0017               | 1000 B        | 280 B<br>Factory setting |

When the voltage in the three-phase system is decreased, the soft starter determines the actual voltage and compares it with the F-17 setpoint. When the voltage value is below the setpoint in F-17, the soft starter gives an alarm signal.

If the value is set to 0, the Undervoltage protection will be disabled.

| Parameter               | MODBUS address (DEC) | Setting range | Default              |
|-------------------------|----------------------|---------------|----------------------|
| F-18: Output phase loss | 0x0018               | 0 - 30        | 5<br>Factory setting |

If the current value (%I) in any of the phases is less than the F-18 setpoint, the soft starter will consider this as a phase loss and gives an alarm signal.  
If the value is set to 0, the Output phase loss protection will be disabled.

| Parameter                  | MODBUS address (DEC) | Setting range | Default               |
|----------------------------|----------------------|---------------|-----------------------|
| F-19: SCR Over Temperature | 0x0019               | 0 - 90 °C     | 85<br>Factory setting |

If the temperature of the SCR module exceeds the value of the F-19 setpoint, the soft starter gives an alarm signal.  
If the value is set to 0, the SCR Over Temperature protection will be disabled.

| Parameter                | MODBUS address (DEC) | Setting range | Default                 |
|--------------------------|----------------------|---------------|-------------------------|
| F-20: Timeout protection | 0x0020               | 0 - 120c      | 20 c<br>Factory setting |

If the soft-start time exceeds the F-20 setpoint, the soft starter gives an alarm signal.  
If the value is set to 0, the Timeout protection will be disabled.

| Parameter        | MODBUS address (DEC) | Setting range | Default                |
|------------------|----------------------|---------------|------------------------|
| F-21: Imbalanced | 0x0021               | 0 - 100%      | 50%<br>Factory setting |

If the difference between the maximum and minimum operating current reaches the F-21 setpoint (% of the rated current of the soft starter), the soft starter gives an alarm signal.  
If the value is set to 0, the Imbalanced protection will be disabled.

#### 1.1.4 Start/Stop parameters

| Parameter        | MODBUS address (DEC) | Setting range | Default              |
|------------------|----------------------|---------------|----------------------|
| F-00: Start Mode | 0x0000               | 0 - 2         | 0<br>Factory setting |

0: Current ramp  
1: Current limit  
2: Voltage ramp  
For a full description, see the user manual.

| Parameter             | MODBUS address (DEC) | Setting range | Default                 |
|-----------------------|----------------------|---------------|-------------------------|
| F-01: Soft start time | 0x0001               | 0 - 120c      | 10 c<br>Factory setting |

| Parameter            | MODBUS address (DEC) | Setting range | Default                |
|----------------------|----------------------|---------------|------------------------|
| F-02: Soft stop time | 0x0002               | 0 - 120c      | 0 c<br>Factory setting |

| Parameter                | MODBUS address (DEC) | Setting range | Default                |
|--------------------------|----------------------|---------------|------------------------|
| F-03: Start-stop voltage | 0x0003               | 20 - 75%      | 25%<br>Factory setting |

Determines the start voltage generated by the motor when the start command is first applied.

| Parameter           | MODBUS address (DEC) | Setting range | Default                 |
|---------------------|----------------------|---------------|-------------------------|
| F-04: Current limit | 0x0004               | 150 - 600%    | 350%<br>Factory setting |

The current limit should be set so that the motor accelerates easily to full speed.

| Parameter                | MODBUS address (DEC) | Setting range | Default                 |
|--------------------------|----------------------|---------------|-------------------------|
| F-07: Kick start voltage | 0x0007               | 20 - 100%     | 100%<br>Factory setting |

Kick-start is the mode of the initial short-term voltage pulse, which is fed at the beginning of the start to form an elevated moment and is used together with the current limitation mode.

| Parameter             | MODBUS address (DEC) | Setting range | Default              |
|-----------------------|----------------------|---------------|----------------------|
| F-08: Kick start time | 0x0008               | 0 - 500T      | 0<br>Factory setting |

Kick start time is the time for one Kick.  
Unit: period (grid frequency)  
If the value is set to 0, the Kick start time will be disabled.

| Parameter                 | MODBUS address (DEC) | Setting range | Default              |
|---------------------------|----------------------|---------------|----------------------|
| F-09: Kick start interval | 0x0009               | 0 - 50T       | 0<br>Factory setting |

Kick start interval is the time between two Kick.  
If the value is set to 0, the Kick start interval will be disabled.

| Parameter              | MODBUS address (DEC) | Setting range | Default              |
|------------------------|----------------------|---------------|----------------------|
| F-10: Kick start times | 0x0009               | 0 - 100       | 0<br>Factory setting |

How many times the device will work in kickstarter mode.  
If the value is set to 0, the Kick start time will be disabled.

| Parameter        | MODBUS address (DEC) | Setting range | Default              |
|------------------|----------------------|---------------|----------------------|
| F-27: X1 program | 0x0027               | 0 - 2         | 0<br>Factory setting |

0: Stop  
1: Reset  
2: Emergency stop

| Parameter           | MODBUS address (DEC) | Setting range | Default              |
|---------------------|----------------------|---------------|----------------------|
| F-30: Analog output | 0x0030               | 0 - 9999A     | 0<br>Factory setting |

4mA - 0% motor rated current  
20mA - 100% motor rated current

| Parameter  | MODBUS address (DEC) | Setting range | Default              |
|--|----------------------|---------------|----------------------|
| F-32: Initialization   | 0x0032               | 0 - 2         | 0<br>Factory setting |
| 0: Invalid<br>1: Reset to factory settings<br>2: Clear alarm records |                      |               |                      |

### 1.1.5 Communication parameters

| Parameter           | MODBUS address (DEC) | Setting range | Default              |
|---------------------|----------------------|---------------|----------------------|
| F-23: Delayed start | 0x0023               | 0 - 60c       | 0<br>Factory setting |

| Parameter                   | MODBUS address (DEC) | Setting range | Default              |
|-----------------------------|----------------------|---------------|----------------------|
| F-24: Communication address | 0x0024               | 0 - 255       | 1<br>Factory setting |

| Parameter                               | MODBUS address (DEC) | Setting range | Default              |
|---|----------------------|---------------|----------------------|
| F-25: Baud rate                         | 0x0025               | 0 - 2         | 0<br>Factory setting |
| 0:4800 bps<br>1:9600 bps<br>2:19200 bps |                      |               |                      |

| Parameter                    | MODBUS address (DEC) | Setting range | Default              |
|------------------------------|----------------------|---------------|----------------------|
| F-26: Parity                 | 0x0026               | 0 - 2         | 0<br>Factory setting |
| 0: None<br>1: ODD<br>2: EVEN |                      |               |                      |

| Parameter                | MODBUS address (DEC) | Setting range | Default              |
|--------------------------|----------------------|---------------|----------------------|
| F-33: Language           | 0x0033               | 0 - 1         | 0<br>Factory setting |
| 0: Chinese<br>1: English |                      |               |                      |

| Parameter              | MODBUS address (DEC) | Setting range | Default                 |
|------------------------|----------------------|---------------|-------------------------|
| F-35: Factory password | 0x0035               | 0 - 9999      | ****<br>Factory setting |

## 2. Communication

MCD5 use RS-485 line.

### 2.1 RS-485 technical characteristics:

**Asynchronous serial** communication

**Half duplex**

Communication protocol : **Modbus RTU**

**2.1.1 Baud rate**

MCD5 supports **4800/9600/19200 BPS**.

More detail : 1.1.5 Communication parameters.

**2.1.2 Data bit**

The **data bit** of MCD5 is **8**.

**2.1.3 Parity bit**

**Parity** bit can be set : **None/ODD/EVEN**.

More detail : 1.1.5 Communication parameters.

**2.1.4 Stop bit**

When **Parity** bit is **none**, **Stop bit** is **1**;

When **Parity** bit is **EVEN** or **ODD**, **Stop bit** is **1** or **2**.

**2.2 Response time**

**Normal** response **time: 30mSec**.

**Long** response time: **100mSec**.

|  |  |
|--|--|
|  | <p><b>Notes:</b><br/>                 Frequent query will cause longer response time of MCD5;<br/>                 When set the parameter by communication, the interval time of query should be 1000mSec. MCD5 doesn't support broadcast communication.<br/>                 When MCD5 is communication bus terminal, 120Ω Termination resistor is recommended. When MCD5 peer-to-peer communicate with PC, Termination resistor is no needed.<br/>                 The maximum number of terminals connected with MCD5 is 32.<br/>                 The transmission distance should &lt;1.5KM ( the relay is needed if distance&gt;1.5KM).</p> |
|--|--|

**2.3 MODBUS Message RTU Framing**

|       |                        |                        |        |       |        |                 |                 |      |
|-------|------------------------|------------------------|--------|-------|--------|-----------------|-----------------|------|
| Start | Slave Address<br>1Byte | Function Code<br>1Byte | Data 1 | ..... | Data n | CRC-Hi<br>1Byte | CRC-Lo<br>1Byte | Stop |
|-------|------------------------|------------------------|--------|-------|--------|-----------------|-----------------|------|

**Start:** Separated by a silent interval of at least 3.5 character times.

**Slave Address:** Slave Address from 1 to 255.

**Function Code:** Function Code

**Data 1...Data n:** Data transmitted.

**CRC-Hi:** The CRC high-order byte from slave address to Data n.

**CRC-Lo:** The CRC low-order byte from slave address to Data n.

**Stop:** Separated by a silent interval of at least 3.5 character times.

**2.3.1 Interval time**

In RTU mode, **message frames** are separated by a **silent interval** of at least **3.5 character times**. In the following sections, this time interval is called **t 3,5**.

$$interval\ time = \frac{3.5 * 11}{baud\ rate} (Sec)$$

Example:

When Baud rate is 9600BPS, the interval time =  $3.5 \times 11 / 9600 = 4 \text{mSec}$ . So the interval time  $\geq 4 \text{mSec}$ .

### 2.3.2 Slave Address

The number of slaves can be set from 1 to 255. (The default number is 1)

### 2.3.3 Function Code

| Function Code | Modbus instruction     | MCD5 function               |
|---------------|------------------------|-----------------------------|
| 03            | read holding registers | read MCD5 parameter setting |
| 06            | write single register  | write single MCD5 parameter |

### 2.3.4 Address space and Commands

| Definition            | Address space | Read/Write Value | Function Description  |
|-----------------------|---------------|------------------|---|
| Function code (03&06) | 0x0000~0x0023 |                  | The soft-start function code corresponds to the Modbus RTU protocol register address. For example: F-00 corresponds to address 0x0000 |
| Control command (06)  | 0x2000        | 0X0021           | Start command   |
|                       |               | 0X0022           | Stop command  |
|                       |               | 0X0023           | Reset command   |
| System status (03)    | 0x3001        | 0X00             | Stop status   |
|                       |               | 0X01             | Reserved  |
|                       |               | 0X02             | Soft start state  |
|                       |               | 0X03             | Running status  |
|                       |               | 0X04             | Reserved  |
|                       |               | 0X05             | Soft stop state   |
|                       |               | 0X06             | Fault status: Low 8 bits: 0x06;<br>High 8 bits: fault code** (decimal);<br>e.g. ER01 «Running overcurrent» (0X0106)                   |
| Operating data (03)   | 0x2002~0x2008 |                  | Average current/A   |
|                       |               |                  | A current/A   |
|                       |               |                  | B Current/A   |
|                       |               |                  | C current/A   |
|                       |               |                  | Input voltage/V   |
|                       |               |                  | Output voltage/V  |
|                       |               |                  | Module temperature / degree   |

### 2.3.5 Alarm

| Alarm Code | Alarm Contents              |
|------------|-----------------------------|
| Er01 (01)  | «Running overcurrent»       |
| Er02 (02)  | «Module overtemperature»    |
| Er03 (03)  | «Start-up timeout»          |
| Er04 (04)  | «System phase loss»         |
| Er05 (05)  | «Power supply overvoltage»  |
| Er06 (06)  | «Power supply undervoltage» |
| Er07 (07)  | «Overload protection»       |
| Er08 (08)  | «Imbalance»                 |

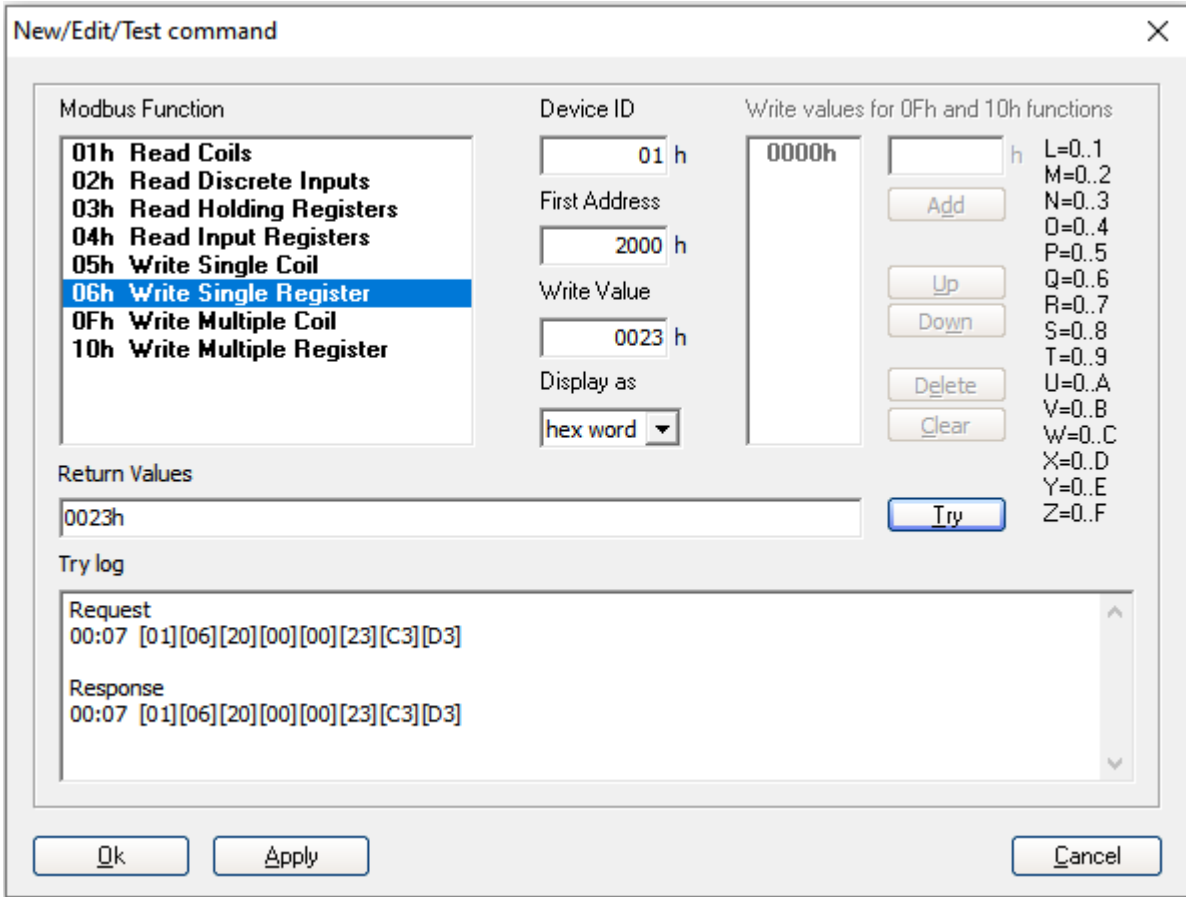


## 2.4 Debugging

### 2.4.1 Instruction

**Example 1:** Reset

The coil address of reset fault is 0x2000 in 2.3.4 Instruction. Write single register through function code '06' of Modbus RTU. Suppose the slave number is 1.



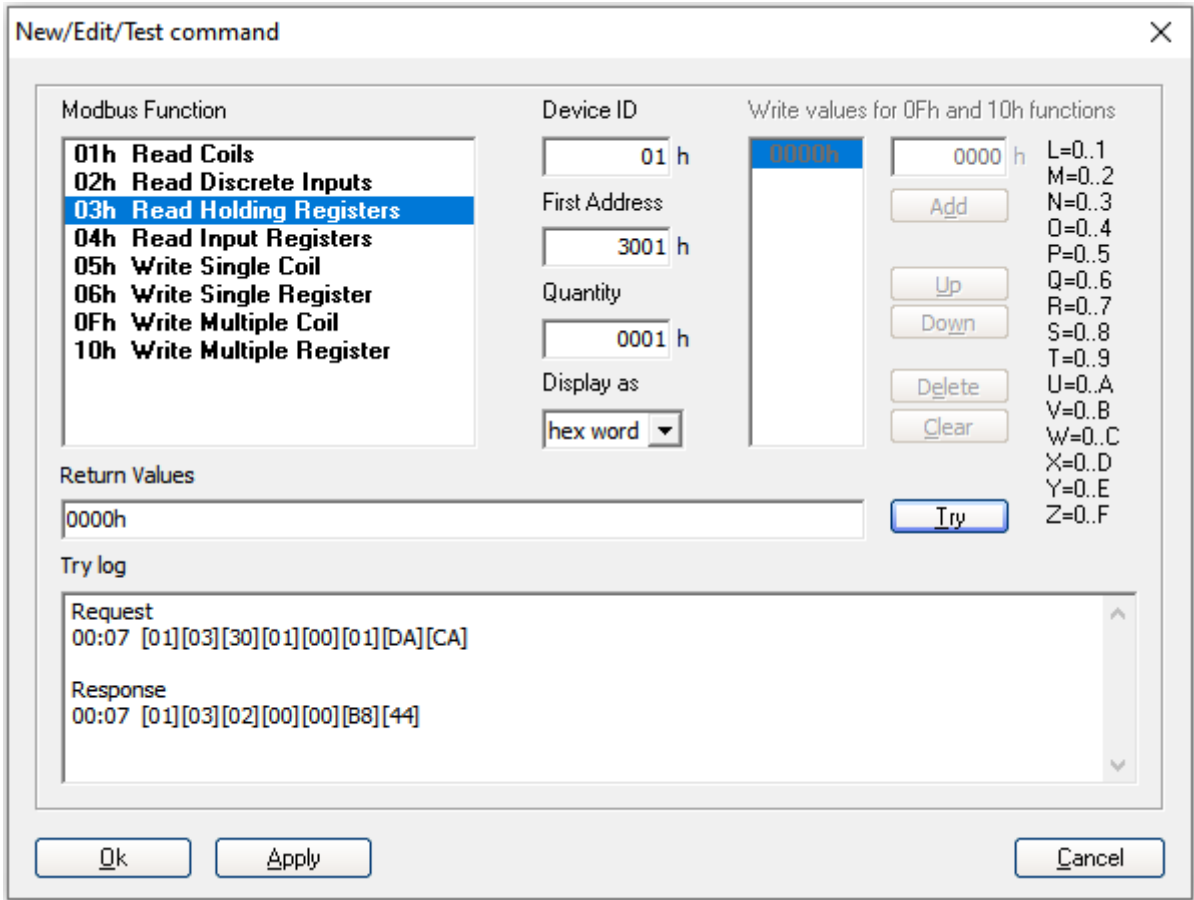
Caution:

The first address is 0x2000, write value 0x0023

Returned data:

- [01] - Slave number (ID)
- [06] - Function code
- [2000] - Register address
- [0023] - Register set 0023
- [C3D3] - CRC

**Example 2:** Read System status.



Returned data:  
[01] - Slave number (ID)  
[03] - Function code  
[02] - Number of bytes  
[0000] - Register data  
[B844] - CRC

These instructions should not be used as a replacement for VF-101 operating instructions.

VEDA MC has tested and checked the information provided in these instructions.

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VEDA MC LLC