





### Industrial Data Xchange

(IDX) is one of the Modbus Organization's newest member companies.

IDX is a South African-based Industrial IT company, providing the products and services to Sub-Saharan Africa. The company offers industrial communications expertise and products such as (industrial gateways, interfaces, test tools and remote monitoring. Acting as a distributor for Anybus, COMsoft, HMS Industrial Networks & PROCENTEC, IDX also designs and manufactures its own products.

IDX provides training and support for many industrial fieldbuses and protocols including Modbus. The IDX Academy includes the PROFIBUS Competence Center and OPC Competence Center for the region.

### JVL Industri Elektronik A/S

develops and produces electronic controls for stepper and servo motors. The company offers a wide selection of products for motion control, including integrated AC-Servo motors and Stepper motors: AC-Servo motor controllers; DC-Servo motor controllers;



and Motor drivers.

Most recently, JVL announced its integrated servo motor MAC 141 in a stainless steel version especially for the food and medical industry. The MAC 141 has an option for built-in PLC, RS232/485, Profibus, CANbus or industrial Ethernet (including Modbus TCP and more).

These stainless steel motors are designed to handle IP67 and withstand high-pressure wash down conditions. The concept is based on a totally sealed stainless steel tube with stainless steel front flange and rear cover.

### Ewing/Kessler, Inc.

, based in Hernando, Mississippi, specializes in providing total building automation and integration solutions from concept and design, to fully installed and managed systems.

Focusing on the total system provides innovative, customized, broad-spectrum plans for the future based on individual needs and desires. Committed to relationships, E|K

AUTOMATION prides itself on being dedicated to service, and responsive to the needs of its clients.



### **The Modbus Organization Mission**

The Modbus Organization, Inc. is a group of independent users and suppliers of automation devices that seeks to drive the adoption of the Modbus communication protocol suite and the evolution to address architectures for distributed automation systems across multiple market segments. Modbus Organization also provides the infrastructure to obtain and share information about the protocols, their application, and certification to simplify implementation by users resulting in reduced costs.

### **Modbus Newsletter**

This is the newsletter of the Modbus Organization, the international nonprofit organization devoted to the evolution and support of the Modbus protocols.

For more information about membership and other services, please refer to our website:

[www.modbus.org](http://www.modbus.org)

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## Q&A from the Modbus Discussion Forum...

### Firmware Update an Embedded System over Modbus RTU using UART...

**Vee posted this message to the forum :**

Can I update the firmware of an embedded system using Modbus RTU over UART? If yes, what function code needs to be used for firmware update? and how?

Currently, my system supports 1, 2, 3, 4, 5, 6, 15, 16, 23 function codes.

A quick reply will be highly appreciated.

**David replied:**

I'm aware of one control device that uses Modbus for download and upload of configurations. It uses function codes 20 and 21 to transfer the configuration data.

That same device applies firmware updates with a Windows based "loader" application that manages the firmware data download.

My gut feeling is that if you have to ask how to accomplish a firmware update, you're not in a position to execute an update successfully.

**Vee responded:**

Can you please name that control device? [In] what format [do] you receive a file on the device; how does it get stored in memory?

I'm a novice programmer for Modbus and firmware update. I've implemented Modbus using some function codes as mentioned.

Your response refers to function codes 20 (0x14) & 21 (0x15) which are Read File Reference &

Write File Reference respectively.

I feel that there is no file read or write function under Modbus.

Does the use of the function code 16 (0x10), which would allow to write 200 bytes of data per message, from PC to device resolve my problem?

Following are the steps I would like to implement for firmware update through Modbus RTU over serial (loading device with a new image file):

1. Break down the image file (FW update) into groups of bytes not to exceed 200 bytes per group.

2. Encapsulate each of the 200 byte groups as write register commands (i.e., add destination Modbus Address 1-249), function code (16 (0x10) = write multiple registers), starting address (two bytes, value depends on how you are managing the counting of groups), qty = 2 bytes value 200 decimal, and then the error check (CRC-16 two bytes).

3. Transmit the groups of bytes from PC to device ONE group at a time. As the response indicates that group of bytes is received, send the next one.

4. Assemble the file from the received groups on the other end (server).

Please correct me if I'm wrong.

**Lynn August Linse jumped in:**

As someone else pointed out, most vendors either use proprietary functions like 0x7D, or the file read/write. Using standard

functions like 16 will be problematic since Modbus holding registers have no notion of moving 128Kbytes as a whole, which is why the file read/write is preferred.

Plus how are you going to prevent missing a block or duplicating a blocks? Imagine this situation — you write block #75, the server sends a response so now expects block #76, but your master misses the response and re-sends block #75.

In your design you are already demanding a custom "client" tool breaking up the file and sending it, as well as a custom "server" function — why bother misusing using function 16? What does it buy you? Problems is all that I can see you gaining.

The file read/write include offsets, plus if I understand the standard correctly the 10000 'records' can be, for example, 200 bytes each, so one could move a file of up to 2 MB. If your product has different text/code segments, those could be different files which allow you to replace the code in phases.

[Read more or add your comments](#) to this thread.

#### [The Modbus Community](#)

- Active technical discussions
- Knowledge aggregation
- Contact with Modbus users

Discussion supported by...

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We're with you. The Modbus Organization is there to help suppliers and users of the Modbus protocol succeed. Our members range from Modbus device suppliers, to system integrators, end users, and educational institutions.

The common link? They all value the information and services provided by the Modbus Organization, and they all play a role in determining the future of the world's most broadly applied protocol.

## Designing with Modbus

Modbus developers rely on the Modbus Organization for valued assistance with their projects:

- Start by downloading specifications and other design documents from the [modbus.org](http://modbus.org) website.
- To save time, [purchase the Modbus TCP Toolkit](#) CD (FREE to general members); it contains source code and a myriad of other resources.
- If you come across technical issues that have you stumped, post your question on the [modbus.org forum](#). One of the many experienced Modbus implementers who frequent this forum will likely have your answer.

## Conformance Testing

When your project's done, how do you know it really conforms to the Modbus specification? How do your users know?

The answer starts with running the conformance test suite included with your Modbus TCP Toolkit. This self-test helps you check your design assumptions and catch the subtle "gotchas" that might otherwise slip through your design review.

Then [submit your product for testing](#) to the Modbus Organization for conformance testing. We'll certify your product as compliant, and post that information on the Modbus website for the world to see.

## Visibility: Your Company & Your Products

Your membership in the Modbus Organization also opens the door to a powerful range of visibility options to highlight your company as a supplier of Modbus-based products.

Exposure on our website, our newsletter, and through our various trade show appearances are all options that allow you to make the most of your Modbus Organization membership.

Your company will also value the opportunity to participate in our technical committees. There, your company's knowledge, experience and technology can help guide future enhancements, extensions, and adaptations of Modbus to keep it the world's leader for decades to come.

## Time to Apply

When it comes time to get your Modbus network up and running, it's comforting to know that hundreds of thousands of applications have preceded yours. But what if things don't go as planned?

Again, the [modbus.org forum](#) is ready to answer your questions and provide guidance. Thousands of users from diverse backgrounds participate in the forum, giving you a powerful base of experience from which to draw.

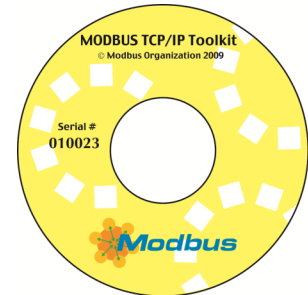
## The Future is Yours

Whatever your role in the use of Modbus, consider joining the Modbus Organization. You'll get the support you need today, and have opportunities to help guide Modbus to a dynamic future.

[Download the Modbus Organization Membership Application](#) to learn about the different membership levels and their associated benefits.

## Modbus TCP Toolkit v3.0

The Modbus TCP Toolkit provides all the necessary pieces to develop a Modbus-compliant device, including documentation, diagnostic tools, sample source code, and pre-test software to prepare for Modbus conformance certification.



The toolkit is available as a benefit of corporate-level membership in the Modbus Organization or can be purchased separately for US\$500 plus shipping and handling. The toolkit contains the following items:

### Modbus Documentation

- Modbus Application Protocol Specification, v1.1b
- Modbus Messaging on TCP Implementation Guide, v1.0b

### Tools

- Modbus TCP Client & Server Diagnostic Tools

### Sample Source Code

- Modbus TCP Sample Client Code for Visual Basic Win32
- Modbus TCP Sample Client Code for C/C++ Win32
- Modbus TCP Sample Server Code for C/C++ Win32
- Modbus TCP Sample Server Code for C VxWorks
- Modbus TCP Sample Server Code for C++ VxWorks

### Modbus Conformance Testing

- Conformance Test Tool v3.0
- Conformance Test Tool v2.1

### Additional Resources