Modbus Newsletter

Is Your Device Listed?

Does your company offer Modbus-enabled devices? Are your products listed in the Modbus Device Directory?

Or perhaps you're looking for the right device for your next project.

Modbus Organization maintains a directory of devices so you can easily find the Modbus product you need. Search for a part number or company name, or filter for the type of device your project requires.

Filter for conformance tested devices, wireless/wired, or by device type, such as controller, gateway, SCADA, motion control, and more.

We aim to make it easy to find what you need or to get the word out about your company's Modbus expertise!

Wireless Hart Gateway

The Phoenix Contact RAD-WHG/WLAN-XD, a premier rail-mount WirelessHART gateway, received a firmware update, (v 6.1) that features expanded Modbus TCP functionality as well as HART IP support. The Modbus functionality makes it easy for PLC programmers to incorporate key HART parameters into a Modbus controller.

Support for the HART IP protocol offers an easy, widely available interface to provide standardized deployment and the ability to do intelligent HART device management using Ethernet. HART IP integrates into tools that most plant operators and maintenance personnel already use, such as HART Server, HART OPC Server, Simatic®PDM, and Honeywell®FDM.

New Free Resource...

The Modbus Organization's Technical Resources Page list of resources for Modbus developers and users continues to grow.

The newest listing is an extension/fork of the original Free Windows Modbus Simulator listed on the site.

This version, currently last on the list of outside links, is a Modbus RTU and TCP/IP server simulator. It supports the full range of Modbus addresses
(0xxxxx, 1xxxx, 3xxxx, & 4xxxx addresses).

Diagnostics include complete traffic byte capture and logging capability with human readable decode descriptions. Multiple Device IDs can be simulated at one time. Supports CSV loading and a scripting environment for testing purposes as well as HTML custom displays. Written in Visual Studio C++ 2010 with full source code available.

Meet Our Members...

Tom and Susan O'Hanlan founded **Sealevel Systems, Inc.** in 1986. Today, Sealevel continues to provide innovative, reliable hardware and software products to enable computer connectivity and control. The company manufactures more than 300 standard I/O products with ISO 9001: 2000 registration and a standard lifetime warranty.

Sealevel's SeaI/O data acquisition modules provide powerful digital, analog, and serial expansion to any computer or Modbus network. Users can connect to the host via wireless (802.11b/g), Ethernet, USB, RS-485, or RS-232 — whatever is required for the application.

The company offers a variety of I/O configurations, for maximum flexibility and easy field wiring. For software implementation, application programs or third-party software can use Sealevel's SeaMAX libraries or industry-standard Modbus.

In June, Sealevel announced the SeaPAC R9-7R compact flat panel computer. It combines a RISC-based processor with a bright 7" TFT LCD to create a wide-temperature, rugged, flat panel computer. An industrial, LED backlight gives the LCD extended life over CCFT-backlit models. The system ships with Sealevel's Modbus-SSD software suite, making it ideal for distributed control and monitoring networks.

Joining the Modbus Organization is easy and affordable. Download the membership application to learn more.

Founded in 1990, **United Electronic Industries (UEI)** is an experienced leader in the data acquisition and control industry. The company's cube form factor provides a compact, rugged platform, ideal for applications in the automotive, aerospace, petroleum/refining, simulation, semiconductor manufacturing, medical, HVAC, and power generation fields, to mention a few.

Check UEI's website to learn more about the 10-year availability guarantee on all its RACKtangle®, Cube, and FLATRACK™ series products (including DNA, DNR, UEI-PAC, UEISIM, UEILogger and UEIModbus chassis and compatible I/O boards.

California-based manufacturer **Applied Motion Products** specializes in high-precision, cost-effective motion control products, offering a full complement of stepper and servo, drives, motors, controllers, gearheads, and power supplies to serve a diverse industrial and OEM customer base.

AMP's Modbus RTU and Modbus TCP product families include high-performance motion control for stepping motors, servo motors, and StepSERVO closed loop products. They are designed to interface easily to popular PLCs and HMIs.

Q&A from the Modbus Discussion Forum

Modbus Router...

ModbusChris wrote:

I have a question concerning Modbus TCP IP.

There is a network with three servers, each with its own IP, which provide data via Modbus TCP as Servers. I have software that should read the information in that network as a Client, but it can only access one IP address.

So [I] am looking for some sort of Modbus Router that can read as a Client via Modbus TCP data from the three Servers, each with its own IP address and that then can give out the read data via Modbus Server (or Client if Server is not possible) on a single IP address.

The idea is to bundle the information from three IP addresses to just one IP address. Then my software can read the data properly.

Does anyone know if there is hardware (or software) available that can do this?

Henrik replied:

Our MBRG-300 router/gateway would be able to do this. It acts as an intermediate gateway exposing one single IP address and you can map other Modbus TCP Server devices to be accessible either under different register ranges or under different server IDs.

So you could map 192.168.1.11 registers 1000 to 1999 to be accessible as 192.168.1.1 register 11000 to 11999 and 192.168.1.12 registers 1000 to 1999 to become 192.168.1.1 register 12000 to 12999 and so forth.

Matt suggested:

Real Time Automation offers a solution, the 460MCMS-N34-D. The gateway acts as the Client for your three Server devices and then as the Server for your software program. It grabs the data from the three Servers

and then presents it as data from a single Server to the Client (your software).

Gateway setup is simple. It is a web interface, where you enter the IP address of the gateway into a web browser (e.g., Chrome, IE). From this, you are able to set up your IP Addresses, scan lines, registers, etc. It also has a display data page that shows the mappings and the data being pasted through it.

ModbusChris added a question:

Would any of the above mentioned solutions also provide the capabilities described above and the possibility to write (log) the read data to a text file?

The reason for this is that we have problems with the Modbus connection with our software (seems to be a float/int problem). If we could have the data as a text file, then we could read that with our software and we would have a preliminary working solution at least to start with.

David2 answered:

Modbus is responsible for packing binary bits into a specified format and transporting them from Server to Client or vice versa and for generating some basic error codes in the case when transport doesn't happen as expected.

The interpretation of the received data is up to the application software or firmware on the receiving end. Once the binary bits are interpreted as data values (whether integer or floating point), what is done with them is up to the application.

Saving data values as ASCII numbers in a text file might be an application option (depending on the resources available), but it is not a Modbus function. Modbus is only responsible for transferring the data as binary bits. Interpreting the bits into useable data and what happens with the data is up to you or the

application software claiming to run the Modbus data transfer function.

Read more or add your comments to this thread.

RS485 Does Not Work if Ground Is Connected...

Chinmay Harkare posted this:

Facing what I can only assume are grounding problems.

This is the first time I am working with RS485.

There are basically about 20 MAX485 and Arduino-based RS485 devices on our bus and the Client is the PC that runs our custom software. Not once has there been a single issue in lab testing for more than a month.

First of all, the cable used on site is unshielded CAT5. This is because it was already put by the previous vendor before we entered the picture. Total length about 900m. Changing the cable is not an option at this stage.

All devices are connected in series, and there are no 'T' connections/star points.

All the devices have their own isolated SMPS and are not connected to the physical earth.

One of the CAT5 twisted pairs is used for RS485 and one of the pairs is used for connecting the Grounds.

All RS485 Grounds are connected together and this wire finally is connected to the Ground terminal of the 485-to-232 converter connected to the PC. It probably gets connected to physical earth through the PC.

The Modbus Community

- **Technical discussions**
- **Knowledge aggregation**
- **Contact with Modbus users**

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Q&A from the Modbus Discussion Forum, cont'd

Here's what is happening:

The exact same system is working perfectly fine in another building here for more than 15 days and still is.

Completed testing the cabling for Building 2 yesterday. The complete system was working excellently for more than 24 hours on the PC and I had already booked a ticket home.

Suddenly communication completely stopped. Some devices were not responding at all and others were responding very slowly with various timeouts.

I removed the RS485 wires from the PC and put them into my Laptop through a 485-to-USB converter and everything was perfect and all devices were responding instantly. I was happy that none of the devices were damaged and concluded that the RS485-to-RS232 converter was probably broken.

I connected the 485-to-USB converter to the PC expecting it to work perfectly but there was no response. I disconnected the ground wire from the USB-to-485 converter and it started working OK, but not excellent.

Terminal software shows that there is continuous noise on the RS485 bus with the byte 255 being received by the PC every few seconds. Though communication has started, the byte 255 is occurring every few seconds. This will result in timeouts every now and then, but the communication will at least take place. The packets that get corrupted by the 255 should get thrown away by our protocol and the data again requested by the Client. Thus even though there shouldn't be any overall errors in the system, this doesn't seem to be a very reliable, robust and trustworthy RS485 network.

I can only imagine that the entire communication is extremely clean on the Laptop due to the lack of physical earth. I am almost certain that the same

garbage will occur even on the Laptop when the 3-pin charger is connected. Will confirm this tomorrow.

The reason for me to believe this is that I was experiencing minor shocks when touching the RS485 lines, which were connected to the Laptop as well as the main RS485 bus a few days back. Removing the Laptop charger stopped the shocks.

I also think the PC will have crystal clear communication if its earthing is disconnected, although this is just a hypothetical scenario due to the major risk of electric shock if this is done.

All in all, what do you make of this? System that runs perfectly on a Laptop and not so perfectly on a PC? I am reluctant to leave the site knowing that even though the system looks like it works, weird unexplained things are happening under the hood.

David_2 wrote:

That was a great description of the problem; somewhat unique in ForumLand.

I had similar circumstances — when the laptop was 'floating' on battery power it worked fine. When the laptop charger was plugged in, the 485 network essentially had a heart attack.

I put in an RS-485 isolator (485 in/.485 out) in the network, between the USB/485 converter and the field network lines. That fixed the problem. It so happened that the isolator I picked labeled A and B data lines the opposite of the other components, but swapping the lines fixed that.

Curt Wuollet's insights:

If you can't connect the ground on your network, I'd check for a difference in ground potential on the connected machines. It doesn't take much of a difference to mess things up. This is quite common with laptops, because the ports are not isolated. Appreciable

noise can be injected and considerable current can flow with half a volt of difference as measured with a multimeter. The bias idea can help in some cases, but fixing the grounds or an isolator may be necessary.

This is another case where floating power to a PLC can cause headaches. When in doubt, get a scope and watch your signal levels. I've see where attaching a ground can take the network outside of the common mod voltage range of the transceivers and they simply quit working.

dwpatterson added:

I would ensure that you have proper termination resistors; nominal value 120 ohms.

And could also try idle state bias resistors at 1 terminating resistor, effectively pull up and pull down resistors. One from A line to Vs and one from B line to ground. Typical values from 1200 to 2100 ohms.

Harvard07 replied:

Sounds to me like the AC power plug you are using has a "ground" that is floating and not properly bonded to Neutral and Earth at source.

When this happens the floating ground wire will adopt a level somewhere less then 120VAC / 2 = 60 VAC. This happens because of the capacitive coupling between the H to G and G to N where G wants to be about 60 VAC.

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

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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 Resources

Modbus Q&A...

The Modbus Community is the premier on-line engineering discussion forum. Sponsored by the Modbus Organization and supported by Control.com, check out Q&A from the Modbus Community website or log-in and have the threads you want emailed directly to you.

The Modbus Community

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Modbus conformance certification...

The Modbus Conformance Testing Program provides independent verification that a broad array of qualifications has been met in compliance with Modbus specifications. It provides verification that a device's design and configuration process will proceed smoothly and that products were developed in accordance with key Modbus criteria. Learn more...

Looking for the Modbus specifications and implementation guides?

The Modbus specifications and guides for implementing Modbus over serial line or Modbus TCP can be downloaded freely from the Modbus.org Technical Resources page.

Order the Modbus TCP Developer Toolkit

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

Learn more...