

### Summary

A brief summary of the various methods of communicating Meter readings to a central compute and how they are implemented within ND Metering Solutions products. Some communications systems also allow additional meters — such as Gas, Water or Electricity — to be read via the communications link.

### Pulse Outputs

The traditional communications options for Metering. Meters are fitted with a Volt-free contact which closes momentarily every time a defined amount of energy has been used - typically between 0.01kWh or 10kWh depending on the load.

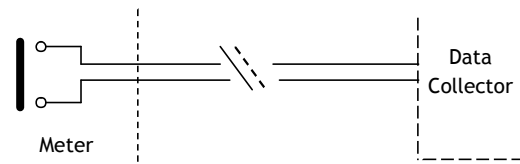
The major limitation of Pulse Outputs is that the only parameters that can easily be communicated are energy consumption — kWh, kvarh & kVAh..

Meters are cabled to a data-collector — typically a data-logger or BMS outstation. These collectors count the pulses, store the readings, usually as ½ hourly profiles, and communicate this information to a central PC for analysis and long-term storage. Maximum data rate is typically between 5 & 120 counts per minute.

Pulse outputs provide a simple and relatively low-cost solution. Costs can however rise sharply if data-collectors have to be purchased and communications infrastructure installed.

The contacts at the Meter are normally fully isolated (but some imported devices have been known to connect one side of the contact to the Neutral terminal on the Meter). The voltage level is set by the 'wetting voltage' supplied from the Data Collector — typically 5 to 24Vdc.

Normal telecom or alarm cables can be used for installation.

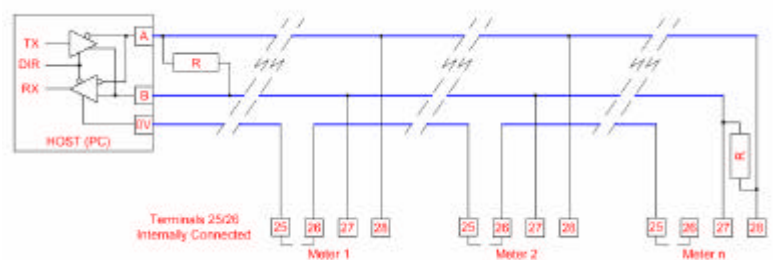


### MODBUS RTU®

MODBUS is a serial communications protocol published by Modicon in 1979 for use with its programmable logic controllers (PLCs). It is probably the most commonly available means of connecting industrial electronic devices, mainly because MODBUS is openly published, royalty-free and is simple to implement.

MODBUS is a Master/Slave protocol — the Master (a PC or PLC) interrogates the Meters which are configured as Slaves, each with a unique address.

MODBUS is implemented on ND Meters using RS485 twisted pair cable. This allows for a maximum cable length of 1200m (which can be extended with repeaters), up to 127 Meters per cable (247 if repeaters are used) and a maximum communications speed of 19,200 baud.



**Typical MODBUS RS485 Connection**  
(The 0v connection & termination resistors are optional)

Full error checking & exception reporting is implemented, and the communications link can be shared with other MODBUS devices..

In practice, key data from 5 - 10 meters can be read every second. All meter readings are available, as is the Meter configuration. If the Master allows the 'Read Multiple Register' (04) function, up to 54 standard parameters can be read in one request; or up to 32 user selected ones. The Meter can also be configured via MODBUS

On certain Meters, digital inputs and outputs are provided. Meter pulses (from gas & water Meters) can be counted, status conditions read, and remote equipment controlled — all via the MODBUS link.

Technical notes on MODBUS configuration and trouble-shooting are available on request.

## MODBUS TCP



Cube.IP MODBUS Bridge

MODBUS TCP is an extension of MODBUS RTU allowing communications over TCP/IP (Ethernet) networks.

MODBUS TCP can be implemented within the Meter if the Meter has Ethernet connectivity. Where the Meters are fitted with a standard MODBUS RS485 interface, these can be cabled to a MODBUS - TCP/IP Bridge. These devices provide the interface between the RS485 MODBUS cable and the Network – allowing the Meters to be read across the Network or the Internet.

A web-site can even be hosted within the Bridge.

## CC-Link®

CC-Link (Control & Communication Link) is a control and field bus level communications system created in 1996 by Mitsubishi Electric for high-speed communication between data and field devices. It is the standard and market leader in Asia, and its application in Europe and the USA is spreading.

*CC-Link interfaces for the Cube 350 and Cube400 Meters are currently in development*

## Ethernet



Standard RJ45 network connector on rear of the Meter

Cost-effective direct Ethernet connectivity is available on certain Meters. However, what this offers varies across suppliers and products.

ND Metering IP-Enabled products offer:

- **High speed MODBUS TCP protocol**  
Allows access to all Meter registers at speeds up to 10Mbps
- **Data Logging**  
Up to 15 parameters can be logged in non-volatile memory  
Memory capacity is sufficient to store ¼ hourly readings for 31 days
- **Embedded Web Site**  
Real-time access to meter readings and consumption profiles
- **Standard Network Connection**  
Meters are fitted with an RJ45 connector & use CAT5 cables

### ➤ Remote Data Access

Meter Readings can be made available on any PC - on the same network or anywhere over a link that can be as secure as necessary. Individual Energy Registers can be accessed and read by billing software - daily, weekly or monthly as required

### ➤ Standard Network Protocols

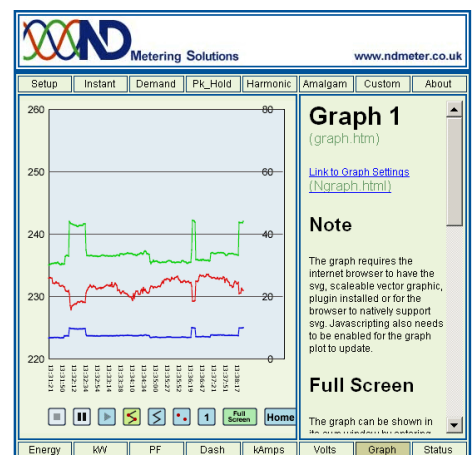
SNTP is used to maintain an internal Clock  
FTP can be set to automatically transmit data to a remote web-site for backup & archive.

### ➤ Digital Inputs and Outputs

Meter pulses (from gas & water Meters) can be counted, status conditions read, and remote equipment controlled – all via the internet connection.

### ➤ Alarms

Alarms can be set to warn of excessive consumption - by E-mail, text message, SMS, etc



## Other Protocols

Other industry standard protocols are in development.