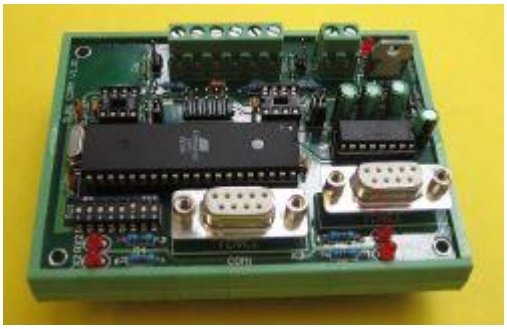
Modbus to Davis VantagePro2 Gateway Manual



- Connects Davis VantagePro2 Weather Station to Modbus Network
- Modbus RS232 or RS485 Selectable
- Selectable Modbus Address 1-16
- 2400, 4800, 9600 and 19200 Bauds Supported
- None, Odd and Even Parity Suported
- 10sec Poll Interval
- Power, Transmit and Receive Indicator LEDs

The Modbus VantagePro2 Gateway allows the easy connection of a PLC (Programmable Logic Controller), RTU (remote telemetry unit) or SCADA System to a Davis Instruments Vantage Pro2 Weather Station. Using the Modbus RTU (Binary) protocol it enables a programmable controller to monitor and carry out actions based on wind speed, wind direction, temperature and many other weather based variables.

The gateway is linked to the weather stations RS232 serial connection, the gateway then polls the weather station for its readings every 10 seconds. These readings are stored in the Modbus holding registers of the Gateway. A PLC or RTU acting as a Modbus master is able to use Modbus Function 3 to read the contents of the Gateway's holding registers, which will contain the latest weather readings.

Features

- PLC connects to Gateway Com Port 1, RS232 or RS485 connection.
  - VantagePro2 weather station connects to Gateway RS232 Com Port 2 with Baud Rate 19200
  - PLC Connection features
    selectable Modbus address from 1 to 16.
    selectable baud rate of 2400, 4800, 9600 or 19200
    selectable parity, none, odd, even
  - LED indication of transmit and receive communications between Weather Station and Gateway and between PLC and Gateway.
  - Weather Station readings
    Outdoor Temperature
    Outdoor Humidity
    Wind Speed
    Wind Direction
    Rainfall (Precipitation)
    Barometric Pressure
    Indoor Temperature (console)
    Indoor Humidity (console)
    Solar Radiation
    Evaporative Transfer
    Daily Rainfall
    Weekly Rainfall
    Monthly Rainfall
  - Communications OK status shows the communications between the weather station and the gateway is OK

Modbus Description

The gateway operates as a Modbus slave. To access the holding registers in the gateway, the PLC or RTU must be configured as a Modbus Master. Using Modbus Function 3 the PLC can read the Holding Registers 1 to 60.
Please note - the PLC or RTU can not read more than 30 registers at one time. To interrogate the full 60 holding registers two separate reads must be used.

Table 1: Variables and Holding Register Addresses

Holding Register Address	*No. of Registers*	*Description*	*Multiplier*	*Units*
1	1	Indicates the current 3-hour barometer trend.		
2	1	Packet Type , always 0		
3	1	Location in the archive memory where the next data packet will be written. This can be monitored to detect when a new record is created.		
4	1	Barometer	0.001	inHg
5	1	Inside Temperature	0.1	degF
6	1	Inside Humidity	1	%
7	1	Outside Temperature	0.1	degF
8	1	Wind Speed	1	mph
9	1	10Min Average Wind Speed	1	mph
10	1	Wind Direction	1	degrees
11	4	7 Extra Temperatures	0.1	degF
15	2	4 Soil Temperatures	0.1	degF
17	2	4 Leaf Temperatures	0.1	degF
19	2	Outside Humidity	1	%
20	4	7 Extra Humidities	1	%
24	1	Rain Rate	0.01	In/Hr
25	1	UV Index	1	
26	1	Solar Radiation	1	W/m^2
27	1	Storm Rain	.01	inches
28	1	Current Date Of Storm Rain	.01	inches
29	1	Day Rain	.01	inches
30	1	Month Rain	.01	inches
31	1	Year Rain	.01	inches
32	1	Day ET	.01	inches
33	1	Month ET	.01	inches
34	1	Year ET	.01	inches
35	2	4 Soil Moistures	1	centibar
37	2	4 Leaf Wetnesses, 0 to 15, 0= Very Dry, 15=Very Wet	1	
39	1	Inside Alarms	1	
40	1	Rain Alarms	1	
41	1	Outside Alarms	1	
42	4	Extra Temp Hum alarms	1	
46	2	Soil and Leaf Alarms	1	
48	1	Transmitter Battery Status	1	
49	1	Console Battery Voltage	1	Volts
50	1	Forecast Icons	1	
51	1	Forecast Rule Number	1	
52	1	Time of Sunrise	1	HHMM
53	1	Time of Sunset	1	HHMM
60	1	Comms Status (1=OK, 0=Fault)	1	

Holding Register 60 contains the communications status, which indicates if the Gateway is receiving data from the Weather Station
For more detail see the document “Vantage Serial Protocol Docs v2.1.0.pdf” , section IX, 1 LOOP data format - Contents of LOOP packet, Forecast Icons in LOOP packet, Forecast Icon Values, Currently active alarms in the LOOP packet. The document can be seen by downloading the file: http://www.davisnet.com/support/weather/download/Vantage%20Serial%20Protocol%20Docs%20v2.1.0.zip

Weather Station Setup
The Davis Instruments Weather Station must be fitted with a RS232 Serial Interface. The Gateway includes a cable which is a 9 pin Male to Male D9 with pins 2 and 3 crossed over.
Attach one end of the cable to COM 2 on the Gateway, and the other to the serial interface on the Weather Station.
Set the Serial Baud rate on the Weather Station to 19200 Baud.
Ensure Jumper J4-232 is closed.
Please note the Weather Station must have batteries fitted into its console. If power is lost to the Weather Station it will not respond to data requests from the gateway.

Gateway Setup
Connect 9 to 15VDC to the screw terminals Vs (+) and COM(-)
Set the DIP Switches on the Gateway to match the Modbus Address, BaudRate and Parity
Please note if DIP Switches are altered while power is on then no change will take effect until power is re-applied.

Table 2a: DIP Switches - Modbus Address

Modbus Address	***Switch 1***	***Switch 2***	***Switch 3***	***Switch 4***
1	OFF	OFF	OFF	OFF
2	ON	OFF	OFF	OFF
3	OFF	ON	OFF	OFF
4	ON	ON	OFF	OFF
5	OFF	OFF	ON	OFF
6	ON	OFF	ON	OFF
7	OFF	ON	ON	OFF
8	ON	ON	ON	OFF
9	OFF	OFF	OFF	ON
10	ON	OFF	OFF	ON
11	OFF	ON	OFF	ON
12	ON	ON	OFF	ON
13	OFF	OFF	ON	ON
14	ON	OFF	ON	ON
15	OFF	ON	ON	ON
16	ON	ON	ON	ON

Table 2b: Baud Rate Settings

Baud Rate	***Switch 5***	***Switch 6***
2400	OFF	OFF
4800	ON	OFF
9600	OFF	ON
19200	ON	ON

Table 2c: Parity Settings

Parity	***Switch 7***	***Switch 8***
None	OFF	OFF
Even	ON	OFF
Odd	OFF	ON
None	ON	ON

Table 3: Jumpers J5 and J6

Comms	***232 (J6)***	***485 (J5)***
RS232	Closed	Open
RS485	Open	Closed

RS232 Modbus Connection
COM 1 is a D9 Female RS232 connection (DCE). If connecting to a DTE D9 Male Port on the Modbus Port of the PLC or RTU then a straight through cable is required.
If connecting to a DCE then a null modem cable is needed.
Jumper J6-232 should be closed and jumper J5-485 open.

RS485 Modbus Connection
Connect the Modbus RS485 network to the screw terminals D1+ and D1-
Jumper J5-485 should be closed and jumper J6-232 open.
An RS485 network termination can be enabled by closing jumper J1. Terminations only need to be done on the ends of long RS485 networks

Troubleshooting
LED's are provided to assist in troubleshooting

Tx2 and Rx2 should flash once every 10 seconds to indicate communications to the Weather Station is good.

If Tx2 is not flashing, check
(a) 12VDC is applied to Vs and COM terminals

If Rx2 is not flashing, check
(a) The serial baud rate on the weather station is set to 19200
(b) The cable connections are OK

Rx1 and Tx1 LEDs indicate communications to the PLC or RTU.

If Rx1 is not flashing check
(a) Jumper J6 is set correctly (see Table 5)
(b) If RS232 connection check if crossover on pins 2 and 3 (Rx and Tx) is needed.
(b) Baud Rate and Parity DIP switches match Baud Rate and Parity of PLC

If Tx1 is not flashing check
(a) Modbus Address DIP switches are correct
(b) Baud Rate and Parity DIP switches match Baud Rate and Parity of PLC