KTA-382 Weather Station Gateway

- **Connects a Davis VantagePro2 or VantageVue to a Modbus Network**
- **2 x Modbus RTU over RS485/232 ports. Also, TCP/IP configuration over ethernet and Wi-Fi**
- **Simple Modbus RTU and TCP/IP configuration using webpage or desktop application**
- **Supports up to 5 simultaneous Modbus TCP masters and 2 simultaneous RTU masters**
- **Various metric/imperial unit conversion settings**
- **Allows for direct weather station configuration**

Overview

The KTA-382 Modbus TCP Weather Station Gateway allows the easy connection of a PLC (Programmable Logic Controller), RTU (Remote Telemetry Unit) or SCADA System to a Davis Instruments Weather Station. Using the Modbus RTU (Binary), or Modbus TCP/IP (Ethernet & Wi-Fi) protocols, 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 KTA-382 Modbus TCP+RTU Weather Station Gateway is a major upgrade to our popular GWY-141 and KTA-282 Modbus- VantagePro2 Gateway. It provides all the functionality of the GWY-141 and KTA-282, with the following additions:

- Supports LOOP1, LOOP2 and HILOWS command – over twice as much data as the KTA-282 (almost 200 registers of weather data)
- Addition of extra serial RTU port. Able to be polled simultaneously with pre-existing port.
- Simultaneous TCP/IP polling over Wi-Fi and Ethernet.
- Provides a method to set up weather station for first use via the gateway
- Build in cloud upload capability (WeatherUnderground by default – custom cloud upload available on request for custom firmware)
- Logging and PoE (power over ethernet) variants (available upon request)

Variants

- **KTA-382 –** Standard version
- **KTA-382L –** Standard + datalogging
- **KTA-382P –** Standard + PoE (power over ethernet)
- **KTA-382LP –** Standard + datalogging + PoE

Quick Access

Device Compatibility

6152C Cabled VantagePro2
6162C Cabled VantagePro2 Plus
6152 Wireless VantagePro2
6162 Wireless VantagePro2 Plus
6153 Wireless Vantage Pro 2 Fan Aspirated
6163 Wireless Vantage Pro 2 Plus Fan Aspirated
6250 Vantage Vue
6316 Wireless Weather Envoy
6316C Cabled Weather Envoy

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Getting Started

Terminology	Reference To
"Weather station"	• Vantage Pro 2 console • Vantage Vue console • Envoy (Wired or Wireless)
"Sensors"	Any weather sensors your weather station communicates with. This is commonly a variety of sensors packaged together as an **Integrated Sensor Suite (ISS)** but can also include: • ISS Plus (ISS + UV & Solar Radiation) • Wireless Temperature Sensor • Temp/Humidity Sensor • Leaf & Soil Moisture/Temp Or individual sensors (not an exhaustive list): • Leaf Wetness • Solar Radiation • UV • Anemometer • Rain Collector
"Weatherlink"	The serial WeatherLink expansion cable. Allows for weather station connection to the KTA-382. Can also be used to update the firmware of your console.
"Gateway"	The KTA-382 Modbus Weather Station Gateway
"Controller"	The Modbus device you are using to poll the KTA-382.
"Weather station EEPROM"	Persistent memory held inside the weather station used to store factory calibration values, location specific data, and other configuration values. It is this memory that is set during the setup of your weather station for first use (latitude, longitude, elevation, etc).

Table 1: Davis Instruments Terminology

Weather Station Set-up

Begin by assembling your weather station and sensors, using the documentation provided by Davis. You will need to fit the **WeatherLink** in this step – **see figure 1**.

This is now the best time to setup your weather station for the first use. The Davis documentation will detail this process. If you have a weather station with a screen you can follow the prompts after entering "setup" mode, otherwise the setup process can be done by connecting to a PC. The KTA-382 also offers a method to setup your weather station by directly writing to registers. However, it is designed for advanced users to alter calibration values and is not recommended for first use configuration. The following values are typically set during this procedure:

- IDs, and retransmission of wireless sensors (if applicable).
- Date and time
- Latitude and longitude
- Daylight savings
- Elevation
- Wind cup size (large is standard)
- Rain collector size (US models: 0.01 in, UK models: 0.2 mm. This will typically only need to be changed if a metric adapter is fitted to a US unit)
- Rain season start
- Serial Baud Rate (ensure it is at default: 19200.)

Continue the set-up process by connecting all necessary cabling. A generic set up is shown in the diagram below (depending on your particular product, connections may differ slightly).

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Figure 1: Typical Hardware Set-up

Connection	Description
VIN Power +	Power supply Positive: 9-36VDC
GND Power -	Power supply Negative: 0V (Ground)
DIO0	Digital In/Out 1
DIO1	Digital In/Out 2
USB-C & Female DE-9	Serial/RTU communication port 1 (DE-9 and USB-C are mirrored)
D+	Serial port 2 – RS-485 Data +
D-	Serial port 2 – RS-485 Data
Male DE-9	Connection to Davis Weather Station
Ethernet Port	Port for TCP/IP polling over ethernet

Table 2: Connections to KTA-382

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LED	Function
1 **Green (Tx)** **Red (Rx)**	LED 1 (furthest from edge of PCB) **During Startup:** Wi-Fi initialization check (green = success, red = failure). **NO LIGHT = Access point mode (FACTORY DEFAULT)** **After Startup:** Serial port 1 polling (USB-C and DE-9) indicator
2 **Green (Tx)** **Red (Rx)**	**During Startup:** Ethernet initialization check (green = success, red = failure) **Will flash red and green if the ethernet port is not connected** (in this case the initialization is still successful) **After Startup:** Serial port 2 polling (D+ & D- pins) indicator
3 - Green and red	**During Startup:** SD card initialization check **(LOGGING VARIANT)** (**green = success, red = failure/SD not inserted**) **After Startup:** Weather station polling indicator
Status (Blue)	Status LED (Closest to edge of PCB) **During Startup:** OFF **After Startup:** ON

Table 3: KTA-382 LED Functions

Provide power to the KTA-382 via the VIN and GND pins or by the USB-C port. With nothing else connected, the green LEDs will flash, then the initialization checks will commence. LEDS, 1, 2 and 3 should light up green in succession if all initializations are successful. Once the gateway begins main function (post initialization) the blue LED will turn on to indicate initialization is finished.

Ensure you have connected the Davis Weather Station via the male DE-9 connector, then LED 3 will begin flashing if communication to the weather station has been successfully established.

Configuring Modbus

Modbus RTU

The Modbus serial settings can be adjusted from within the KTA-382 webpage. Each method allows you to live update the baud-rate, parity, data-bits and stop-bits without a power cycle. Both serial ports are customizable to allow you to interface communication between any desired, serial capable devices.
How to access the webpage is detailed on page 8.

If you adjust the slave address, you must power cycle for both ports to initialize to your new address. Otherwise, only the specified port will re-initialize.

As seen in figure 2. Each serial port is configurable via the menu on the webpage. Ensure ALL of the values you have input are as desired, then press the “Write Serial settings to gateway” button. Give the gateway a few moments to receive the request, then the serial settings will be set (and stored for next power cycles) to the desired values.

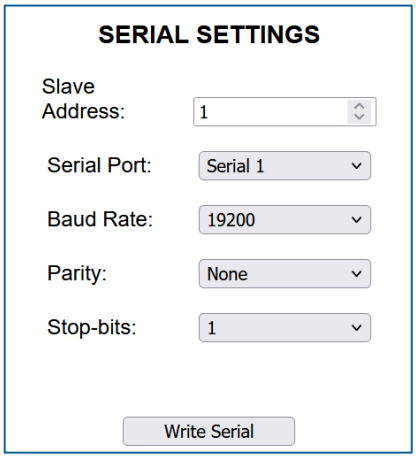

Figure 2: KTA-382 Serial Configuration

Holding Register Address 40,000+	No. of Registers	Description	Notes
101	1	Commit Serial Params to Gateway (PORT 0)	**1**
102	1	Commit Serial Params to Gateway (PORT 1)	**1**
128	1	Slave Address **DEFAULT = 1**	**(0-254)**
129	1	Port 0 Baud rate **DEFAULT = 19200**	**0 = 1200** **1 = 2400**

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			2 = 4800 **3 = 9600** **4 = 19200** **5 = 38400** **6 = 57600** **7 = 115200**
130	1	Port 0 Parity **DEFAULT = NONE**	**0 = None** **1 = Even** **2 = Odd**
131	1	Port 0 Stop-bits **DEFAULT = 1**	**1 = 1** **2 = 2**
132	1	Port 0 Data-bits	**8 = 8**
133	1	Port 1 Baud rate	**See Port 0**
134	1	Port 1 Parity	**See Port 0**
135	1	Port 1 Stop-bits	**See Port 0**
136	1	Port 1 Data-bits	**See Port 0**

Table 4: Serial Parameters from Modbus Registers

1. *The commit serial params registers act the same as the commit IP register. Using the serial data stored in registers 129 to 136, these will be mapped to the relevant serial port of the gateway. These are stored in EEPROM, and will persist a power cycle.*
2. *Registers 129 – 136 contain the individual serial parameters for each port. Both port 0 and 1 store the serial parameters identically. However, they can be configured separately.*

Modbus TCP/IP – Wi-Fi and Ethernet

The KTA-382 can be polled via Wi-Fi (port 80) and Ethernet (502). By default, the KTA-382 produces its own Wi-Fi network for your configuration. If you want the KTA-382 to connect to your local Wi-Fi network, the configuration must be done from the webpage.

Via Webpage:

To communicate over a TCP/IP network, by factory default, the KTA-382 is initialized in access point (AP) mode. This means it will broadcast its own Wi-Fi network that you can connect to via a PC or mobile phone. The KTA-382 is also capable of connecting to a Wi-Fi network. In order to connect the device to a network please follow the steps below;

1. *Connect to the access point (**Wi-Fi SSID: KTA 382 ACCESS POINT**)*
2. *Navigate to the webpage (**by default 192.168.4.1, or 192.168.1.100 if connected to network**)*
3. *The webpage provides a Wi-Fi SSID and Password – Input the relevant network you want to connect to*
    a. *The IP address of the KTA-382 within the network – set by user. **(Default = 192.168.1.100)***
    b. *The subnet mask of the network – set by user. **(Default = 255.255.255.0)***
    c. *The default gateway of the network – set by user. **(Default = 192.168.1.1)***
    d. *The DNS address of the network – set by user. **(Default = 192.168.1.1)***
4. *Allow 10 seconds for the device to reset and establish a connection. It may take longer if the connection strength is poor. A power cycle is recommended but not required.*
5. ***You now must connect to NEW IP 192.168.1.100 by default***
6. *Once the device has connected; the Modbus TCP/IP port is 502 and the webserver HTTP port is 80. The default initial IP address will be 192.168.1.100. This can be changed from the application or the website.*

Configuring Cloud Upload

The standard model of the KTA-382 offers cloud upload functionality**. It can be configured on the webpage (exhibit 9).** By default, every 10 minutes, the gateway will attempt to upload current weather data to https://www.wunderground.com/. The KTA-382 will only upload upon successful communication with the Davis Console and 10 minutes have passed, or power is cycled.
NOTE the uploads will be unsuccessful until you have configured your WeatherUnderground profile.

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WeatherUnderground Configuration

1. *Ensure the KTA-382 is connected to an internet capable Wi-Fi network* ***(ENSURE DNS IS VALID, e.g.8.8.8.8).***
2. *Navigate to https://www.wunderground.com/*
3. *Sign in or create a new account.*
4. *Navigate to "My Devices" by clicking "My Profile" in the top right of the webpage.*
5. *Select "Add New Device"*
    a. *Select a device type – "Davis Vantage… pro, pro2 etc"*
    b. *Enter the device location*
    c. *Enter remaining details for WeatherUnderground – (altitude, surface type, etc…)*
6. *Upon finishing the configuration, navigate back to "My Devices"*
7. ***WeatherUnderground will allocate a PWS ID and Key –*** *see figure 3*
8. ***Input your PWS ID and key into the KTA-382 webpage***

Name	Location	Status	ID	Key	Type
Ocean Controls Vantage Pro 2 TEST 2	Melbourne (Seaford), AU	Offline	IMELBO5011	ZQBnisQ5	PWS

Figure 3: WeatherUnderground Device Example

Holding Register Address 40,000+	No. of Registers	Description	Notes
79	1	Cloud Upload Status	1

Table 5: Cloud Upload Status Register

1. *The information stored in this register can be used as troubleshooting for the cloud upload process (Weather Underground by default). The value stored in here is the HTTP response after the KTA-382 sends the upload request. If the value does not match the following set of variables, search online for HTTP response codes, which will provide more extensive troubleshooting.* ***See below for standard HTTP code.***
    a. *0 = unconfigured (you haven't put your PWS ID and password into the gateway)*
    b. *1 = connection issue (likely DNS or some issue with your network)*
    c. *200 = Successful data upload*
    d. *401 = Invalid PWS ID or password*

If you wish to upload your data to a cloud system other than WeatherUnderground. Custom firmware development is available – contact us directly for a quote.

KTA-382 Webpage

By default, the KTA-382 comes equipped with a webpage as a method of wireless configuration. Due to certain limitations, some configuration is limited to the webpage, and some to the PC application. The main configurations limited to the webpage are;

- SSID and Password input to connect the KTA-382 to a Wi-Fi gateway
- Weather Underground PWS ID and Password – for cloud weather data upload
- Serial Port parameters

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Similarly**, if you have purchased the logging variant, the data log is ONLY downloadable via the webpage** – or you can access the SD card by removing the board from the enclosure.
Please refer to figure 4 and table 6 for a breakdown of each webpage function.

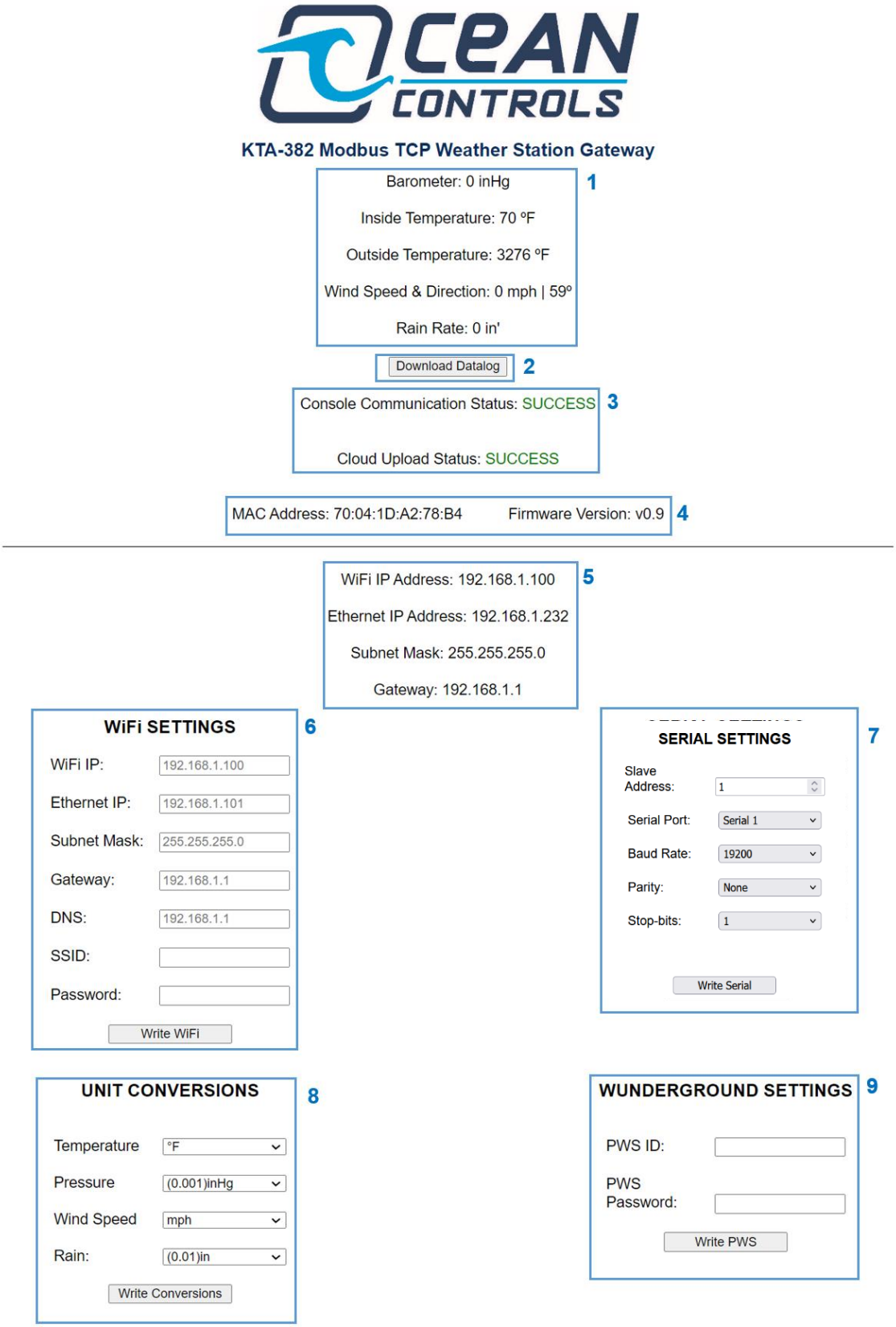

Figure 4: KTA-382 Webpage

Index	Description
1 – Live Data Values	Live updated data of the relevant values
2 – Download Datalog	Click this button to download the datalog.csv file. **Logging variant required**

3 – Communication status's	Status of the KTA-382 to your weather station, also the cloud upload status
4 – Device & Firmware data	MAC address and current firmware version
5 – Current IP address's	Currently assigned IP addresses.
6 – Wi-Fi Settings	Here you can configure the IP addresses (DEVICE WILL SET TO DEFAULT VALUES IF LEFT BLANK) as well as connect the KTA-382 to a Wi-Fi network by entering the SSID and PASS inputs.
7 – Serial Settings	The serial settings for the RTU ports
8 – Unit Conversion Settings	Configure Temperature, pressure, speed and rain units
9 – Cloud Upload	Input your PWS (personal weather station) online account details. Weather Underground by default but any custom cloud can be done with a custom firmware for an extra charge

Table 6: KTA-382 Webpage Explanation

The webpage server will always be hosted on the Wi-Fi IP address, hence if the IP address is 192.168.1.100, the URL is http://192.168.1.100. Any new IP configuration will automatically change the hosted IP address of the webpage.

The IP address data is stored and read directly from the Modbus registers as below.

Register	IP Octet
80	1st octet IP Address
81	2nd octet IP Address
82	3rd octet IP Address
83	4th octet IP Address
84	1st octet Subnet Mask
85	2nd octet Subnet Mask
86	3rd octet Subnet Mask
87	4th octet Subnet Mask
88	1st octet Gateway IP
89	2nd octet Gateway IP
90	3rd octet Gateway IP
91	4th octet Gateway IP
92	1st octet DNS IP
93	2nd octet DNS IP
94	3rd octet DNS IP
95	4th octet DNS IP
96	1st octet Ethernet IP
97	2nd octet Ethernet IP
98	3rd octet Ethernet IP
99	4th octet Ethernet IP
100	Commit IP values to gateway (1 to commit, 2 to reset all IPs to factory default)

Table 7: Modbus TCP/IP, Wi-Fi and Ethernet Configuration Registers

2. *Registers 80-83 contain each respective octet of the **Wi-Fi IP** address. This is the address that the webpage is hosted on.*
3. *Registers 84-87 contain the octets of the **subnet mask** for the Wi-Fi network.*
4. *Registers 88-91 contain the octets of the **default gateway** for the Wi-Fi network.*
5. *Registers 92-95 contain the **DNS IP** – the only time this IP is used is for cloud data upload.*
6. *Registers 96-99 contain the **Ethernet IP** – If you poll the gateway using TCP over ethernet, this is the IP to poll to.*
7. If the commit IP register is written 1, then all the current values within the IP registers will be set to the config of the gateway, storing the new IP's after new power cycles. **If 2 is written to this register, it will restore the factory default IP's**.

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KTA-382 PC Application

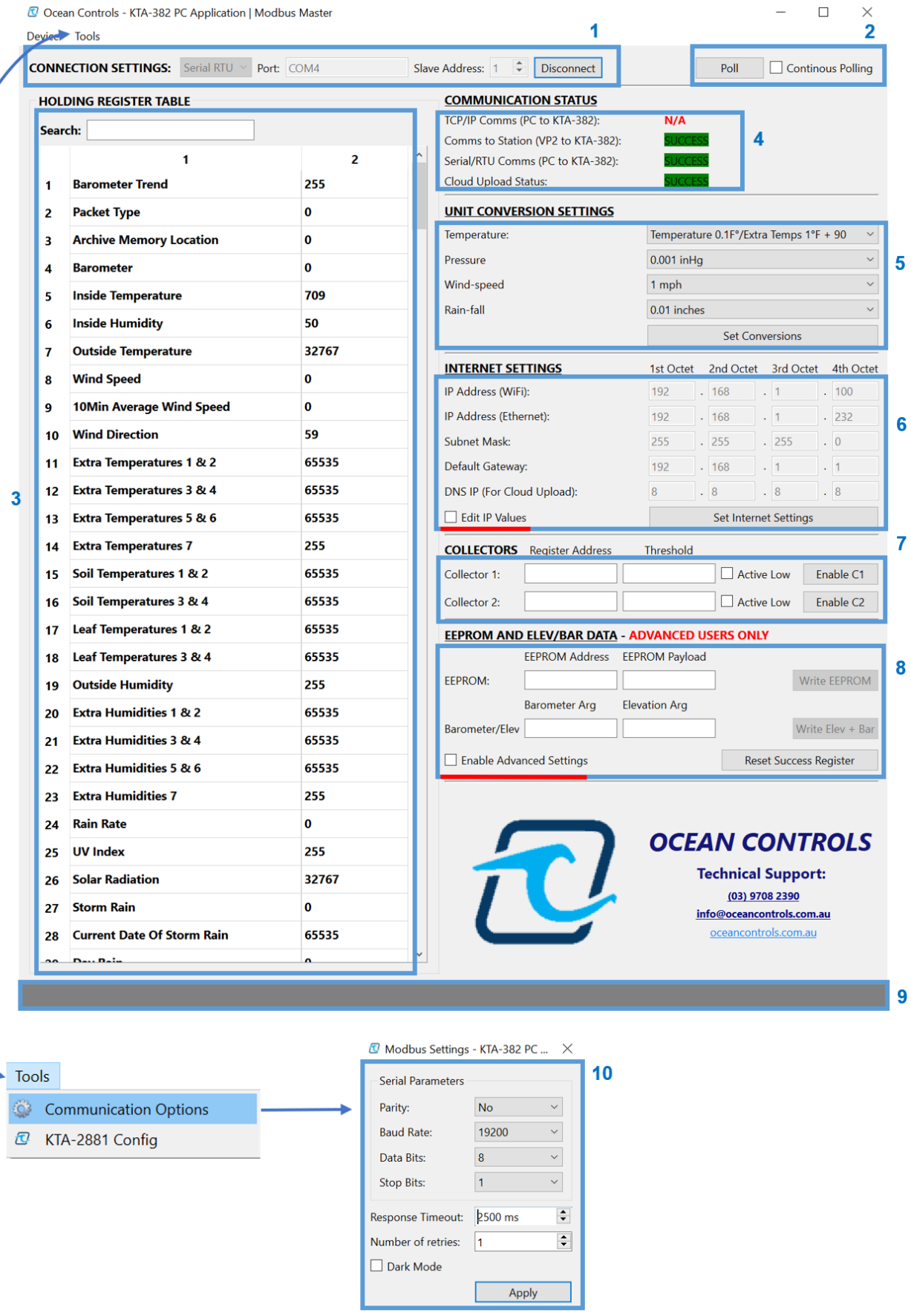

Figure 5: KTA-382 PC Application

Index	Description
1 – Connection Settings	Connection settings. Here you can configure to use RTU or TCP/IP comms. Also you can select the COM port, IP address and slave address. At the end is the connect/disconnect button to open/close communication. **See section 10 for Modbus communication parameters.**
2 – Polling	Polling. Press the poll button to poll a single time. Check the continuous polling box to poll at a defined interval (check 10 to configure interval)
3 – Register Table	Holding Register table. Here you will be able to see all the registers with a description and value attached. This table will be blank until a successful poll has occurred.
4 – Communication Status	Communication status. Here you can see the TCP/IP or RTU status. As well as the communication status to the weather station and the cloud upload status.
5 – Unit Conversion Settings	Here you can configure the desired units to be written to the registers (these settings will survive a power cycle) **NOTE the hilows packet data is not affected by the unit conversions**
6 – IP settings	Here you can manually select all the relevant IP addresses of the KTA-382. This will survive a power cycle.
7 – DI/Os	Here you can configure the conditions for the O/C outputs. These are located on the DIO pins. Select a register address, threshold and active high or low, then press the button to write.
8 – EEPROM/BAR & ELEV Writing	**ADVANCED USERS ONLY.** Here you can configure the factory settings of the weather station. **An incorrect write here could result in permanent issues**. Refer to the Davis manual to see how these commands work.
9 – Status Bar	The status bar will show any error indication with the communication from your PC to the KTA-382. This can include Modbus error codes and more to help with troubleshooting an invalid connection.
10 – Detailed Connection Settings	Here you can directly configure the Modbus communication parameters, ensure they match with the relevant port you have chosen.

Table 8: KTA-382 PC Application Explanation

Weather Station Data

The gateway operates as a Modbus slave. **To access the holding registers in the gateway, the PLC or RTU/TCP device must be configured as a Modbus Master**. Using Modbus Function 0x03, the master can read the Holding Registers.

LOOP 1 Data

Data returned by the loop 1 command. All supported Davis Instruments hardware will populate these fields.

Holding Register Address 40,000+	No. of Registers	Description	Multiplier	Units	Notes
1	1	Indicates the current 3-hour barometer trend.			1
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	0.1	mbar	
5	1	Inside Temperature	0.1	°C	
6	1	Inside Humidity	1	%	
7	1	Outside Temperature	0.1	°C	
8	1	Wind Speed	1	kph	
9	1	10Min Average Wind Speed	1	kph	
10	1	Wind Direction	1	degrees	
11	4	7 Extra Temperatures	1	°C	
15	2	4 Soil Temperatures	1	°C	
17	2	4 Leaf Temperatures	1	°C	
19	1	Outside Humidity	1	%	

20	4	7 Extra Humidity Stations	1	%	
24	1	Rain Rate	0.1	mm/hour	2
25	1	UV Index	0.1		
26	1	Solar Radiation	1	W/m2	
27	1	Storm Rain	0.1	mm	2
28	1	Current Date of Storm Rain	1		3
29	1	Day Rain	0.1	mm	2
30	1	Month Rain	0.1	mm	2
31	1	Year Rain	0.1	mm	2
32	1	Day ET	0.1	mm	2
33	1	Month ET	1	mm	2
34	1	Year ET	1	mm	2
35	2	4 Soil Moistures	1	centibar	
37	2	4 Leaf Wetness, 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	
54	1	Wet Bulb	0.1	°C	4
60	1	Comms Status (1=OK, 0=Fault)	1		5

Table 9: Loop 1 Data Register Mapping

1. *The three-hour barometer trend will show one of the following:*

Value	Meaning
-60 (196 as an unsigned byte)	Falling Rapidly
-20 (236 as an unsigned byte)	Falling Slowly
0	Steady
20	Rising Slowly
60	Rising Rapidly
80 (ASCII 'P')	Rev A firmware; no trend info is available. The WeatherLink cable can be used to update the weather station to the latest firmware
Any other value	The weather station doesn't have the 3 hours of barometer data required to calculate trend data

Table 10: 3-Hour Barometer Trend Description

2. *The start date of current storm is represented as follows, bit 15 to bit 12 is the month, bit 11 to bit 7 is the day and bit 6 to bit 0 is the year offset by 2000.*

3. *Holding Register 60 contains the communications status, which indicates if the Gateway is receiving data from the Weather Station.*

4. *Wet bulb is not NOAA accurate, but rather an estimation based on temperature and dewpoint. Use as an indication only.*

5. *The Comms status located at register 60, shows the CRC check status of the LOOP1 data. If this CRC is passed then communication has been successfully withdrawn from the VP2. This likely means LOOP2 and HILOWS data is also correct, but does not guarantee that.*

LOOP 2 Data

Only recent Davis Instruments hardware (Vantage Pro 2 firmware V1.9 or later, Vantage Vue) will return the loop 2 command with valid data. Older hardware will either not respond or respond with invalid values. The WeatherLink cable can be used to update an older weather station with this recent firmware.

Holding Register Address 40,000+	No. of Registers	Description	Multiplier	Units	Notes
61	1	2Min Wind Speed	0.1	kph	
62	1	10Min Wind Gust	1	kph	
63	1	Wind Direction for 10Min Gust	1	degrees	
64	1	Dew Point	1	°C	
65	1	Heat Index	1	°C	
66	1	Wind Chill	1	°C	
67	1	THSW Index	1	°C	
68	1	Last 15Min Rain	0.1	mm	
69	1	Last Hour Rain	0.1	mm	
70	1	Last 24 Hours Rain	0.1	mm	
71	1	Barometric Reduction Method			1
72	1	User Entered Barometric Offset	0.1	mbar	
73	1	Barometric Calibration Number	0.1	mbar	
74	1	Barometric Sensor Raw Reading	0.1	mbar	
75	1	Absolute Barometric Pressure	0.1	mbar	
76	1	Altimeter Setting	0.1	mbar	
77	1	Index to Minute Within the Hour			2
78	1	Loop 2 Comms Status			3

Table 11: Loop 2 Data Register Mapping

1. *The barometric reduction method applies corrections to the barometer to get a more accurate reading. The raw pressure is affected by other weather events such as temperature, humidity, and elevation. The options are:*

2. *Index to the minute within the hour holds the current progress of the hour used for rain rate calculations – from 0 to 59.*

3. *Holding register 78 contains the status of the loop 2 command. If 1, loop 2 is being successfully received. To obtain the loop 2 data, the hardware must be either a Vantage Pro2 (Firmware revision 1.90 or later) or a Vantage Vue.*

Reading	Barometric Reduction Method
0	User offset
1	Altimeter Setting
2	NOAA Bar Reduction (for Vantage Pro 2 this is the default and cannot be changed)

Table 12: Barometric Reduction Method Description

Functionality

Unit Conversions

The units of the readings can be changed by writing to the Modbus holding registers shown in table 13. The following table shows the multiplier and unit. For example, if a 1 was written to holding register 108 then the atmospheric pressure readings would be in mmHg and have to be multiplied by 0.1.

You can set the conversions via the PC application, webpage, or by manually manipulating the modbus registers. After power cycle, write the new conversion settings in the “conversion registers” (108-111), then write 1 to the “commit conversions” register. This will save the new values in EEPROM.

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Holding Register Address 40,000+	No. of Registers	Description	Conversion	Registers Affected
107	1	Commit Conversions	1 = Commit	108, 109, 110, 111
108	1	Temperature Conversion setting	0 = 0.1°F 1 = 0.1°C	5, 7
108	1	Extra Temperatures	0 = 1°F+90 1 = 1°C+50	11, 12, 13, 14, 15, 16, 17, 18
109	1	Pressure Conversion setting	0 = 0.001 inHg 1 = 0.1 mmHg 2 = 0.1 mb 3 = 0.001 atm	4
110	1	Wind speed conversion	0 = 1 mph 1 = 1 kph 2 = 1 knots 3 = 1 m/s 4 = 1 ft/s	8, 9
111	1	Rain and rain rate conversion	0 = 0.01 in 1 = 0.1 mm	24, 27, 29, 30, 31, 32, 33, 34

Table 13: Unit Conversion Modbus Register Mapping

DI/O (Digital IN/OUT)

NOTE: The standard KTA-382 ONLY comes with digital INPUTS by default. Call or email us for digital OUTPUT capability

Holding Register Address 40,000+	No. of Registers	Description	Notes
55	1	DI/O1 State	1
56	1	DI/O2 State	"
57	1	DIGITAL PIN MODE	2 **Default = 1**
120	1	DI/O 1 register to monitor	3
121	1	DI/O 1 threshold	4
122	1	DI/O 1 Direction. 0 = down, 1 = up	5
123	1	DI/O 2 register to monitor	3
124	1	DI/O 2 threshold	4
125	1	DI/O 2 Direction. 0 = down, 1 = up	5

Table 14: DI/O Port Modbus Configuration Registers

1. *As the pins are **inputs by default,** registers 55 and 56 will represent the state of each pin. 0 = LOW, 1 = HIGH. **If these are left floating, they will read HIGH.** So, ensure they are connected to a ground for a valid LOW state.*
2. *If this register is set to 0 (default), the registers 55 and 56 will reflect the state of the input pins **DRY CONTACT** – (0 for LOW, 1 for HIGH). If this register is set to 1, the DIO pins will be in Alarm Threshold mode. Detailed below.*
3. *Held in register 120 and 123 are the O/C register to monitor. This is the target register you want to monitor, in order to **set alarms if the monitor value is above or below the threshold (2).***
4. *Within registers 121 and 124 is the threshold. Depending on the value in registers 122 (or 125) the O/C will close when the register to monitor (120 or 123) is above or below this threshold.*
5. *Registers 122 and 125 set an active high or low for their corresponding monitor register and threshold.*

These pins CANNOT be used to power another device. They are ONLY intended as a digital signal output.

Symbol	Parameter	Min	Max
V_{OH}	**High-level voltage output**	**1.01V**	**1.02V**
V_{OL}	**Low-level voltage output**	**0V**	**0.33V**

V_{IH}	**High-level voltage input**	**~2V**	**3.3V**
V_{IL}	**Low-level voltage input**	**0V**	**~0.5V**

Table 15: DI/O Port Voltage Input Threshold

Factory Reset

To factory reset the KTA-382;

1. *Remove the top of the enclosure, to expose the PCB.*
2. *Turn DIP switch 4 SW4 on.*
3. *Press the 'reset' button, which will simulate a power cycle.*
4. *All LED's will turn red on power up, you must wait 10 seconds with SW4 on.*
5. *Once red LED's flash then stop, factory reset has finished.*
6. *Ensure you turn SW4 off after a successful reset.*

The factory reset sequence will put the device into access point mode **(IP = 192.168.4.1),** all serial settings will be set **to default (Baud = 19200, Stop-bits = 1, Parity = None),** and conversions will be set to default **(℉, inHg, Mph, inches).**

Troubleshooting

Webpage/IP Issue

If you are unable to navigate to the webpage or poll using Modbus TCP/IP follow the below methodology to diagnose the issue.

1. Open the KTA-382 PC application **(see page 10)**
2. Connect a computer to the KTA-382 via the USB-C port
3. In the PC application, connect to the valid COM port, and poll the device.
4. Located in the "Internet Settings" you will see the currently assigned IP's
5. Check all the IP's match the network you have connected the gateway too
6. If the IP is 192.168.4.1, you must connect to the Wi-Fi network broadcasted from the KTA-382.
7. If you are still unable to navigate to the webpage, factory reset the device

Modbus RTU Issue

1. In the event you have an RTU issue, try to connect with the other port, using factory settings.
2. Read the "Port Settings in the Modbus registers" via the PC application.
3. If you are completely unable to access communication via either port, factory reset your device
4. Reconnect using factory defaults

Complete Holding Register Listing

Holding Register Address 40,000+	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	0.1	mbar
5	1	Inside Temperature	0.1	℃
6	1	Inside Humidity	1	%

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7	1	Outside Temperature	0.1	°C
8	1	Wind Speed	1	kph
9	1	10Min Average Wind Speed	1	kph
10	1	Wind Direction	1	degrees
11	4	7 Extra Temperatures	1	°C
15	2	4 Soil Temperatures	1	°C
17	2	4 Leaf Temperatures	1	°C
19	1	Outside Humidity	1	%
20	4	7 Extra Humidity Stations	1	%
24	1	Rain Rate	0.1	mm/hour
25	1	UV Index	0.1	
26	1	Solar Radiation	1	W/m2
27	1	Storm Rain	0.1	mm
28	1	Current Date of Storm Rain	1	
29	1	Day Rain	0.1	mm
30	1	Month Rain	0.1	mm
31	1	Year Rain	0.1	mm
32	1	Day ET	0.1	mm
33	1	Month ET	1	mm
34	1	Year ET	1	mm
35	2	4 Soil Moistures	1	centibar
37	2	4 Leaf Wetness, 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
54	1	Wet Bulb	0.1	°C
55	1	DIO1 State		
56	1	DIO2 State		
57	1	Unused		
58	1	Unused		
59	1	Unused		
60	1	Comms Status (1=OK, 0=Fault)	1	
61	1	2Min Wind Speed	0.1	kph
62	1	10Min Wind Gust	1	kph
63	1	Wind Direction for 10Min Gust	1	degrees
64	1	Dew Point	1	°C
65	1	Heat Index	1	°C
66	1	Wind Chill	1	°C
67	1	THSW Index	1	°C
68	1	Last 15Min Rain	0.1	mm
69	1	Last Hour Rain	0.1	mm
70	1	Last 24 Hours Rain	0.1	mm
71	1	Barometric Reduction Method		
72	1	User Entered Barometric Offset	0.1	mbar
73	1	Barometric Calibration Number	0.1	mbar
74	1	Barometric Sensor Raw Reading	0.1	mbar
75	1	Absolute Barometric Pressure	0.1	mbar
76	1	Altimeter Setting	0.1	mbar
77	1	Index to Minute Within the Hour		
78	1	Loop 2 Comms Status		
79	1	Cloud Upload Status		
80	1	IP Address 1st octet		

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81	1	IP Address 2nd octet		
82	1	IP Address 3rd octet		
83	1	IP Address 4th octet		
84	1	Subnet Mask 1st octet		
85	1	Subnet Mask 2nd octet		
86	1	Subnet Mask 3rd octet		
87	1	Subnet Mask 4th octet		
88	1	Default Gateway 1st octet		
89	1	Default Gateway 2nd octet		
90	1	Default Gateway 3rd octet		
91	1	Default Gateway 4th octet		
92	1	DNS 1st octet		
93	1	DNS 2nd octet		
94	1	DNS 3rd octet		
95	1	DNS 4th octet		
96	1	Ethernet IP 1st octet		
97	1	Ethernet IP 2nd octet		
98	1	Ethernet IP 3rd octet		
99	1	Ethernet IP 4th octet		
100	1	Commit IP Values to Gateway		
101	1	Commit Serial Params to Gateway (PORT 0)		
102	1	Commit Serial Params to Gateway (PORT 1)		
103	1	Product Code		
104	1	Firmware Version		
105	1	Unused		
106	1	Unused		
107	1	Commit Conversions		
108	1	Temperature Conversion setting		
109	1	Pressure Conversion setting		
110	1	Wind speed conversion		
111	1	Rain and rain rate conversion		
112	1	Unused		
113	1	WS EEPROM write: address		
114	1	WS EEPROM write: payload		
115	1	WS EEPROM write: send		
116	1	WS elevation & barometer write: barometer argument		
117	1	WS elevation & barometer write: elevation argument		
118	1	WS elevation & barometer write: send		
119	1	Weather station memory write success		
120	1	DI/O 1 register to monitor		
121	1	DI/O 1 threshold		
122	1	DI/O 1 Direction. 0 = down, 1 = up		
123	1	DI/O 2 register to monitor		
124	1	DI/O 2 threshold		
125	1	DI/O 2 Direction. 0 = down, 1 = up		
126	1	Rain Rate Resolution		
127	1	Rain Rate Direct		
128	1	Slave Address		
129	1	Port0 Baud rate		
130	1	Port0 Parity		
131	1	Port0 Stop-bits		
132	1	Port0 Data-bits		
133	1	Port1 Baud rate		
134	1	Port1 Parity		
135	1	Port1 Stop-bits		
136	1	Port1 Data-bits		
137	1	Daily Low Barometer		
138	1	Daily High barometer		
139	1	Month Low Bar		
140	1	month High bar		

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141	1	Year Low Barometer		
142	1	Year High Barometer		
143	1	Time of Day Low Bar		
144	1	Time of Day High Bar		
145	1	Daily Hi Wind Speed		
146	1	Time of Hi Speed		
147	1	Month Hi Wind Speed		
148	1	Year Hi Wind Speed		
149	1	Day Hi Inside Temp		
150	1	Day Low Inside Temp		
151	1	Time Day Hi In Temp		
152	1	Time Day Low In Temp		
153	1	Month Low In Temp		
154	1	Month Hi In Temp		
155	1	Year Low In Temp		
156	1	Year Hi In Temp		
157	1	Day Hi In Hum		
158	1	Day Low In Hum		
159	1	Time Day Hi In Hum		
160	1	Time Day Low In Hum		
161	1	Month Hi In Hum		
162	1	Month Low In Hum		
163	1	Year Hi In Hum		
164	1	Year Low In Hum		
165	1	Day Low Out Temp		
166	1	Day Hi Out Temp		
167	1	Time Day Low Out Temp		
168	1	Time Day Hi Out Temp		
169	1	Month Hi Out Temp		
170	1	Month Low Out Temp		
171	1	Year Hi Out Temp		
172	1	Year Low Out Temp		
173	1	Day Low Dew Point		
174	1	Day Hi Dew Point		
175	1	Time Day Low Dew Point		
176	1	Time Day Hi Dew Point		
177	1	Month Hi Dew Point		
178	1	Month Low Dew Point		
179	1	Year Hi Dew Point		
180	1	Year Low Dew Point		
181	1	Day Low Wind Chill		
182	1	Time Day Low Chill		
183	1	Month Low Wind Chill		
184	1	Year Low Wind Chill		
185	1	Day High Heat		
186	1	Time of Day High Heat		
187	1	Month High Heat		
188	1	Year High Heat		
189	1	Day High THSW		
190	1	Time of Day High THSW		
191	1	Month High THSW		
192	1	Year High THSW		
193	1	Day High Solar Rad		
194	1	Time of Day High Solar		

Table 16: Complete Modbus Holding Register Listing

Note that the addresses in table 16, as per the Modbus protocol, begin from 40,000+ inclusive of 0. Meaning register 10 for example (in the PC application), is a system address of 40,009.

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Appendix B

If there is a communication problem, the sensor is unplugged or failed, you would see the reading of 255 (0xFF) for the extra temperature/humidities/soil/leaf stations. The “extra” stations have each datapoint stored in the respective 8-bits of each register, hence will read 65535 (0xFFFF).

11	Extra Temperatures 1 & 2	65535	→ 0xFFFF
12	Extra Temperatures 3 & 4	65535	
13	Extra Temperatures 5 & 6	65535	
14	Extra Temperatures 7	255	→ 0xFF
15	Soil Temperatures 1 & 2	65535	
16	Soil Temperatures 3 & 4	65535	
17	Leaf Temperatures 1 & 2	65535	
18	Leaf Temperatures 3 & 4	65535	
19	Outside Humidity	255	
20	Extra Humidities 1 & 2	65535	
21	Extra Humidities 3 & 4	65535	
22	Extra Humidities 5 & 6	65535	
23	Extra Humidities 7	255	

Leaf/Soil Stations (Register 15-18, and 35-38)

Description	16-bit signed value	In HEX	Explanation
Both Sensors (wet and dry) connected	15	0x000F	• 0x00 is 0, this means sensor 2 is connected and very dry • 0x0F is 15, this means sensor 1 is connected and very wet
Left (wet) sensor disconnected, right (dry) connected	255	0x00FF	• 0x00 is 0, this means sensor 2 is connected and very dry • 0xFF is 255, this means sensor 1 is not connected, an error value is shown
Right (dry) disconnected, left (wet) connected	-241	0xFF0F	• 0xFF is 255, error, sensor 2 is not connected • 0x0F is 15, sensor 1 is connected and very we
Both sensors disconnected	-1	0xFFFF	• 0xFF is 255, error, sensor 2 is not connected • 0xFF is 255, error, sensor 1 is not connected
Both connected and both wet	3855	0x0F0F	• 0x0F is 15, sensor 2 is connected and very wet • 0x0F is 15, sensor 1 is connected and very wet

Extra Humidity Stations (Register 20-23)

This field supports seven extra humidity stations, the humidity readings of each station would be one byte in length in %.

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Description	16-bit signed value	In HEX	Explanation
Extra Humidities 1&2	2650	0x0A5A	Sensor 2: 10%RH Sensor 1: 90%RH

Forecast Icon (Register 50)

Field	Bit#
Rain	0
Cloud	1
Partly Cloudy	2
Sun	3
Snow	4

Here are some possible examples forecast icon values:

Decimal Value	Hex Value	Segments Shown	Forecast
2	0x02	Cloud	Mostly Cloudy
3	0x03	Cloud + Rain	Mostly Cloudy, rain within 12 hours
6	0x06	Partial sun + Cloud	Partly Cloudy
7	0x07	Partial sun + Cloud + Rain	Partly Cloudy, rain within 12 hours
8	0x08	Sun	Mostly Clear
18	0x12	Cloud + Snow	Mostly Cloudy, snow within 12 hours
19	0x13	Cloud + Rain + Snow	Mostly Cloudy, rain or snow within 12 hours
22	0x16	Partial Sun + Cloud + Snow	Partly Cloudy, snow within 12 hours
23	0x17	Partial Sun + Cloud + Rain + Snow	Partly Cloudy, rain or snow within 12 hours

Forecast Rule Number (Register 51)

See the "*Forecast Rule Number.pdf*", which can be downloaded from https://oceancontrols.com.au/KTA-382.html?category_id=499#product-details-tab-Downloads_1