WeatherDuck: Serial Port Climate Monitor

Remote PC Environment Monitor

A simple, low-cost way to monitor remote computer rooms or cabinets, the WeatherDuck plugs directly into the PC serial port and reports temperature, humidity, light level, air flow and the door position status. Remote sensors and a camera can be added.

All sensors are internal (external magnetic-type door sensors are required to sense door position).

The WeatherDuck uses serial port power: no external "wall-wart" supply is required. The matchbox-sized device can be located up to 15' away by use of a serial port extender cable.

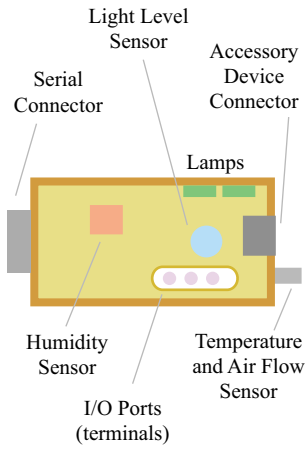
External temperature sensors can easily be added. The sensors connect to the WeatherDuck using RJ-11 telephone-type connectors and can be located hundreds of feet from the WeatherDuck. Typical installations have three Remote Temperature Sensors for monitoring room temperature, air conditioning outlet temperature (check for evaporator freezing or refrigerant loss) and the "hot spot" in a computer cabinet.

The PowerEgg accessory continuously monitors volts, amps, power factor, wattage plus low and high volts. Additionally, the amount of power consumed (kWh) is continuously calculated in the PowerEgg which can be used for sub-net power billing.

Comprehensive Software Supplied

Data can be viewed via a Web page, Excel™ spreadsheets, Telnet, and Simple Network Monitoring Protocol (SNMP). When viewed through the Web format, a variety of graphs and real-time data can be viewed.

Internal Sensors



A rugged metal housing contains the circuitry and sensors.

Self-contained Monitor

- *Temperature, humidity, air flow, light level, door open - all use internal sensors*
- *Remote temperature sensors*
- *Optional WebCam*
- *PowerEgg electrical power monitor*
- *No external power required*
- *Simple click-together wiring connects external accessories*

The unit plugs into a PC serial port. No external power supply is required.

External devices can be added such as remote temperature sensors and power condition monitors.

Alarming functions via e-mail and paging are available and threshold easily set. See the sections on software later in this data sheet.

Uses Existing IP Address

The WeatherDuck uses the existing server IP address and network connections thus saving the cost of maintaining a separate IP address.

The simplest application uses one WeatherDuck per room. Most users add a Remote Temperature monitor air conditioning register output or room temperature.

Avoiding Melt Downs

Remote computer installations face catastrophic failure in the event

of air-conditioning failure. Once internal temperatures have exceeded 130 degrees F, the equipment is usually damaged and should be replaced.

Sensor Specifications

Each sensor is factory calibrated and should never require re-calibration.

The WeatherDuck is an indoor device and can not be used in environments where condensation could occur. The presence of water on the circuit board will damage the electronic components.

Temperature: -10C to +85C (14F to 160F), +/- 0.5 degrees. (Note: 1. Remote temperature sensors have same characteristics. 2. Temperature is updated internally every two minutes.)

Humidity: 0 -100% range, non-condensing, +/- 5%, 0-60 RH, +/- 8% at 90% RH typical.

Light Level: 0 -100 Lux, +/- 5%.

Air Flow: 0 - 100cfm. (Updated every two minutes. 100cfm is the about amount of air from a 5" muffin fan in a no-resistance environment. A reading of 10 approximates still air, a reading of 100cfm is approximately 30.

Humidity: 0 -100% range, non-condensing, +/- 5%, 0-60 RH, +/- 8% at 90% RH typical.

Lamps: Two internal green lamps (LEDs) are furnished and can be turned on and off under software control.

External Devices Bus: A Dallas Semiconductor "1-Wire" bidirectional communication bus is furnished. All external devices (except contact sense) are sent over this bus. See serial communications for more information.

Input/Output Contacts (Door Sensors): 0 to 5 vdc with internal loop current furnished.

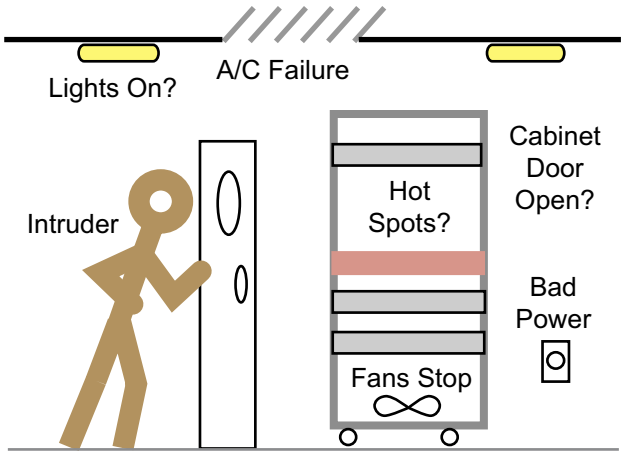
Three multiple purpose contacts are supplied with screwdriver attachments. An internal 500 microamp loop current allows the position of magnetic door sensors to be detected. A reading of "1" means there is essentially no current (door open) and a reading of "99" means the full loop current is flowing (door closed). These sense ports can also be used to measure 0 to 5 volts direct current.

A 1.5 volt battery connected negative end to the Contact labeled "C" and the positive end to any of the contacts labeled "1,2,3" would give of a real-time reading of about "30" on the real time data (0 to 100) and graphing scale. It is this function that enables the monitoring of Current Transformers (CT) by use of a small adaptor.

Other 5 volt output devices can be used.

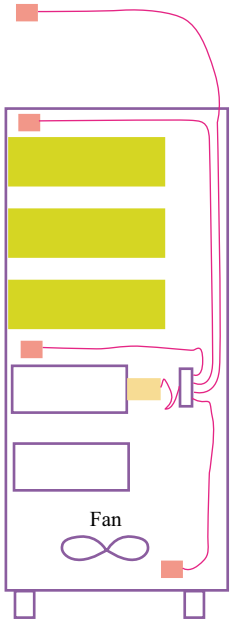
By use of a serial port command, the contact ports can be configured to output from 0 to 5 volts direct current. A

What Threatens Remote Computer Sites



Adding a WeatherDuck provides a complete climate picture. When magnetic door sensor are used, the position of the room door or the cabinet door can be monitored. A WebCam adds the view of the room.

Monitor Hotspots and Room Temperature



One sensor outside, three sensors inside the cabinet check for hot spots

Add four Remote Temperatue Sensors and a cabinet fully instrument against heat damage. An external sensor checks that Service Level Agreements are maintained.

typical application would be to turn a small lamp on (Light emitting diode typical. With an interposing relay, an auxiliary air conditioner or other high current device could be turned on. (Call Tech Support for more information on device control.)

Power Required: None, uses power from serial port data lines (RTS and DTR) held to on by WeatherDuck software.

Connector. DB-9, female connector.

Mounting: Two 4-40 screws with knobs.

Data Input Connectors: up to 24 AWG wire, solid wire preferred.

External Device Port: RJ-11 female telephone connector.

Serial Port Commands: the Weather Duck is supplied with a complete Windows, NT, 2000, and XP client and use of this client is recommended. If you wish to access the WeatherDuck and external devices, the following commands are supported.

Serial Port Commands (case sensitive)

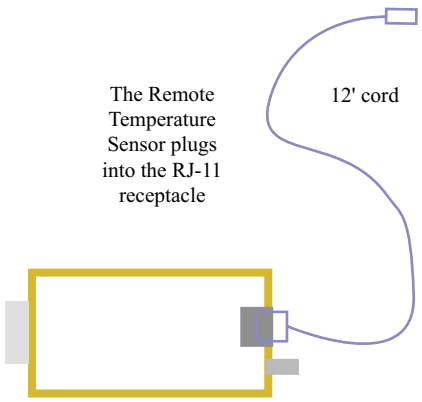
'h' Help Menu
' ' Banner (version)
'@' Serial number
'V' Verbose Mode on
'v' Verbose Mode off
'B' Auto Report on (every 60 seconds)
'D' Auto Report off
'T' Temperature
'H' Humidity
'F' Airflow
'L' Light
'<' LED A on
'>' LED B on
'l' Latched port
':' LEDs off

I/O Ports Commands (controlling the I/O ports)

Rn (1, 2, 3) reads the specified port as an analog input, returning a value of 0-99, where 0 indicates complete closure and 99 indicates open.
Jn (1, 2, 3) [V2.0 only] reads the specified port as an digital input, returning either **H** or **L** followed by CRLF.
Pn and Nn (1,2,3) set port n high or low, respectively, returning either **H** or **L** followed by CRLF.

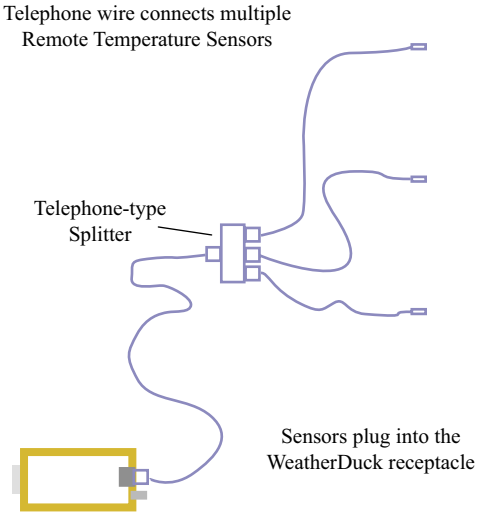
One-Wire Commands: The 1-wire command set provides high-level access to the Dallas Semiconductor 1-Wire protocol which is communicated via the RJ-11 jack opposite the DB-9 connector. The Remote Temperature sensor and Power Egg are 1-Wire devices.
Consult the V2.0 software documentation for more information and examples of 1-Wire communications.
'r' Reset

Using One Remote Temperature Sensor



The Remote Temperature Sensor comes with a 12' cord and can be installed (or deinstalled) at any time. The software automatically discovers the sensor and begins graphing it..

Multiple Temperature Sensors



Common telephone connectors add additional sensors. Total cable lengths should not exceed 200 feet. Six sensors are recommended although dozens can be used..

'j' Read/Write BIT
'f' FIRST
'n' NEXT
'b' BYTE mode
'p' BYTE but with strong pullupSensor

For more information on communicating with Dallas Semiconductor "1-Wire" devices the user should review the reference documentation supplied by Dallas Semiconductor.

Remote Temperature Sensor Specifications

Sensor: semiconductor sensor, same as internal sensor of WeatherDuck, +/- 0.5 degree accuracy.

Cable: 12 feet, Cat 2 wire (telephone wire)

Connector: RJ-11 male

Mounting: Four mounting clips, double sided tape mounted.

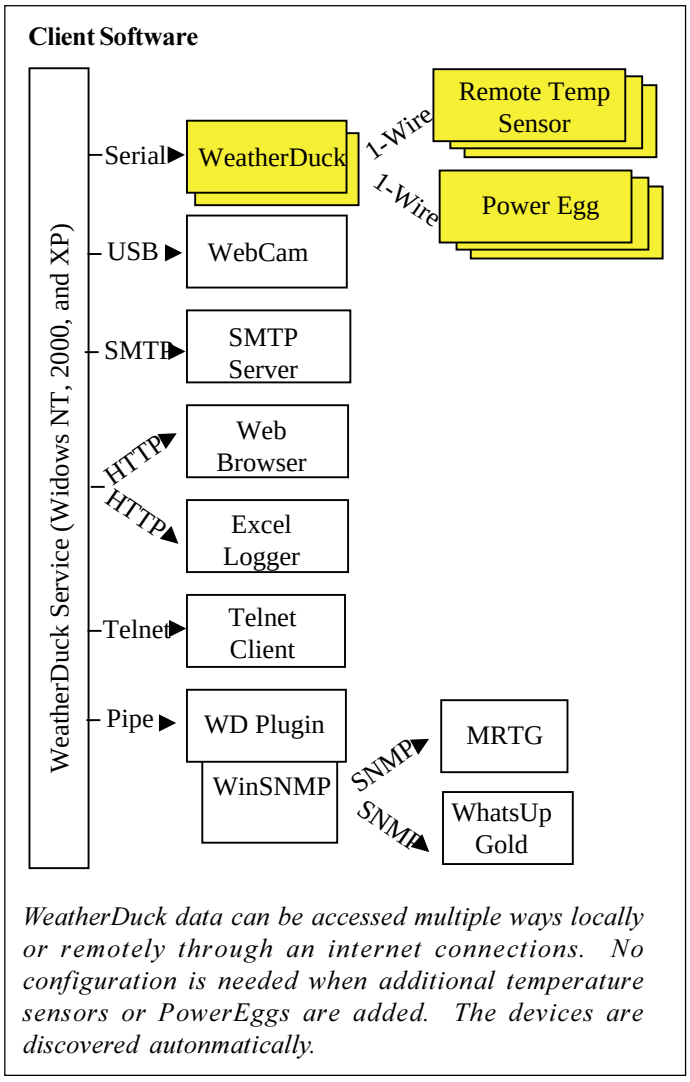
Software Specifications:

Operating Systems: Windows NT, 2000, and XP running as a service. (Windows 98 can run as an application. See installation note.)

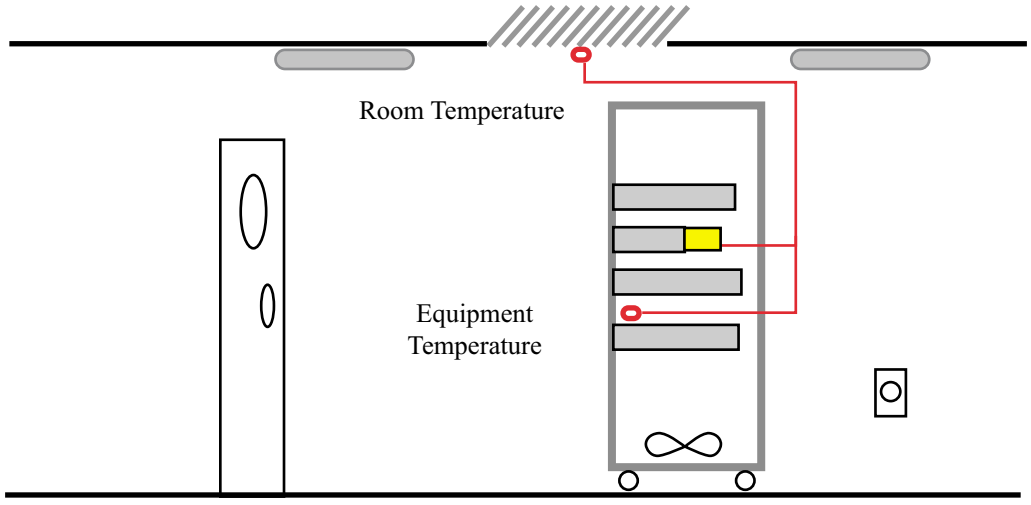
Memory Requirements: 40MB disk, 30MB RAM. (Varies with application.)

Processor Speed: P3 or better

Processor Loading: Average usage shows peak 1% during Web accesses.



WeatherDuck data can be accessed multiple ways locally or remotely through an internet connections. No configuration is needed when additional temperature sensors or PowerEggs are added. The devices are discovered autonmatically.



A WeatherDuck and two Remote Temperature Sensors give a comphrensive coverage of a room. The WeatherDuck's internal temperature sensor monitors the cabinet, the first Remote Temperature Sensor hottest part of the cabinet, and the second Remote Temperature Sensor monitors the air-conditioning system operation for early warning of evaporator freezing or compressor failure.

Installation has been made as intuitive as possible and most users will not need to do any additional configuration. The system runs automatically, cleans up after itself, and automatically discovers devices.

Web Service (local and remote)

All commonly-used features are available via a simple web-based interface. WeatherDuck Server has its own embedded web server that runs on its own port, so it will not interfere with any other web applications that may be running. A separate server, such as IIS, does not have to be running.

Graphs and Real-time Data

Graphs are automatically drawn for all registered devices and are visible on the home page of the web application. Hourly graphs are updated every minute, and daily graphs are updated every hour. Real-time data is also available on the same page.

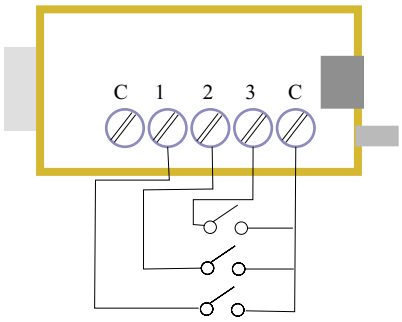
Alarms

Alarm conditions may be set for any numeric value returned by any known device. For example, an alarm condition may be set to monitor temperature or humidity, in effect keeping an eye on your air conditioner. E-mail alerts are mailer whenever alarm conditions are triggered or reset.

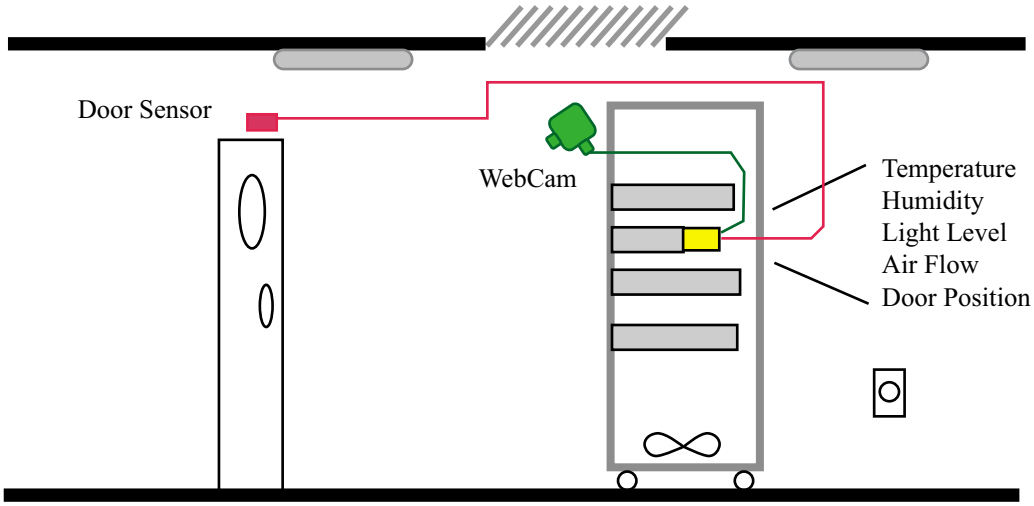
Webcam

Magnetic Door Sensor Wiring

The door sensors wire int the ports through screw terminals



Up to three door sensors can be accomodated. Thse contact ports can be used for other purposes.



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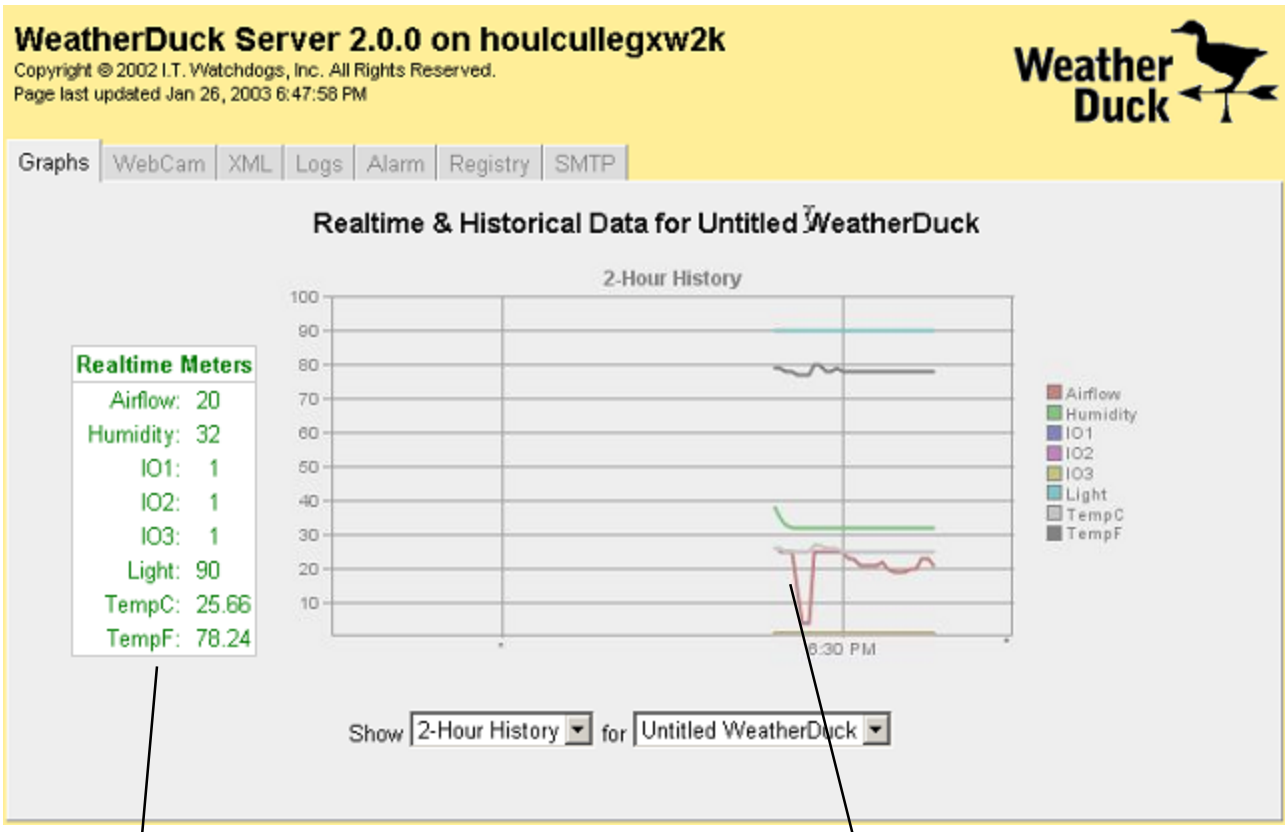

Real-time data, updated continously. The IO values of "1" shows doors are closed.

Graphs are automatically updated, times period from 2 hours to 5 days can be selected

WeatherDuck data can be accessed in a variety of way. No cnfiguration is needed when new sensors or PowerEggs are added. The devices are discovered autonmatically..The Web page can be viewed locally or remotely.

If you have a Windows-compatible webcam attached to your system, WeatherDuck Server can be configured to take a snapshot at a fixed interval and display the snapshot in the web application.

XML

Real-time data is available in XML format via http, providing a straightforward way to integrate environmental data into external applications. The Excel remote logger (see below) is a simple example of XML-based integration.

Log Exporter

Sometimes the provided graphing functionality may not be adequate for the kind of data analysis you wish to perform on historical data. To address this need, historical data may be exported as html, Excel spreadsheets, or comma-delimited text. This functionality is available over the web, so you don't need to fish around on the file system.

Telnet Interface

Many administrators find that they can get things done faster using the command line. So WeatherDuck Server provides a telnet interface for text-based access to real-time data, device tables, user administration, low-level configuration, and system log monitoring.

Excel Logger

As an example of XML-based remote monitoring, we have provided an Excel template that connects to a remote WeatherDuck Server and logs data on the fly.

SNMP

WeatherDuck comes with graphing and monitoring tools of its own, but there are plenty of other monitoring applications that can keep eyes on a WeatherDuck server. WeatherDuck Server publishes its data via a WinSNMP extension, making it available to SNMP-aware monitoring tools such as WhatsUp Gold, MRTG, and IPSentry.

Examples, instructions, and MIB files are provided for the most common tools.