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# Integrating real-time weather into an Irrigation System

**Every day isn't always an irrigation day**

"Weather is the predominant non-controllable factor affecting energy consumption in commercial and municipal sites."

***Use it to your Advantage!***

## Weather & Irrigation

Most irrigation systems have a method for adjusting the irrigation based on a measure of weather be it rainfall amounts or another measurement.

An example is the HUNTER ACC Controller which can accept a Solar Sync sensor input to automatically adjust the irrigation delivered on a given day based on the sensor input.

These add-on sensors adjust irrigation amounts automatically for local conditions in the controller using the Seasonal Adjustment feature to set percentages of the base runtime (100%) of each station.

In an automation system, the controller will simply report the current level of adjustment, and this is adequate for many applications. These sensors can also provide rain and freeze shutdowns to inhibit irrigation locally and reported it to the system.

## Alternative Sources of Weather Data

There are many weather service providers. Most are online (the cloud) and the data is accessed by an API (see sample below). Often the weather server can be installed locally at a site. Most of this data cannot easily be used by an irrigation controller. Why? Because the data is provided in a format that the irrigation controllers cannot accept as input. Solutions are provided by means of protocol gateways.

http://weather.chipkin.com/
**IP Address:** 178.128.239.15
**Slave Address:** 255
**Function Supported:** 1,2,3,4,5,6,15,16
Modbus register map

It is also possible to use a local weather station or an online weather source that is connected to the automation system to provide a source for similar, or more advanced, adjustments.

At a minimum, the weather source must provide:

- Solar Radiation
- Air Temperature

Ideally, it would also provide:

- Relative Humidity
- Wind Speed
- Rainfall Totals

**NOTE**: Most irrigation systems require immediate shutdown during rainfall events, and a dedicated rain sensor (Hunter Rain Clik™) at each controller is always recommended for this purpose.

# Auto-Adjusted Irrigation Based on Weather Conditions


1. Direct Integration – Weather data sends commands to Irrigation controller to start/stop/pause/reduce… e.g. Write to Seasonal Adjustment Parameters.

2. Weather data can be made available to irrigation controllers in a format it can understand

3. Site/Building Automation Systems (BAS) reads weather and makes irrigation decisions by sending commands to irrigation controller. E.g. Irrigation Controller data and commands exposed using BACnet, Modbus or a similar protocol.

For Example, a contingency can be created within the BAS to suspend irrigation or provide part-irrigation for several days based on measured local rainfall amounts.

Let's say the root zone requires 8 mm of water and it rains for 4 mm. The system can be programmed to irrigate the additional 4 mm to reach the desired amount of water for the area. A user can also override the system as needed. In the case where Irrigation is suspended using the controller's Programmable Days Off command. A user can override by using the Cancel Programmable Days Off command.

More detailed scenarios are possible that allow modeling the soil moisture level of the root zone of plants in each zone of irrigation

# Typical Weather Service Data

"Imagine having, at your fingertips, the ability to track such factors as temperature, humidity, rain levels, wind speed, radar forecast, severe-weather alerts, heat index, and barometer/pressure"

Ronald Greaves, product manager, Siemens Building Technologies Inc.

| | |
|---|---|
| Current condition codes | Comfort level |
| Temperature | Barometric pressure |
| Wind speed | Precipitation reporting |
| Wind direction | Sunrise / Sunset |
| Humidity | UV Index |
| Visibility | Tomorrows weather and conditions |
| Dew point | Smog |

| Category | Weather Condition | Description |
|---|---|---|
| Thunderstorm | 200 | Thunderstorm with light rain |
| Thunderstorm | 201 | Thunderstorm with rain |
| Thunderstorm | 202 | Thunderstorm with heavy rain |
| Thunderstorm | 210 | Light thunderstorm |
| Thunderstorm | 211 | Thunderstorm |
| Thunderstorm | 212 | Heavy thunderstorm |
| Thunderstorm | 221 | Ragged thunderstorm |
| Thunderstorm | 230 | Thunderstorm with light drizzle |
| Thunderstorm | 231 | Thunderstorm with drizzle |
| Thunderstorm | 232 | Thunderstorm with heavy drizzle |
| Drizzle | 300 | Light intensity drizzle |
| Drizzle | 301 | Drizzle |
| Drizzle | 302 | Heavy intensity drizzle |
| Drizzle | 310 | Light intensity drizzle rain |
| Drizzle | 311 | Drizzle rain |
| Drizzle | 312 | Heavy intensity drizzle rain |
| Drizzle | 313 | Shower rain and drizzle |
| Drizzle | 314 | Heavy shower rain and drizzle |
| Drizzle | 321 | Shower drizzle |

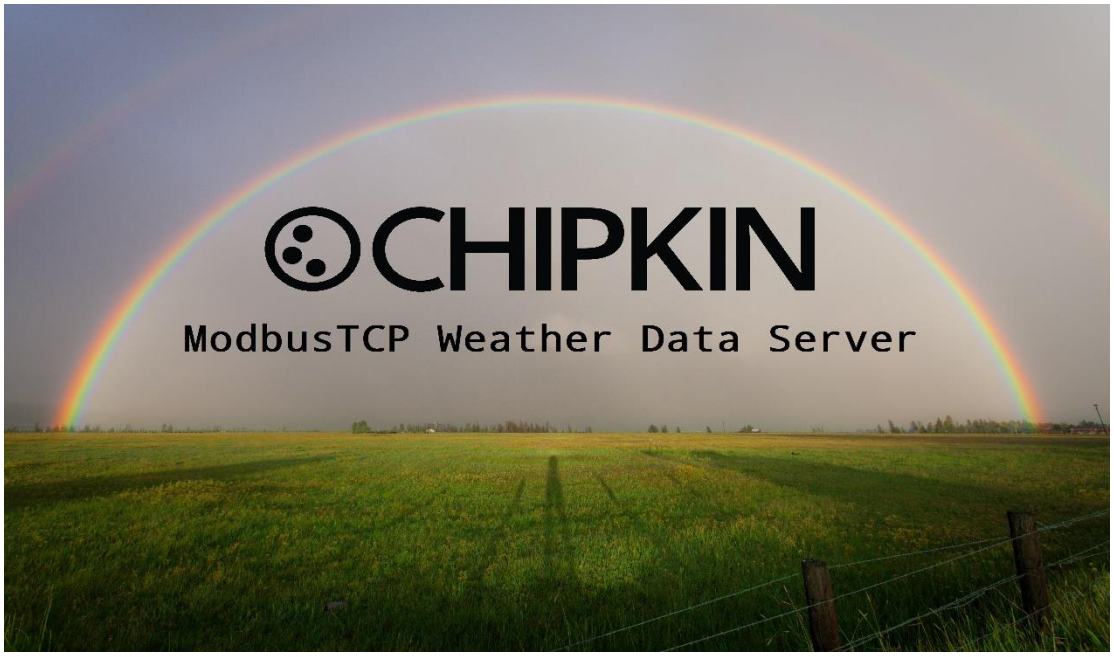
| | | |
|---|---|---|
| Rain | 500 | Light rain |
| Rain | 501 | Moderate rain |
| Rain | 502 | Heavy intensity rain |
| Rain | 503 | Very heavy rain |
| Rain | 504 | Extreme rain |
| Rain | 511 | Freezing rain |
| Rain | 520 | Light intensity shower rain |
| Rain | 521 | Shower rain |
| Rain | 522 | Heavy intensity shower rain |
| Rain | 531 | Ragged shower rain |
| Snow | 600 | Light snow |
| Snow | 601 | Snow |
| Snow | 602 | Heavy snow |
| Snow | 611 | Sleet |
| Snow | 612 | Shower sleet |
| Snow | 615 | Light rain and snow |
| Snow | 616 | Rain and snow |
| Snow | 620 | Light shower snow |
| Snow | 621 | Shower snow |
| Snow | 622 | Heavy shower snow |
| Atmosphere | 701 | Mist |
| Atmosphere | 711 | Smoke |
| Atmosphere | 721 | Haze |
| Atmosphere | 731 | Sand, dust whirls |
| Atmosphere | 741 | Fog |
| Atmosphere | 751 | Sand |
| Atmosphere | 761 | Dust |
| Atmosphere | 762 | Volcanic ash |
| Atmosphere | 771 | Squalls |
| Atmosphere | 781 | Tornado |
| Clear | 800 | Clear sky |
| Clouds | 801 | Few clouds |
| Clouds | 802 | Scattered clouds |
| Clouds | 803 | Broken clouds |
| Clouds | 804 | Overcast clouds |

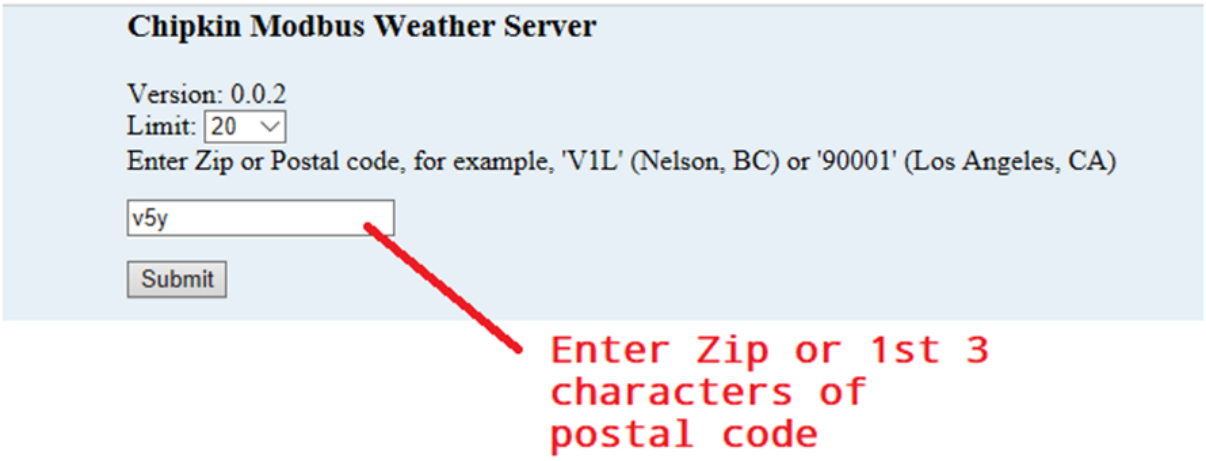
## Chipkin's Modbus Weather Server

This is a handy server that keeps track of weather data on real time. The data is provided via the Modbus TCP protocol and can be access based on Zip/Postal Code. Once the server is connected to a system it can be used to simulate a Modbus device or as a Modbus server for testing or even to control irrigation systems based on current reported weather conditions.

For more information visit: https://store.chipkin.com/articles/modbus-weather-servers-and-weather-condition-enumerations.

For the server visit: weather.chipkin.com/modbusserver



# Fully Manual Irrigation System based on stupidity