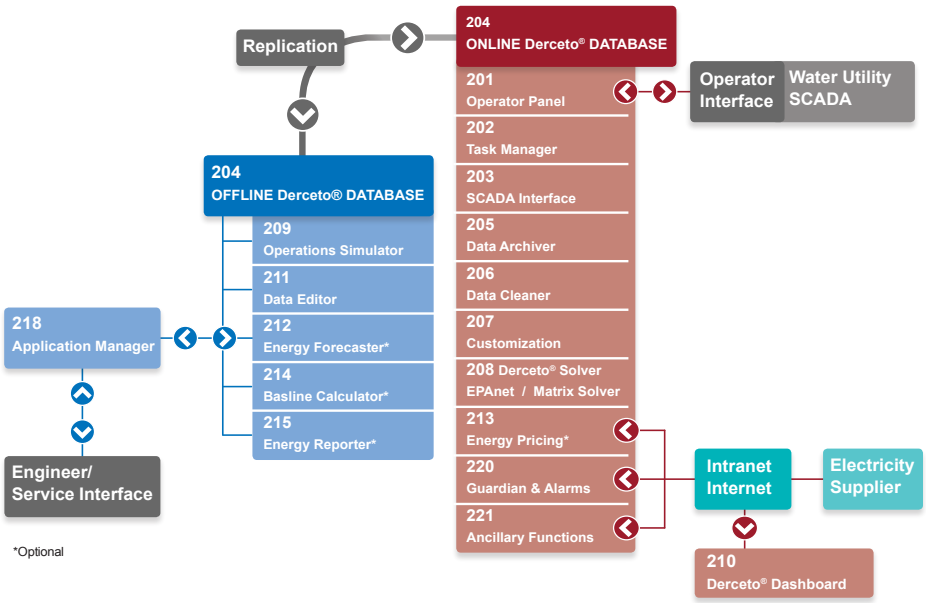
Derceto AQUADAPT

206 Data Cleaner

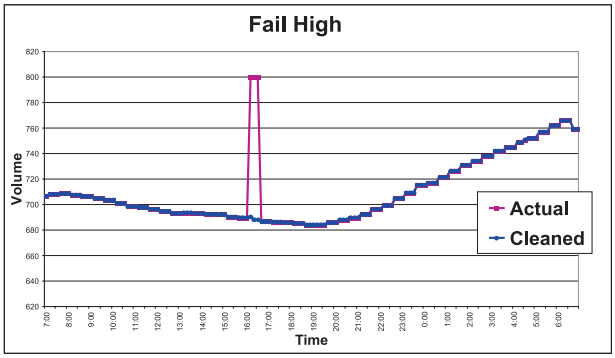
Derceto® Aquadapt™ software runs on-line and in real-time. It is therefore totally dependent on precise and reliable input data to allow it to produce high quality outputs. A key component of an Aquadapt system installation is the **Data Cleaner** which tests, validates and, if necessary, corrects incoming data.



Reservoir levels, pump status and current flow readings are retrieved from the client's SCADA system at regular intervals and saved in the Aquadapt software database.

Invariably SCADA systems are geographically widely distributed, with the inherent need to have long distance communication paths between field instruments and the operator. Faulty instruments, communication loss or faults within the SCADA system can lead to incorrect or missing data.

The **Data Cleaner** takes the SCADA values and using cross-validation techniques detects errors and omissions and then uses predicted values to correct the data set. An operator alarm is raised if the SCADA data remains invalid for an extended period of time.

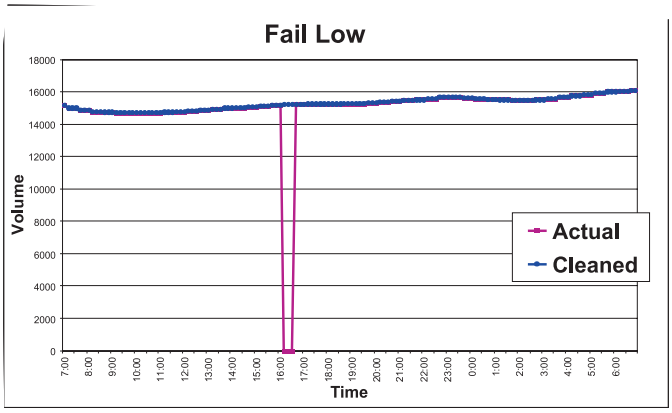


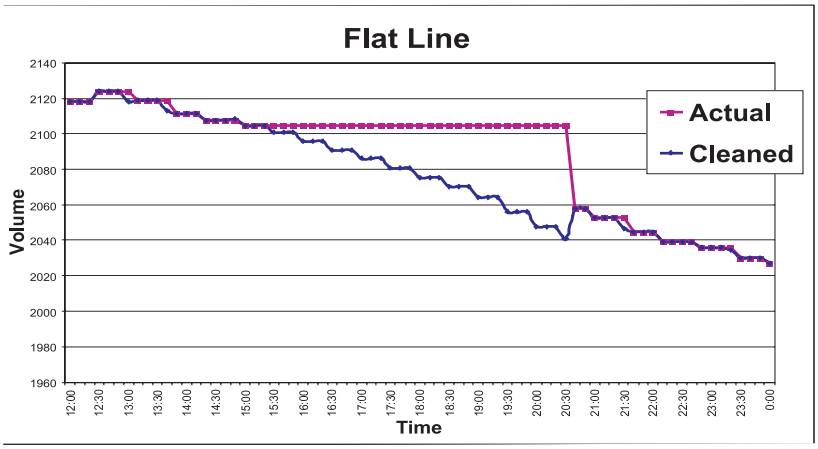
Data Cleaner performs the following basic steps:

- Confirms reservoir levels are increasing or decreasing as expected
- Confirms pump flows from pump status and flow data
- Calculates last half hour's water demand for each pressure zone
- Checks explicitly for signal spikes, drop-outs and flat lines

Error Detect and Correct SCADA Values

The **Data Cleaner** uses rules based on standard hydraulic system behavior to decide which values to keep and which to discard. Typically, a reservoir level that has 'flat-lined' for a certain period of time would be replaced with the value predicted by the Aquadapt software. Sudden level changes that cannot be supported by pump flows or water demand are detected and corrected. Where possible data is cross-validated: for example when comparing flow meter values with pump run statuses, inconsistent information can indicate a fault. The most common data errors are





a result of instrument fault or short-term communications loss. Instruments can often be set to “fail low” or “fail high”. This means that the instrument is programmed to give either a minimum or maximum signal when it detects a sensor or internal problem. These errors are relatively easy to detect and are immediately replaced with the Aquadapt software’s predicted values from its previous solution. Short-term communications loss tends to produce flat-lines. These are values that initially appear valid but haven’t changed, even slightly, over time. This is a common problem and difficult for operators to detect over short time frames. The **Data Cleaner** can detect flat-lines very quickly and will again substitute predicted values to enable continued operation. Prolonged flat-lines also generate operator alarms. Depending on system conditions Aquadapt software can use cleaned data for many hours following communications loss. When communications are restored the **Data Cleaner** resynchronizes with the live data.

Water demand calculations require a combination of pump station flows and storage tank levels to be used together to determine pressure zone demand. These calculations are very important as water demand is one of the most unpredictable inputs for the Solver. To improve accuracy the **Data Cleaner** uses accumulated values from the flow meters rather than instantaneous flow signals. The use of accumulators inside the flow meter itself or the local RTU makes the **Data Cleaner** relatively resilient to short-term communication loss.

Every SCADA system has its own unique data cleaning requirements. Through numerous implementations Aquadapt software has built a vast knowledge base for the **Data Cleaner** enabling it to handle a wide variety of data corruption issues. This experience has produced a reliable and robust method of dealing with incoming data in real-time, making it possible for the Solver to continually make high quality decisions using imperfect information.

Derceto Aquadapt software is the unique real-time, on-line water distribution system optimization package from Derceto, Inc. It schedules pumps, flow control valves and production up to 48 hours in advance. Pump and flow schedules for large distribution systems can be derived in minutes enabling it to operate interactively. Aquadapt software can also be used in real-time energy markets. The Aquadapt system continuously adapts to refine its schedule in real-time in response to changing conditions including demand changes, equipment availability and treatment plant capacity. Aquadapt software also improves water quality by seeking to increase turnover of storage and minimize production flow disturbances. It is backed by an established and fast growing user base and has undergone four major feature upgrades since its inception in 1998. Payback from energy savings is rapid, typically under two years.

Offices:

Derceto, Inc.
San Francisco, USA
Tel: +1.415.646.8950
Fax: +1.415.433.5994

Derceto, Inc
Georgia, USA
Tel: +1.770.995.7921
Fax: +1.770.995.7921

Derceto UK Ltd.
London, England
Tel: +44.207.375.9842
Fax: +44.870.420.5072

Derceto Ltd.
Auckland, New Zealand
Tel: +64.9.373.7100
Fax: +64.9.373.7101

sales@derceto.com www.derceto.com

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