Managing the A200 meter

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This document is aimed at meter managers and other water company personnel to explain features of the A200 meter that are relevant to their procurement and management in the field.

Aquiba A200 Meter

For a detailed specification, please refer to the A200 meter datasheet.

Key features

BETTER METER

- Fully static mag-flow metrology – no jamming or wear and insensitive to particulates
- Accurate at all flow rates, over full 20+ year lifespan
- Future proof, field-upgradeable functionality
- Accurate time-stamping of all consumption

SMART METER

- High capacity data archive
- Fully remote operation by ZigBee SEP radio
- Local programming and data retrieval by optical port

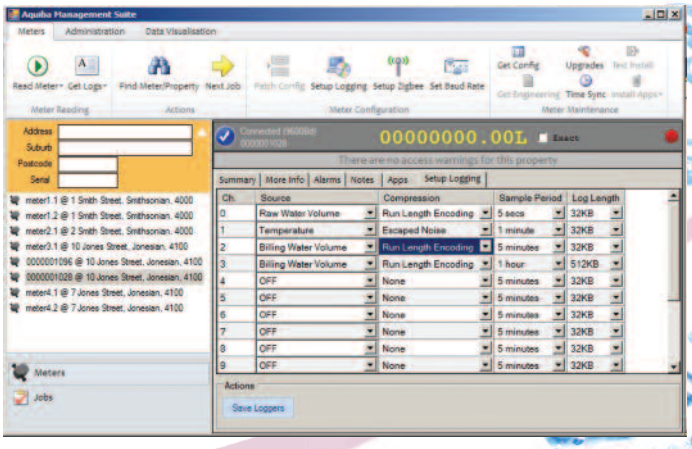
Optical Interface

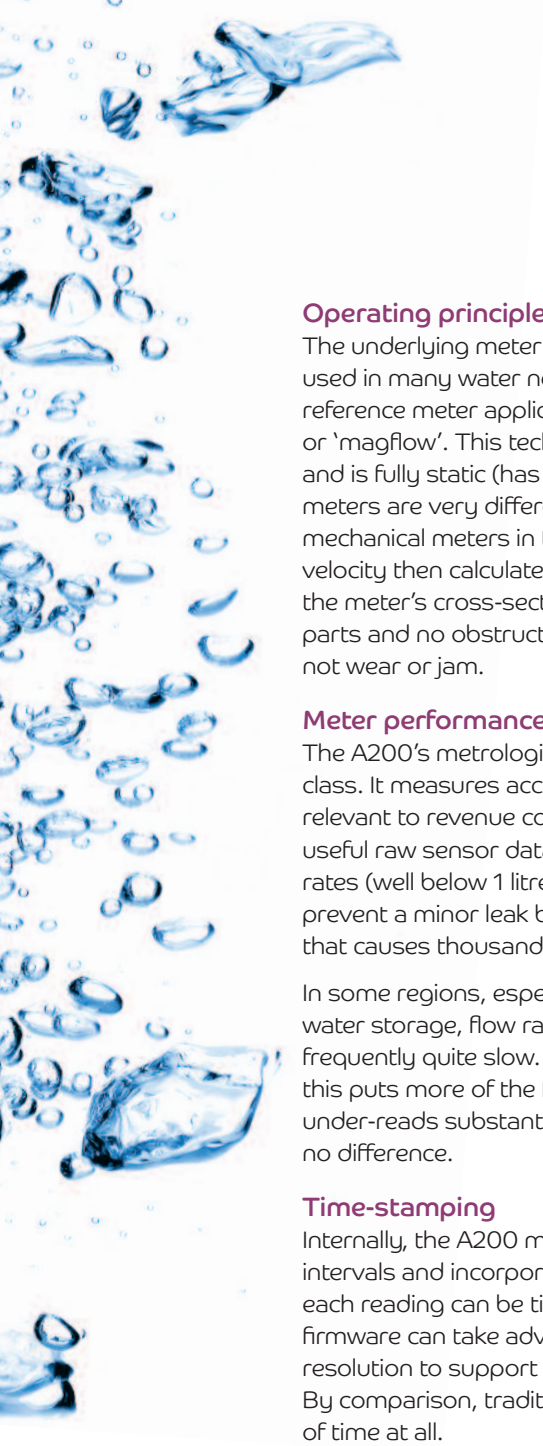
Optical Reader / Programmer and Aquiba Meter Explorer Software

A200's secure optical port allows connection of an optical reader / programmer (ORP) for easy programming and data retrieval. The ORP simply locates onto the top of the meter and is held in place by magnets. Data is transferred via USB cable to a PC where it can be stored and analysed using Aquiba Meter Explorer software.

Aquiba Meter Explorer is used to configure the A200 meter and initially to 'join' it to the electricity meter over the ZigBee SEP network. Aquiba Meter Explorer also allows meter readings, data downloads, firmware upgrades and basic data visualisation.

Aquiba Meter Explorer runs on Microsoft's Windows® 7 operating system.





Operating principle

The underlying meter technology is the same as is used in many water networks, industrial and reference meter applications: electromagnetic flow or 'magflow'. This technology is inherently linear and is fully static (has no moving parts). Magflow meters are very different from traditional mechanical meters in that they measure flow velocity then calculate flow rate by multiplying by the meter's cross-sectional area. With no moving parts and no obstructions to flow, the A200 does not wear or jam.

Meter performance

The A200's metrological performance is world class. It measures accurately at all flow rates relevant to revenue collection. It also provides useful raw sensor data down to extremely low flow rates (well below 1 litre per hour) enabling you to prevent a minor leak becoming a major pipe burst that causes thousands of dollars of damage.

In some regions, especially where there is local water storage, flow rates into the tank are frequently quite slow. With a mechanical meter, this puts more of the flow into the region where it under-reads substantially. With the A200, it makes no difference.

Time-stamping

Internally, the A200 measures at one second intervals and incorporates a software clock so that each reading can be time stamped. Custom firmware can take advantage of this fine time resolution to support many new system functions. By comparison, traditional meters have no concept of time at all.

Data archive for secure storage

Data is saved in the meter's secure data archive in non-volatile flash memory for later retrieval. The types of data that can be archived are controlled in firmware and by the meter's configuration (which can be updated using Aquiba Meter Explorer and an ORP). The data types available as standard are:

- Legal metrology data (to OIML/NMI R-49) for billing purposes
- Raw flow data
- Internal temperature (of the meter).

For each of these sources, data can be archived at different rates ranging from once per 5 seconds upwards.

A200 meters are capable of storing approximately 800,000 data points (depending on data compression algorithm selected) from any of the above sources, plus meter status information, error messages and alerts.

The purpose of the data archive is not to replace all functions of commercial logging equipment but to provide access to data that cannot be transmitted by radio either because the radio protocol does not support it or because the necessary radio schedule would excessively shorten battery life. Aquiba can advise on appropriate strategies to ensure that the captured data is suitable for its intended use without needing long visits to download data from the meter.

Aquiba can also develop custom applications to perform additional processing so that only the required information is stored. For example, if you need to capture peak daily flow rates, it is more efficient to install an application in the meter to calculate this single number than to collect 15 second interval data, transmit or download it and do the calculation back at the office. A possible archiving strategy for typical residential deployment might be to store daily reads for the whole life of the meter, and 15 minute reads for the current and the previous billing periods. This 15 minute data could then be retrieved and analysed to help resolve a billing query, for example.

Another household might join an "end use" study. Their meter could be configured to archive (in addition) 15 second raw flow data for a period of one month, and the data downloaded by ORP and Aquiba Meter Explorer for offline analysis.

Customise the A200 to your requirements

Different smart water metering projects can have very different objectives. The stakeholders may have very different views. It is likely that the smart water meters will need customisation to support the functionality that your system must provide.

Aquiba can customise meters in all aspects of battery and radio management, data capture, alert processing and home/local area network functions. The firmware architecture consists of an operating system and metrology module that are fixed, plus application modules that can be installed at manufacture or in the field. These application modules enable extra meter and system functionality ranging from simple (e.g. generating a new type of alert) to complex (e.g. data archiving and download).

Aquiba meters can be supplied with radios turned off where 'better metering' (benefits of static technology with high accuracy over the complete flow range throughout the meter lifetime) but no comms is required.

Alternative thread forms are possible and the A200 may also be customised for branding purposes, for example, by the choice of colour and logo.

Future proof – designed to last

The A200's processor and memory is substantially over-specified for current needs, allowing growth room for the future. The firmware architecture ensures that the A200 is safely field-upgradeable. New applications can be requested and specified by meter owners, provided by Aquiba, then installed in the field. The A200 is therefore as 'future-proof' as possible .

Manage upgrades easily

A full firmware management service is available. Under this service, Aquiba maintains and upgrades the master copy of firmware so that it can integrate and thoroughly test all changes to ensure that only reliable code is released for field installation. These firmware management facilities, coupled with accurate version recording and diagnostic log files on the meter, allow Aquiba to build and run an exact replica of any meter's firmware. Aquiba can therefore provide swift and effective support in the event of a problem in the field.

A secure meter

A200 is secure. Its radio communications are strongly encrypted and both the radio and optical port are protected from denial-of-service types of attack. There are multiple levels of access, each protected by different password. All passwords are encrypted. All transmissions (via radio or optical port) are uniquely coded to the meter identity. Physical (tamper) attacks on the meter are detected and reported.

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Buying and owning the A200

Long life

The A200 is a long life product:

- manufactured from the highest grade materials selected to survive harsh environments
- design life of 20+ years
- battery life of approximately 15 years, depending on radio usage and meter temperature.

Battery life prediction

The A200 meter keeps an accurate count of the energy it uses. This energy count is combined with meter temperature data to continuously calculate remaining battery life, which is reported via the radio and optical port. Meter swap-out programmes can therefore be planned with confidence and implemented at the optimum time.

Meter refurbishment

Aquiba offers a factory refurbishment programme during which the battery will be replaced and the meter will be cleaned, reset, resealed, recalibrated and re-tested.

Advantage of polymer body

Aquiba's choice of high-grade engineering polymers for the main parts of the A200 is driven by two factors:

- low embodied energy: the A200 mechanical parts embody much less energy than a brass meter
- meter theft: in some regions, brass meters are stolen for their scrap value.

Training

Aquiba will provide training for meter management staff and for field operatives in the use of Aquiba Meter Explorer in the office and in the field. This covers meter installation and commissioning, configuring the meter for special purposes, downloading and visualising data and advising on integration of Aquiba Meter Explorer with water company information systems.

Trials and end-use studies

Please see separate application note, "Evaluating Aquiba's A200 water meter".

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