Precision and accuracy.
ABB Liquid Measurement Application.
The Liquid Measurement Application is designed to meet a variety of liquid measurement needs; from basic water measurement, produced oil or water measurement at the wellhead, to full custody quality liquid hydrocarbon measurement. ABB has an extensive list of standard measurement and automation applications. These are included in the firmware that is installed and shipped with every G4 flow computer or RTU. Liquid Measurement is one of these applications. This application is available in all Totalflow G4 devices: µFLOG4, EXG4, XFCG4 and XRCG4. The Linear Liquid Measurement Application is designed for custody quality measurement of liquid hydrocarbons or water.

How it works:
API 11.1 equations are implemented to correct for temperature and pressure effects on density and volume of liquid hydrocarbons, which fall within the categories of crude oil, refined products, lubricating oils, and special applications. The flow inputs can be either high speed pulse inputs or serial inputs utilizing the MODBUS protocol.

The serial input may be RS232, RS485, or MODBUS over TCP/IP. Typical primary meter types that may be used with this application are turbine, PD, vortex, ultrasonic, and Coriolis meters.

The equilibrium vapor pressure may be entered if known or required. The user may enter a fixed percentage for sediment and water or select the input to be live from an outside source. Use of sediment and water in the calculations is optional.

The application supports the K-factor as quantity/pulse or pulse/quantity if using a pulse input. A meter correction factor is available as well as placeholders for the serial number of the primary meter and the serial number of applicable primary meter internal components if applicable.

For the most accurate volume/mass calculations, CTL and CPL should be implemented as well as an accurate density value. The temperature and pressure inputs can be from a flowing measured source or can be "Fixed" and a user entered value. The CTL and CPL are individually configurable.
## Flow input types
- **Pulse input volume (U.S. gallons):**
  - Pulse/volume or volume/pulse
  - Liquid types: Crude oil (-10º to 100º API)
  - Live density: kg/m³
  - Fixed density: Degrees API
  - Thermal expansion: Manually entered
  - CTL and CPL options: Enable or disable

- **Pulse input mass (kg):**
  - Pulse/mass or mass/pulse
  - Liquid types: Fuel oils (-10º to 37º API)
  - Live density: lbs/ft³
  - Fixed density: Relative density
  - Thermal expansion: Calculated
  - CTL and CPL options: If enable, calculate values

- **Volume flow rate:**
  - Serial (U.S. gallons/sec)
  - Liquid types: Jet (37º to 50º API)
  - Live density: lbs/US gallon
  - Fixed density: Kg/m³
  - Thermal expansion: If enable, use fixed values that are entered by the user

- **Mass flow rate: serial (kg/sec):**
  - Liquid types: Transition (48º to 52º API)
  - Live density: lbs/UK gallon
  - Fixed density: g/cc

- **Gasoline (50º to 85º API):**
  - kg/Sdm³

- **Lube oil (-10º to 45º API):**
  - g/cm³

- **Water:**
  - g/m³

- **Special application fluids:**
  - kg/kL
  - lbm/MMSCF
  - kg/Mm³

### NOTE:
Density can be provided from a live density source such as a densitometer/Coriolis or entered as a fixed value. Density input may be at base conditions or flowing conditions. Multiple inputs are supported. The liquid thermal expansion factor (alpha 60) can be calculated by the application or manually entered. If “Special Application Fluids” is selected, the thermal expansion factor must be manually entered by the user.

### Producing results:
The Liquid Measurement Application provides current values and last calculation period values that may be used to monitor or verify flowing conditions, parameters, and calculations. Also included are complete event records showing any auditable changes that may have been made to the application, a characteristics log that will reflect the current configuration of the application’s parameters, as well as hourly and daily logs. The log files contain API 21.2 compliant data (flow measurement using electronic metering systems; electronic liquid volume measurement using positive displacement and turbine meters).

All setup and configuration is performed using PCCU32 local interface software. WinCCU32 remote host software is capable of polling the remote Totalflow devices for current status updates as well as remote data collection and reporting. Third party host software programs that utilize the TCI Toolkit with Totalflow register access capability can also interface to the Totalflow devices running the Liquid Measurement Application.