

# Spirit<sup>IT</sup> Flow-X

## Liquid USC application

### Liquid\_USC v2.2.0 (April 2016)

The Liquid\_USC application version 2.2.0 has been released in April 2016.

Besides the features and changes described below, this release also contains around 200 minor improvements and bug-fixes.

For a complete list of changes please contact ABB.

### New Features/Changes

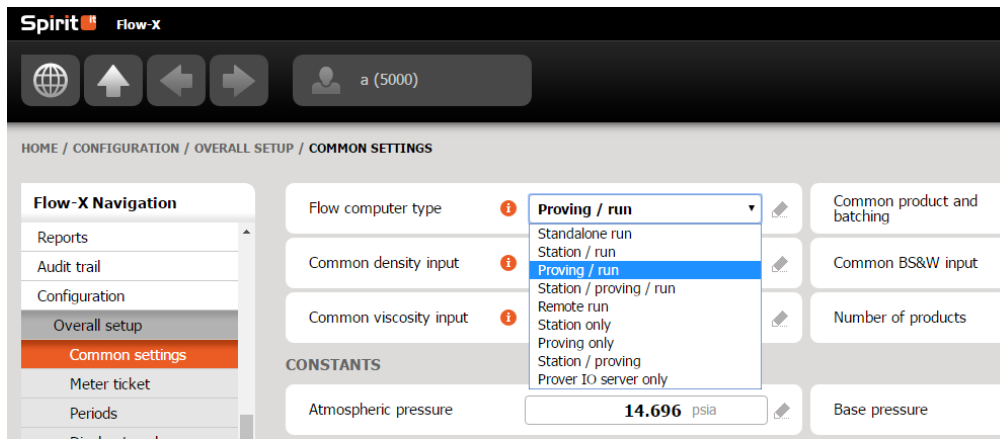
#### Three separate application files

The Liquid\_USC application is released in three different variations:

- **Liquid\_USC Master 2.2.0.fxm**  
Full application for single run flow computers (X/S, X/P1, X/R1)
- **Liquid\_USC Master 2.2.0 loading.fxm**  
Full application for single run flow computers (X/S, X/P1, X/R1) with added loading functionality
- **Liquid\_USC Master 2.2.0 abridged.fxm**  
Abridged application for multiple run flow computers (X/P2, X/P3, XP4, X/R2, X/R3, X/R4). This application has the following restrictions: no reverse totals and averages, no hourly and period B totalizers and averages, no station sampler logic only, number of products limited to 8, no support of dP meters (orifice, venturi, etc.).

#### Parameter 'FC type' for easy configuration of run/station/proving combinations

In previous application versions enabling / disabling of the run, station and proving functionality was done by setting several parameters on a number of different displays. In this new version these parameters have been replaced by one global parameter 'FC type' on the common settings display. Based on this parameter the flow computer enables or disables the run, station and proving functionality and shows the appropriate display screens for configuration and operation. For more information please refer to the application manual.



When upgrading a flow computer from a previous application version to this new version, please remember to set this parameter accordingly.

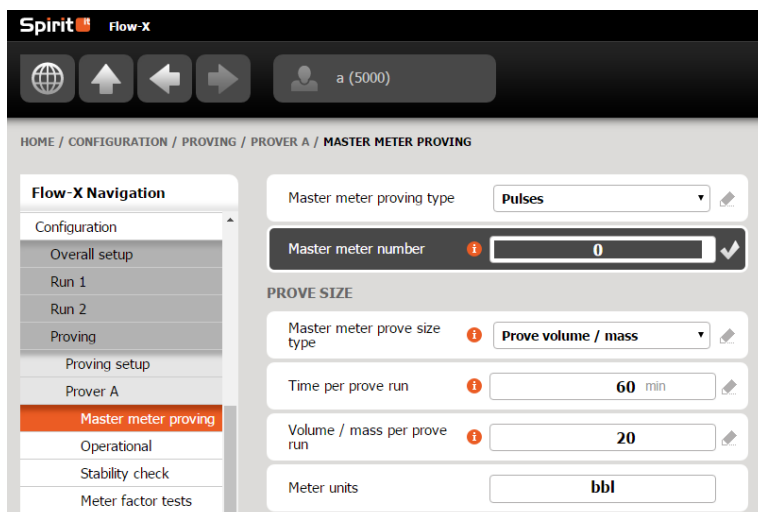
### Master meter proving in one module only (with limited functionality)

Formerly for master meter proving at least 2 modules were required: one for the meter under prove and one for the master meter. In this new application version it's also possible to do master meter proving using one single module, albeit with limited functionality:

- Only for master meters that give pulses
- Meter pulse input B is used for the master meter pulses, so only one pulse of the meter under prove can be used (no dual pulse)
- There's no master meter K-factor curve and only one master meter factor curve.
- No meter body correction or viscosity correction on the master meter.

When using separate modules for the master meter and the meter under prove, the master meter is treated as a full-blown meter without any restrictions.

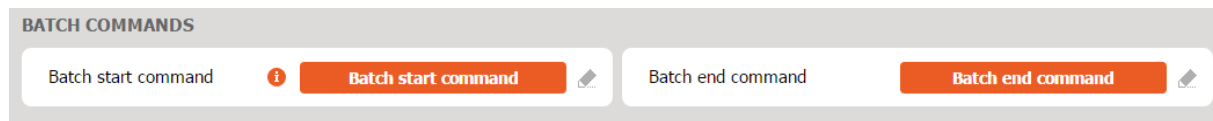
Master meter proving in one module only is enabled by selecting master meter nr. '0'.



### Batch start command

In former application versions there was only a **Batch end command**. This command closed the active batch and immediately opened the next batch. Now there's an option to use separate Batch start and

Batch end commands. When using this option the next batch is only opened when the Batch open command is activated. Any flow between the closing of the batch and the opening of the next batch is not counted in the batch totals.



### Implementation of API MPMS 12.2.2 / 12.2.3 rounding rules

This version includes a new option to apply the API MPMS 12.2.2 rounding rules for meter tickets and the API MPMS 12.2.3 rounding rules for prove reports. When this option is enabled the results of each calculation step are rounded to the number of digitals specified in the API standard, before they are used in the next calculation step.

API MPMS 12.2.2 requires the batch to be recalculated after closing, because the calculations are based on the average batch process values. Therefore, when 'API 12.2.2 Measurement Tickets' compliance is enabled, a batch recalculation is conducted by the flow computer and a **recalculated meter ticket** is printed (instead of the normal meter ticket).

### Apply meter factor retroactively

A new option makes it possible to apply a meter factor retroactively. This means that the end-of-batch meter factor is retroactively applied to the whole batch. With this option it is possible to use the meter factor that is obtained from a prove during the execution of a batch to the whole batch, including the part before the prove was conducted.

As this option requires the batch to be recalculated after closing, the results will be printed on the **recalculated meter ticket**.

### Average Meter Factor method for pipe and compact proving

API MPMS 12.2.3 allows for two different meter factor calculation methods:

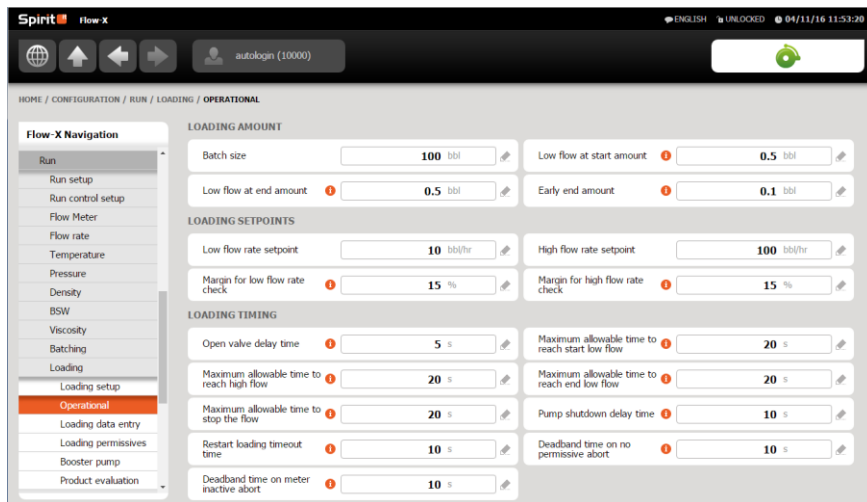
- the **average data method** (calculating the proved meter factor from input data averaged over all prove runs)
- the **average meter factor method** (calculating the proved meter factor as the average of the individually calculated run meter factors)

Formerly for pipe and compact proving the Flow-X only was supporting the average data method. In this application version alternatively the average meter factor method can be selected.

### Loading functionality

Liquid\_USC Master 2.2.0 loading.fxm contains the following added loading functionality:

- Loading data entry
- Loading sequence with optional low flow start, high flow and optional low flow end stages.
- 4 loading commands (start loading, stop loading, finish loading, emergency shutdown) through user interface and / or digital inputs
- Ground connected permissive, 4 extra digital input permissives
- Data entry permissives, max. BS&W permissive, 3 custom permissives
- Flow control by means of flow control valve or two stage valve
- Control of inlet and outlet valves
- Pump control
- Booster pump control (analog or digital)
- Divert valve control



## Remote station / remote run configuration

Several flow computers can be set up to operate in a remote station / remote run configuration. In this configuration one flow computer is set up as a remote station that is communicating to a number of (max. 8) remote run flow computers. Each flow computer is running a separate application. Inter-FC communication is done through Modbus TCP/IP. All station functionality is executed by the remote station flow computer, all run functionality is executed by the individual remote run flow computers.

Remote station functionality may include:

- Station totalizing based on the totalizer data from the individual remote runs
- Read data from station transmitters (density, BS&W and/or viscosity transmitters connected to the remote station flow computer) and send the process values to all remote run flow computers
- Prove a remote meter run, using a pipe, compact or small volume prover, and send the resulting meter factor to the remote run flow computer
- Prove a remote meter run against a local or remote master meter and send the resulting meter factor to the remote run flow computer
- Station batch control
- Station flow control
- Station sampler control

Dedicated **connect to remote run** and **connect to remote station** Modbus drivers are available to handle inter-FC communication.

