



## APPLICATION REPORT Food & Beverage

### Equipping a mixing plant with flow and level measuring technology in the beverage industry

- Measuring volume and mass flow as well as level in storage tanks
- Dosing of all ingredients for consistent beverage quality
- All measuring devices from one source for simplified installation and operation



#### 1. Background

Beverage producer Topochico Soft Drinks in Monterrey, Mexico, produces table water, soft drinks and wine mixers (sangria) for both the domestic market and export.

When equipping a new mixing plant, Topochico wanted to find a measuring device manufacturer able to provide all of the devices required. The number of measuring device manufacturers was to be reduced, obtaining everything for flow, mass, level, temperature and pressure measuring points from one source.

If possible, the measuring devices were also to feature an additional function, enabling them to measure quality parameters as well as perform the actual measuring task. Further, the devices had to be available with the desired pipeline connections.

Topochico also required a contact person for on-site support.

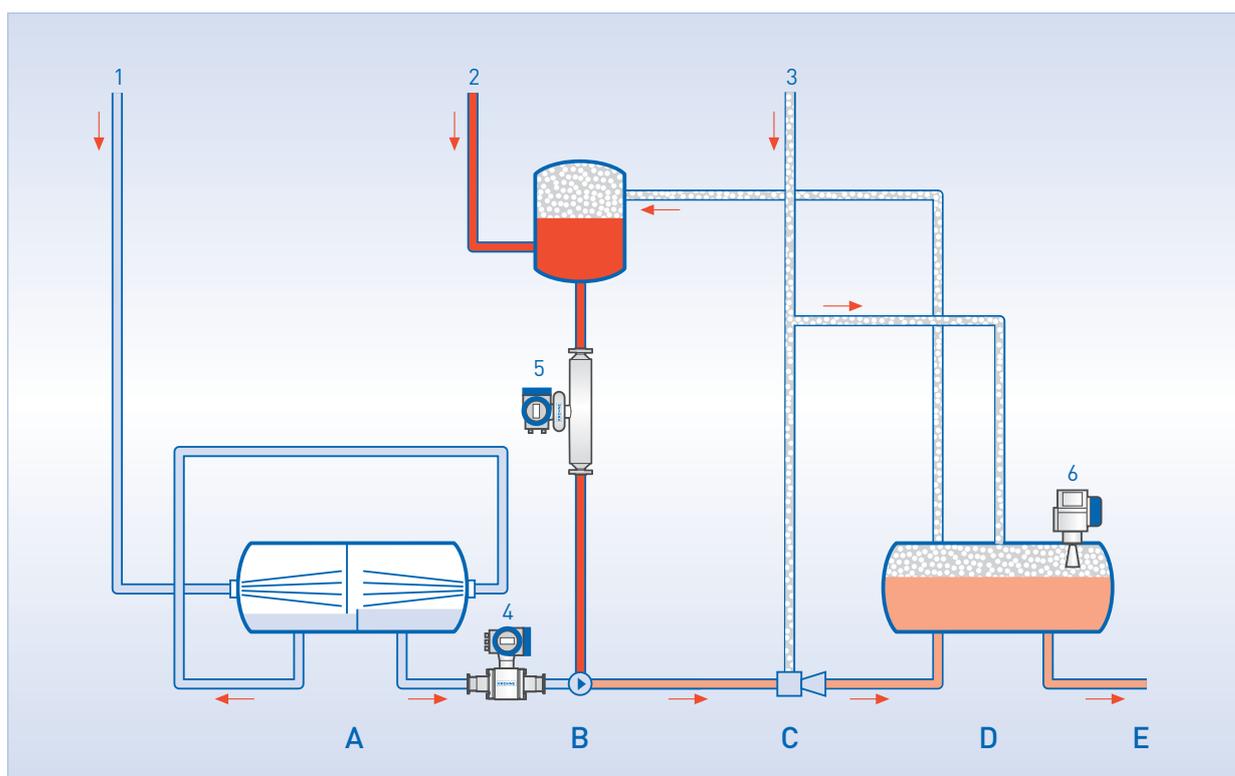
The reduction in measuring device suppliers is advantageous for equipment manufacturers and beverage producers. Purchasing processes are simplified as the purchase volume per supplier increases and it is easier to communicate with just one contact person.

Moreover, installation and follow-up costs are reduced because the mechanical and electrical installation for the various measuring devices is identical or at least similar. Further, the devices can be adjusted and operated via standardised concepts. Maintenance and the procurement of spare parts follow the same process.

## 2. Measurement requirements

The measuring devices used should be made of FDA-compliant materials and comply with all hygienic requirements including 3A approvals. The compact measuring devices should be able to be easily cleaned with CIP/SIP and it goes without saying that the devices should be available with all of the common hygienic connections.

### Principal configuration of a mixing plant for soft drinks and the typical measuring tasks



#### Production steps

- A Degassing of the make-up water
- B Mixing pump
- C Carbonation
- D Storage tank with finished beverage
- E To the filling plant

#### Components introduced

- 1 Water
- 2 Syrup concentrate
- 3 CO<sub>2</sub>

#### Measurements used

- 4 Volume flow
- 5 Mass flow
- 6 Level

### Mass flow measurement of the syrup concentrate

Measuring the various kinds of syrup is the most important flow measurement in a mixing plant. On the one hand, syrup is the most expensive beverage component used in production. On the other hand, the syrup contributes significantly to the quality of the end product. The mass flow measurement may not allow itself to be affected by changes in process conditions. In addition, it should be possible to determine the quality parameters by measuring the syrup concentration in °Brix. Minimal additional pressure loss and the capacity for easy drainage were other very important requirements for the mass flowmeters.

### Volume flow measurement of make-up water

The product properties of make-up water may vary depending on the origin and intended use. The most important parameter is the electrical conductivity of at least 20  $\mu\text{S}/\text{cm}$  ( $\mu\text{mhos}/\text{cm}$ ). This value was not to affect the devices available for selection for volume flow measurement. In addition, it had to be possible to assess the quality of the make-up water via a conductivity measurement.

### Non-contact measurement of the beverages ready to be filled

Topochico was searching for absolutely reliable and accurate level and volume measurement for the ready-to-fill end products in the storage tanks. They required the continuous measurement of the volume in the tank in real time.

## 3. KROHNE solution

KROHNE supplied Topochico with the following measuring devices for this application:  
4 OPTIMASS 1300 C mass flowmeters to measure the syrup  
4 OPTIFLUX 6300 C electromagnetic flowmeters to measure the make-up water  
6 OPTIWAVE 7300 C radar level meters to measure the end products in the storage tanks

### OPTIMASS 1300 C mass flow measurement of the syrup concentrate



In addition to measuring the flow of the various kinds of syrup, the OPTIMASS 1300 C also measures the syrup concentration in °Brix for quality assurance. The device is easily drained, which is important when there are frequent product changeovers. The measuring section features two parallel, straight stainless steel pipes with flow splitters. The mixing ratio of water to syrup can be accurately set prior to dosing. Diluted syrup phases which may occur during product changeovers can now be almost completely utilised. This reduces syrup loss. Due to the minimal loss of pressure, a smaller nominal size than that of the process line could be used for these devices. The device can be cleaned via CIP / SIP and is approved according to 3A.

### OPTIFLUX 6300 C electromagnetic measurement of the make-up water



OPTIFLUX 6300 C can be used for water starting at an electrical conductivity of 20  $\mu\text{S}/\text{cm}$  ( $\mu\text{mhos}/\text{cm}$ ). Thanks to the integrated conductivity measurement, Topochico no longer has a need for separate measurement. The measured conductivity is transmitted via a 4...20 mA current output (alternatively via Bus) to the in-house laboratory. In addition to this measurement, the device also features application and device diagnostics to help the user operate the devices optimally and thus achieve the superior plant availability. OPTIFLUX 6300 C is available in sizes DN 2.5...150 / 1/10" ...5" with all of the industry-specific hygienic connections. The maximum operating temperature is 140 °C / 284 °F. The devices feature FDA-compliant materials and are certified to 3A.

### OPTIWAVE 7300 C Level measurement of finished products (FMCW radar)



The volume contained in the tank is continuously measured and displayed (in real time) by the OPTIWAVE 7300 C. The OPTIWAVE 7300 C radar level meter was especially designed for liquid products and works according to the non-contact FMCW principle (Frequency Modulated Continuous Wave).

The continuous measurement provides stable measured values and is ideally suited to moving process conditions such as agitated surfaces. The device can measure the distance, level and volume in the tanks.

## 4. Customer benefits

The high demands placed by Topochico on the measuring devices used were met and even exceeded in all areas. The deciding factor for Topochico was that KROHNE offered a selection of measuring devices to equip a mixing plant for flow, level, temperature and pressure measurement in a variety of versions and qualities. The devices have 3A approval and conform to the FDA, as required. Further, all devices are available with different hygienic connections. The fact that this was all available from one source, added to KROHNE's years of experience in the industry, tipped the scales in KROHNE's favour as a supplier. Previously, special custom-made devices had been necessary for many applications in the food and beverage industry. Now, standard measuring devices cover these needs.

## 5. Products used

### OPTIMASS 1300 C

- Coriolis mass flowmeter for accurate measurement of mass flow, density, volume, temperature, volume concentration or solid content
- Innovative twin measuring tubes
- Self draining and easy to clean
- Unaffected by type of installation and process effects
- Various hygienic process connections available (DN 25...80 / 1...3")
- Optimised flow divider for minimum pressure loss
- Modular electronics concept with data redundancy
- Available as compact or remote version



### OPTIFLUX 6300 C

- Electromagnetic flowmeter developed in cooperation with customers from the food industry
- Stainless steel version for all hygienic uses
- Unique seal concept
- Suitable for CIP / SIP processes
- All industry-specific connectors and lengths
- Available in compact and remote versions
- Sizes DN 2.5...150, corresponding to 1/10" ...6"
- High form stability and vacuum resistance



### OPTIWAVE 7300 C

- FMCW non-contact radar level meter for liquids
- Reliable measurement in difficult process conditions even in tanks with agitated surfaces, foam or internal objects
- Hygienic antenna for processes where stringent hygiene standards must be obeyed
- Hygienic flange versions available: BioControl®, Tri-Clamp®, DIN 11851 (DN 50 / 2"); SMS 51; others on request
- Operating condition for the hygienic antenna option: -20...+150 °C / -4...+300 °F
- Measuring range up to 80 m / 260 ft
- PACTware and DTMs are included by default



### Contact

Would you like further information about these or other applications?  
Do you require technical advice for your application?  
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Please visit our website for a current list of all KROHNE contacts and addresses.

