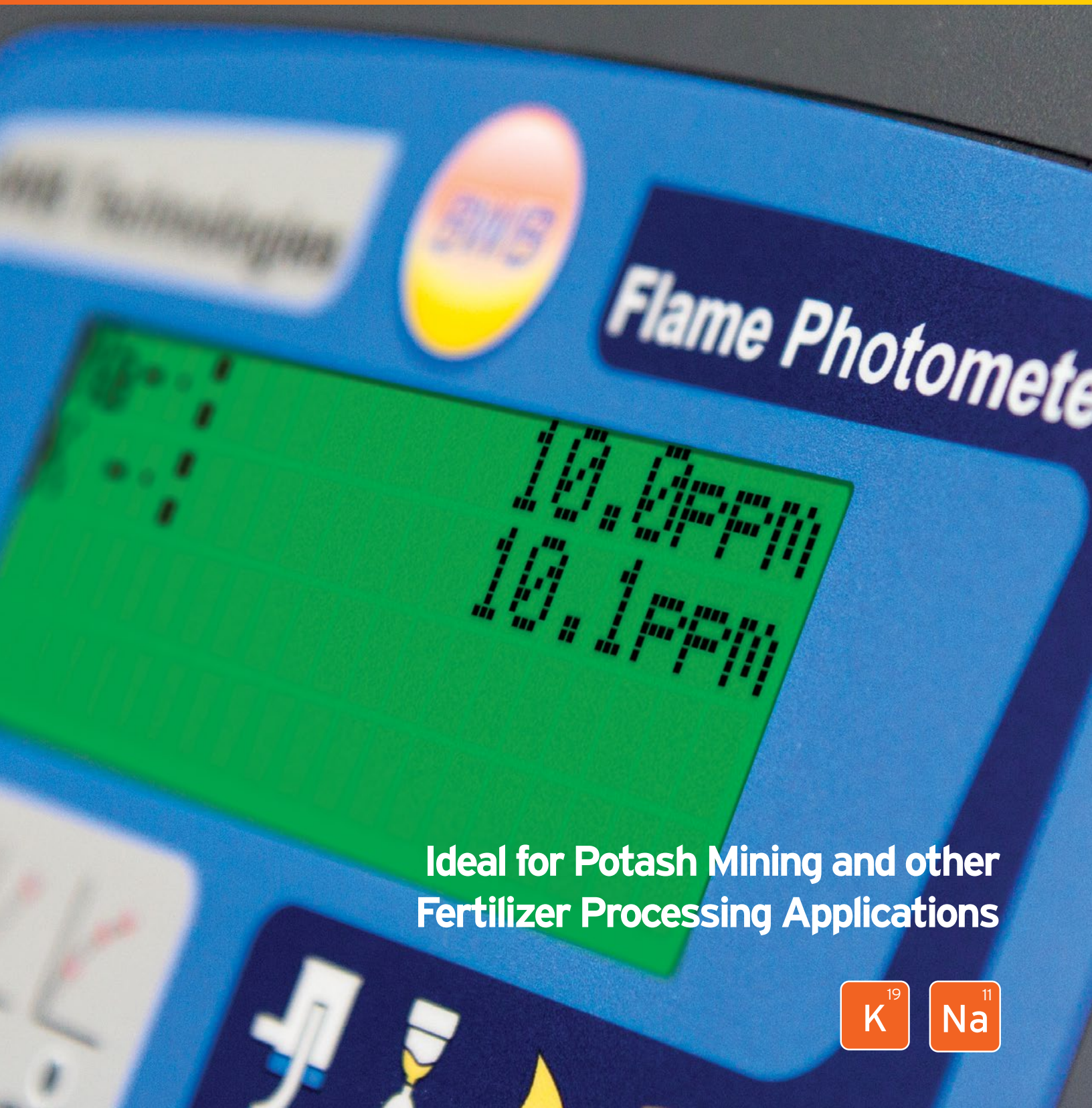
Just Add Gas

BWB Technologies USA LLC

BWB Sugar Flame Photometer



Ideal for Potash Mining and other Fertilizer Processing Applications

K 19 Na 11

BWB Technologies USA LLC

K 19 Na 11 SUGAR

BWB SUGAR

Ideal for potash and mineral mining, fertilizer processing and soil amending studies, and steam generating thermal power processes where diluted brines are measured

In keeping with the Globally accepted published papers from 1977 forward, potassium and sodium detection is now available online 24/7 with a Uniquely configured channel of detection for extreme accuracy along the range of potassium control.

This winning proprietary format has been improved with a unique adaptation and optimisation of the proprietary BWB optical array detection systems, which in this iteration of the BWB Specialty Flame Photometers allows for a single channel of precise and accurate potassium and sodium measurement.

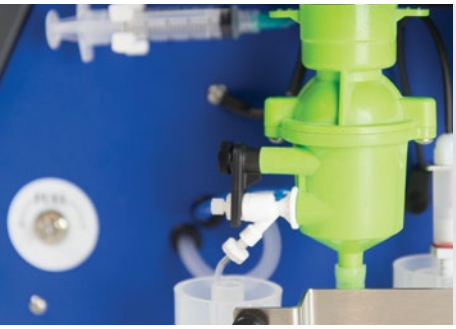
This Specialty Flame Photometer has been requested and designed for the global Sugar Production marketplace. There were a few traditional Flame Photometer manufacturers over the decades who had served this market and now these robust and fantastic units are coming out of service.

Enter the BWB SUGAR Flame Photometer with specialised potassium and sodium channel detection, supplied with hybridised specific needs multiple point calibration solutions for potassium and sodium. Per our customers' requests, our Collection Cup provides Real Time sample access for our mixing chamber/detection systems and only requires that the sample be at or near ambient temperature and customer provided ~5ml/minute feed to our unique "Collection Cup" system.

FP/PC APP

This totally unique BWB feature allows multiple installations details to be shared via intranet or internet links to provide "Distributed Control" via a single Control room with staff completely remote from the Refinery site itself. For large Sugar Companies with multiple sites around the world, this allows Expertise from a centralized location anywhere in the world with real time virtually limitless data accumulation and analysis.

.csv files allow users to construct novel and proprietary Excel spread sheets and to share data quickly and efficiently.



+ FEATURES

- UNIQUELY HYBRIDIZED BWB DUAL CHANNEL, FOCUSED FOR HIGH ACCURACY POTASSIUM AND SODIUM MEASUREMENTS
- "IRS" (INTERNAL REFERENCE STANDARD) AVAILABLE
- 4-20MA 2 WIRE OUTPUT COMPATIBLE WITH SCADA SOFTWARE
- LIVE ONLINE MONITORING
- CONSTANT CONDENSATION STREAM FEEDS WITH USE OF THE PROPRIETARY BWB COLLECTION CUP
- BUILT-IN AIR COMPRESSOR; PIONEERED BY BWB TECHNOLOGIES IN 2007 AND PROVEN NOW WITH OVER 1000 UNITS IN GLOBAL FIELD USE
- SOLUTIONS AND LABWARE INCLUDED; "JUST ADD GAS", THE HALLMARK OF THE USER FRIENDLY BWB FLAME PHOTOMETER (FES) PROGRAM
- SPECIALIZED CALIBRATION "READY TO USE" SOLUTIONS SUPPLIED AT 1, 5, 10 AND 20PPM
- USER SELECTABLE DECIMAL PLACES
- INTUITIVE USER INTERFACE FOR TRUE EASE OF USE
- DISPLAY PROMPTS STEP BY STEP OPERATION
- DATA SHARING VIA PC LINK WITH BWB'S FP/PC APP

Just Add Gas

Technical Data

Just Add Gas

Sample rate
2.0 - 3.5ml/min

Tubing materials
Silicone and Tygon®

Required desk space for Instrument
50cm (H) x 45cm (W) x 45cm (D)
For Safety reasons the Flame photometer requires 1m of unobstructed space above to allow dissipation of heat from the chimney.

Instrument size
Sugar Flame Photometer
51cm (H) x 38cm (W) x 41cm (D)
(20in x 14in x 16in)
Shipping
62cm (H) x 55cm (W) x 47cm (D)
(24in x 22in x 19in)

Weight
Sugar Flame Photometer - 15.3kg
Shipping - 25kg

Optimal range
Single point calibration
Na 0.1 - 60ppm
K 0.05 - 100ppm

Multi Point Calibration
Na 0.1 - 1000ppm
K 0.05 - 1000ppm

Reproducibility
<1% Coefficient of variability for 20 consecutive samples over ten minutes at concentrations of 100ppm or less. (After instrument stabilisation).

Chemical Interference
Na/K/Li = <0.5% to each other when equal in concentration at <100ppm

Limit of detection (LOD) and limit of quantification (LOQ)

LOD	LOQ
Na - 0.03ppm	Na - 0.1ppm
K - 0.02ppm	K - 0.05ppm

Time to stability
Less than 15 seconds after sample is introduced into the flame

Ions measured
Potassium
Sodium

Interfaces
USB
4-20mA output capable of direct link to SCADA systems
Optional integrated printer
.CSV and .PDF generated reports and files via FP-PC software
Collection Cup providing 24/7 live automated sampling*

Recommended minimum warm up time based on ambient temperature
21ºC - 40 minutes

Power requirements
100V - 250V AC at 50 or 60Hz automatically selecting

Fuel requirement
Propane, Butane or Natural Gas*
regulated to 19Bar. Flow rate of 0.4l/min
*with modifications. BWB Technologies recommends either Propane or Butane for optimum results.

Readout
LCD, four line, alpha numeric, back lit.

+ WHAT'S IN THE BOX

- PC Leads USB and RS232
- Selection of 3 Power cables to suit all regions (4th option for China)
- Gas Hose
- Aspiration Kit
- Manuals covering all aspects of the Sugar FP
- Quick Start guides
- Warranty Registration Form
- Certificates of analysis for all provided Fluids
- Material Safety Data Sheets for all provided Fluids
- The FP-PC Software installation USB
- 150ml of BWB recommended cleaning solution
- 150ml calibration fluids for sodium at 10,000ppm.
- 250ml calibration fluids of potassium at 1, 5, 10 and 20ppm
- 100ml conical flask with screw lid
- 100 disposable sample cups
- 1L of De-Ionised water
- 2m of waste tube
- Set of spare fuses
- 10 x 10ml pipettes
- 10 x 1ml pipettes

Proudly Engineered and Manufactured in England

Manufactured in Newbury, County of Berkshire, England.

Specifications and contents are subject to change without notice.

Why and how: **Detecting sugar within boiler condensate**

by Hozan Edwards for BWB Technologies UK Ltd

Flame Photometry has been the simplest and most cost effective way for monitoring condensate lines in Sugar processing plants since the instruments boom in production in the 1980s; With Sugar industries all over the world still using the method within their daily operation. There have been only a few traditional Flame Photometer manufacturers over the decades who had served this market but now these robust and fantastic units are coming out of service. This paper explains how the BWB Sugar instrument allows for the cost effective method to continue with reliable and accurate results using 21st century modern technology.

This Specialty Flame Photometer has been requested and designed for the global Sugar Production marketplace. The instrument was designed to be in keeping with current methods and globally accepted and published papers from 1977 forward. Measuring both Potassium and Sodium simultaneously 24 hours a day, 7 days a week, without the need of an operator to feed samples, allowing for great process automation and aids in the prevention of human error. The optics and processor have been uniquely configured for the detection of Potassium to enhance the accuracy.

Why is Potassium (K) analysis and measurement such an important requirement within the Sugar industry?

The first stage of processing the raw sugar is to soften and then remove the layer of mother liquor surrounding the crystals with a process called "affination". The raw sugar is mixed with a warm, concentrated syrup of slightly higher purity than the syrup layer so that it will not dissolve the crystals. The resulting magma is centrifuged to separate the crystals from the syrup thus removing the greater part of the impurities from the input sugar and leaving the crystals ready for dissolving before further treatment. The liquor which results from dissolving the washed crystals still contains some colour, fine particles, gums and resins and other non-sugars. Further down the production line during the process of "creating sugar" from the solution, water is removed by boiling; the sugar then precipitates out allowing the formation of sugar crystals. If the water is boiled too quickly in the evaporator (or 'pan') sugar also forms part of the condensate and enters the distillate. This is then not only a loss of product but can lead to other severe problems with faults in the condensate lines, boilers and process downstream.

Almost all manufacturing facilities use high pressure steam boilers; the steam is used to generate power and heat for the industrial process. Condensate lines feed back to the boilers "top up tank"; if contaminated condensate is returned to the tank it finds its way back into the boiler. An increase of chemical is then required to be dosed to maintain the boilers correct chemistry levels, an increase in scum blow-down (blow-down is the process of opening a valve at the scum build up level within the boiler, this is fed to waste. This layer can be thought of as the layer of scum build up you get inside a domestic kettle at the water level.) is required to maintain the correct PH levels and thus an increase in fuel consumption can be observed. In even small quantities sugar within the condensate can damage steam boilers. Sugar breaks down into acids, at high temperatures, causing foam, corrosion and scale inside of the boiler, this cause's considerable damage to the boiler and its accessories. Series cases can see the boiler being shut down for thorough cleaning and repair.

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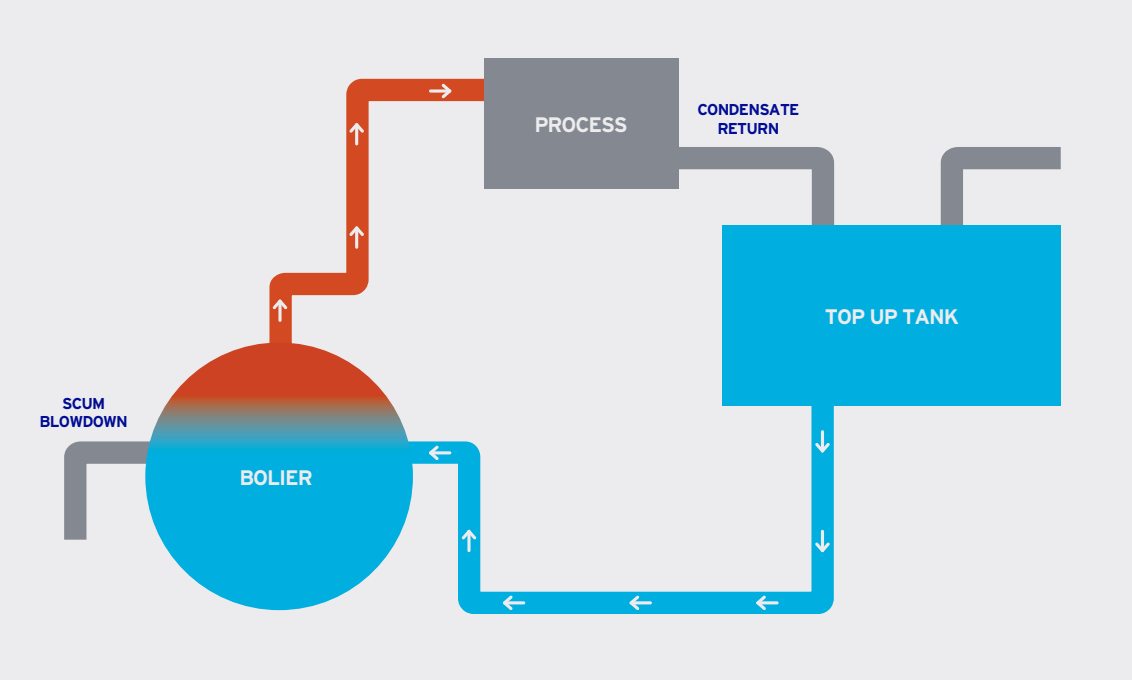
Why and how: Detecting sugar within boiler condensate

See the process model below for a general overview of the operation of an industrial steam boiler.



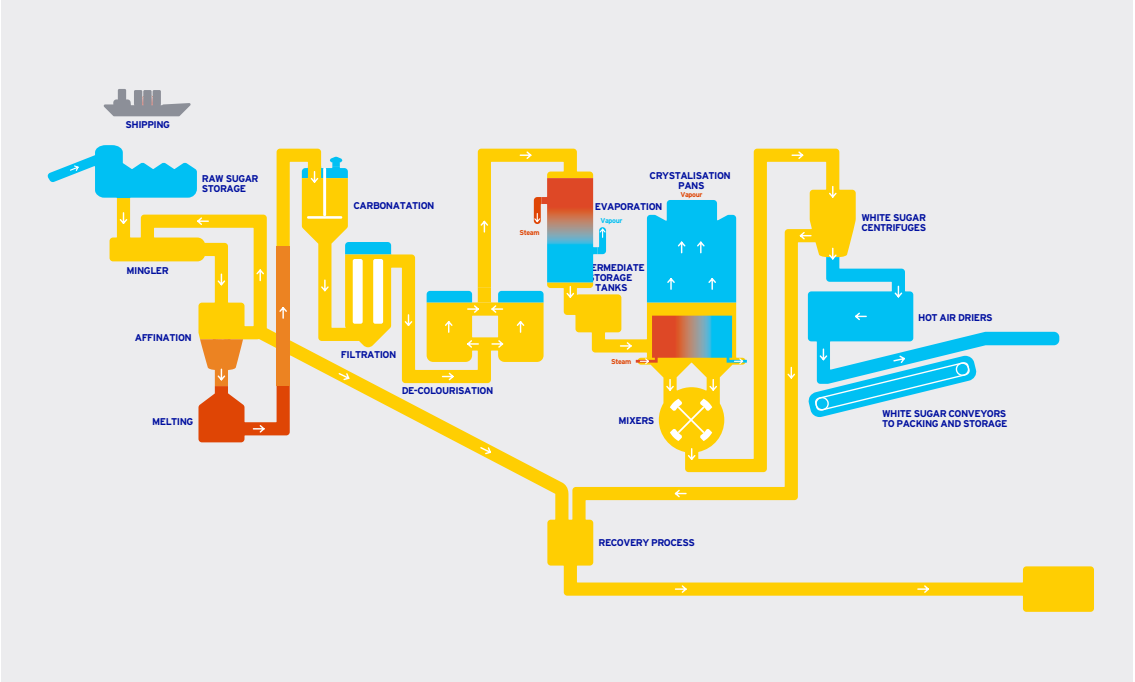
BWB have teamed up with Aquanet international, the world's only small footprint fully automated 24/7 boiler water monitoring and dosing company. Aquanet international provide complete water monitoring solutions adjusting dosing requirements dependant on boiler conditions and load. Contact them to discuss your requirements.

It is clear to see a simple issue of boiling the sugar solution too quickly can have massive financial affects on not only a batch of sugar product but also the long term running of the sugar producing facility.

The use of a flame photometer in the analysis of condensate was reported by Verhaat and De Visser prior to 1977. The technique is based on analyzing the condensate for Potassium and estimating the amount of sugar by means of a known ratio of sucrose to Potassium.

The rough ratio of sucrose to Potassium (K) is 100:1 but analysis has shown that it can vary from 85:1 to 100:1. This is based on entrainment of syrup but can also apply to entrainment from a pan. The ratio of sucrose to K will vary depending on the massecuite boiled and is determined by the feed to the pan. As sugar crystallizes out during boiling this ratio will change. Molasses is a thick dark syrup that is a byproduct of sugar refining, typical sucrose to K ratios are 32:1 for A molasses and 14:1 for B molasses.

Below shows the refinery process overview of raw sugar through to sugar packaging.

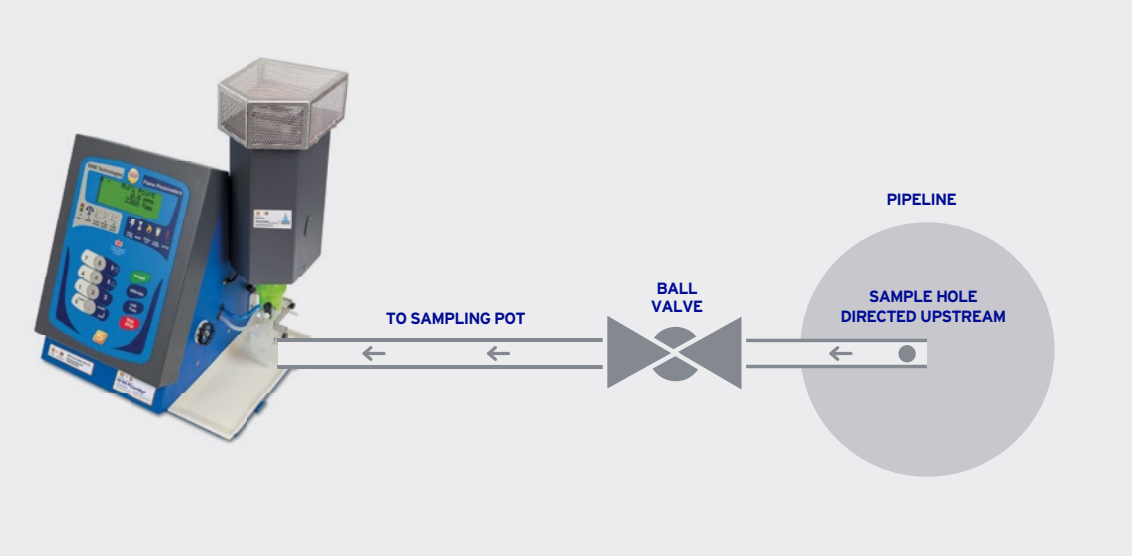


The BWB Sugar instrument has been designed to fit almost straight into the industrial process. With 3 units running 24 hours a day 7 days a week, the facility can comfortably relax knowing that loss of product (and thus damage) will be detected and alarmed. The instruments should be fitted to the steam output line of the evaporation tank and the vapor output lines from both the evaporation tank and crystallization pans.

Through the process of flame photometry every aspect and change, right down to ambient pressure and humidity can have an effect on the flame, BWB have combated very hard to reduce these effects it is important still however, the sample stream is of near equal temperature to the calibration standards when the instrument is/was calibrated. This tends to be at about 20 degrees centigrade. For this reason it is important that the steam lines and any hot vapor lines are cooled by using a cooler prior to aspiration in the flame photometer.

Why and how: Detecting sugar within boiler condensate

Points at which to take a sample can be one of the main hold backs to a facility taking on the automation of condensate and distillate analysis. Fortunately there is a simple cost effective solution to this problem which requires very little work to implement. A sample probe must be created and fed into the required pipelines for analysis. The simplest of all probes takes the form of a welded boss, a ball valve and a piece of hollow tubing.



The boss is welded onto the pipeline to be analyzed, the ball valve is securely attached and a drill is used to drill through the open ball valve into the pipeline. A hollow tube is required at a diameter smaller than that of the ball valve orifice, with a length great enough to pass through the ball valve and position itself centrally within the pipeline. At one end (the sample end) a drilled hole is required, perpendicular to its length. The sample tube can then be passed through the ball valve into the pipeline with this sample hole directed upstream. A modified (drilled though) compression fitting is used to secure the sample tube to the ball valve.

The equipment and methods described above have been used since 1971 to monitor entrainment from evaporators and, in a few cases, from vacuum pans in several factories around the globe. The demand for this type of analysis soon became apparent when reports were published regarding the installation of such an instrument at well known processing sites. One facility in particular faced a season of undetermined high loss of product. There was evidence of sporadic entrainment from an evaporator which had undergone extensive modifications, including the commissioning of new effects, during the previous off season.

They therefore decided to monitor systematically all possible sources of entrainment from the evaporator. The following list briefly states the checks carried out to the processing system.

1. Condensate from the first vessels were checked for the possibility of leaks.
2. Condensate from the second vessel and juice heaters was checked.
3. Condensate from a combined feed from vessels 3 and 4 was checked.
4. Injection water was tested.

The results from the testing that lasted several weeks showed that massive entrainment occurred whenever there were fluctuations in exhaust steam pressure to the evaporator.

In another example of vapor sampling it was found that entrainment occurred only late during the night and in the early morning and this was traced to the higher vacuum produced by colder injection water during this period.

These examples indicate how the monitoring of sucrose in vapor to the condensers can be used to pinpoint sources of entrainment.

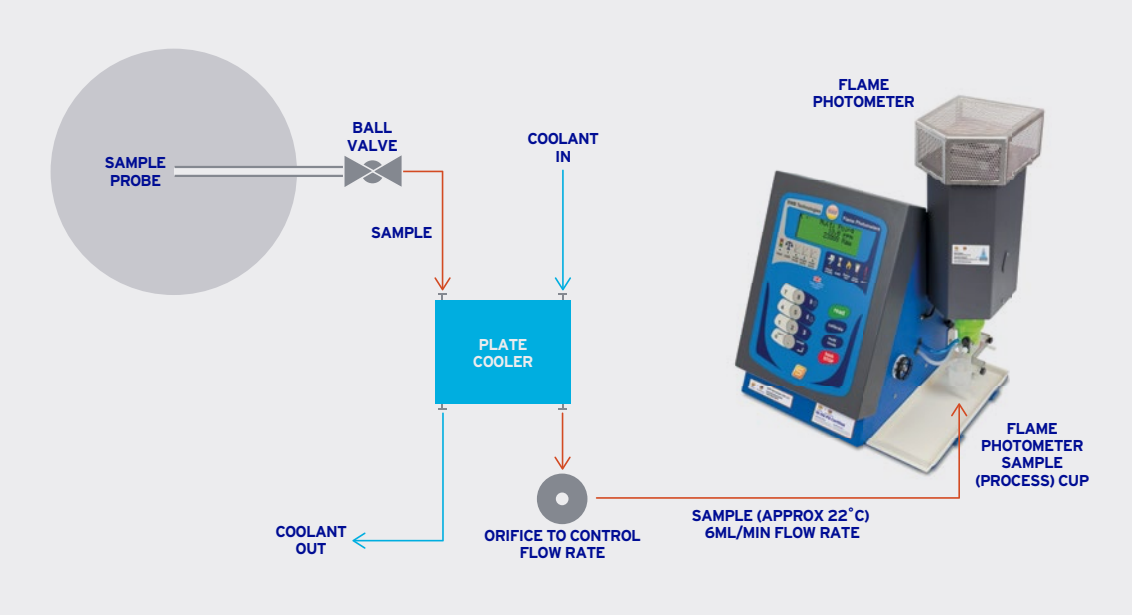
Summary

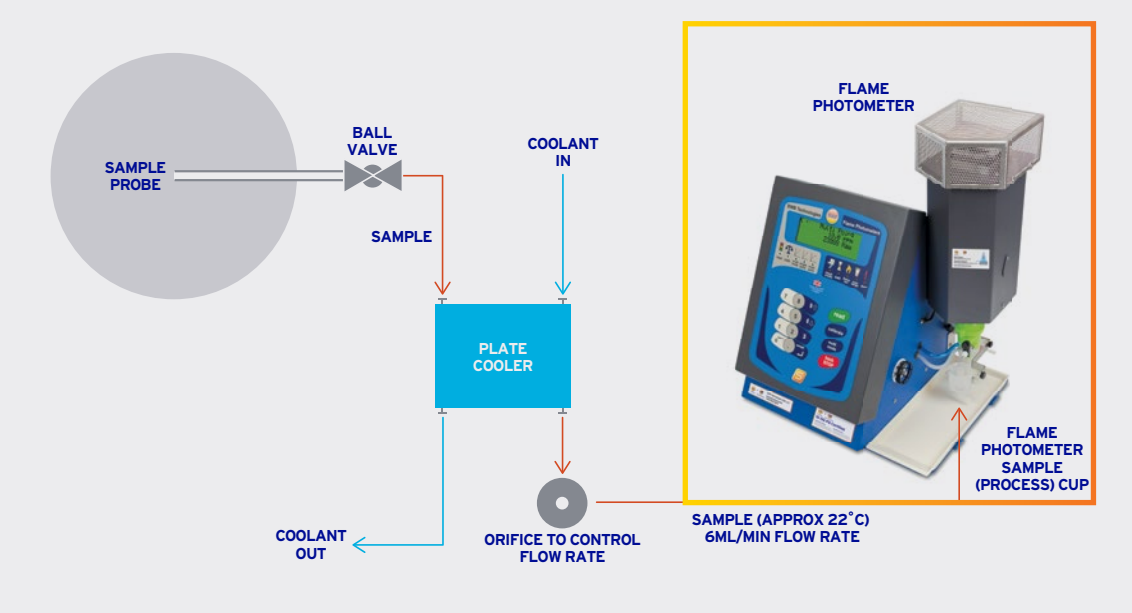
BWB's solutions bring measurable process benefits in terms of energy savings, amount of product wasted and long term economical savings in maintenance and repair. BWBs application engineered measurement solution offers a number of advantages to sugar processing facilities:

- Uniquely hybridized dual channel focused for accuracy on Potassium and Sodium measurements.
- IRS (internal reference standard) compatible.
- 4-20mA 2 wire output compatible with SCADA software.
- Live online monitoring 24/7.
- Built in air compressor: pioneered by BWB Technologies in 2007 and proven now with over 1000 units in global filed use.
- Just Add Gas ready, solutions and lab ware included. The hallmark of the BWB program.
- Specialized ready to use calibration standards at 1, 5, 10 and 20ppm.
- User selectable decimal places.
- Intuitive user interface for true ease of use regardless of local language.
- Display prompts step by step operation.
- Data sharing via PC link with BWB's supplied FP/PC software.

Why and how: Detecting sugar within boiler condensate

BWB Sugar Flame Photometer recommended installation for condensate process analysis





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12 months warranty

BWB Technologies UK Ltd. warrants, subject to the conditions itemised within this document, through either BWB personnel or personnel of its authorised distributors, to repair or replace free of all charges, including labour, any part of this product which fails within the warranty time specified above, appertaining to this particular product. Such failure must have occurred because of a defect in material or workmanship and not have occurred as a result of operation of the product other than in accordance with procedures described in the instructions furnished with this product.

Manufactured in Newbury, County of Berkshire, England.

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