glass WORLDWIDE

Precision control bubbling

It was in the mid-1990s that Electroglass introduced its Precision Control Bubbler System, offering major operating and control advantages over conventional, continuous bubbling in glass melting furnaces. Grahame Stuart discusses the company's latest developments.

It is widely accepted that conventional, poorly controlled bubbling with its fast, high volume bubble generation can have serious detrimental effects on both furnace life and glass quality. Conventional bubbling systems may improve glass homogeneity but frequently introduce increased refractory wear local to the bubbler positions, leading to glass leaks and to increased refractory stone and seed counts in the final product.

Furthermore, there is the real risk of small parasitic bubbles being created where large bubbles collide with each other; these parasitic bubbles can become entrained into the glass flow, never reaching the glass surface and ultimately leading to further quality issues within the final product.

TECHNICALLY ADVANCED ALTERNATIVE

Since its introduction and through successive control and monitoring technology developments, the Electroglass Precision Control Bubbler System has long offered a technically advanced alternative, based on the principle of slow, carefully timed and controlled injections of gas into the glass, creating uniformly sized, individual, equally spaced bubbles. This approach is designed to improve homogenisation of the glass, without risk of rapid refractory wear and its associated glass defects, at the same time eliminating the risk of parasitic bubbles being created by rapid conventional bubbling.

A key element in the success of the system has been the design of a blockage-resistant bubbler injector that allows bubbling at very slow rates, as low as one single bubble every five minutes, without injector blockage or failure. This ability to operate at very low bubbling rates and also to effectively stop and start bubbling has meant that the precision control bubbler has seen success in many different glass types and varied applications. This extends from barrier bubbling, where varied rates of bubbling may be required for different compositions, to colour change bubbling in working ends, furnace throats and forehearth entry areas, where bubbling may only be required for a very short amount of time during colour transitions on a few occasions each year.

The first of these Electroglass systems featured manually adjusted electro-mechanical control. These were succeeded by PC-controlled systems and later PLC control of bubble size and frequency. Large numbers of these systems are in use in glass furnaces worldwide.

The emergence of more speciality and technical glasses that, by their nature are difficult to melt and refine efficiently using either top heat or a combination of top heat and supplemental electrical boosting, has meant that the interest in bubbling as a highly effective way of homogenising glass is again increasing.

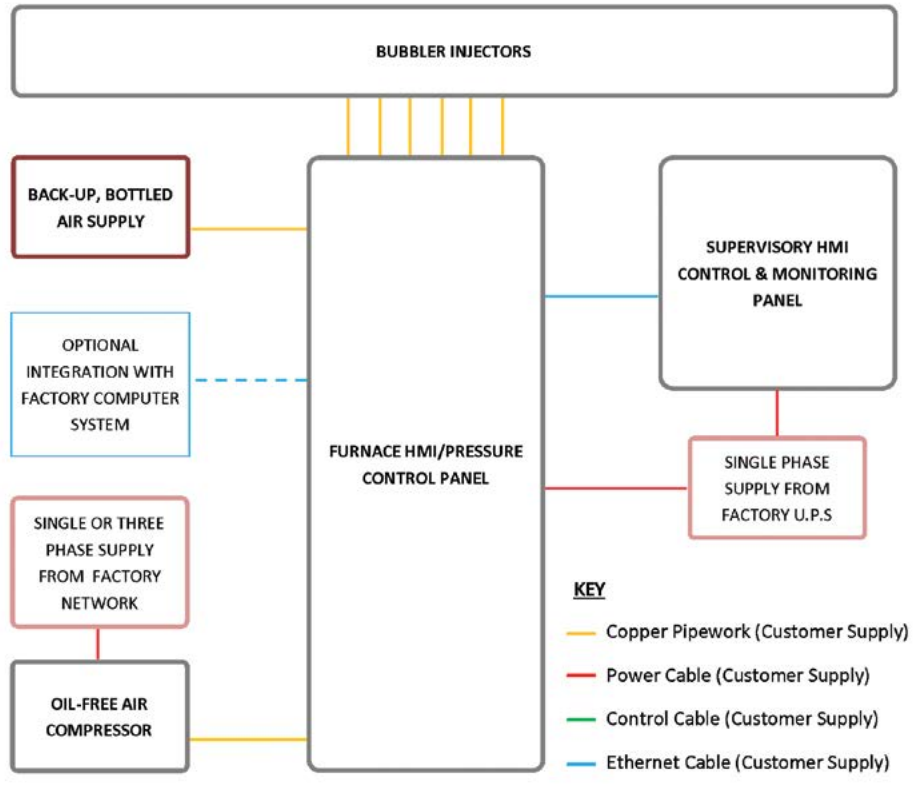
OPERATING ACCOUNTABILITY

With its policy of continual research and development, Electroglass has now introduced the latest technology advance in its Precision Control Bubbler System (PCBS), specifically designed to meet the requirements of modern glass plants where operating accountability and control integration are desirable.

The Electroglass digital PCBS sees all analogue pressure gauges replaced with digital pressure transducers, which can be monitored from two separate HMI displays. The two displays mean that for the first time, operators can control bubbler pulse and interval times (controlling bubble size and frequency), acknowledge alarms and view all operating parameters from the pneumatic control panel close to the furnace, as well as the control panel within the furnace control room.

The system also allows for limited trending and history logging of parameter changes to allow operators and supervisors to track operational variations. In addition, an on-board help screen on both HMIs allows operators to quickly find answers to the most common operating questions.

The addition of the extra HMI has also meant it has been possible to reduce cable run lengths, with all control cabling now terminating at the pneumatic control panel, close to the furnace and only an Ethernet cable being required to communicate between this and the HMI panel within the furnace control room.



Typical system schematic.

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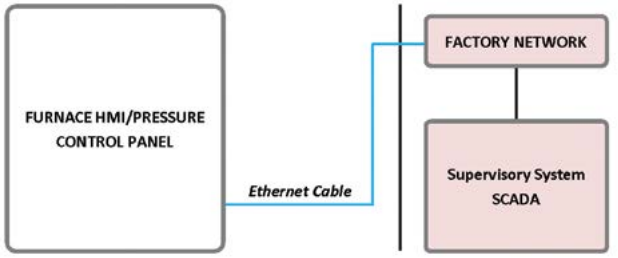
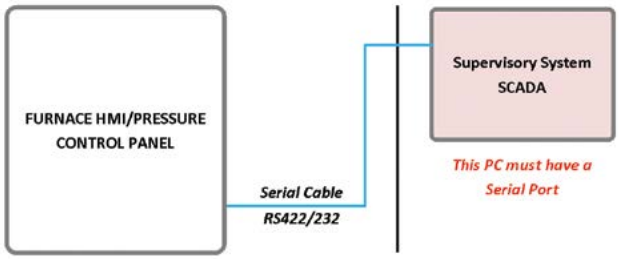
Integration Option One



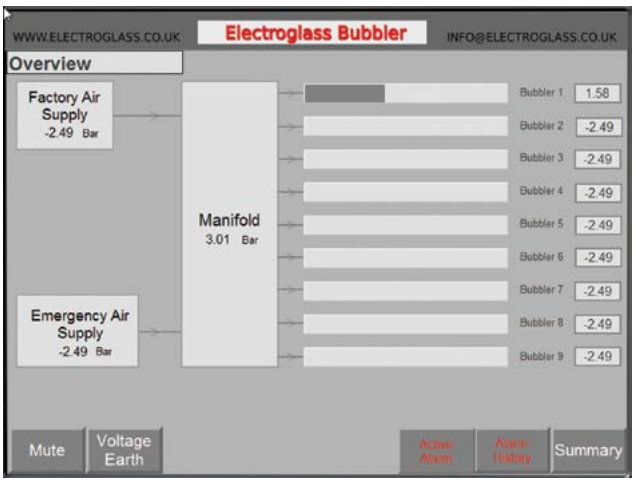
Integration Option Two



Integrated options for the Electroglass precision control bubbler system.

Furthermore, to allow system monitoring by a wider audience throughout the glass plant, the latest PLC equipment has been selected to ensure the Precision Control Bubbler System can be easily integrated into an existing SCADA system, be it factory network-based or standalone, with minimal additional cost if discussed at time of enquiry.

Over 50% of all systems supplied to date have been repeat orders by existing customers or their associates and this trend seems set to continue. The latest generation Precision Control Bubbler System, which also features fully updated pneumatic system design and equipment, is already proving popular, with four systems varying in size from seven points up to 24 points having been ordered by both new and existing bubbler customers in the first two months of its release.



Control screen overview.

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