

Leybold: Innovative HMI for high-end leak detection in quality assurance applications

Easy operation and ergonomic design of helium leak detector

The Phoenix L500i helium leak detector from Leybold is designed as an ergonomic and easy-to-use roller-mounted workstation.

Based in Cologne, Germany, Leybold GmbH manufactures vacuum pumps and measuring instruments, as well as complete solutions. Its vacuum technology is deployed in numerous areas of everyday life, such as air conditioning systems, flat screen displays and automotive applications, as well as in high-tech processes such as microchip coating and the production of optical glass and analysis equipment. Therefore, the operating demands placed on devices such as the helium leak detector offered by Leybold are varied and challenging. However, these challenges can be optimally solved using the CP3915 multi-touch Control Panel and TwinCAT 3 PLC HMI software from Beckhoff.

A helium leak detector like the Phoenix L500i from Leybold detects leaks and the corresponding leak rate, i.e. the gas flow caused by the leak. The part under inspection is first evacuated in order to allow gas from outside – in this case helium – to enter through a potential leak as a result of the difference in pressure. This is then evacuated by the leak detector. The partial pressure produced by the helium in the detector is measured by a sector field mass spectrometer and displayed as the leak rate.

Fast, reliable and convenient measurement functions

The two key characteristics of a leak detector are its range of measurement and time performance, that is the response time. This is where the Leybold device sets new standards, according to Thomas Palten, Senior PLM/SLM of



High Vacuum Systems: "We think the Phoenix L500i is the fastest leak detector on the market. It also enables extremely reliable measurements, and the ergonomic design – winner of the 2014 Red Dot Design Award – sets it apart from other equipment."

Dr. Magnus Janicki, Head of the Electronic/Software Product Group adds: "The high helium suction capacity of up to 50 L/s ensures a response time of less than one second, resulting in extremely short inspection times. Added to this are other factors such as notable ease of operation, an optimized display of measurement results, and integrated data storage to generate inspection reports for efficient quality assurance."



The CP3915 multi-touch Control Panel from Beckhoff is a natural fit for the sophisticated design of the unit.



The clearly laid-out user interface of the leak detector was realized using TwinCAT 3 PLC HMI software.

PC-based control as the foundation for efficient inspection processes

The Beckhoff CX9020 Embedded PC, equipped with a 1 GHz ARM Cortex™-A8 CPU, provides ample performance for fast measurement and visualization processes. The CP3915 Control Panel with 15-inch screen, in combination with TwinCAT 3 automation software, ensures user-friendly visualization that ideally matches the sophisticated design of the unit, as Thomas Palten explains: "When the leak detector was launched, an off-the-shelf, design-oriented tablet PC was used as an operating interface. However, in order to meet the full range of industrial requirements, for example in the field of nuclear power engineering, we have now switched to a Control Panel from Beckhoff. The panel, which also won the Red Dot Design Award in 2013, is the ideal fusion of our exacting design standards with an extremely robust construction, providing an IP 65 rated multi-touch unit in a robust aluminum housing with high-quality glass cover. Ideal for industrial applications, the PC-based control system also meant that we were able to significantly reduce hardware and software maintenance efforts when compared with the app-based user interface."

The numerous functions provided by the visualization were implemented using TwinCAT 3 PLC HMI software, ensuring highly efficient operation and simplified leak detection. A standby/timer function makes sure the device is ready to use from the start of the shift, saving time and energy. Various user and product profiles minimize operating errors and increase efficiency. Other features include reporting functions for different inspection methods, optional barcode scanning to increase operating speed, and an "eco mode" that deactivates the auxiliary pump during long measurement runs, saving energy as a result. Thomas Palten adds: "Users of the leak detector generally require intuitive operation and ease

of use. TwinCAT 3 PLC HMI (TF1800) enabled us to implement exactly this type of user interface experience in an easy and inexpensive way. It includes special features such as logarithmic trending functions using the histogram object, making it possible to represent the leak rate signal over time with a resolution of up to 100 ms in order to detect leaks quickly and reliably."

The Phoenix L500i also uses other components from the Beckhoff portfolio. The 2-channel EL4732 EtherCAT analog output terminal is used to generate a sinusoidal acoustic signal with a frequency of up to 2 kHz. The EL6002 and EL6022 serial interface terminals support communication with a higher-level control device or a mass spectrometer. There are additional digital EtherCAT I/O terminals to control pumps and valves. Leybold has worked with PC-based control technology from Beckhoff since 2010, and Dr. Magnus Janicki sums up this relationship: "We benefit from a very wide portfolio of control, drive and software components. What is more, PC-based control offers a more powerful and convenient programming environment, as well as better component management when compared with the systems we previously used."

Further information:

www.leybold.com

www.beckhoff.com/CP39xx

www.beckhoff.com/TF1800