



# Explosion protected Open HMI series

with PC function in modular design

by Horst Friedrich



Figure 1: Modular Open HMI system with varying screen diagonals (15 or 19 inch)

Graphic operator interface systems with high screen resolution and PC functionality – the Open HMI systems (Human-Machine Interface) – in the past as a rule had to be completely replaced or were subject to complex repairs in the case of failure. The new Open HMI series of HMI systems from R.STAHL is therefore of logical modular design. Units in this series can thus be serviced very quickly and, even in hazardous areas, directly on site; it is also possible to

change individual modules. Interruptions to operation and plant shutdown are therefore reduced to a minimum. In many cases the necessary module replacement can even be undertaken by the user if the authorized personnel have attended a corresponding training course. For most systems in hazardous areas the units represent an efficient and, often, most cost-effective HMI solution.

### The Open HMI series and its applications

The new Open HMI units, based on PC functionality, can be used as stand alone units or built into control panels in many sectors of industry. The series is of extremely robust design and is therefore suitable for even very harsh environments in which vibration, extreme temperatures and/or electromagnetic interference place high requirements on the system. The name of the series is indicative of the open platform that is a special feature of the systems: for the operating system it is possible to use a lightweight Windows XP Embedded, Windows XP Professional or even variants of UNIX/LINUX.

Typical applications for HMI systems of this type are in the oil and gas industry where they are used in exploration, extraction, processing, and loading. Particularly in this sector, long service life and a lack of sensitivity to temperature changes are elementary requirements for these units in view of the sometimes remote locations in extreme climates. There are also numerous applications for PC-based HMIs in machine tool manufacture, for example on centrifuges, mixers, compressors, coaters and paint lines. A key sector is the chemical and pharmaceutical industry. An operator interface system is required here for on-site operation and for batch processes; these systems must not only provide the qualities already mentioned, but must also be suitable for the usual solvents in the case of processing, meeting cleanroom requirements, and satisfying the applicable GMP regulations.

### Ease of servicing

For the majority of the applications across the related sectors, an easy to service design for the HMI solution is of high priority. As even industrial PC technology, on which modern operator interfaces are based, includes a series of wearing parts, replacement over a life cycle lasting years must be expected. The experience of hard disk failure is common.

Many common systems on the market use the type of protection encapsulation »m«, that is a design in which the entire unit is embedded in synthetic resin. Repairs to individual components are then impossible. Also widespread is the type of protection powder filling »q«, which is the type of protection where the unit's enclosure is filled with special types filling material and then sealed. These units may only be repaired by the manufacturer. In addition, due to the hygroscopic properties of the filling material, among other things, they cannot be opened on site but only in safe areas. Then they must be safely sealed again with a filling guaranteed to be dry.

### Modules with different types of protection

Ease of maintenance therefore requires a different, that is modular, design. In principle explosion protection can be realized by using a flameproof enclosure. Unfortunately this approach results in very bulky units in practice. With the necessary size for the flameproof housing and the pressure produced inside in the event of an explosion, walls and glass of increased thickness are necessary, such that an enclosure for a 15-inch HMI can quickly weigh in at over 30 kilograms.

With the new Open-HMI series, R. STAHL HMI systems is providing a much more elegant alternative that is only half the weight in comparison. For this purpose the units are assembled from various individual modules that have different types of protection. A few modules are of fully encapsulated design, others like the CPU and power supply are in flameproof enclosures, backplanes are either intrinsically safe »k« or in increased safety »e«. The design makes it possible to also open an Open HMI enclosure on site in hazardous areas during operation; many modules can then be replaced. Typical wearing parts, e.g. the mass storage, are housed in enclosures of type of protection »e«; with USB 2.0 flash drives in sizes up to 16 GB it is possible to completely avoid the use of rotating parts, the most common source of faults in PC-based systems. If more space is required, as an alternative, SATA hard discs up to 120GB are available. If these should then fail at some point, they can be replaced very quickly. →



Figure 2: USB 2.0 flash drive for the Open HMI system as an alternative to rotating bulk storage or hard disk

### Modern hardware and software

The core of an Open HMI system is a Pentium M processor with a clock frequency of up to 1.6 GHz. This Intel chip provides very high performance with particularly low power consumption. Thanks to the low losses, a processor fan is not necessary, an aspect that significantly reduces the probability of failure of the CPU. The Pentium M operates maintenance-free and has a very long service life. Open HMI systems come with Windows XP Embedded pre-installed, but with unnecessary drivers removed, as an option Windows XP Professional SP2 or UNIX/LINUX are also available, and on request come with standard applications configured ready to use, such as Siemens Win CC flexible or Rockwell RSView. Booting takes only 40 seconds. The BIOS has been specially configured and protected; the system partition on an Open HMI is protected against viruses, worms and system corruption. With crash recovery USB sticks, the user also has available an extremely practical integrated backup/restore concept for custom configured systems. Open HMI systems are multilingual with support in 25 languages. The touch keyboard supports 150 different language layouts at the Windows login for trouble-free usage worldwide.

### International approvals

Thanks to a series of international approvals, the Open HMI systems are of almost universal application. Different modules can be used depending on the hazard zone. The Exicom variants can be used in explosive atmospheres with gases and dusts. These are marked with  $\text{Ex}$  II 2 (2) G Ex de mb ib [ib] [op is] IIC T4 or  $\text{Ex}$  II 2 D Ex tD A21 IP65 T90°C. For the ProVicom models the marking is  $\text{Ex}$  II 3 (2) G Ex nA nL [ib] IIC T4 or  $\text{Ex}$  II 3 D IP65 T90°C. Along with maritime approval by DNV, for the Exicom units INMETRO and GOST-R certificates are also available, in addition to IECEx, KTL, TIIS (in preparation) and the UL approval for Class 1 Zone 1 with the marking AEx de ib [ib] IIC T4.

Apart from the explosion-protected versions, the Open HMI systems are also suitable for general industrial applications (not explosion protected).



Figure 3: View of an explosion protected, multilingual Open HMI system with touchscreen for 150 different layouts build in a stainless steel field cabinet