Omniflex

A comprehensive guide to wireless remote monitoring and control systems

Wireless remote monitoring technology provides **the most convenient and cost-effective method for plant and asset managers** to monitor and manage all important system data across their sites, particularly over large areas.

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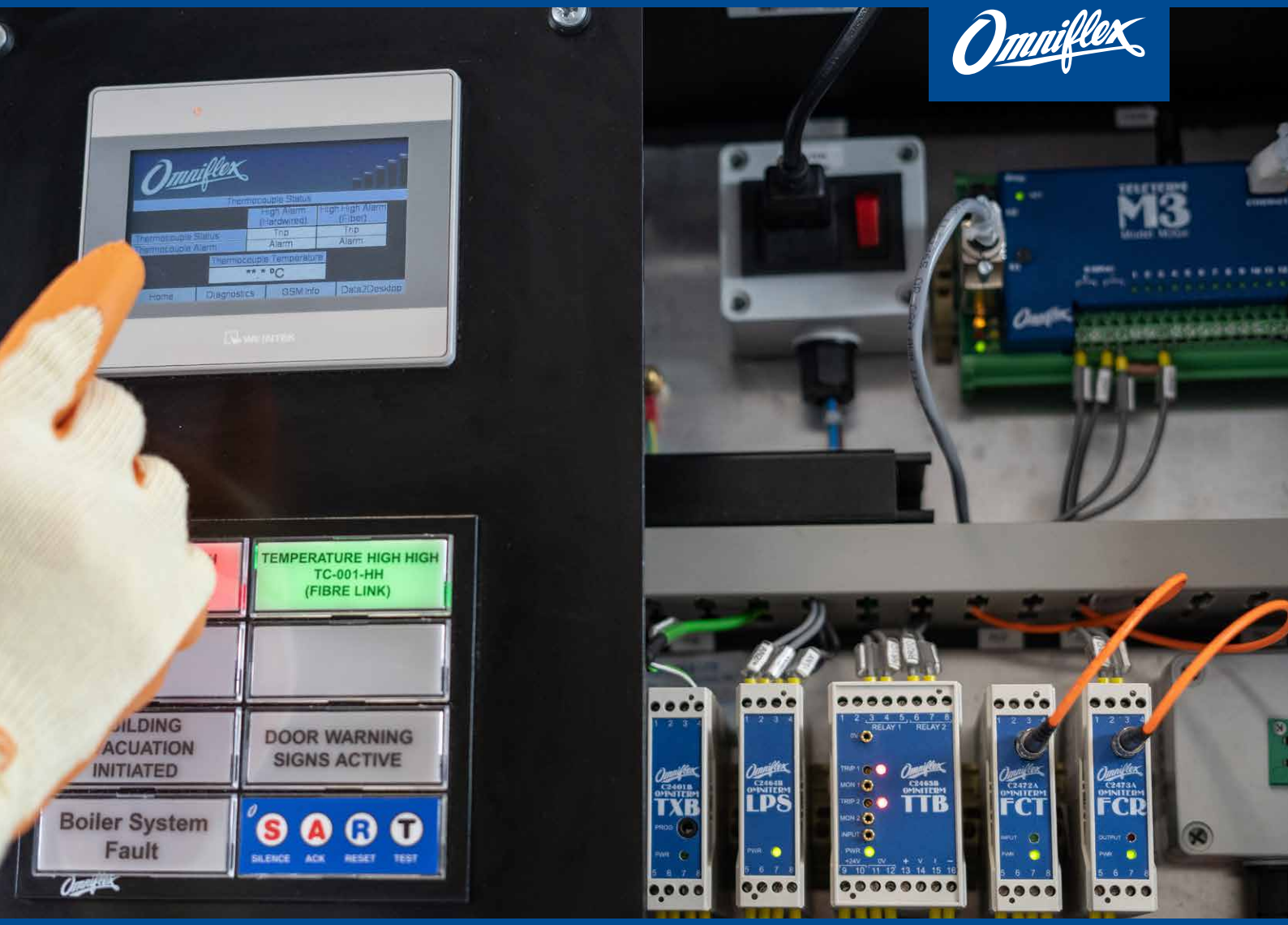


A comprehensive overview of alarm annunciators

Wireless remote monitoring

and alarm management systems

Unlike traditional systems, Omniflex's technology takes advantage of publicly available infrastructure, such as mobile phone connectivity, to provide access to your data easily, affordably and securely. In this guide, we explore some of these systems and how they can help industry overcome some of the biggest challenges it faces.

Wireless telemetry systems are becoming increasingly popular in a range of industrial sectors.

In highly regulated industries, such as nuclear, petrochemical or oil and gas, laying cables for data monitoring applications is not always feasible because of strict regulations and the extensive planning permissions required. Here, wireless communication systems can help facility managers retrieve and manage critical data from the field wirelessly, safely and efficiently.

Wireless communication technology is also becoming increasingly beneficial for utility providers that connect to electrical, water and gas meters and gather data for billing and control purposes.

And that is not the only way utilities providers are taking advantage of wireless systems, with them also making an impact in reservoir water pump monitoring and control applications where geographical considerations and prohibitive cost rule out using wired monitoring and control systems.

Plant-wide telemetry systems

Wireless telemetry systems are becoming increasingly important for plant-wide monitoring and control applications as cabling cost and the disruption caused by the associated installation and maintenance work become prohibitive.

Whether it's a radiological protection system in a nuclear plant, an industrial alarm system in petrochemical, oil and gas applications, or even a utility gas or water meter, it's important that the signals are reliably transmitted and received.

This is where working with a reliable wireless telemetry systems partner with experience of dealing with the operational challenges and infrastructure of industrial plants is important. This ensures that factors like antenna selection, frequency choice and system interfaces are all the best option for the job.

For example, when dealing with radio-based telemetry systems, it is important to remember that radio transmission distance and bandwidth is finite. This is based on factors such as the power of the transmitter, the sensitivity of the receiver, the type of antenna you're using, the operational frequency and, even, weather conditions. These factors will determine whether you get a good signal or not.

Its important that the radio transmission is efficiently managed hence the term "managed wireless or radio transmission" which ensure that your devices "share" the spectrum and are "polite" optimising the transmission of data.

It's important to note that in most countries around the world, to prevent interference between different users, the radio spectrum is regulated using licensed and unlicensed frequency bands.

Space on licensed frequency bands is at a premium and, with more and more businesses setting up radio telemetry equipment, demand will only increase. For many plant managers, the need to pay a fee for exclusive transmission rights means operating on a licensed band is undesirable. Instead, many opt for license-free bands that are open to everyone.

However, regardless of which you're using, the gain of your antenna cannot result in you exceeding the effective radiated power (ERP) allowed on that frequency band. On the 868 Mhz frequency, in the UK for example, the maximum ERP for short range devices and wideband devices is limited to 25 dBm with a duty cycle of 10 per cent. This puts the focus on a managed wireless protocol to use your allocation efficiently and effectively.

In other parts of the world, however, this can differ. For example, South Africa falls into the same EMEA zone and largely follows the same radio standards, although short range devices in the country must register type-approval for radio devices with the Independent Communications Authority of South Africa (ICASA). At the same time, Australia, New Zealand and Asia are considered a separate region and have their own standards.

> "Another way of minimising interference between devices is to **ensure that plants adopt managed wireless systems**, where the communications between wireless modules and supervisory systems is deliberately and effectively managed."

For example, Omniflex's wireless modules use managed wireless techniques such as change of state operations where signals are only sent from modules to the supervisory system when there is a change that operators must be made aware of.

This better than maintaining a constant polling signal between modules and the supervisory system that could overload the network with unnecessary traffic, or even timed updates that still involve sending unnecessary updates that compete for network traffic. Using a managed wireless system ensures that all traffic on the system is meaningful. Managed Wireless also allows more complex topologies to be created using the wireless network eg peer to peer where any node can communicate with any other instead of simple point to point. Also the ability to relay data through other nodes that are in range of each other to extend the network coverage.

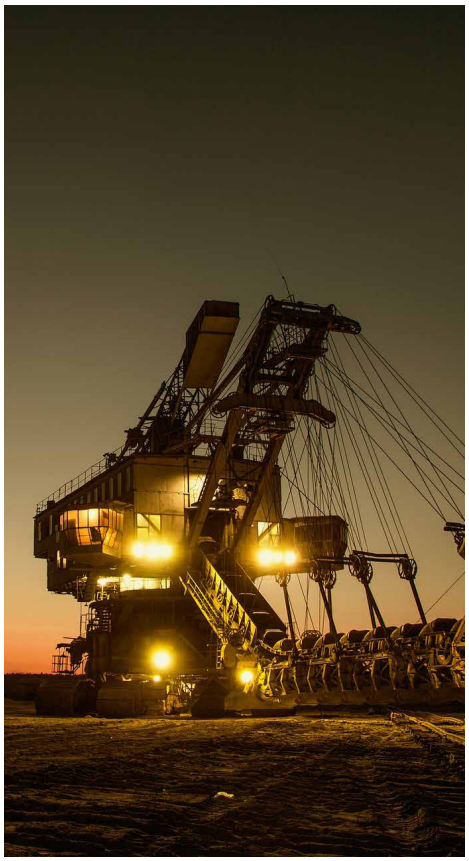
Omniflex's wireless telemetry modules allow users to configure inputs as either analogue or digital inputs and outputs depending on the application requirements. Engineers can integrate them with SCADA systems to achieve secure wireless links on different license-free bands. The modules also offer various power options, such as mains or DC powered, with battery backup or solar powered, so no matter where in the plant needs monitoring wirelessly, the modules can be deployed to perform the job.

The company has also developed a series of protocols to help with different applications, including the ubiquitous standard Modbus Protocol and custom plug-in protocols that businesses can employ when acquiring data from third-party devices.

Water pump monitoring & control

Wireless telemetry systems are increasingly becoming the systems of choice in applications where assets are dispersed over a large geographical area, such as in mining and water reservoir applications.

Looking at water reservoirs specifically, they are often situated across large geographically areas and can be difficult to access. This means that asset managers must rely on remote monitoring and control systems to monitor water levels and turn pumps on and off at each reservoir from a centralised control station. Because installing control cables is extremely expensive, more costly than any of the equipment itself, the utilities industry relies on wireless monitoring and control systems to keep costs down.



Wireless monitoring of all reservoirs from a centralised control system allows asset managers to know what the water levels are at each site at a glance. If combined with a pump control system, this allows them to control water levels to suit demand without the need for costly, disruptive site visits.

Furthermore, wireless technology also increases operational flexibility, since it is much simpler and cheaper to move a wireless device compared to a cable unit.

Traditionally, engineers used radio telemetry systems, operating in license band frequencies, to operate all wireless equipment over. However, administration costs to own and maintain license band radio frequencies often outweighed the cost of the equipment itself, making the networks much more expensive to operate.

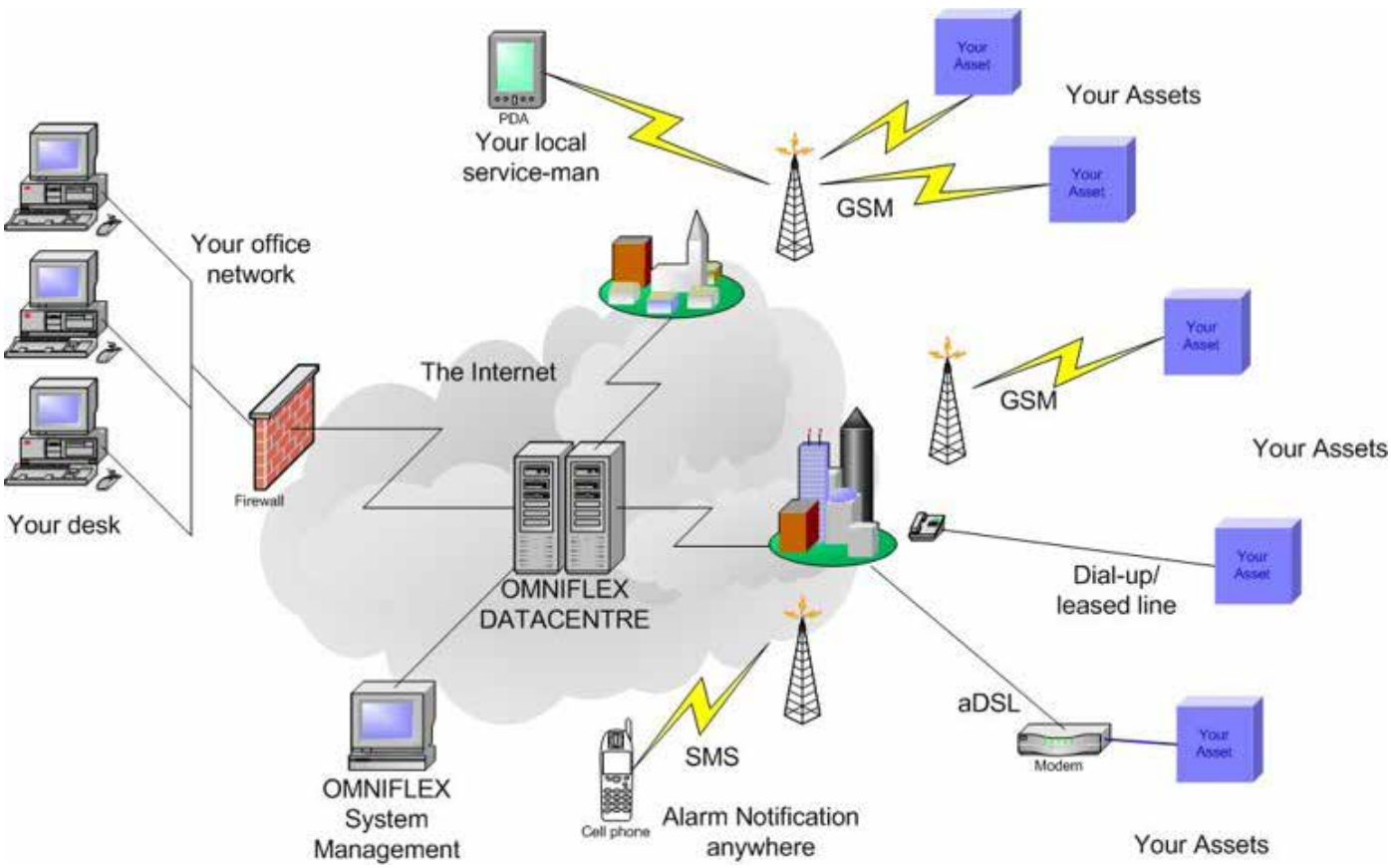
New license-free ISN band radio telemetry equipment has proven to be a game changer, helping equipment owners avoid unnecessary admin costs. Combine this with Omniflex's plug-and-play technology and you have a system that can be easily installed and up-and-running in minutes with commensurate savings.

Furthermore, Omniflex's cloud-based Data2Desktop platform allows asset managers to monitor systems 24/7 using a tablet or phone, rather than having to use a fixed desktop in the plants control room. This is especially helpful in the current situation, where many people are forced to work remotely because of the global pandemic.

Data2Desktop can be used to record all system data and timestamp it to produce a chronological record of all historical data for audit purposes and event analysis.

The system can also automatically produce hourly reports that can be accessed remotely by any plant managers and admin staff who have the necessary login credentials. Finally, should a system error or outage occur, the system can be set up to automatically distributed SMS and email alerts to all relevant personnel (management and service), so the problem can be addressed as soon as possible. This is particularly important when monitoring critical systems.

This new generation of plug-and-play wireless telemetry equipment is benefitting more than just water reservoir managers.



This technology is also extremely beneficial in other industries, such as mining where they rely on surface-level water pumps to remove water from the mines. In fact, any industry where cabling is either too expensive, or too disruptive, to install can benefit from adopting this kind of plug-and-play wireless telemetry system.

> “Sitting at the heart of Omniflex’s wireless telemetry offering is its Teleterm technology, a state-of-the-art remote terminal unit (RTU) range designed to expand the possibilities of remote monitoring”

Flexible RTUs for asset monitoring

The Teleterm systems provide an easy-to-use front-end interface to SCADA/HMI platforms via communications ports like ethernet or RS485 and are compatible with Omniflex's web based Data2Desktop remote monitoring platform.

By combining all the standard features of a COTS product, the Teleterm range provides a trouble-free installation and setup in a matter of minutes.

Teleterm M3

Omniflex's Teleterm M3 module is a state-of-the-art RTU, featuring an on-board RS232/485 port, designed to enable communications with a wide range of devices using most network options, including GSM, radio, ethernet, Modbus, 3G, satellite and Conet.

Furthermore, it comes equipped with twelve digital or analogue configurable I/O, which enables full environmental monitoring covering parameters like temperature, pressure, humidity and water levels etc. It is also fitted with an onboard SD card for data logging, which is ideal for data auditing purposes, especially for post-event analysis. of failure in the system and increases system reliability.

Teleterm D3

The Teleterm D3 comes with built-in lithium batteries, so provides battery back-up in the event of mains power failure (DC powered options are also available). It also has a built-in LCD display, allowing you to view data locally.

Furthermore, it has eight digital or analogue configurable I/O and can communicate using ethernet, Modbus, radio, satellite and 3G options.

Teleterm S3

The Teleterm S3 is solar powered, making it well-suited for remote area applications where power is an issue and you want to collect data and send it back to a central control station.

The S3 comes equipped with five digital or analogue configurable I/O and can communicate using Modbus, radio, satellite and 3G options.

Teleterm W3

The Teleterm W3 ISA100 wireless interface node provides a convenient way of networking all your serially connected devices over an ISA100 wireless network, which is scalable, reliable and secure.

It features a standard RS232/485 port and can be connected to any instrument using standard Modbus or other serial protocols on request. It is well suited to applications such as radiological monitoring as it can transmit monitor readings and alarm alerts to the control centre wirelessly, allowing users to adopt remote monitoring without costly network cabling.

Teleterm SW1

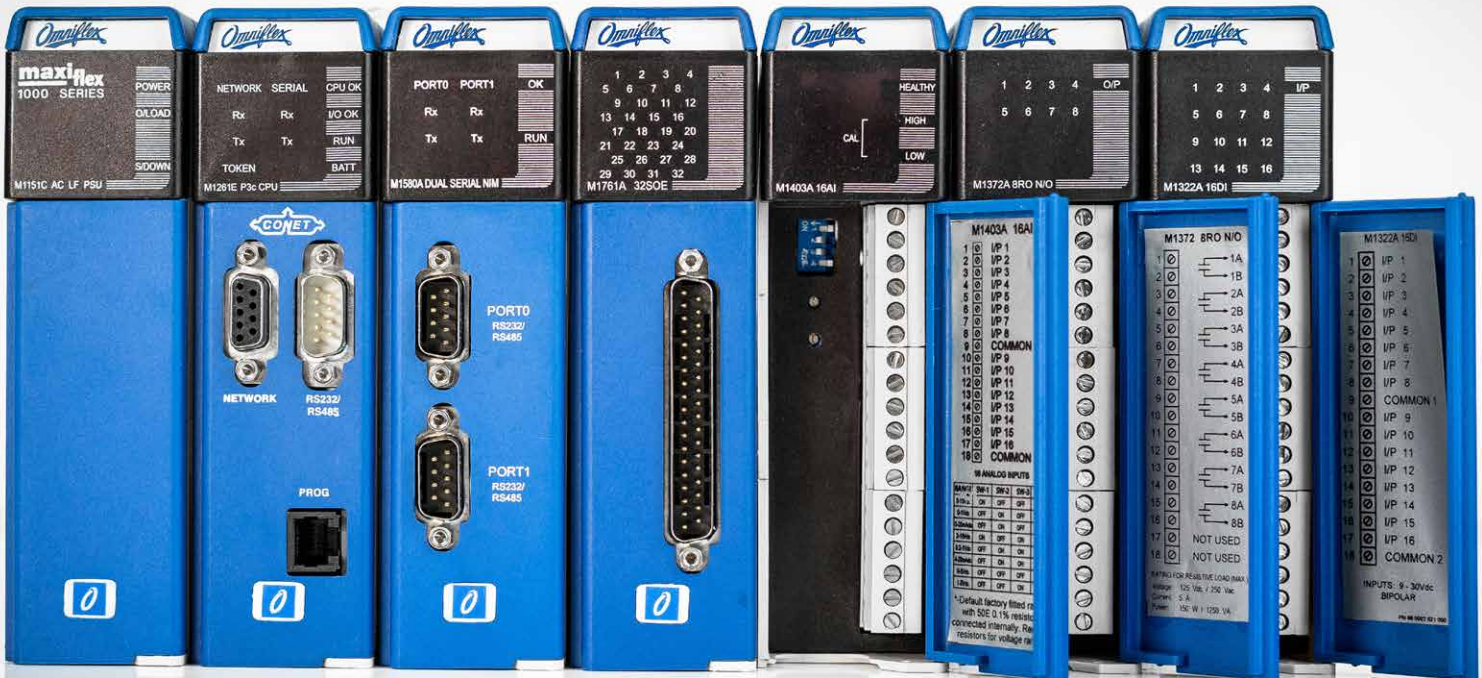
The Teleterm SW1 is a solar powered IoT-focused satellite-based remote monitoring module,

enabling remote monitoring and control in applications with limited mobile connectivity, such as corrosion control for highways, bridges and pipelines, utilities management and offshore oil and gas platforms.

Teleterm Silent Sentry

The Teleterm Silent Sentry is a state-of-the-art alarm monitor, capable of monitor a wide range of input types and sending SMS alarm messages when an alarm condition is detected.

It comes equipped with twelve binary or analogue inputs and a Modbus port, allowing it to monitor a variety of alarm sources. The Silent Sentry can be configured for up to ten message recipients in three escalating priority groups, allowing messages to be sent to a selected group of recipients and, if it is not acknowledged in a set time, then sent to the second group of recipients and, if still not acknowledged, then sent to the third group of recipients.



Maximum flexibility

Omniflex's Maxiflex RTU range provides a cost-effective front end data acquisition system. It comes equipped with RSS232/485 ports and offers network interface capabilities such as ethernet, radio, gsm, fibre, satellite, copper communications and Conet and has a wide range of hot swappable I/O modules, including digital, high accuracy analogue, HART, TC/mV, RTD and high speed pulse.

The Maxiflex system can be as small or as large as you need it to be and the amount of I/O available is unlimited because all you need to do is increase the number of modules in the system to add more I/O. This makes it a fully scalable system that can serve small, medium or large applications and provide unlimited networking of third-party hardware and dissimilar networks.

Customising data visualisation

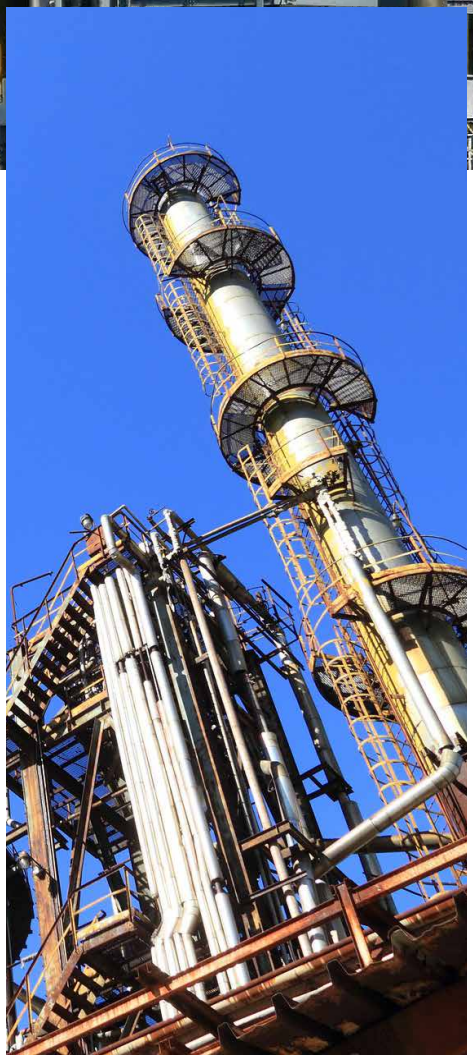
Traditionally, PC-based SCADA systems were the only tool in the instrumentation and control engineer's toolbox for plant process visualisation and control applications. This led to many facilities implementing SCADA systems simply because there were no available alternatives.

While these are functional systems, capable of performing the required operations, they are unnecessarily costly, with plant managers required to pay per I/O point, pay annual subscriptions, pay ongoing Windows operating system license fees, pay ongoing maintenance contracts and pay any specialist support fees. To make matters worse, they also involved surrendering control and maintenance of the SCADA PCs to IT departments who often do not appreciate plant operational requirements.

The evolution of vendor neutral OIT/HMI displays in a range of sizes with touch screen displays and plant hardened HMI technology, suitable for both the control room and factory floor, has added another tool to plant engineers' toolboxes. These systems allow for distributed control to local points while bringing only key parameters back to the control room, reducing control room operator workloads. This is ideal for applications such as water pump monitoring where control room personnel simply need to know live water levels and whether the pumps are on or off.

Another key advantage of OIT/HMI systems is that they are more robust than traditional SCADA systems. With an OIT/HMI system, there are no hard drives that can fail, no Windows operating system to support, no networking issues and no inherent cyber security concerns, something that continues to be a growing worry for many businesses, particularly around mission critical infrastructure.

“OIT/HMI systems are well suited to applications where local engineers need to know ongoing system status at a glance so they can act accordingly and there is no advantage to having a networked PC-based SCADA system in place.”



Omniflex's EasyView range of HMIs can communicate with a variety of PLC and PAC hardware and provide engineers with a flexible system to manage plant operations.

EasyView HMIs come equipped with free configuration software, require no ongoing costs and, crucially, are simple to use. Realistically, plant managers using an EasyView HMI solution can save around 80 per cent of implementation costs compared to using a traditional SCADA system.

The touch screen HMIs range from five inches to 15 inches to depending on the application and space constraints and are compatible with over 300 PLCs. Alternatively, HDMI capable displays, such as large flat-screen TVs can be used because the EasyView technology offers HDMI full HD 1080p capability. This allows plant KPIs to be displayed front and centre at all times, keeping personnel focussed and up to date with ongoing operations.

Why Omniflex?

Omniflex has over 50 years' industry experience in wireless telemetry and systems and it uses this to not only help you collect your key operational, but to also help make sense of it.

We can also work with you to find the best solution to meet your operational needs and provide the best system for the job. For example, if you are not sure what frequency you should be using for telemetry systems or what kind of antenna you need to send and receive data most effectively, we can help.

To find out more, head to our website and read more of our technical whitepapers, covering topics such as cathodic protection, alarm annunciators and radiological surveillance systems.

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