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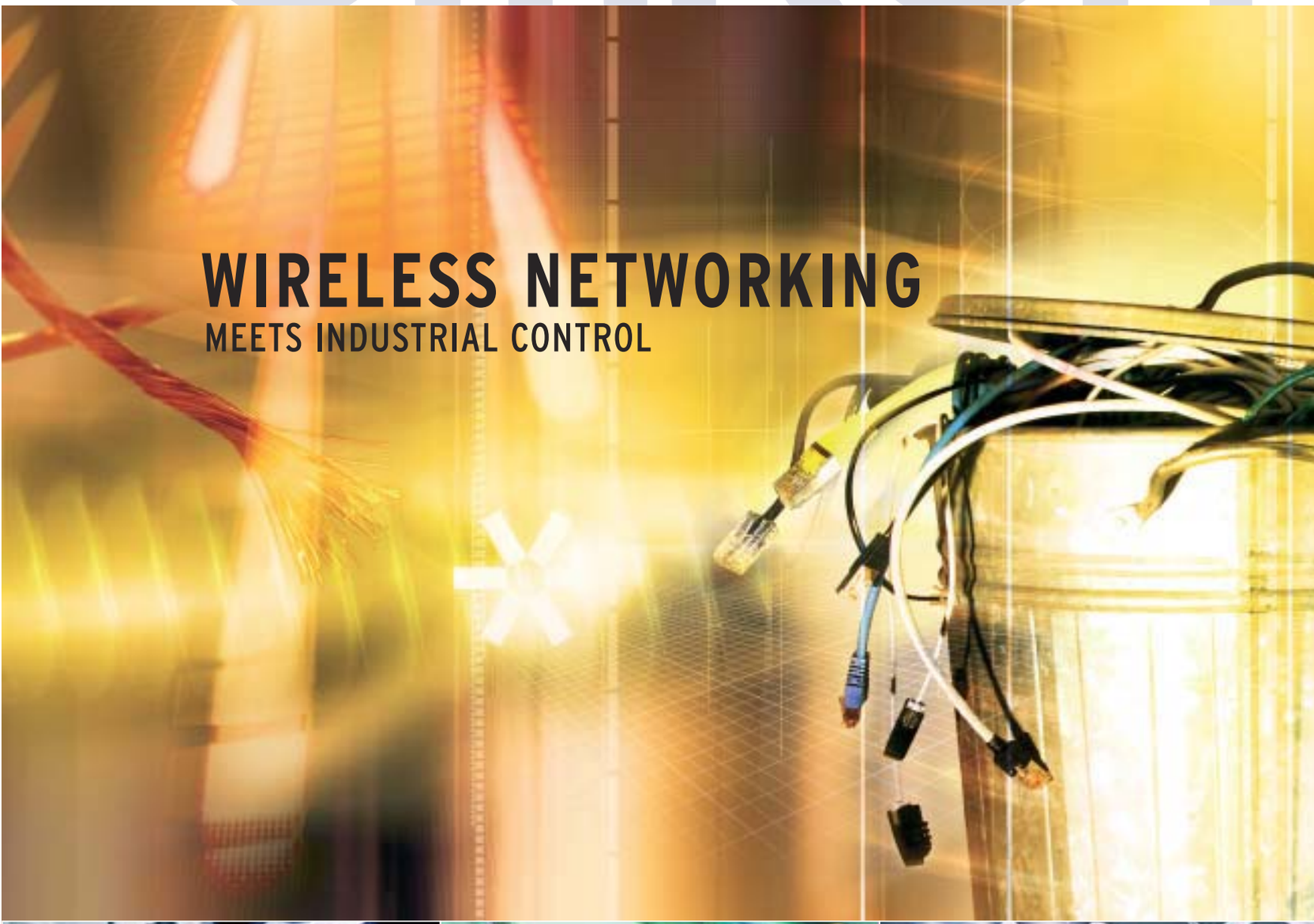

WIRELESS NETWORKING
MEETS INDUSTRIAL CONTROL



Advanced Industrial Automation

OMRON

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Cover story

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Applications

Editorial

The trend towards wireless technology may be new, but it is quickly gathering momentum. The consumer market has already taken the lead and many consumer products have wireless alternatives, which has brought the price right down. It's logical to assume then that in industrial automation installations, where there's a growing use of Ethernet and field-busses, the same trend will follow.

This issue of Technology Trends focuses on the wireless concept, with our cover story highlighting the features, benefits and challenges that this new technology faces in the industrial environment. Omron has always been particularly interested in wireless technology. The company has introduced a DeviceNet modem that allows users to connect any DeviceNet-compatible product on a truly wireless field-bus, and the release of a new version of this product has opened up a whole range of possibilities for factory floor applications where wiring is not practical. These possibilities are discussed in our leading article in the New Products section.

Technology Trends is the ideal forum to announce our new products, so we start with the Profibus version of the CJ1 control system, which expands network possibilities even further. We have an article on the Varispeed L7 - a new frequency invert that offers a cost-effective solution for all lift requirements. We discuss two new sensors that provide exceptionally fast and accurate performance for very different applications.

Finally, we have included application stories from companies that use Omron products to ensure optimum performance from their machines and systems and we introduce new families of Low Voltage Switch Gear products, general-purpose relays and temperature controllers.

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Wireless networking meets industrial control

Over the last decade the increasing use of field-busses and Ethernet within Industrial Automation has led to a reduction in the number of wires in an installation. Will this trend continue to the point where we end up having completely wireless networks?

The use of wireless technology in Industrial Automation applications is still in its infancy, so it is too early to predict where this trend will bring us. Like any other new technology, wireless networking is experiencing growing pains, but there's no doubt that it will find its niche in the near future. The growing popularity of wireless alternatives in the consumer market has brought huge price reductions, and the technology is now becoming more attractive for use in industrial segments.

Harmonised ruling

Wireless technology is highly regulated. All wireless standards must comply with the local government regulations for radio communication. This includes guidelines for operation frequency ranges, power output, and compliance with other technical standards. Up to recently these regulations differed from country to country, making it time-consuming and costly for a vendor to cater to all customers.

Trends

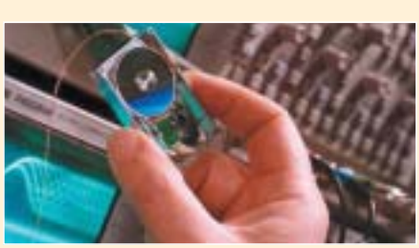
The PrintBrush™ printer isn't big, but it is clever

Most printers are cumbersome pieces of plastic that take up a load of room on a desk. Not so the PrintBrush™ from PrintDreams, which claims to be the world's smallest printer to date. Measuring the length of a Biro and as wide as a mobile phone, the tiny PrintBrush™, weighing just 350g, can be stashed in a shirt pocket. It works by downloading pictures, SMS messages and Web pages via a Bluetooth link from PDAs, mobile phones and laptops. Then, thanks to Random Movement Printing Technology (RMPT), you simply 'sweep' the phone over any type of print media and the images or words will appear! Sadly, we aren't likely to see the RMPT printers until 2005, but for more information on the technology and products check out the PrintDreams website.

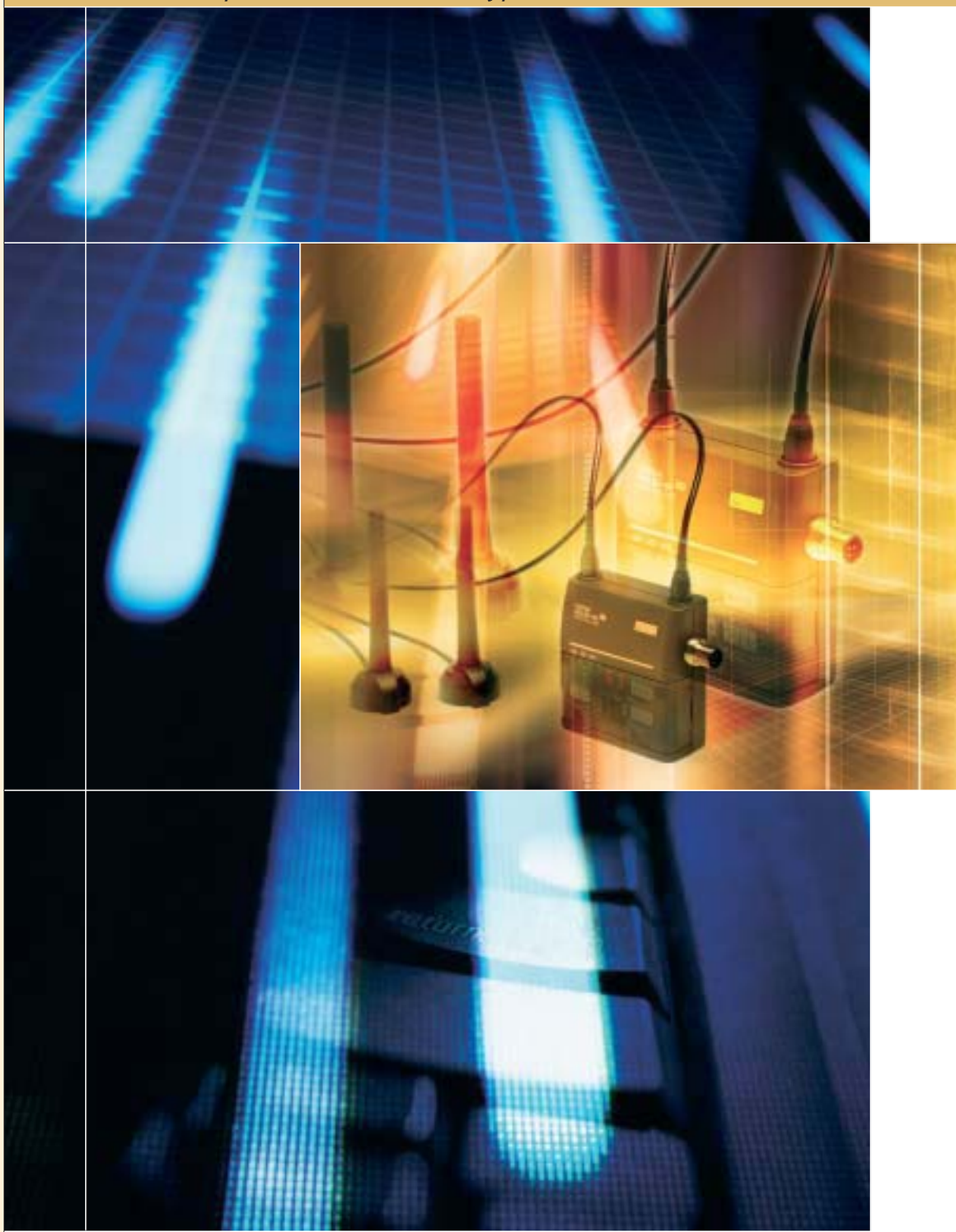
www.printdreams.com

Next generation optical storage

Some major technology breakthroughs have been achieved in the last few years that together allow for a significant increase in optical disc capacity. Tremendous progress has been made in the field of blue-violet lasers, which are now commercially available. Furthermore, it has become feasible to mass-produce high numerical aperture lenses. To give such lenses a practical use, discs with a very thin transparent cover layer of 0.1 mm were developed. Finally, a six-fold increase in capacity compared to DVD has been achieved, combining a reduction in laser spot size and enhanced signal processing. This allows for a capacity of up to 27 GByte of information on a single layer, single sided 12 cm disc, or 1GByte of information on a single sided, single layered 3 cm disc.



www.blu-ray.philips.com



This issue has been addressed by the establishment of global license-free bands (called ISM, as they are reserved for Industrial, Scientific and Medical use) and adopted by the ETSI (European Telecommunications Standardisation Institute). Now, when vendor equipment complies with the regulations described in these standards, it can be used within the European Economic Zone without a license. Harmonising the various European rules has lead to a substantial boost in the use of wireless products. New standards like 802.11, HomeRF and Bluetooth, along with many proprietary applications, share the same 2.4 GHz spectrum. For this reason additional bandwidth has been made available at 5.8 GHz.

Different technologies, different applications

The problem for vendors today is in deciding which wireless technology to use. There are so many types available, and different applications have different requirements. Table 1 gives an overview of some of the technologies available on the ISM band.

Wireless networking meets industrial control

The following factors need to be considered before choosing what works for you:

1 Data volume: Some users want to collect megabits of data per second while others only wish to switch something on/off a few times a day.
2 Response time: When the object is part of a chain, an instruction getting through in a given moment is an essential criterion. The required response time may be just a few microseconds.
3 Communication reliability: will a message get through with certainty and, if not, what is the probability of errors being detected. Interference plays a crucial role here in technology selection.
4 Communication distance: Are the nodes widely spaced, or centred in one location? Communication distances can vary from a few meters for a moving part on a machine to several kilometres for pump stations of a distribution network. The distance to be covered determines the power consumption and very often decides if license-free communication is possible or not.
5 Number of nodes: Is communication only needed between two nodes or does it involve multiple nodes, which would require a more advanced communication structure (a Scatternet topology).

Wireless – a viable alternative

Many vendors are still unaware of the potential benefits of wireless technology and continue to use hardwired solutions. The only real disadvantage of wireless technology is when the application requires fast on/off control; response time is currently slower than it is with direct wiring, and many applications require time-critical control. There are of course numerous applications where wireless products can offer a solution, for example, when the configuration of control equipment requires information from a moving object. Other examples include AGVs (Automatic Guided Vehicles) used in logistics or transport applications, and industrial cranes in harbours. In this magazine you'll find an application story where slip rings have been successfully replaced by wireless field-bus modems from Omron. Slip rings are used in many kinds of applications, and wireless technology can offer a secure alternative.

Wireless control systems also offer solutions for manufacturing sites where production flexibility is key. Some markets demand flexible production, and this means that complete production lines are reshaped every 6 months. Reconnecting huge parts of a production line is a cumbersome and time-consuming task. A production line module that is wirelessly controlled simplifies reshuffling on the work floor.

In some Scandinavian countries, licensed radio technology is already being used to control and gather information from remote installations. Examples include pump stations for potable or wastewater treatment works, and district-heating networks.

Another application already being explored by vendors is wireless monitoring of equipment. A PDA module for Palm and Pocket PC handheld devices acts as an HMI and can be used to change settings at the control system from any location.

Reliable communication

A popular wireless technology for Industrial Automation is Direct Sequence Spread Spectrum (DSSS). Spread Spectrum reduces the influence of electrical noise and intentional jamming, and it matches receivers to enable messages to get through. DSSS uses numeric codes to link the units that must communicate with each other. DSSS also produces a noise-like spectrum that reduces the chance of signals interfering with each other. This answers the growing concern that the many new unlicensed wireless networks interfere with or even override existing licensed wireless networks. Finally - and this is important for industrial applications - DSSS ensures reliable communication in hostile RF (radio frequency) environments. It handles multi-path communication, and offers better resistance to physical objects in the communication path that might cause interference.

Omron's dedication to new techologies

Omron has a strong tradition in bringing new technologies to new applications, and this is true for wireless. When Omron introduced the WD30 wireless DeviceNet product, it received praise for enabling truly field-bus features previously only available in wired format to become available for short and medium range wireless applications. And that was just the start. Omron is bound to release more wireless products, and bring new technologies to new applications.

Comparison of the global ISM Frequencies

Frequency (MHz)	Bandwidth	Applicable areas	Regulation Institute	Regulation Document	Max Rad Power EIRP	Channel Spacing	Modulation Technique	Bit-rate
433.5-437.9	1.740	Europe	ETSI	ETS300/220	10 mW/10 dBm	Not defined	Free	Free
868.0-868.6	0.600	Europe	ETSI	ETS300	25 mW/14 dBm	25 kHz/100 kHz	Free/SS	Free
902-928	26	USA	FCC		1 W/30 dBm		FHSS/DSSS	
2400-2483.5	83.5	USA/Europe	FCC/ETSI	ETS300/228	1 W/30 dBm (USA), 100 mW /20 dBm	- (USA)/ 100 kHz (Europe)		- (USA)/ >250 kbps (Europe)

Trends

Research could accelerate computing to speed of light

New technique enables scientists to form tiny perfect photonic crystals of high optical quality

Researchers have discovered a new technique to form tiny perfect crystals that have high optical quality, a finding that could usher in a new era of ultra-fast computing and communication using photons instead of electrons.

These crystals, called photonic crystals, could greatly improve both speed and bandwidth in communications systems, says Ottawa University Professor Geoffrey Ozin of the Department of Chemistry.

"All of the promises of what photonic crystals can do, in terms of guiding light and bending light in incredibly small spaces, may be achieved by the assembly of patterns of micrometer-size photonic crystals all in a plane," he says. "The breakthrough possibly represents a step towards the development of miniaturized optical components earmarked for the next generation of all-optical computers and telecommunication systems."

The technique, described in the June issue of Advanced Functional Materials, carves geometrically and spatially well-defined microscopic patterns into the surface of a material. The surface relief patterns are then exposed to an alcohol-based solution of synthetic microspheres. These microspheres exclusively enter the surface relief patterns and self-assemble into perfectly arranged microstructures called photonic crystals. The crystals have the property of being able to act as tiny optical components for managing photons in circuits of light similar to how semiconductor transistors control electrons in circuits of electricity.

Ozin, who holds the Canada Research Chair in Materials Chemistry, says the findings represent a step towards significantly reducing the size of optical components, devices and circuits.

Omron improves DeviceNet Communications

In aluminium production processes it is quite common to have mobile sections in large production lines. Trying to automate such systems is a complicated and expensive process, mainly because of the wiring systems required when automating the mobile sections. The automation process is further complicated by problems generated by the constant noises and vibrations to which these sections are submitted. Maintenance would also be both difficult and expensive.

Traditionally, brushes or very specialised wiring systems were used in such applications. The mobile sections and the control central communicated with each other via DeviceNet type networks.

The introduction of wireless technology has meant that automating aluminium production processes can now be easily achieved. Wireless automation not only eliminates production stoppages caused by vibrations and noise, but it also ensures that important factors attached to productivity such as safety, quality and the performance of the system are enhanced.

GIA, a company specialising in manufacturing machinery and systems for the production of aluminium, has developed a system called 'GIA Aluminium Extrusion System & Technology', which is presented as a clear example of the benefits that wireless technology can offer in this sector. This system has been successfully installed in many companies throughout the world including Alumitran, a company that manufactures aluminium profiles through extrusion, and where the combined use of powerful machines and extrusion presses with wireless technology has proven to be very useful.

Operating philosophy

Extrusion processes require the presence of intensive specific pressures. The compact presses used are extremely powerful and, as in the case of the Alumitran Company, are arranged horizontally.

A wide range of Alumitran profiles are obtained from aluminium logs (7-metre long cylindrical bars). These logs are inserted into a very hot oven (>480oC). Once the logs have been heated they are cut with a fixed blade,

GIA Aluminium Extrusion System & Technology – wireless technology for improved system quality

reliability through wireless technology

of causing production stoppages. This process is also synchronised with the profile stacker. In this way the entire system is automated, which leads to increased performances in the plant.

GIA uses wireless technology in this Double Puller system to ensure the communication and precise synchronisation of all the mobile sections involved (oven, extrusion-press, blade, guillotine cutter, stacker, etc.). The technology is based on Omron's WD30 modem for DeviceNet. The configuration consists of a CS1 as the main PLC of the application. It includes a DeviceNet communications master card, which is connected to a master Wireless modem that communicates with the slave wireless modems located in each of the above-mentioned mobile sections.

Since the installation of this system, interruption problems and breakdowns in the manufacturing processes have been totally eliminated. Furthermore, the reliability and performances of the machinery have improved, leading to a considerable increase in productivity. All these benefits have significantly strengthened GIA's image as an innovative company in the market and have been a determining factor in adopting this solution in every one of the company's machines.

and the resulting piece is picked up by a punch and inserted into the extrusion press where it is submitted to high pressure in order to be stretched. This feeding system encourages faster, interruption-free production. A stream of water then cools the resulting aluminium profile in under a minute. The system applies pressurised pulverised water through 280 nozzles.

After the extrusion, 45-metre long profiles are produced with deformations in the aluminium join. The automatic control system is informed of the profile length and detects the points where the deformations have occurred. A Double Puller system (lower and upper Puller) grabs the profile and holds it firmly so that a guillotine cutter can cut the deformed piece of aluminium. It also directs the profile, preventing it from exiting the production line. The Double Puller does not push or transport the profiles; these are ejected out of the press, which leads to a need for synchronising the various systems that form this process.

Both Pullers operate continuously in parallel. They cross without colliding and with no risks

Double Puller System

Wireless DeviceNet units with detachable antennas

Omron has released an additional version of its wireless DeviceNet modems, the WD30-01, to extend the application possibilities of the units. A detachable antenna enables the modem to be mounted in a cabinet, while the antenna is mounted externally. This increases the installation flexibility of the unit and improves the covered communication distance.

About the WD30 family

With Omron's wireless DeviceNet products you can connect to any DeviceNet compatible product on a truly wireless field-bus. The WD30 products are not just 1:1 devices for extending your network; a single WD30 master modem can address multiple slave modems. Placing multiple wireless masters on a single DeviceNet network provides multiple, flexible topologies on the same system.

Technology used

Wireless DeviceNet combines two of the latest technologies in wireless communication: spread spectrum and antenna diversity. The wireless communication relies on Direct Sequence Spread Spectrum (DSSS) technology, divided into 34 distinct channels at 2.4GHz. This is the frequency made available globally for Industrial, Science and Medical (ISM) applications. The spread spectrum technology minimises signal interference, allowing the message to get through the first time.

Each Wireless DeviceNet transceiver uses a dual antenna system. It samples the output signal of a device by discriminating between signal and reflections. The transceiver automatically selects the antenna with the better quality signal to minimise interference. Omron's Wireless DeviceNet products were the first wireless products in the industry to combine these technologies.

Extending application possibilities

Network branches that are hard-wired according to DeviceNet cable topology specifications are normally limited to six meters because of cable impedance. Some applications however require much longer cable runs. Omron's Wireless DeviceNet allows end-users to transmit data up to 60 meters without any impedance problems. The low output power (10 mW) minimises RF (radio frequency) interference with other devices. The high operating frequency reduces the possibility of plant-floor electrical noise from interfering with the Wireless DeviceNet signal. And wireless DeviceNet features a built-in security feature that prevents other users from changing the settings without knowing the codes. The set-up procedure is a specific sequencing of switches that can not be easily duplicated. Changing a switch setting will not alter the unit's configuration.

Omron's new WD30 wireless modems work with any product using the standard DeviceNet micro-change connector, enhancing the possibilities to use DeviceNet in factory floor applications. Such applications include material handling, conveyor systems, assembly lines, AGVs, and moving equipment where wiring is not practical. Wireless DeviceNet does however require a different skill set and a little more knowledge and training. Your local Omron representative can help you to support such technology.

CJ1 PROFIBUS – Open & flexible connection to smart devices

Omron offers a wide range of field bus compatible products for machine automation: HMI, remote I/O, control systems, inverters, servos, vision systems, sensors, temperature controllers, and power supplies. All products are an integral part of the Smart & Seamless technology that Omron offers. In that, Omron focuses on ease of use and a high degree of integration between devices, so that our customers are able to build their machines almost on a programless manner.

Interoperability throughout the portfolio

Network technologies have brought major benefits to all aspects of industrial automation. Many of these technologies are now well established and accepted by end users and OEMs. Omron's CJ1 series of control systems seamlessly offers you these many network capabilities, enabling you to design and create solutions that best fit your application. You have the freedom to select between Ethernet, ControllerLink, DeviceNet, Compobus/S and of course Profibus.

The Profibus units offer many benefits, including:

- Compact design
- Easy to install
- Simple configuration
- Comprehensive control and monitoring
- Mounting on a standard DIN rail
- For the master: reduced CPU load by handling data transfer independently

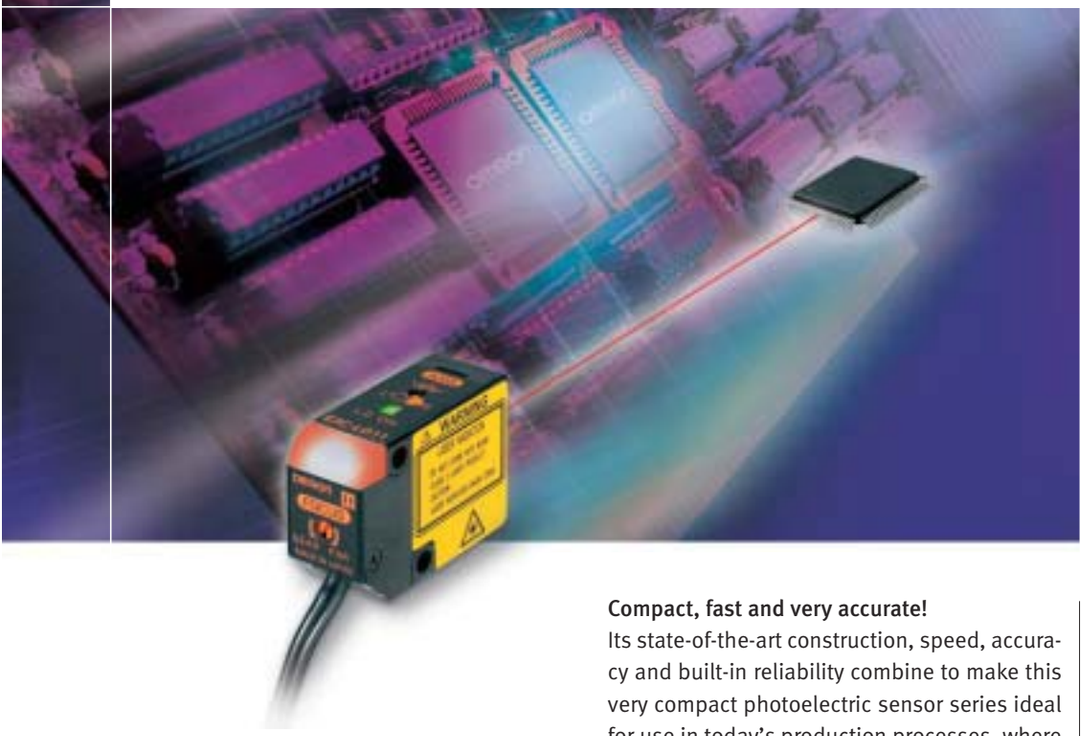
VARISPEED L7 - The frequency inverter for lifts

The Omron-Yaskawa L7 Varispeed frequency inverter is built with the focus firmly on reliability, ease-of-use and smooth performance. Designed specifically for the lift market, the L7 series ensures that lifts exceed the right quality and safety demands of the market. Available in power ratings from 3.7kW up to 55kW, the Varispeed L7 offers a cost-effective solution for all your lift requirements.

Made to drive lifts smoothly and safely

The Varispeed L7 is based on years of experience in inverter design, and uses the latest proven technology to provide reliability and safety. Furthermore, lift-specific features have been developed in response to market needs. These standard features include direct control of motor brake and motor contactor, short floor operation, door opening control and hardware base block. In addition, both open loop and closed loop vector control is available in the Varispeed L7, providing the optimum speed regulation to suit the application. Ease of use has been considered from the outset. An LCD operator is available to provide plain text set-up and monitoring of the inverter, while a non-rotating autotuning function ensures the inverter can obtain all of the required motor information without the need to decouple the motor from the gearbox. Option cards are available to integrate the L7 series into communication networks such as Canopen, DeviceNet or Profibus-DP.

E3C-LDA Series – Photoelectric laser sensors

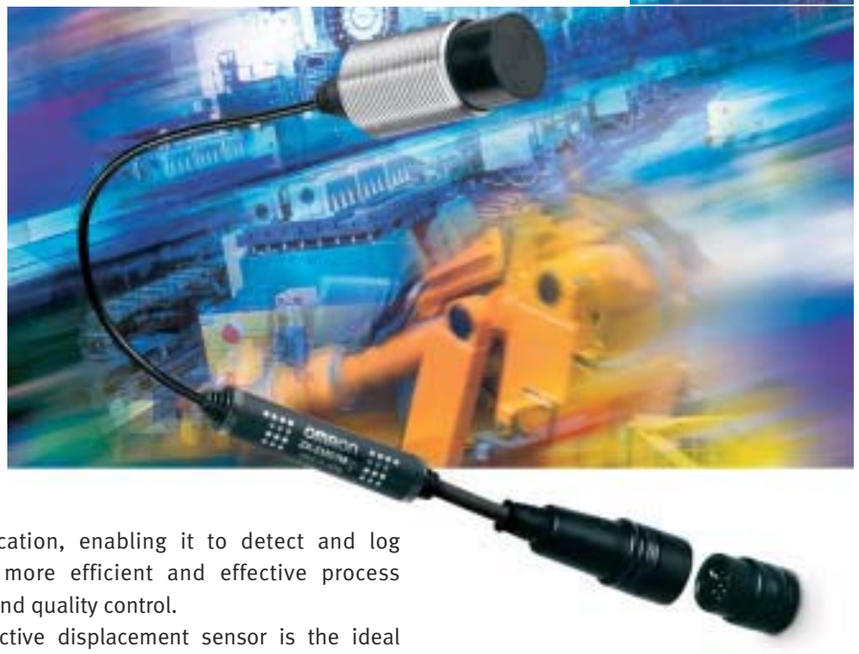


Omron's E3C-LDA photoelectric laser sensor series is designed to provide advanced object detection, positioning and high-resolution sensing. What's unique about the E3C-LDA is that the focal point and optical axis on the sensor head can be easily adjusted for precise beam adjustment, which in turn ensures easy set-up and very precise operation from a long distance. In addition, the E3C-LDA Series offers 3 separate laser beam types – spot beam, line beam and area beam – to cover a multitude of applications!

Compact, fast and very accurate!
Its state-of-the-art construction, speed, accuracy and built-in reliability combine to make this very compact photoelectric sensor series ideal for use in today's production processes, where high precision and fast response time are vital.

Typical applications include object detection in the semiconductor industry, grease, adhesive and seal inspection, assembly oriented applications in the automotive industry, and sheet displacement inspection in the paper and packaging industries.

ZX-E Series – Inductive displacement sensors



Omron continues to set new standards in fast, precise measurement sensing with the ZX-E Series of inductive displacement sensors. Designed specifically for metal measurement applications, the ZX-E Series is based on Omron's unique Plug & Play concept, in which a wide variety of interchangeable sensor heads can be connected to the same amplifier. This concept covers all of your measurement requirements and takes the costly and time-consuming process out of selecting the best sensor heads for the job!

Unique features for extremely accurate performance
The ZX-E features a host of remarkable features and functions, some of which are unique! These include the smart calculation function, simple linearity adjustment, easy resolution display, dual digital display and mutual interference prevention function. The ZX-E is not only easy to use, it also features intelligent communication, enabling it to detect and log data for more efficient and effective process analysis and quality control.
This inductive displacement sensor is the ideal solution for those who need very accurate, high-resolution measurement sensing in high-tech environments like the packaging, metal processing, machinery, automotive and semiconductor industries.

Controllers & SSRs – Omron's perfect partnership

Omron is the world's largest supplier of temperature controllers. This product range is unrivalled, and includes everything from the simplest controllers to advanced communication units that help you master any control application. What sets these temperature controllers apart from competition is that they include Omron's legendary control performance and reliability, superb quality, and compact dimensions as standard. Omron also offers a comprehensive range of solid-state relays (SSRs) that provides the perfect load switching for temperature control applications.

Omron's temperature controllers and solid-state relays – a powerful combination!

These SSRs are a fast reliable and cost-effective partner to our temperature controllers. Combinations of temperature controller and SSR are available to handle almost any application, including heater bands for plastics extrusion processes, packaging machinery and heater elements in general manufacturing. Only Omron could bring you such a product choice, and all from one supplier!

- Designed and tested to Omron's renowned high standards, each product in this range meets all relevant international standards and provides consistently superb quality throughout its working life.
- Omron's huge product portfolio ensures that there's always a product available to handle your specific application!
- Omron's drive for continuous development and use of innovative technologies, combined with its strict quality first policy and just-in-time delivery of components and solutions, makes us the ideal business partner for even the most demanding user.

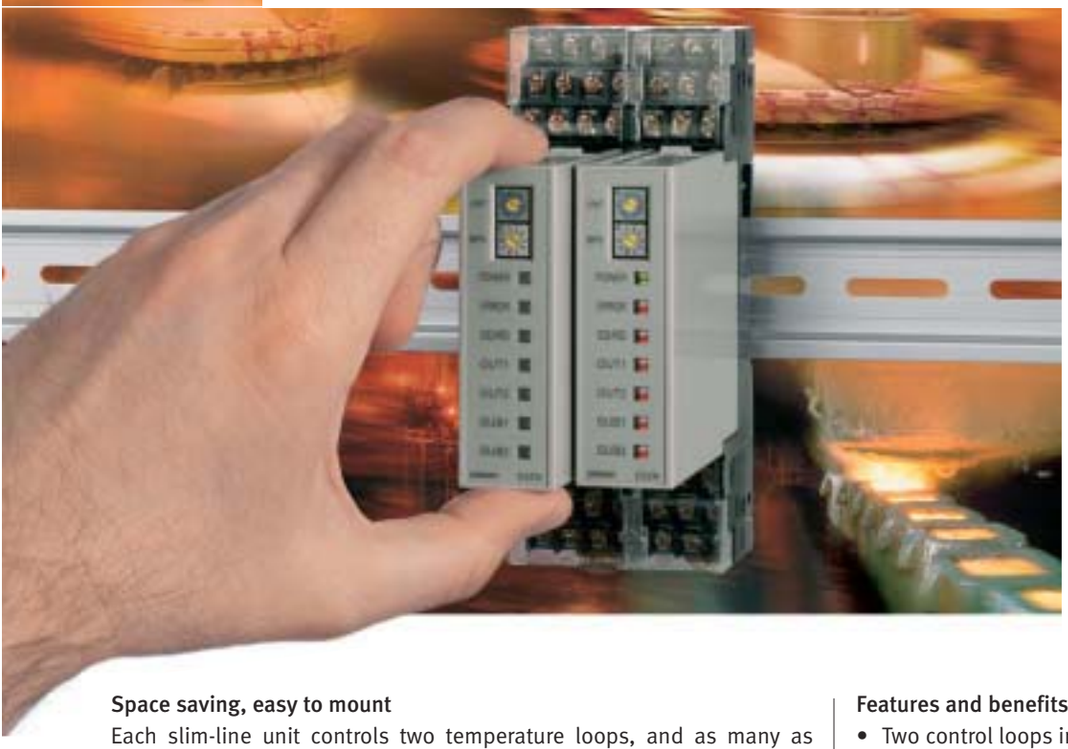
J7 Series – Minimum size, maximum performance

Omron introduces the new J7 Series of high-quality contactors, thermal overload relays, and motor protection circuit breakers to complement its existing portfolio. This series of feature-packed products is designed using state-of-the-art technology, and built by Omron on a product line that has been certified according to quality standards ISO 9001. The J7 Series offers impressive power-handling capabilities on compact footprints. Most models of the contactor range can operate in temperatures from –40°C to +90°C, making them ideal for use in extreme environmentally harsh conditions.

Multi-featured range for multi-functional applications

Constructed according to European and International standards, these contactors, thermal overload relays and motor protection circuit breakers conform to EN/IEC and are approved by UL/CSA, enabling them to be used in any part of the world. They are suitable for any industrial application and will appeal to panel builders, OEMs and engineers in the automotive, chemical and heavy-power industries looking for the best choice in top-quality products from one supplier.

E5ZN series – in-panel temperature control solutions



At just 22.5 mm wide, Omron's new E5ZN temperature controller series introduces one of the slimmest dual-loop controllers on the market. The E5ZN features all standard temperature control functionality, and thanks to its innovative design, mounting it onto a DIN-rail is simply a matter of click-and-go! Its innovative design and built-in Omron quality guarantees process stability and saves panel builders valuable installation time, space and wiring costs.

Space saving, easy to mount
Each slim-line unit controls two temperature loops, and as many as 16 units can be mounted side by side. This allows you to control up to 32 loops in the minimum amount of space, and at a lower cost-per-loop than anything the competition has to offer!

Now with: DeviceNet option, Retransmission outputs, Current control

Features and benefits at a glance:
- Two control loops in one 22.5 mm module
- Easy and fast replacement of modules, without rewiring
- Voltage (SSR), Transistor or Current output
- Two alarm outputs as standard
- Heater burnout alarm or retransmission output
- Omron's renowned quality and reliability built in

G2RS Series – Omron's general-purpose relays

With the G2RS relay Omron sets new standards in feature design and reliability. Since pioneering the widespread use of slim-line interface relays over a decade ago, Omron continues to be the first choice for relay users. Built to Omron's renowned quality and reliability, the G2RS relay brings enhanced features and flexibility for more user-friendly installation, commissioning and operation.

The G2RS relays unrivalled quality and reliability
Omron's G2RS relays offer unrivalled reliability, performance and product choice. Three relay types are available, in both single- and double-pole changeover contact arrangements, as well as AC and DC coil voltages. All models feature a mechanical indicator, and a name-plate onto which identification data can be added. The mainstream and full-featured models have an LED indicator which lights green for DC coil voltage types and red for AC coil voltage types).

The G2RS relays are robust and compact in design yet have a high switching capacity; the single-pole versions can switch an impressive 440VAC. They are built to Omron's own high quality and environmentally friendly standards, so a long, reliable working life is guaranteed. They meet all relevant international standards, including UL, CSA, VDE, LR and CE. In addition, with the G2RS plug-in relay users have the choice of screw terminal or Screw-Less Clamp (SLC) terminal sockets for maximum installation flexibility.

OMRON participates in the RFID-pilot project

Kaufhof AG starts RFID-pilot project with Gerry Weber. Omron Participates in the project. Touchless data transfer in a practical test.

Kaufhof Warenhaus AG is currently testing the application potential of RFID (Radio Frequency Identification) technology in co-operation with the clothing manufacturer Gerry Weber and partners from the IT industry. RFID is an innovative technology that uses a programmable smart tag or label to give a product its own identification data. With the help of this technology, managing merchandise can become more efficient and the whole logistics chain from manufacture to the retail store - can be a faster, smoother process. Test sites for this pilot project include the Kaufhof warehouse Neuss-Norf, the Galeria Kaufhof in Muenster and the Kaufhof in Wesel.

All Gerry Weber-branded garments destined for the Kaufhof branches in Muenster and Wesel are provided with identification labels. Each label is programmed with identification and security data. The transport units are also equipped with RFID labels. Once these units pass the gates of the Kaufhof warehouse, the information contained in the labels is automatically recorded and logged by computer 'readers' using radio frequency technology. In the same way, the labels attached to the garments are tracked from the warehouse to the test sites. It is only when each garment is purchased that the cashier removes the label.

Sub-systems at each test location collect and evaluate the RFID data of each garment. In the salesroom, the assistant can record and check the article continuance of Gerry Weber garments in a matter of seconds with the help of mobile readers. In addition to this, a reader

system is installed directly at the shelf for stock control. This saves the shop assistants considerable amounts of time stocktaking.

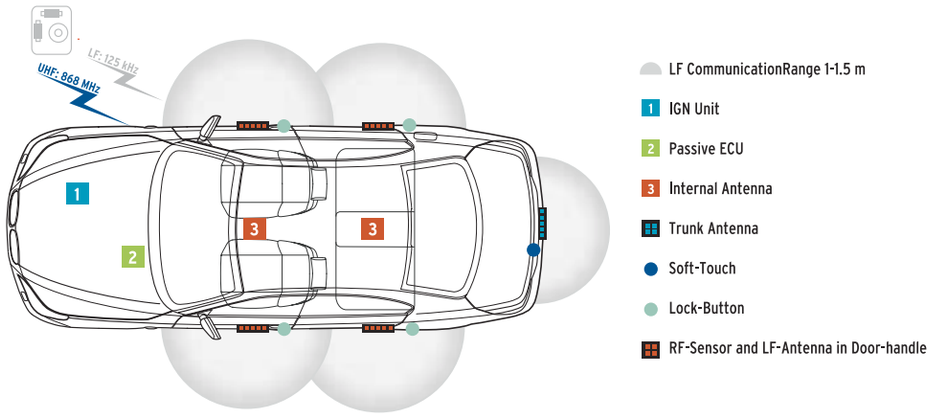
The RFID project is supported by a group of technology and service partners that include: Siemens / Philips / Nedap / Omron / Symbol / Etimark / Checkpoint Meto / LIS / Sandlab / EHI / Fraunhofer Institut.

OMRON developes a Passive Entry System

Omron introduces its new passive entry system technology that allows for hands-free locking and unlocking of passenger and commercial vehicles.

Omron's new system is an improvement on the existing remote keyless entry (RKE) technology introduced in the early 1980's, which uses one-way transmitters to send a signal to the vehicle to lock/unlock the doors.

The system includes a passive entry ECU, interior and exterior antennas and a keyfob as transmitter. Touching the door-handle activates the system by a sensor which is built into the handle. The ECU sends a LF signal (125kHz) to the transmitter if it is within a radius of 1-1,5 m around the antenna, which is also built into the doorhandle. After the wake-up the keyfob receives the full data, which contains some specific bits and the rolling code. After processing, the transmitter sends back the code to the ECU by an UHF signal (315, 433 or 868 MHz). The ECU compares the data and if the keyfob is the right one it sends a LIN or CAN command to unlock the doors. Locking the car is possible either by pushing a button in the outer door handle or by just moving away from the car. The passive entry ECU locks the doors if there is no more valid transmitter inside the car which is detected by interior antennas. The very limited range of just a few centimetres is one of the advantages of the Omron system. Besides the passive entry function, the keyfob also allows the traditional use of the integrated buttons to lock or unlock the car from a distance. In case of a dead transmitter battery the driver door can still be opened by a mechanical backup key. To start the engine the keyfob must be placed on a defined place in the car to get permission to start the engine. Starting the engine is possible only if a valid transmitter is detected inside the car. All together the whole system offers a higher level of security than the traditional RKE method. And because the cost is one of the advantages of the Omron passive entry system it is expected to debut on verhicles in 2005. Omron will produce the entire system in Japan and in North America with engineering and customer applications worldwide.



M2's key to success – developing top-quality

M2 is an independent, privately held Swedish company that builds machines for CD and DVD manufacturing. Founded in 1995, M2 is noted for introducing the SQ1, the first truly integrated CD/DVD finishing machine that has become the industry standard for size, performance and productivity.

What's innovative about M2 is that it strives for true integration by constructing compact, self-contained machines rather than traditional 'lines'. No external racks or cabinets are used, just a single entity with one user-interface and shared PLC, computer, pneumatics and handling systems.

The company's philosophy is to ensure the highest possible process quality while minimising production costs. It designs all components to be part of the system, since this is the only way of ensuring that the components satisfy M2's rigorous quality standards for reliability and performance. Not surprisingly, M2 is an established customer of Omron Sweden, and uses a variety of Omron products, mainly PLCs (CS1 Series) and Servo systems (Smartstep and 'U' Series) as well as sensors.

Omron was chosen as a supplier not just for its own renowned product quality and reliability, but also because it was able to provide very easy-to-use programming software for its PLCs (CX-Programmer). Omron's products are used in almost every step of M2's manufacturing processes. During the cooling down process of a freshly moulded CD or DVD for example, M2's Vertical Cooling Conveyors use a unique rotation action disc movement to ensure maximum heat dissipation and uniform temperature distribution. An Omron 100W Smartstep servo, which is itself controlled by a CS1 PLC, powers the servo-controlled arm that handles the disc from the moulding machine. After the cooling process the disc is placed on a conveyor belt, an action that is performed using a 100W Smartstep servo.

products using top-quality products

In the dye coating process, a Smartstep servo is used to control an arm that handles the disc over from the conveyor belt to the dye cup and back. The dye coating process requires a very special power supply that uses Profibus as a high-speed communication link to Omron's PLCs. In the substrate dying process, Smartstep servos are used to control the handling of discs in and out of the dryer. Once the substrates have gone through the sputtering process their edges are cleaned in a servo-driven edge wash unit. The washing process uses a spinning motion on the discs, which is controlled by a Smartstep servo and NC-module.

M2 also manufactures DVD-Recordable discs, and the company's Recordable Bonding System uses state-of-the-art technologies to ensure perfect bonding results without any bubbles and using the lowest possible amounts of adhesive. Three Smartstep servos are used to handle the discs onto the bonding table, and a 3G3JV inverter is used to rotate the table. Another Smartstep is used in the adhesive-spinning process, while an NC-module allows recipe-spinning profiles to be used. For years, M2 has strived to push the envelope in the CD and DVD production process, and many innovations and several successful patents have resulted from this. Using Omron's tools and technologies has certainly helped M2 to achieve its goal.

CMOS image sensor

German venture company develops highly advanced wide dynamic range CMOS image sensor

IMS VISION (Stuttgart, Germany), a joint venture company of Omron Corporation and public research organization IMS (Institut fuer Mikroelektronik Stuttgart), has developed an active pixel (APS) logarithmic transformation type CMOS image sensor, whose performance dramatically exceeds that of conventional image sensors. Compared to the ordinary image sensor, the dynamic range of this new sensor is 100,000 times greater.

This CMOS image sensor makes it possible to capture an image with a very large contrast, for example in situations where the light changes from counter-light to darkness, a vehicle equipped camera, welding and melting furnace monitoring and tunnel surveillance, etc. This development brings a marked improvement in performance to low-level illumination, so it will likely be applied in vehicle night vision sensors and security cameras.

Aiming to contribute further to vehicle safety, security and comfort, Omron's Automotive Electronic Components Company will develop and offer this high-performance CMOS image sensor as a high-quality/highly reliable vehicle equipped camera. Omron has acquired an exclusive license to sell IMS VISION's HDRC® products in automotive components markets all over the world and as such will offer high-performance products from consistently advanced technology.

www.omron.com

CCD Photo: vehicle usage at night

HDRC Photo: vehicle usage at night

Omron-Trends

Omron's D6F MEMS flow sensor

This supersensitive gas flow sensor employing Omron's proprietary MEMS technology* as its primary sensing element, is used to detect the flow rate of a gas.

In the wake of growing awareness regarding the global environment and ever-increasing health concerns, there is an urgent demand for bringing under control the CO and NOx generated through incomplete combustion.

The D6F flow sensor can be used to measure the amount of flammable gas and air to achieve complete combustion for a hot water boiler. Combustion occurs at an optimum efficiency, which results in reduced energy consumption and more control over harmfull substances.

Moreover, with sick house syndrome measures included in the revisions to building standards, this flow sensor can also be used to measure faint flow rates of circulated air for ventilation and air emission of non-wooden homes and high-rise buildings with windows that haven't been opened in years.

In the field of medicine, this flow sensor can be used to measure the amount of oxygen, nitrogen and di-nitrogen monoxide consumed from a respiratory apparatus in surgery. Applications also include precise measurements of gases utilized by respiratory apparatuses and automatic calculation of medical treatment fees based on output data (accounting system), thus reducing hospital costs and helping to assure a more accurate calculation.

This product, using Omron's proprietary MEMS technology and fluid technology for measuring the air flow rate of burning appliances, ventilators, and medical devices, contributes to size reduction, reduced energy consumption, and total cost reduction of equipment.

**MEMS (microelectro mechanical systems) is a technology that integrates semi-conductor processing, micromachining, and electrical circuit among a variety of other technologies. Omron launched into this field in the 1970's.*

www.omron.com

Advance control provides the key to efficient Alumin

Recycling scrap aluminium brings big financial and environmental benefits, but the size of the benefits depends on the efficiency of the recycling process. That's why recycling expert, Platinum Controls, has developed a new range of ultra-efficient recycling furnaces with award winning control systems utilising equipment from Omron Electronics.

Platinum Controls provide full turnkey packages for specialised 'Rotary Tilting Furnaces' for the aluminium and metals industries, including their own Systems Integration capability. They are award winners for their 'Rotary Tilting Furnace' controls and innovative software design.

The control systems and technology, designed by Platinum Controls and using state-of-the-art equipment provided by Omron Electronics, are creating step changes in the aluminium recycling industry. The result is gains in yield and recovery rates of 10% or more and reduced cycle times of 75% compared to conventional fixed axis rotary furnaces. The innovation in control means that the efficiency of the recycling process is optimised throughout each cycle and is now much less dependent on operator skills. Typically, recycling scrap aluminium requires only 5% of the energy needed to produce the same amount of metal from its bauxite ore. Clearly, this makes the process very attractive, both in financial and environmental terms. If, however, high levels of throughput combined with efficient recovery are to be achieved, sophisticated recycling furnaces are needed.

Short payback periods

Platinum Controls is a company that specialises in the development of these furnaces, and the results achieved by its latest models are such that, in many applications, they have a payback period of just six months. These innovative furnaces comprise a refractory-lined cylinder that rotates and tilts while applying heat to the process via high-velocity burners.

At the end of the melting period the rotation of the drum ceases and it is tilted to allow the molten aluminium to be poured off. The

ium Recycling Management

process sounds simple but, in practice, achieving consistently good performance is no easy task, and depends on precise control over variables such as furnace temperature, drum rotational speed, drum tilt angle and melt time. The drum rotation motor is controlled by an Omron 3G3FV Flux vector inverter, which is operated in full flux vector mode to achieve the high degree of speed and positional accuracy required. Overall control of the system is provided by an Omron CS1 programmable controller to which all field-mounted devices are linked via DeviceNet products.

DeviceNet offers flexibility

The DeviceNet installation handles approximately 24 analogue inputs, 4 analogue outputs, 30 digital inputs and 30 digital outputs, the largest proportion of which are associated with the burner management system. DeviceNet was adopted specifically for its flexibility, reducing the amount of field wiring, reducing troubleshooting time and ease of reconfiguration for future system enhancements or change. During operation, the temperature of the furnace is continuously monitored, and control is provided by a PID loop implemented on the CS1 PLC. Operator interface for the Platinum Controls furnace is provided by an HMI via a Controller Link network, which also logs data from the process and provides the link to the SCADA installation. Ethernet connectivity is also implemented, allowing remote access to the operational log and all key parameters. This means that Platinum Controls can provide comprehensive technical support to users of its furnaces anywhere in the world.

Programming for the installation was carried out using Omron's CX programming system, which the Platinum Controls design team found to be both intuitive and powerful. The team also made extensive use of the simulation facilities provided, which allowed most of the programming to be tested and debugged prior to installation of the system on the furnace. As an aid to setting up the furnace's field-bus system, DeviceNet Configurator was used.

"Working with Omron has been very important for us," said Stephen Vincent, Technical Director of Platinum Controls. "Not only does the company offer all of the key products we need for this application, its technical back-up is outstanding. This has meant that we have been able to develop new 'step changing technology' safe in the knowledge that if and when we needed support, it would be there. Having this degree of confidence in Omron has made it possible for us to take big steps forward in aluminium recovery technology. Omron's support has helped to take an amount of risk out of innovation."

Less than one week to commission

So successful was its collaboration with Omron that Platinum Controls was able to deliver the first furnace using the new control system just 24 weeks after receiving the order. Pre-testing of the software helped to achieve this short delivery time, as did the easy set up and powerful diagnostics offered by the CS1 controller and the DeviceNet installation.

"From the first application of power to the system, commissioning took less than a week," said Stephen Vincent. "This is a truly amazing achievement for such a radically new design, and we were delighted with how straightforward the Omron products were to use."

Platinum Controls is expecting to supply several aluminium recovery furnaces to customers around the world in the next twelve months. These will help to minimise the environmental impact of aluminium use, as well as providing big cost benefits for the furnace owners.

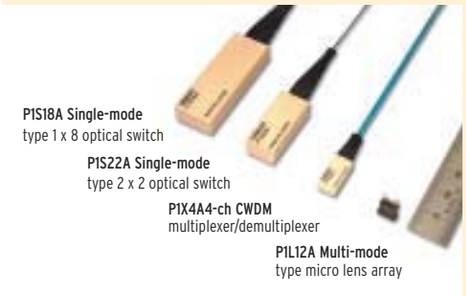
Rotary Tilting Furnace

www.platinumcontrols.co.uk

Omron-Trends

Omron releases ultra low cost, tiny optical communication devices

Omron Corporation will begin making shipments for samples of the following optical communication devices:



P1S18A Single-mode
type 1 x 8 optical switch

P1S22A Single-mode
type 2 x 2 optical switch

P1X4A4-ch CWDM
multiplexer/demultiplexer

P1L12A Multi-mode
type micro lens array

FTTH (Fibre-to-the-home), eagerly anticipated home directed super hypernated broadband, has spread at a staggering rate, but a tremendous cost reduction for network devices is needed to realise an affordable service. Omron has responded to this need by developing a product group integrating proprietary micro lens array (MLA) and actuator technologies, aimed at access networks, metro networks, and interconnection.

Expensive high-precision parts and the large number of assembly parts/number of alignments have been required by optical communications devices, so there was no way to avoid high costs. At Omron, lenses and other optical elements are manufactured through replication. By utilising arrayed parts the number of assembly parts is reduced, and total auto-alignment is possible by arraying parts together, which results in extremely low costs.

Specifically, the micro lenses, arrayed in a line over a distance of 250µm, (µm for micro meters), are inserted into a concentrated/parallel type coaxial series aspheric configuration. Replicable processing of a coaxial symmetric 'free form' lens is also possible, as is the expansion of various applications. Moreover, fine level optics design becomes attainable and significant miniaturization is achieved. By bringing dramatic cost reduction to this device group, network technologies that could only be used until now in backbone networks will expand into access domains, so an increase in demand is targeted. Plus, the characteristics of light, which is unaffected by noise and safe to humans, are well recognised. Omron therefore expects an expansion of light utilising circuit design into many application areas, and will intensify new demand by providing devices that engineers can use with ease.

www.omron.com

SANHA Fittings achieves success through "double"

SANHA Fittings is a manufacturer of pipeline components and systems that are used in a variety of applications, including gas and drinking water installations.

The company was founded in 1964 in Essen/Germany, and was initially involved in importing and exporting various sanitary and heating products ranging from toilet seats to boilers. In the 1970s and 1980s, SANHA Fittings was a leading producer of fittings in copper and copper alloys in the Federal Republic of Germany. In the 1990s, the company became a major player in Europe and expanded its range to other metal products. Today, more than 50% of the company's turnover comes from outside Germany.

SANHA Fittings manufactures its products in Belgium, Germany and Poland. The entire in-house construction of machines for the company is done in Ternat (Belgium) and is managed by Mr. Wilfried Verlinden. Technology Trends went to meet with Mr. Verlinden, who is responsible for building over 70 production machines in the last 37 years and looks to Omron for solutions when possible.

Mr. Verlinden's latest achievement is the production of a brand new drill and chamfer machine (to chamfer means to cut a work-piece slantwise) which, like all his other creations, is completely automated using Omron technology. "We use a CS1G-CPU42-V1 PLC to control inputs and outputs, analogue signals, a safety circuit, three servomotors and three drives", explains Mr.

zero defects strategy

Verlinden. “We also use an NT600S-ST121B-EV3 touch-screen which acts as the interface between the machine operator and the machine”.

Each of the machine’s three motors is driven by a 3G3MV. The speed of each 3G3MV-A4075 drive is controlled by an analogue signal of 4-20mA, originating from the PLC. The three servomotors receive their instructions through a 4-axis positioning module with pulse output, the C200HW-NC413.

“The type of work-piece dictates the motor speed”, explains Mr. Verlinden. “The outside diameter, the thickness of the wall and the material that needs to be handled are all key factors in determining the speed. Stainless steel and copper have their own specific characteristics. As the workings require a very high degree of precision, accurate to within one hundredth of a millimetre, the positioning of the cut-and-drill chucks is carried out by servomotors”.

A cut-and-drill chuck actually performs three different workings in one single movement: the level knife determines the right distance and deburrs (smoothens) the inside of the fitting while the outside knife does the same on the outside. Finally, the inside knife takes care of drilling the hole.

Mr. Verlinden opted for the CS1G PLC for this application. “This PLC controls 32 inputs and 48 outputs”, he explains. “Every output has been cabled directly on the C200H-ID212, whereas every output of the C200H-OD212 card drives a corresponding solid-state relay. This allows the machine to drive and control the valves and hydraulics. Via the operating terminal the operator enters the required cutting speed and the different workings. After handling the data from the PLC, the CS1W-MAD44 sends an analogue signal to the appropriate 3G3MV flux vector drive”.

An Omron NT600 operating terminal enables the operator to send the necessary data to the PLC. In case of an error, the operator is automatically warned and can easily detect the cause using the ‘general defects’ menu. In addition, each cable duct is fused separately, which allows a quick evaluation to be made and action to be taken in case of a short-circuit.
Safety is paramount, so an Omron safety light curtain F3SNA-0457P25 is used to provide hand protection to type 4-safety category. An Omron safety module CS1W-SF200 ensures the manual reset becomes an automatic reset by pulses. This prevents the operator from having to do a manual reset after the placement of each work-piece.

Mr. Verlinden points out that that investment in quality material saves money. “We accept that we bear an immense responsibility towards the environment and towards the health of the workforce in general”, says Mr. Verlinden. “That’s why we cannot allow our fittings to contain errors. And as we produce all the machines for the SANHA holding, zero defects in our machines is a must.”

A reliable partner in automation is without doubt an important element in this strategy. For more than 15 years, Omron has been fulfilling this partnership with excellence. “Our relationship with Omron is based on trust and professionalism”, emphasises Mr. Verlinden. “Quality products and an outstanding service make our investments in quality worthwhile. This morning, I got a report from a machine we delivered to our production plant in Germany in 2001. To date there has not been one single error. I believe no further explanations are needed in this matter”. No wonder SANHA Fittings pursues its “double” zero defects strategy so strongly: it keeps both its customers and employees happy.

Hotline-Fax

Please send me information on the following new products:

- ☐ WD30-01 - Wireless DeviceNet units with detachable antennas
- ☐ CJ1 Profibus - Open & flexible connetion to smart devices
- ☐ VARISPEED L7 - The frequency inverter for lifts
- ☐ E3C-LDA - Photoelectric laser sensors
- ☐ ZX-E Series - Inductive displacement sensors
- ☐ Controllers & SSRs - Temperature controllers and solid-state relays
- ☐ J7 Series - High-quality contactors
- ☐ E5ZN Series - In-panel temperature control solutions
- ☐ G2RS Series - General-purpose relays

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