

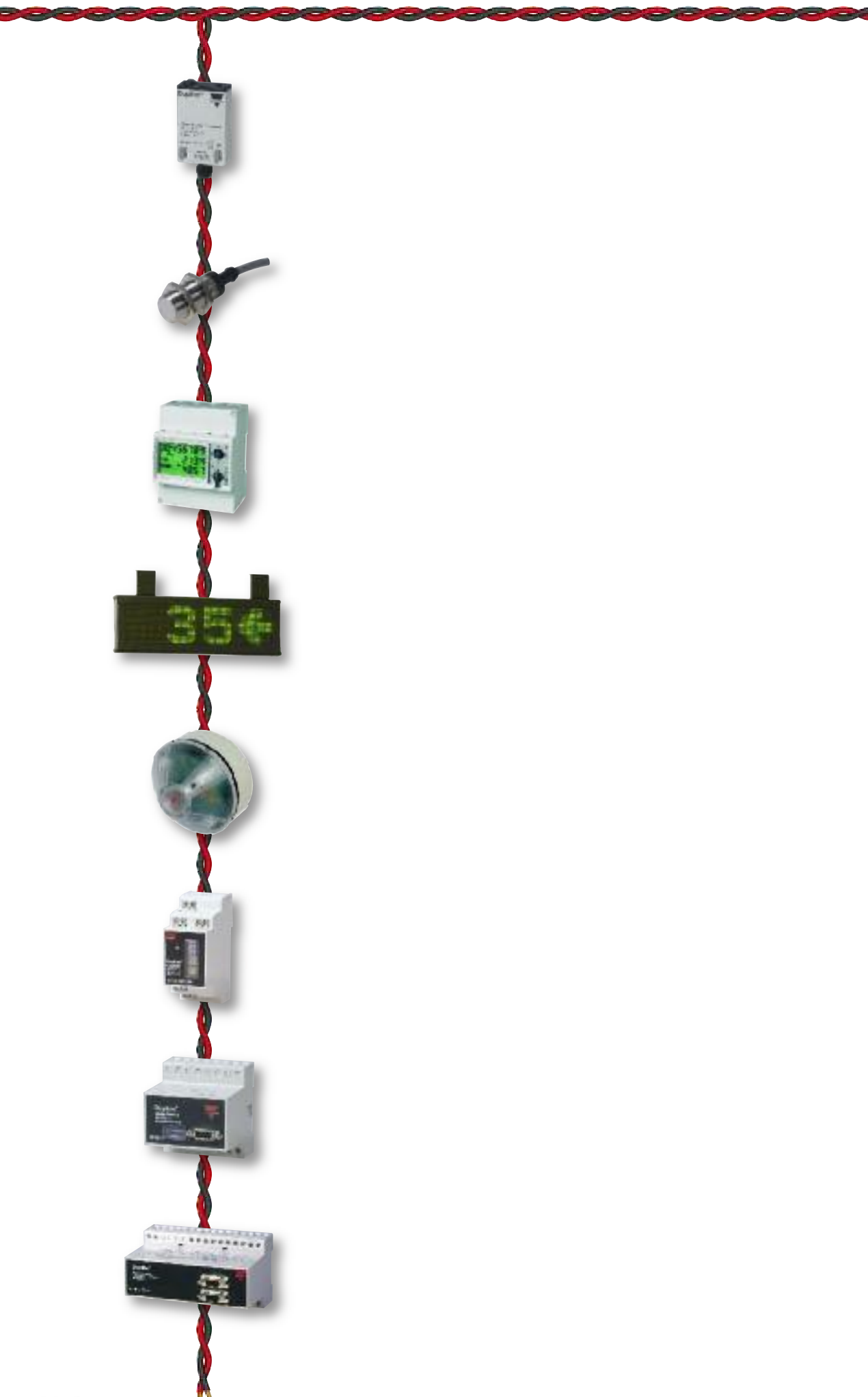
CARLO GAVAZZI
Automation Components



Dupline[®] Fieldbus and Installationbus

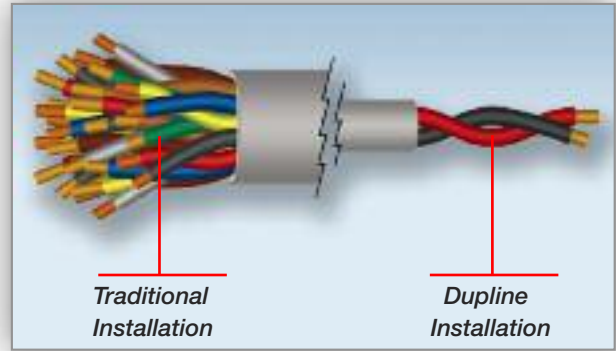


Dupline[®]
Fieldbus Installationbus



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Parallel wiring of traditional automation systems is often costly and complicated. Each sensor and actuator needs its own wiring, which makes the initial installation cost high. Expansion is also a problem, and even ongoing maintenance costs are high. Therefore, serial bus technology has become an increasingly important part of the concepts of electrical installations for buildings, industrial processes and public services. There are numerous advantages in using a bus system, which replaces a bundle of parallel wires with a single 2-wire cable. Easy and fast installation reduces labor cost significantly, and the possibility of expanding the system using the existing cabling makes it easy to adapt to changing needs. Bus systems also

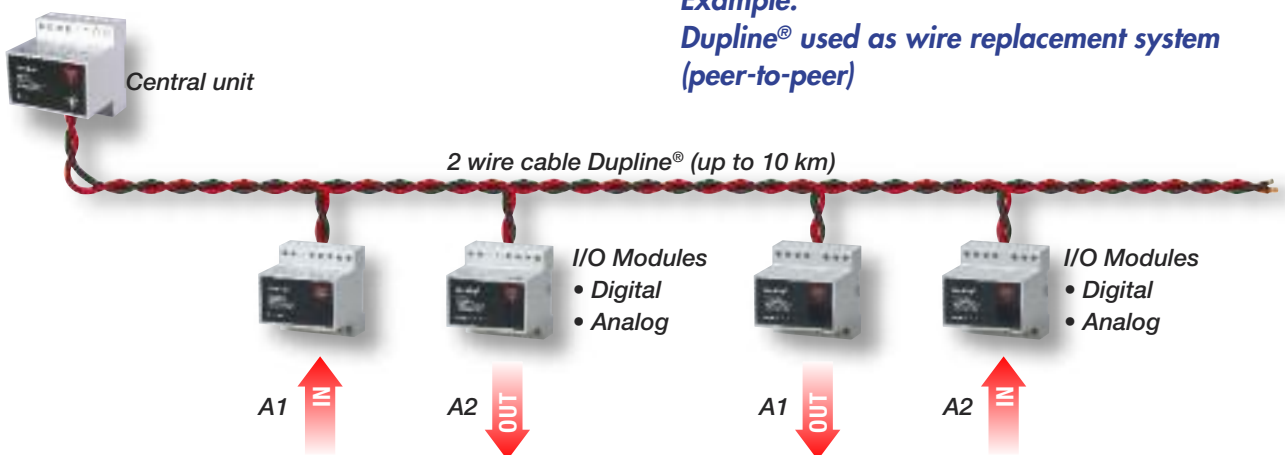


provide cost-effective access to a larger number of signals. This supports the increasing demand for automation systems to collect and use more and more data to optimize cost and performance.

What is Dupline® ?

Dupline® is a field and installationbus that offers unique solutions for a wide range of applications in building automation, water distribution, energy management, railway systems and many other areas. The system is capable of transmitting multiple digital and analog signals over several km, via an ordinary 2-wire cable. And its modular design and simple operating principle enable even novices to implement its use in new or existing applications. Solutions are engineered by combining products from the wide range of Dupline® modules, including digital and analog I/O modules, PLC and PC interfaces, HMIs and Modems. All modules in an installation connect to the same 2-wire cable which is used to exchange data between modules and between a central controller and modules.

Dupline® is typically used as a remote I/O system, creating a link between field devices, such as sensors, contactors, valves, pushbuttons etc. and a central Monitoring Controller, which may be a PLC, PC or the Dupline® Controller. But Dupline® can also be used as a simple wire replacement system where signals are transmitted peer-to-peer without involving a controller or other intelligent unit. The Dupline® signals can be transmitted not only on copper wire, but also on fiber optic cable, via radio modem, on leased telephone lines or via GSM Modem. Dupline® has proven its performance in *more than 150.000 installations* worldwide since 1986. And even though the latest ASIC technology is used today, the new Dupline® modules are still compatible with those installed 20 years ago.



Example:
Dupline® used as wire replacement system (peer-to-peer)

Why use Dupline® ?

Many criteria have to be considered when selecting a fieldbus system. These include transmission distance capabilities, easy operation, noise immunity, topology and response-time. And cost-effectiveness, of course, is always a factor. Therefore, it is important to define the key application requirements in order to optimize the bus system for the specific task. The strength of the Dupline® system lies in a unique set of features that enable elegant, flexible and cost-effective solutions for a wide range of applications. Most of these features originate from the effective time-division multiplex technology used. The efficiency of the protocol allows a low carrier frequency of 1 kHz, providing long transmission distance and superior noise immunity. Hence, Dupline® is capable of transmitting multiple digital and analog signals over distances up to 10 Km, via a non-shielded, non-twisted 2-wire cable, without using repeaters. These unique Dupline® features provide considerable cost savings in many installations, especially when existing ordinary cables are available for use. Another important Dupline® characteristic is easy handling in all project phases. It does not take an engineering degree to work with Dupline®. No PC is required, since the coding of addresses and testing is carried out by means of simple handheld devices. There is no need for special cables and terminations, and there are no cable routing restrictions as known from many other Fieldbuses. It is so simple and easy to implement, that many customers do their own installation, troubles-

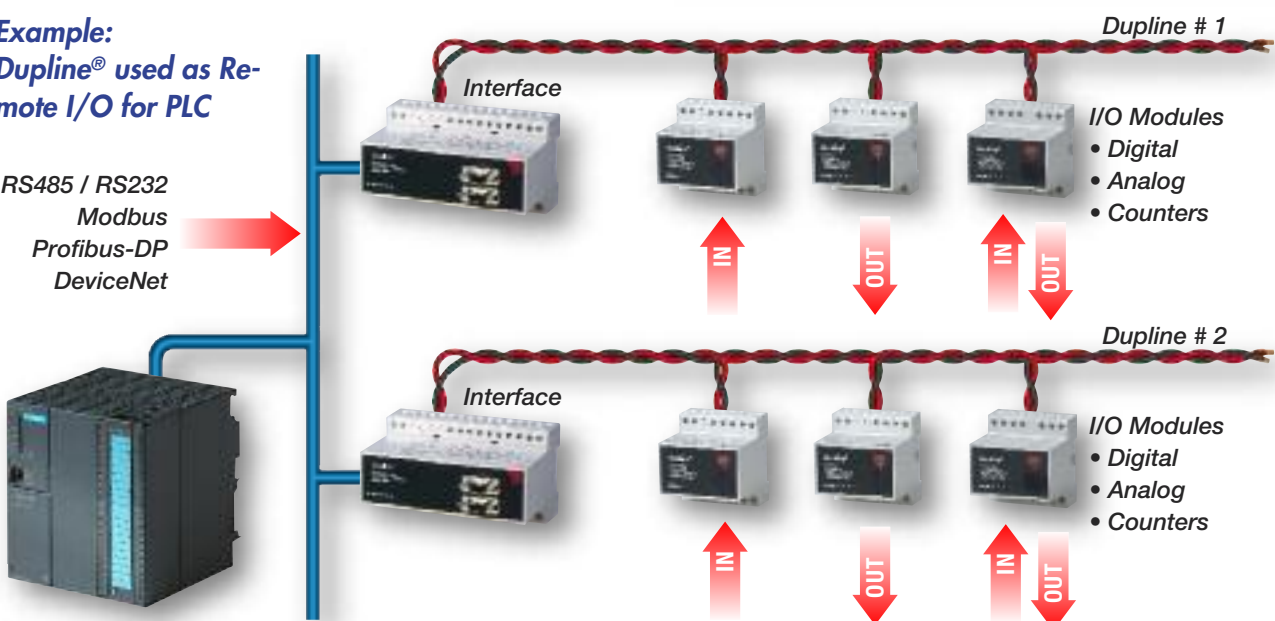
hooting and maintenance, thus eliminating the need for costly service and installation contracts. Dupline® is system independent and open for interfacing with basically any kind of controller. Serial interfaces with Modbus and dedicated PLC protocols, together with gateways for Profibus-DP and Devicenet, enable easy and flexible interfacing to PLCs, PCs and dedicated controllers.

Dupline® features at a glance

- **Up to 10 km transmission distance without Repeaters**
- **Easy handling**
- **Extremely noise immune**
- **Free topology**
- **Flexible**
- **No special cable requirements**
- **Existing cable can be used**
- **Bus-powered devices available**
- **Flexible interfacing to PLC's and PC's**
- **Transmission via GSM modem, radio modem or fiber optics possible**
- **Proven performance in more than 100.000 installations**
- **Cost-effective**

Example: Dupline® used as Remote I/O for PLC

RS485 / RS232
Modbus
Profibus-DP
DeviceNet







Water Distribution

Control and monitoring of pumps, valves, levels, flow etc. over long distances, with or without wires.

Carpark Systems

Guidance for drivers in car parks, detection of free parking bays.

Factory Energy Saving

Energy recording, lighting control, temperature control, machine alarm handling, data logging.

Long Conveyors

Safe monitoring of pull-wire emergency stop switches with DuplineSafe, precise diagnostic information.

Railway Systems

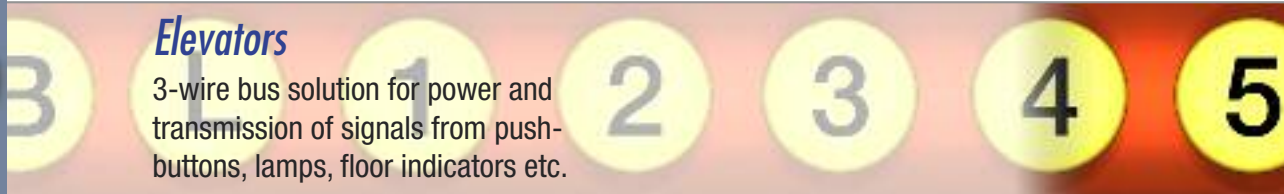
Monitoring of traffic lights and railroad crossings, and control of trackshifter heating and tunnel ventilation.

Irrigation

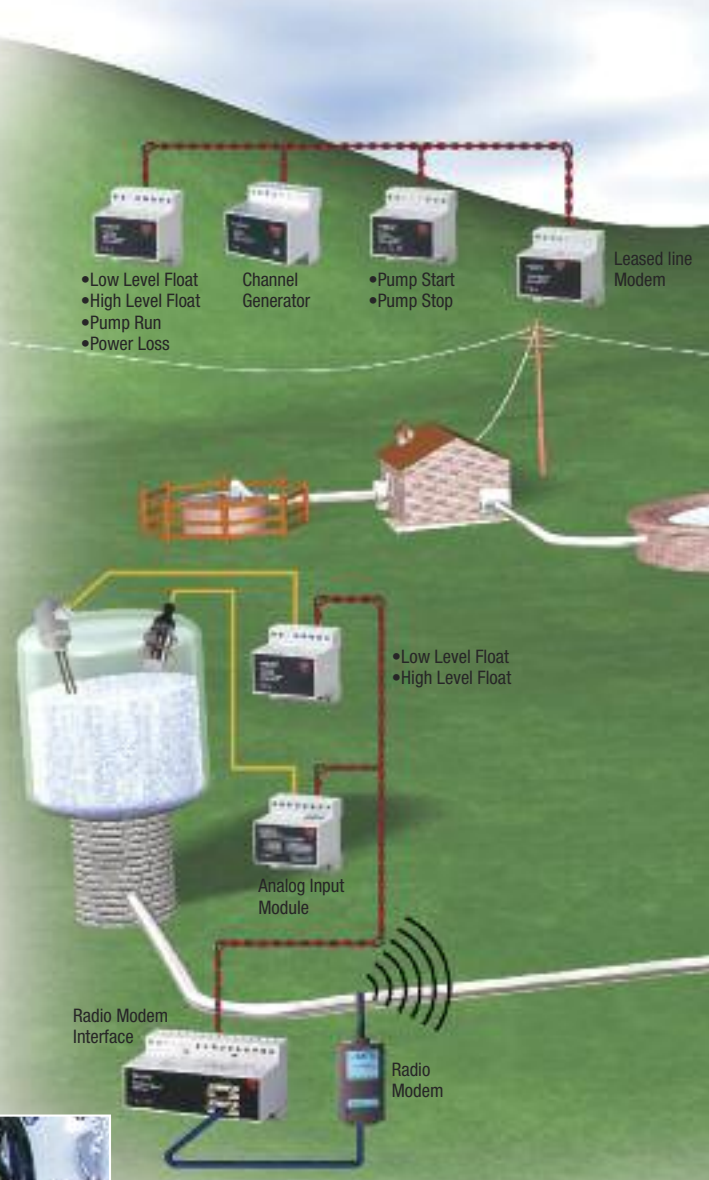
Control and powering of multiple valves, monitoring of flow, valve position and water consumption.

Elevators

3-wire bus solution for power and transmission of signals from push-buttons, lamps, floor indicators etc.



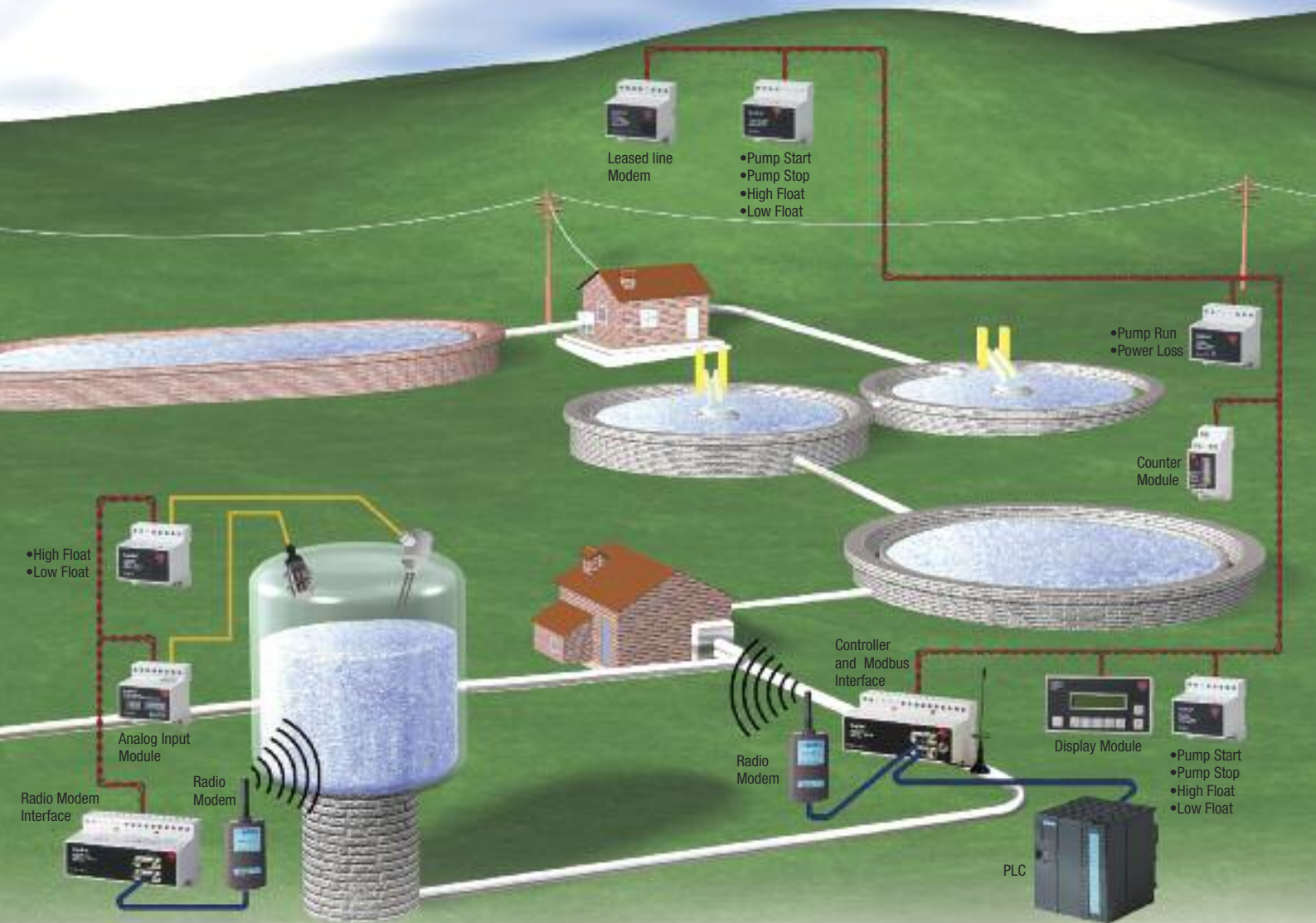
- Up to 10 km transmission distance without Repeaters
- No special cable requirements, existing cable can be used
- Easy handling
- All signals can be controlled and monitored from any point in the system
- Transmission via GSM Modem, Radio Modem or Fiber Optics possible
- Flexible interfacing to PLCs, PCs and RTUs
- Cost-effective



In the water industry, Dupline® is typically used in connection with start/stop and monitoring of pumps, open/close valves, level measurement, flow and pressure measurement and leakage detection.



With the capability to transmit multiple digital and analog signals over long distances by the use of a standard 2-wire cable, Dupline is an ideal solution for automation of waste-water treatment plants.



A water distribution system using Dupline® as Remote I/O

Sensors and pumps at the Remote Well are monitored and controlled from the Treatment Facility, using a pair of Dupline® leased line modems. One of the modems is located at the Remote Well, while the other is located Kilometers away at the Reservoir Pump House. Communications are carried out over conventional telephone lines. Both locations are monitored and controlled by the PLC at the Treatment Facility. The Levels in the Water Towers are measured by ultrasonic level sensors and transmitted on

Dupline® as analog signals. There are also high-level float switches used for alarm purposes. The PLC monitors the level and switches the booster pumps ON or OFF to maintain the Water Tower levels within defined limits. Between the two Water Towers and the Treatment Facility it is not practical to run wire, therefore RF modems are used. Flow meters with pulse outputs are installed at various points in the system and connected to Dupline® Counter Modules, which register the amount of water

passing by. This enables the PLC to monitor if there are leakages in the system. LCD Text Displays are used to indicate alarms and to read out the levels in the Water Towers. The Dupline® Central Unit at the Treatment Facility has a built-in GSM modem, which sends an SMS text message to a mobile phone in case of an alarm. The alarm messages can be “pump 2 thermal overload”, “well power loss”, “water on the floor pump house 1” or “high level exceeded in Water Tower A”.

- Saves time and reduces stress for the driver
- Increased productivity
- Reduced operating cost
- Robust and reliable system
- Easy handling
- Stand-alone or PC-based



With the Dupline® Carpark System the facility can be utilized more efficiently. Parking bays can be announced free and sold faster, because availability is detected immediately when the car leaves the parking bay.



The Dupline® Carpark System guides you to the right spot

The Dupline® Carpark system is a complete solution for guiding the drivers directly to the free parking bays. Displays with green arrows and digits are indicating which direction to drive and showing how many parking bays are available in this area. If the area is fully occupied, the display shows red crosses. It is a system of high precision, because each parking bay has an ultrasonic sensor that detects and indicates occupancy. The sensors and displays are linked together via a Dupline® 3-wire

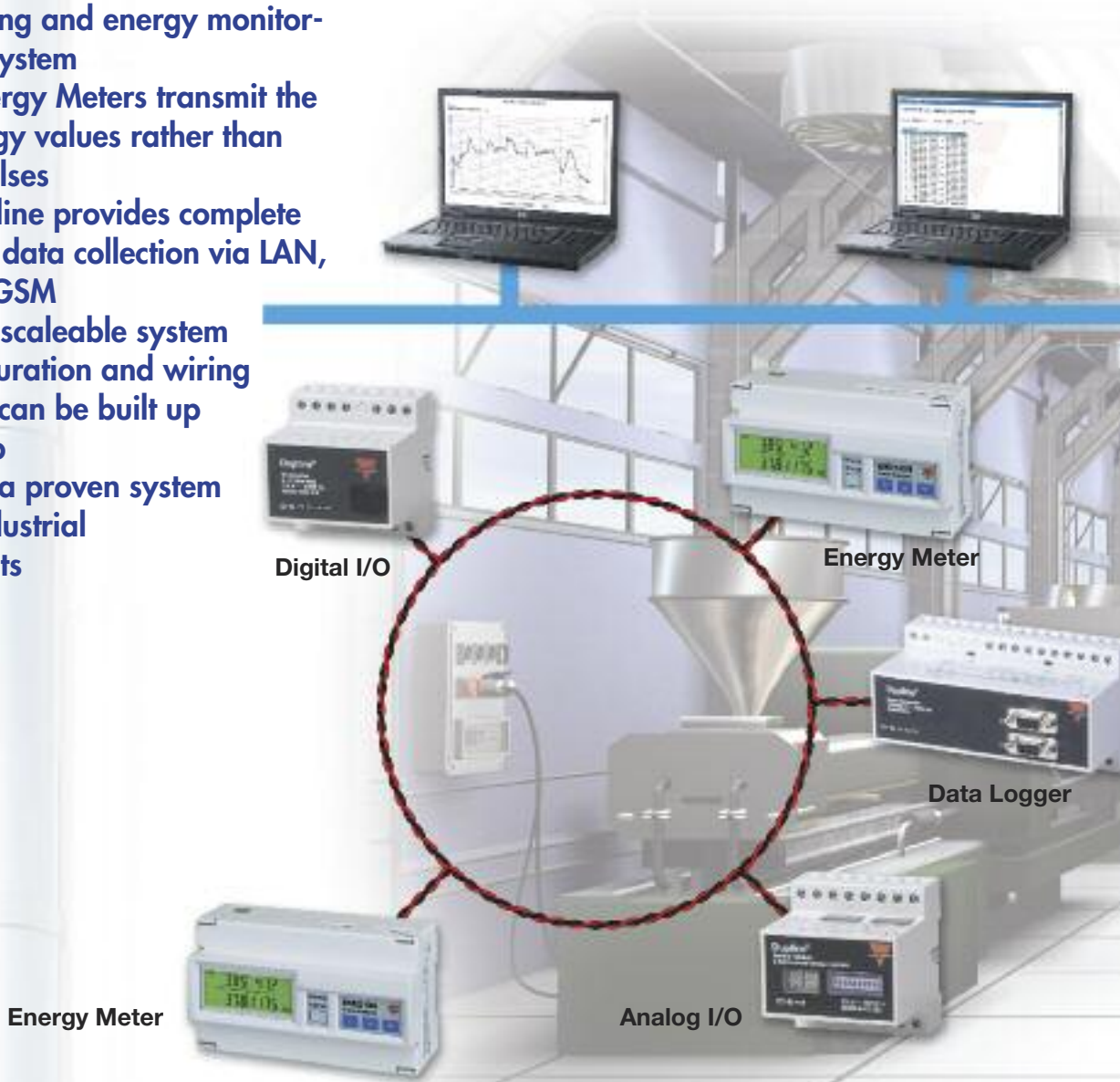
bus for power and communication, thereby enabling each display to read the status of the sensors within the area it has been configured to monitor.

If desired, a PC can be connected to the system. This opens up the possibility for additional features like graphical overview of the parking system status, detection and indication of cars exceeding the time limits, booking of free places and statistical information about occupancy rates for the individual parking bays or the entire system.

With this guidance system the drivers will experience an improved service making the car park system more attractive. Precious time is saved, the level of comfort is increased, and the stress created by the search for free places are avoided. Furthermore, the driving can be reduced by 20 %, whereby the amount of exhaust gases decrease correspondingly. The reduced need for ventilation provides direct savings in energy costs.

(See also Concept Description on page 38)

- Energy saving and energy monitoring in one system
- Dupline Energy Meters transmit the actual energy values rather than counting pulses
- Dupline-Online provides complete solution for data collection via LAN, Internet or GSM
- Completely scaleable system
- Easy configuration and wiring
- The system can be built up step-by-step
- Dupline® is a proven system in harsh industrial environments

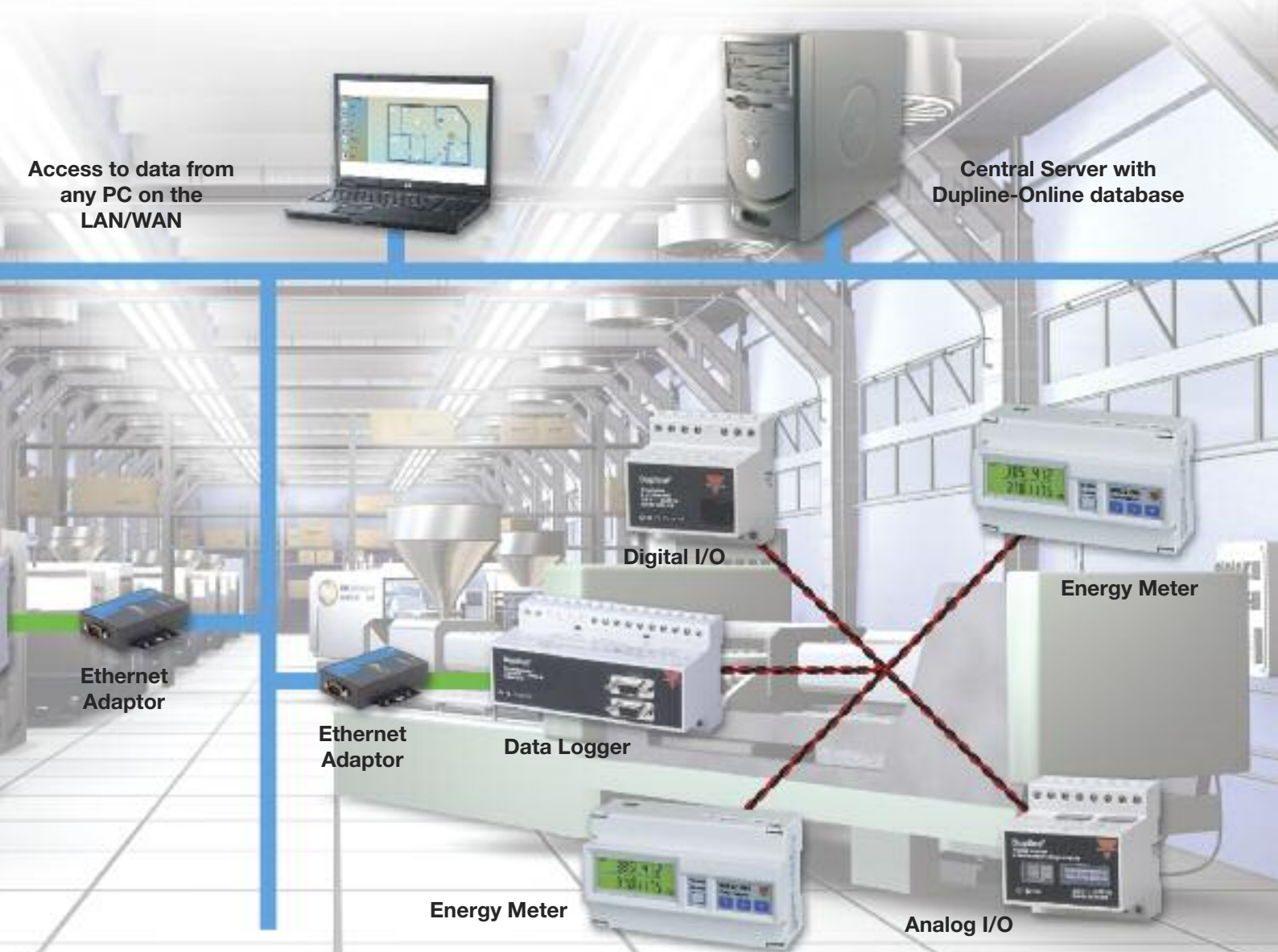


Dupline®-Online used for energy saving and recording

Many factories have the possibility of substantially reducing their energy consumption by means of intelligent control of lighting, heating and machines, simply by turning off the loads when they are not needed. The electricity consumption, for example, can be reduced by only having the light on when persons are present in the building and the light intensity is below a certain level. And many machines can without problems be turned off completely during long periods, thereby avoiding

stand-by power loss. The Dupline bus in combination with the energy meter range of Carlo Gavazzi and the Dupline®-Online M2M software offer a powerful solution with all the elements needed in one system:

- *Many possibilities of intelligent control of lighting, heating and machine power, such as Real-time clock function with calendar, light level (lux), dimmers, daylight control, presence detectors, switch-all-off, timers, light switches and night setback of temperature.*



- *Dupline® Energy Meters* transmit the actual electrical parameters measured by the meter, but pulse counting from 3rd party meters is also possible.
- *The Dupline®-Online M2M server software* makes it possible to log data via the factory LAN, Internet or GSM network from several Dupline® Data Loggers, each controlling one Dupline® network. The logged data can be consumption data (electricity, gas, water and heating), operating hours, electrical parameters, alarms, temperatures etc. The data can be accessed via standard browser

- from any PC on the LAN. It is also possible to switch loads and change operating parameters, such as temperature levels and turn-on/off times.
- *Machine alarm logging and messaging* functions are included in the system
- *Completely scalable system*, the central server can handle as many local and/or remote Dupline® Data Loggers as desired.
- *Simple programming*. No experts are needed. The factory's own electrical staff can make expansions and changes when needed – simple, fast and with-

- out high costs.
- *Simple installation*. The Dupline® 2-wire cable can be laid in existing cable trays – and together with power cables, if required. Wiring topology is free and no terminations are required.
- *Modular and flexible*, it is easy to enhance the installation with additional I/O modules.
- *Robust and noise immune*. Dupline® is a proven bus for harsh industrial environments. (See also *Concept Description* on page 42)

DuplineSafe

- Immediate and precise diagnostics
- Safer than traditional emergency stop systems
- Approved by TÜV according to EN/IEC61508-SIL3 and EN954-1 Cat.4
- Up to 5 km transmission distance without Repeater
- High noise immunity – false trips avoided
- Easy to design, install and commission a system
- Several safety relays can read the same input modules



Emergency stops on conveyors

Along many conveyors, there are several emergency stop switches connected to a pull-wire, enabling the workers to stop the belt at any point in case of an emergency or a fault on the belt. In order to reduce costly downtime of the belt, it is important that the location and nature of the problem is identified as fast as possible. The traditional wiring solution with serial connection of all the safety switches does not provide this diagnostics, it merely stops the belt. Parallel wiring can provide



GS75102101 Safety Transmitter



GS38300143230 Safety Relay



Text Display

GS38910125230 Profibus Gateway

PLC

the diagnostics, but it is a difficult and costly solution, since a 3-5 km conveyor may have more than 50 switches installed. With DuplineSafe, however, a simple, flexible and cost-effective solution can be implemented.

A single two-wire bus cable is pulled along the conveyor. At each pull-wire safety switch, a small DuplineSafe input module is connected to the two bus wires and to the NC contact set of the safety switch. The input

module continuously transmits the status of the safety switch in a dynamic way using the DuplineSafe address assigned to the module. The power supply for the input module is derived from the two-wire bus, hence no local power supply is required. If the belt needs to be extended, it is easy to install additional input modules.

In the machine room, a Dupline-Safe Relay Output Module is continuously monitoring the bus and the status of all the safety

switches. If one of the safety switches is activated, or if a bus fault is detected, the Output Module will deactivate its Safety Relay and thereby stop the belt. The status of the safety switches can be monitored from a text-display or LED mimic panel, providing fast and precise diagnostics. The signals can also be monitored from a PLC or PC, for example by using the Dupline-Safe Profibus-DP Gateway. (See also *Concept Description* on page 40)

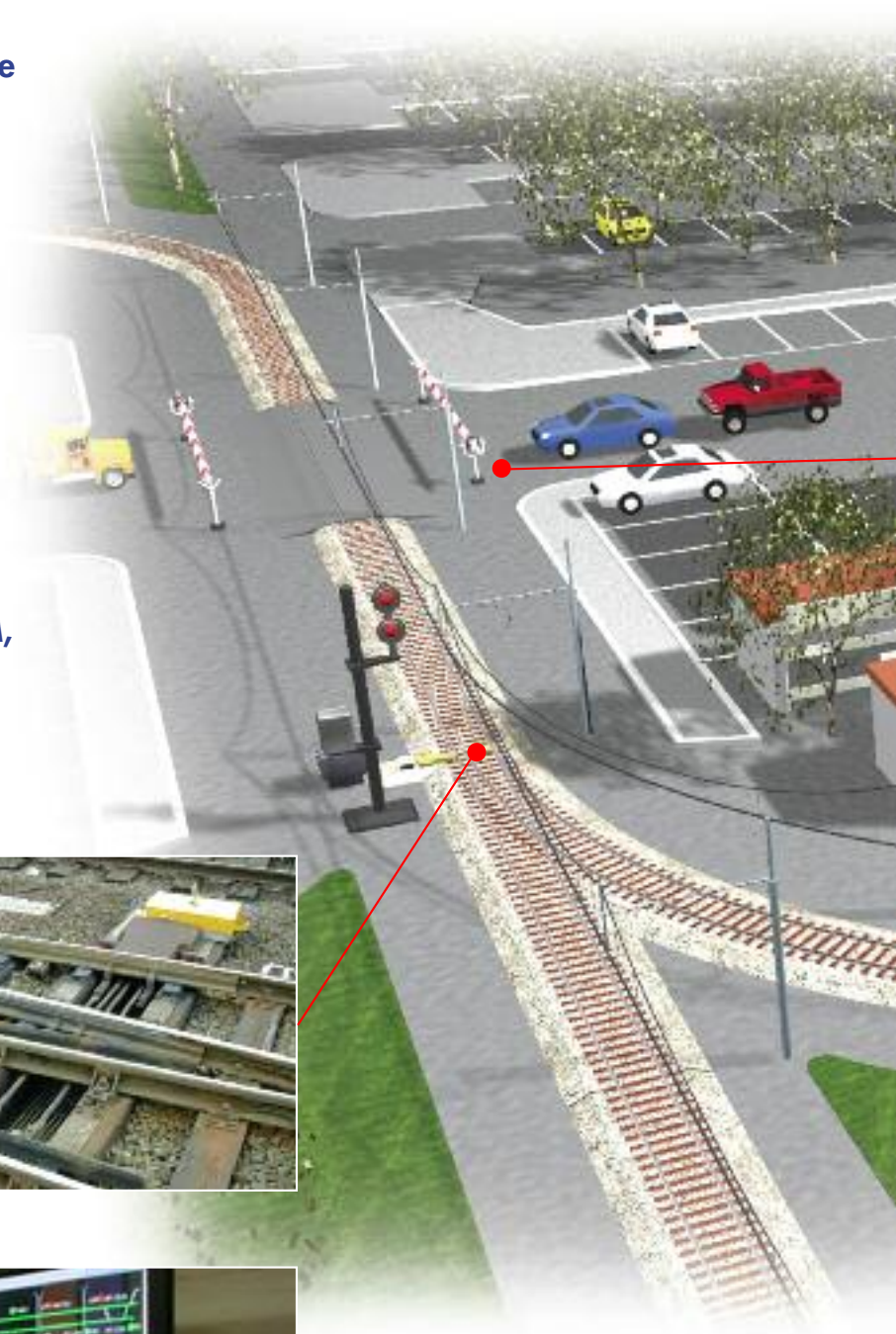
- Up to 10 km transmission distance without Repeaters
- Un-limited transmission distance with cascaded Repeaters
- Existing cables along the tracks can be used
- High Noise Immunity
- Easy to expand or change an installation
- Extremely user-friendly
- Options for transmission via GSM, leased lines, public telephone network, or optical fibres
- Cost-effective



In the central control room, plasma screens are displaying the traffic light status and railway crossing alarms collected via Dupline®.



In the Railway Industry, Dupline® is typically used to gather status and alarm signals along the tracks over very long distances using the existing cables.





Railway Systems

The capability to transmit multiple signals over long distances using two wires makes Dupline® ideal for use in Railway systems. A Dupline® network without Repeaters can handle up to 10 km, but when Repeaters are used in cascade there is no limitation on distance. Dupline® is used to monitor the gates and lights at railway crossings. The fault outputs from the local gate control system are fed into Dupline® input modules, which transmit the signals to one or several

control centers. The final link to a control center far away from the tracks may be implemented via GSM-, leased line- or auto-dial modems. If a fault occurs, it is immediately reported to the computer. Dupline® is also used to monitor the operation of trackside signalling relays. The output signals from current transformers, provide true feedback if lights are ON, are fed into Dupline® voltage input modules. The information is again transmitted via Dupline® to the control

center, where the computer records the information and verifies correct output status. When the temperature drops below freezing point, track shifter heaters need to be activated at regular intervals to prevent blockage of trackshifters because of ice. A central PLC reads the temperature and humidity via Dupline® and controls the heating elements accordingly via relay outputs.

Digital Input Module

Digital Input Module

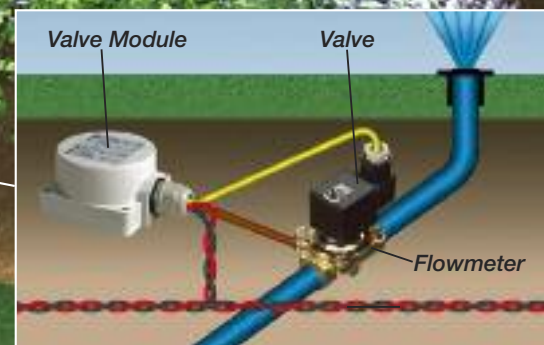
- Reduced installation time
- Reduced cable cost
- Easy to expand or change an installation
- Extremely user-friendly
- Free topology
- Robust, reliable and proven technology
- Flexible interfacing to Irrigation Controllers
- Cost-effective



The Dupline[®] irrigation bus reduces installation costs and increases flexibility in agricultural irrigation systems, where the valves are usually distributed over a large area.



Also golf courses need a reliable irrigation system to remain in good shape.



Irrigation Control with Dupline®

Traditional irrigation systems are characterized by costly and complicated wiring. Each valve needs a separate hot wire running back to the Irrigation Controller, which can be located kms away. Expansion is also a problem due to the high cost and impracticality of getting extra wires for valves that need to be added to the system.

By running the power, valve control signals and pulses from flow meters on a single two-wire cable, Dupline® reduces the wiring and cable cost significantly

and makes expansion easy. Any type of Irrigation Controller, whether it is a PLC, PC or Dedicated Controller, can use Dupline® as a remote I/O system. In order to achieve sufficient voltage level to switch the 3-wire latching valves in the field, a Booster Module converts the Dupline® voltage level to 28 VDC. Each valve is connected to an IO-module with two outputs for opening and closing the valve, and with 2 inputs that can be used for transmission of pulses from flow meters. The module

is available in a housing that allows underground installation, and in a DIN-rail mount housing. Each time the valve is fired, a built-in capacitor slowly charges up and after 10s it stores enough energy for the next valve operation. The wiring topology is completely free with no limitation in number and length of branches. One Hi-Line network can handle up to 64 valves over distances up to 7 km, and several networks can be linked together.

5

- Provides significant reduction in installation and commissioning time

4

- Simple to handle and easy to apply
- Industrial grade and noise immune
- Cost-effective

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The Dupline elevator bus system offers a complete solution for serial communication, which is cost-effective and easy to work with. All signals and power run on the same 3 wires, thereby reducing installation and commissioning time significantly.



G2196.... Series PLC interface module

G21X0 series I/O-module for floor fixtures.

G21X0.... series I/O-modules for car signals

Dupline® Elevator Bus System

The wiring of traditional elevator control systems is quite costly and complicated. Each push button, lamp, floor indicator etc. needs its own wiring, which makes the initial installation cost high. Expansion is also a problem, and even ongoing maintenance costs are high.

But Carlo Gavazzi's Dupline® 3-wire bus makes elevator control systems simpler and more effective than traditional systems. Based on 20 years of experience from more than 150,000 Dupline® installations in the industrial field, we have

developed a user-friendly, noise immune and cost-effective bus system for elevators. Installation and commissioning time is reduced significantly with a minimum increase in material cost. Space and cost saving I/O-boards with 2 inputs and 2 outputs are mounted in each floor fixture and connected to the push button and lamps. In the elevator car, where the number of signals is higher, boards with multiple I/O's are used. All the I/O-boards are connected to the same 3-wire cable, which provides both 24 VDC power for

lamps and floor indicators and serial communication connection with the Dupline® Master Module.

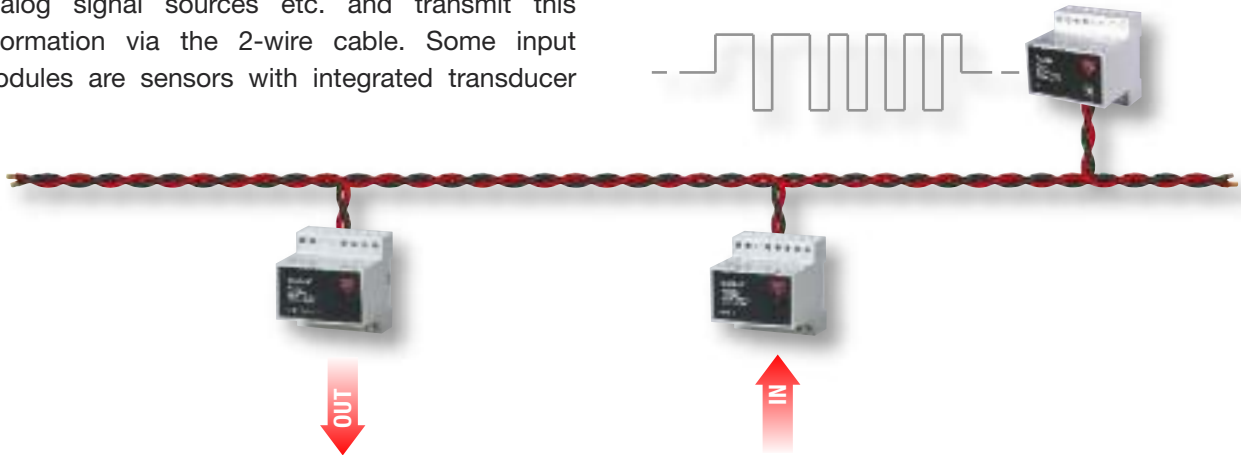
The Master Module interfaces Dupline® to any Elevator Controller with a RS232 or RS485 port. In order to make the integration of Dupline® fast and easy, dedicated plug & play versions have been developed for all major PLC brands. The Master Module continuously scans all the Dupline® I/O boards and reads and writes the Dupline® data directly into the PLC memory.

Basic Components

A Dupline® network consists of 4 basic elements: A Central unit, input modules, output modules and a 2-wire cable. **The Central Unit** controls the communication in all Dupline® installations. It sends out the Dupline® carrier signal and co-ordinates all transmission between input and output modules. **Input modules** connect to contacts, voltages and analog signal sources etc. and transmit this information via the 2-wire cable. Some input modules are sensors with integrated transducer

hence no external signal source is required. **Output modules** connect to lamps, contactors, LEDs, instruments etc. and control these devices according to the information received via the Dupline® network.

Example: A basic Dupline® system



The Cable

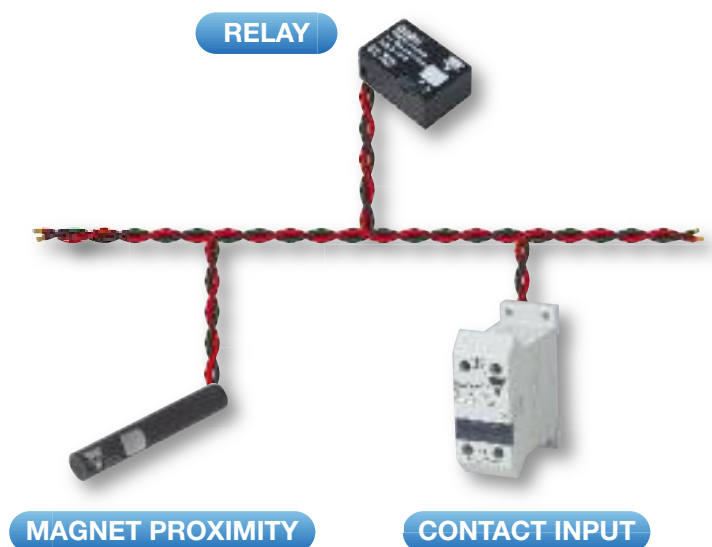
All the Dupline® modules connect to the same 2-wire cable to form a communication network where signals can be transmitted between the modules. Ideally, the 2 wires are twisted, but in

practice basically any cable can be used, as long as the 2 wires follow each other in the same conduit or cable. In many cases this means that existing cables can be used.



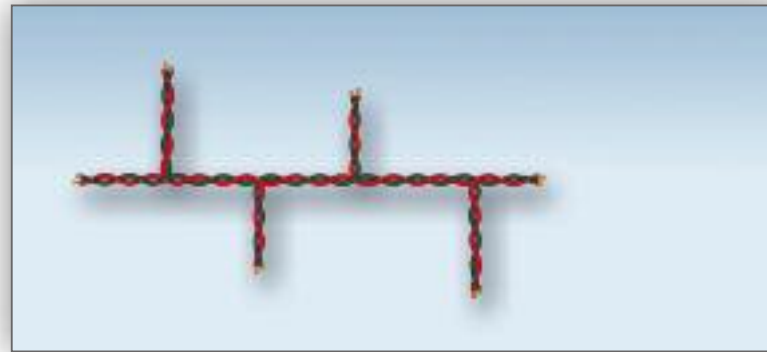
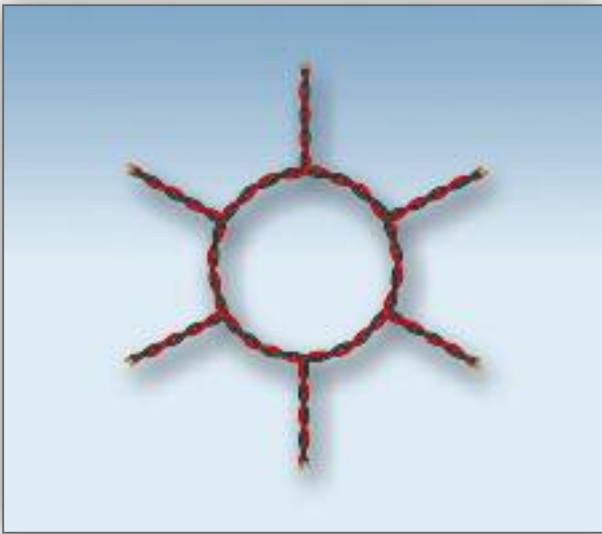
Bus-powered Components

Some Dupline® I/O modules are powered directly from the bus hence no external power source is required. This makes installation flexible and easy and is a particular advantage when no local power supply is available. Most of these devices are input modules such as small contact inputs and sensors for temperature, light intensity or movement detection, but a bus-powered relay output for de-centralised installation is also available.



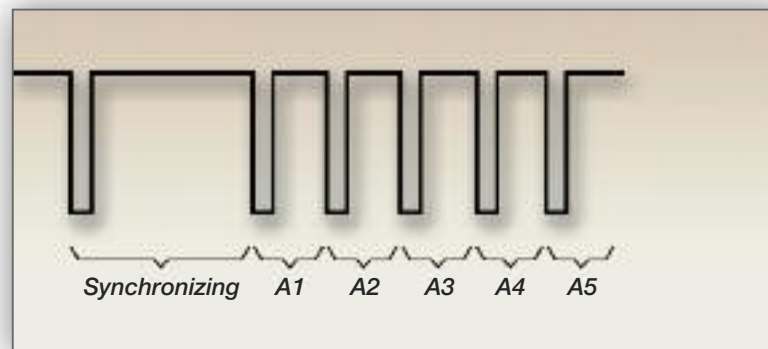
Topology

The topology of a bus system is the definition of which type of cable routing is allowed. Dupline® features a completely free topology allowing the network to be established as a line, ring, star or a combination of these. This makes planning easy and provides a high degree of flexibility for last-minute changes and future expansions.



Communication Principle

Dupline® signal transmission is based on a time-division multiplexing principle that provide a more efficient transmission of simple signals than the traditional message-oriented method. This has made it possible to run Dupline® on a low carrier frequency of 1 kHz, which is the key for Dupline® features like long-distance transmission, high noise immunity and robustness. The Controller generates a square-wave signal consisting of an 8 ms synchronization period followed by 128 pulses each with a length of 1 ms. This 136 ms pulse train is repeated continuously. Each pulse defines a time slot where those modules assigned to that specific pulse number are allowed to transmit and



receive information. So, in fact the I/O modules are sharing the same 2-wires by using them in turn. The response time in a Dupline® system is always below 272 ms, regardless of the number of nodes and active signals in the network.



Addressing

Each input or output needs to have one of the 128 addresses assigned. The address defines which pulse number in the Dupline[®] pulse train the I/O point shall use for transmitting or receiving its signal. The 128 addresses are divided into 16 groups (A-P) each with 8 addresses (1-8), so an address reference is a combination of a letter and a number, e.g. B3. The addresses are assigned to the nodes by means of a simple handheld coding device.

Coding and Testing

Addresses are assigned to the Dupline[®] modules by means of the handheld GAP1605 coding tool. The modules do not need to be powered or connected to the Dupline[®] bus to be coded. The current address can be read back into the GAP1605 for verification. Coding an address is as easy as dialling a telephone number. The GTU8 is a test tool, which makes it possible to read the actual status and control all 128 addresses in a running system. This is a useful tool during commissioning of a system and for isolating a problem with a wrongly wired input or output module. The GTU8 can be connected to the Dupline[®] 2-wire at any point in the installation.



Dupline Operating Mode

In the figure below, two inputs and two outputs are assigned the same address B3. Every time an input module detects the time slot corresponding to address B3, it checks the status of the input coded for B3 and if it is activated it sends a signal to the central unit. The central unit will register address B3 as having an active input no matter which one of the two inputs are active. All inputs coded for the same

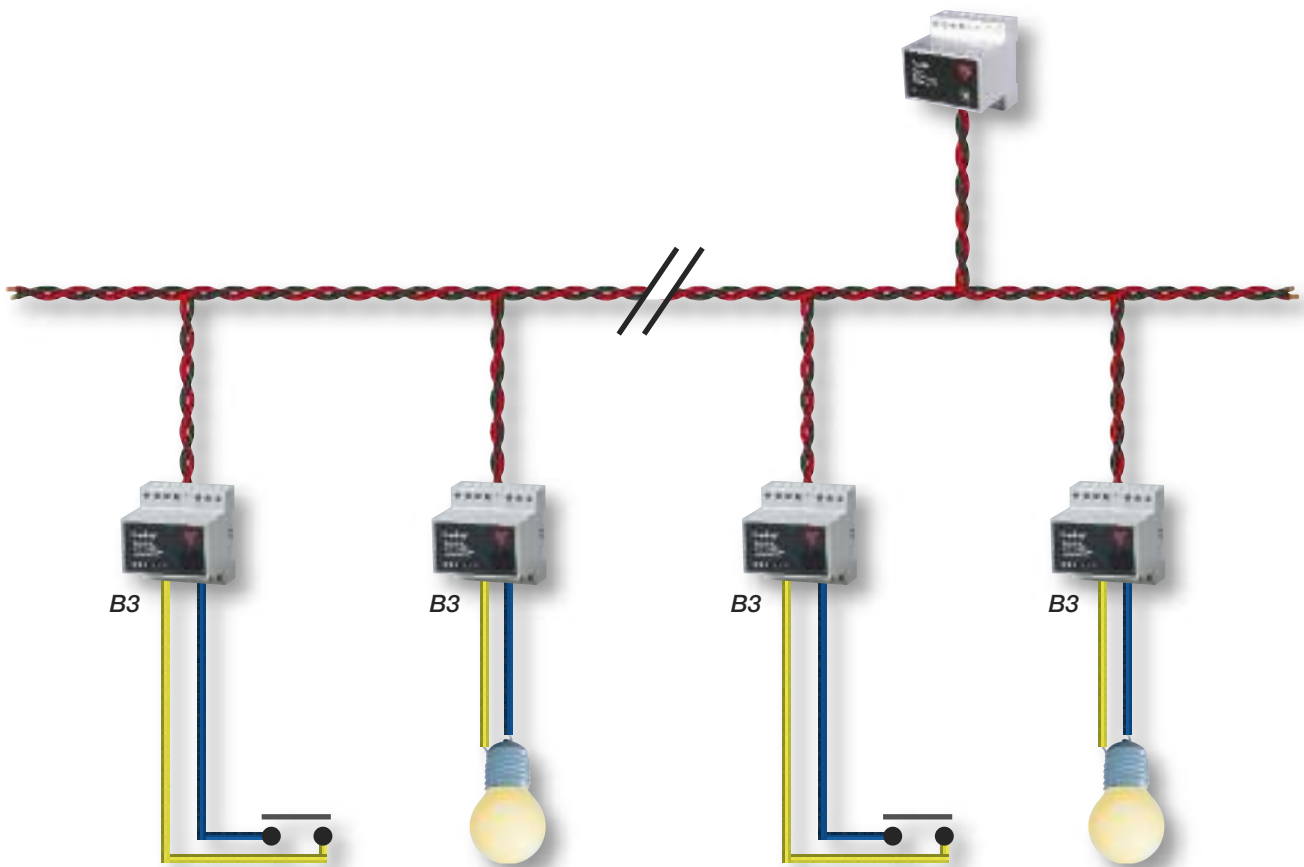
address are OR-ed together, and there is no limit to the number of inputs that can have the same address. This is useful for example when a light is to be controlled from light switches mounted at different positions. If the central unit is a standard type or an interface without intelligent functions, it will simply transfer the input status detected on B3, to the B3 outputs.

This function, that outputs coded for B3 follow the input status of B3, makes it easy to perform a simple peer-to-peer transfer of a signal without involving an intelligent unit.

If the configurable Master Generator is used, then it is possible to assign an intelligent function to an address. If a toggle function is assigned to address B3, then the output coded for B3 will toggle whenever an input coded for B3 is activated. Or if an OFF-delay timer is assigned, the B3 outputs will remain ON for the specified time after the B3 input has been deactivated. There is no limit to the number of inputs that can be coded for the

same address and thereby output the same signal. This is useful, when the status of lights and alarm signals need to be displayed at multiple locations, or when more loads need to be switched with the same signal. The fact that

several Dupline I/O modules can input and output information on the same address without knowing the existence of each other, is a key characteristic that demonstrates the open and flexible architecture of Dupline®.



Product Categories

The wide range of Dupline® products for industrial applications and building automation can be divided into different categories depending on the function they perform on the network. By combining products from the various categories, complete solutions can be engineered for a multitude of different applications.

Central Units

Being the heart of the system, the Dupline® Central Unit produces the carrier signal allowing all the other modules on the network to communicate with each other. There is always one, and only one, central unit in a Dupline® network. Some central units have built-in control and/or interfacing functions.

Digital and Analog Input modules

These modules are used to collect the digital and analog signals in the field for transmission via Dupline®. They connect to contacts, voltages and analog signal sources with DIN-norm outputs like 4-20 mA. A Counter module for counting pulses from energy meters is also available.

Digital and Analog output modules

These modules are used to output signals transmitted on Dupline® to field devices. The digital types are available with relay or transistor outputs and the analog types have DIN-norm outputs like 4-20 mA. They typically connect to contactors, lamps, instruments, drives etc.

Sensors

Dupline® sensors are self-powered devices that detect or measure physical states directly. The digital types can detect presence of people, magnet proximity, metal proximity or water leakage, while the analog types measure temperature or light intensity.

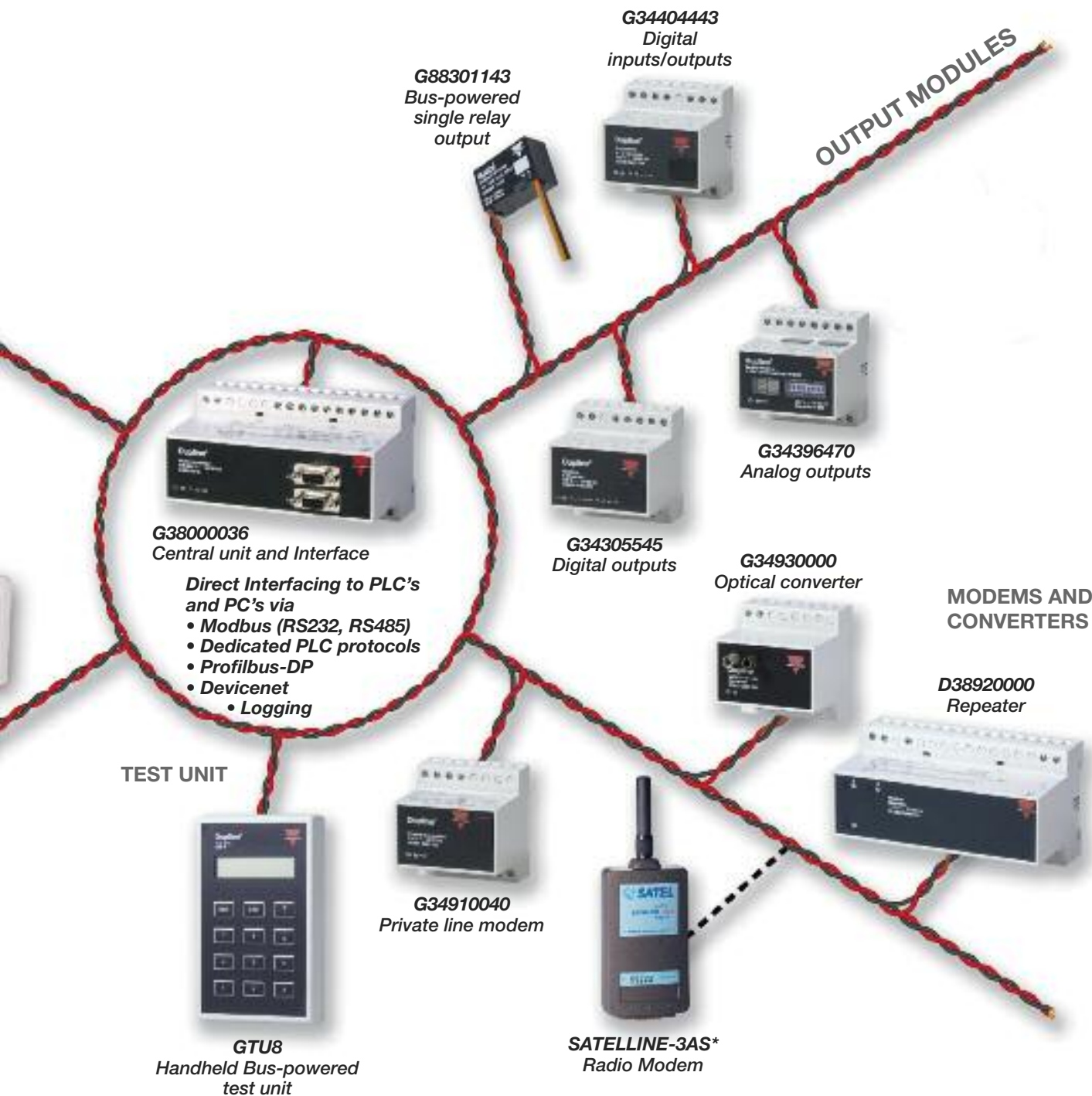
Interface Products

In many applications, the Dupline® signals need to be controlled and monitored from a central PLC or PC. To accommodate easy and flexible interfacing there is a number of products available for interfacing via serial ports (RS232 or RS485) or via standard Fieldbus connections (Profibus-DP and DeviceNet).



Modems and Converters

Sometimes it is necessary to convert the Dupline® signal for transmission on media other than copper wire. Via modems and converters Dupline® can be transmitted on telephone cables, wireless via Radio Modems, on optical fibre or via GSM modem. The transmission distance on copper wire can be extended by using the Dupline Repeater.



* Only serial interface provided by Carlo Gavazzi, not the component itself.

Display and HMIs

The products in this category are used to perform the interface between the users and the Dupline® network. The status of digital and analog signals can be read out on Text Displays, Panel Meters, Touchscreens or LED indicators and control of signals is also possible.

Coding and Testing Tools

No PC or other advanced tool is required for address coding of Dupline® modules or for testing an installation. Instead, these tasks are performed by means of two simple handheld devices that are intuitive in use.

The Master Generator

The advanced control and interfacing unit

The Master Generator is the most advanced Dupline® central unit. Apart from generating the Dupline® carrier signal, it can perform various intelligent control and network functions, and at the same time operate as an interface to a PC or PLC. It can also send out event-based SMS alarm messages via a built-in GSM Modem (optional), and it can be connected to an external radio modem and

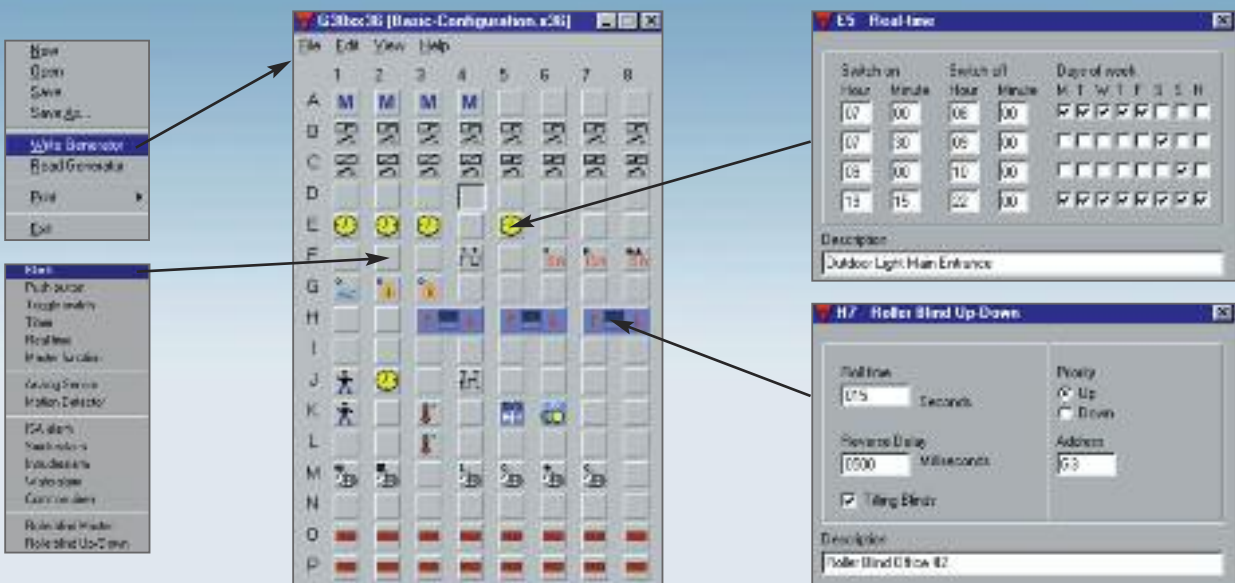


thereby establish a wireless link to several other Master Generators.

Intelligent functions

The configuration of the intelligent functions in the Master Generator is performed on a PC by means of windows-based software with a graphically orientated user interface. The process simply consists of selecting a pre-defined function from a list for each of the applied addresses. The function defines how the Master Generator will control the output status of the selected address based on the input status, time or status of other addresses. Each type of function has a number of parameters, which can be defined. Thus, it is possible to define the roll time for a roller blind upon activation and whether it must react on an alarm from a wind

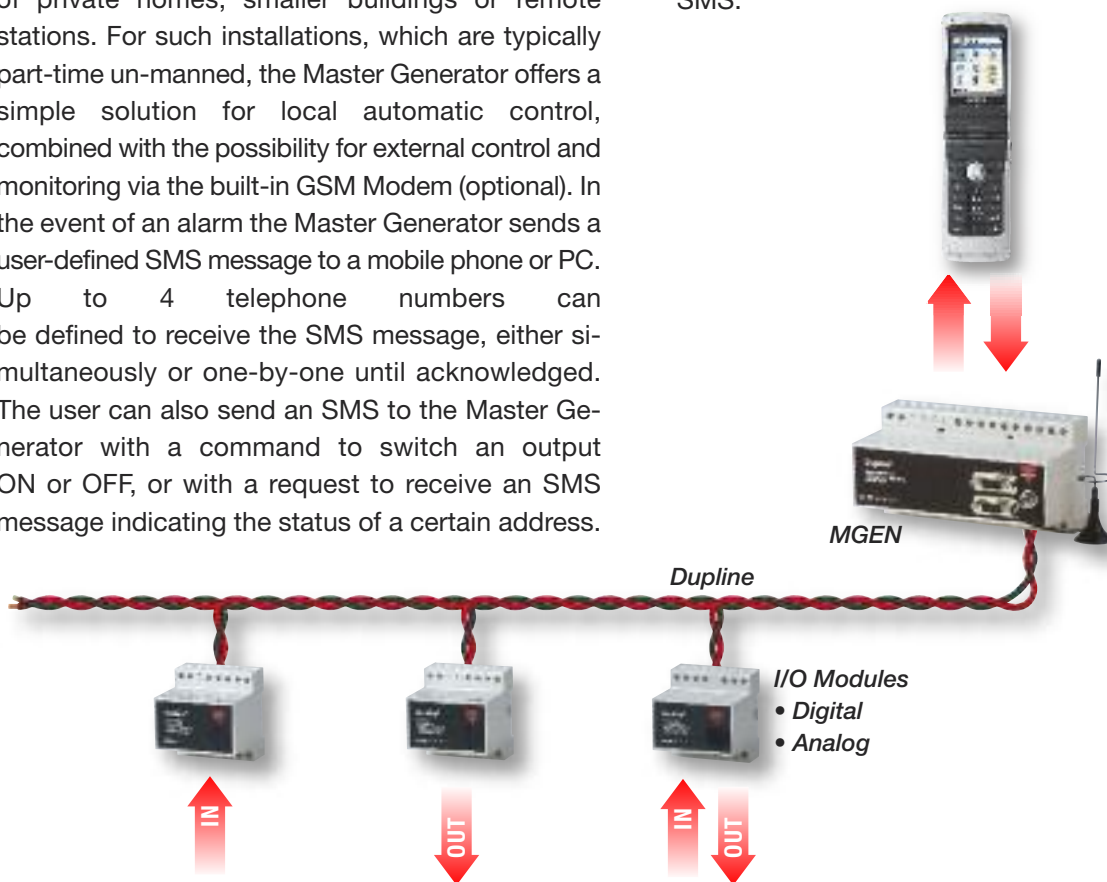
sensor; And if the user wants the light to switch ON and OFF at certain times of the day and on certain weekdays, a real-time function can be assigned to that address. The so-called master function enables an input activation to trigger a pre-defined output pattern for several addresses. This is typically used for tasks like “all-OFF” or “welcome home” lighting control. Several other functions for handling ISA alarms and level monitoring of analog signals are available, and it is also possible to define timers and Boolean logic functions such as AND, OR and XOR.



Stand-alone operation

The Master Generator is often used in a stand-alone configuration for control and monitoring of private homes, smaller buildings or remote stations. For such installations, which are typically part-time un-manned, the Master Generator offers a simple solution for local automatic control, combined with the possibility for external control and monitoring via the built-in GSM Modem (optional). In the event of an alarm the Master Generator sends a user-defined SMS message to a mobile phone or PC. Up to 4 telephone numbers can be defined to receive the SMS message, either simultaneously or one-by-one until acknowledged. The user can also send an SMS to the Master Generator with a command to switch an output ON or OFF, or with a request to receive an SMS message indicating the status of a certain address.

The SMS function can be secured by means of password and checking of the number that sent the SMS.

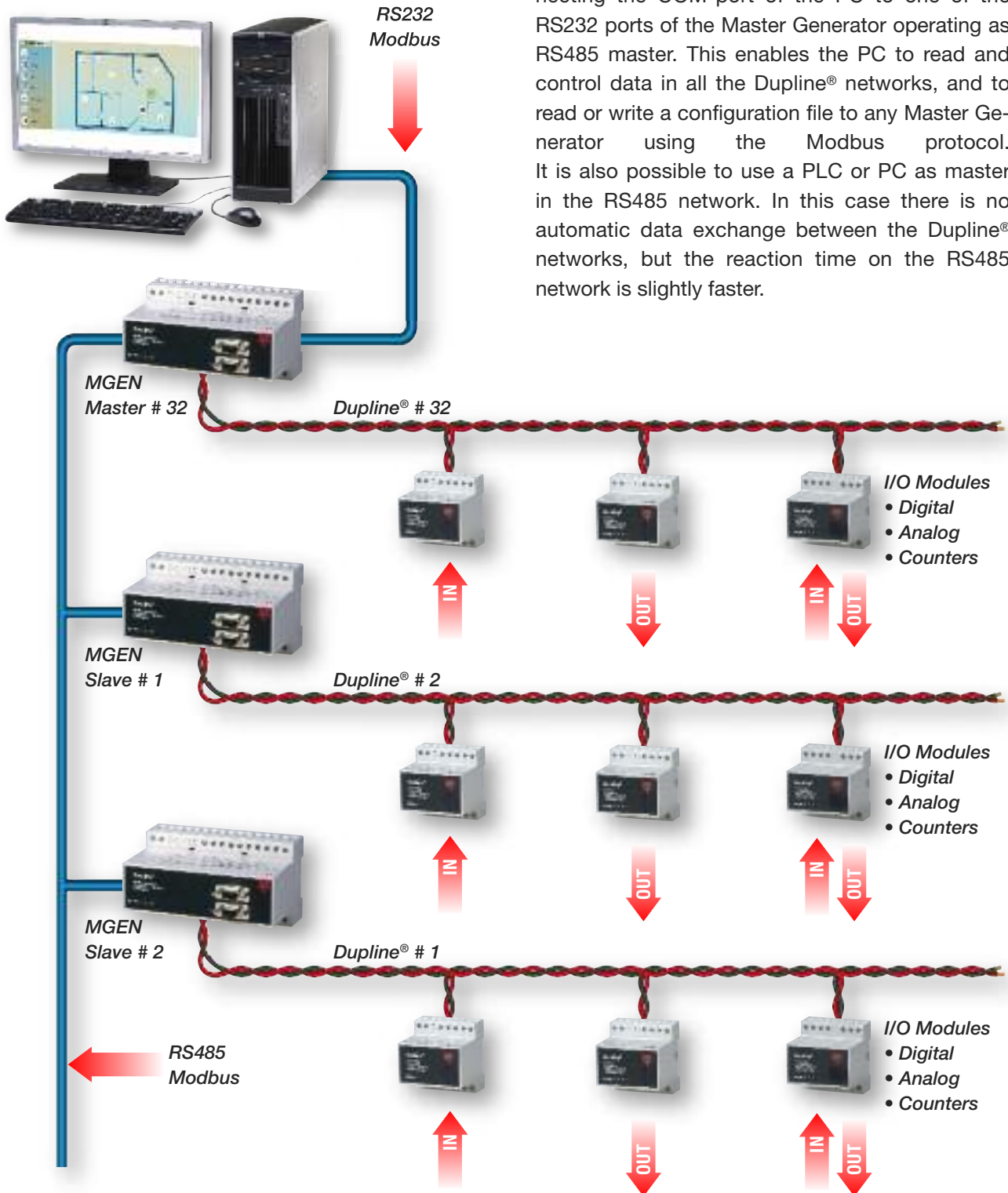


Larger system with a network of Master Generators

Dupline® solutions for larger buildings, factory processes or municipalities can be implemented by having a Dupline® network with a Master Generator for each section in the installation. Up to 32 Master Generators can then be linked together by means of an upper level network based on either RS485 or Ethernet (via converter). One of the units, configured as RS485 master (#32), coordinates an automatic exchange of data between Master Generators, so that each unit is continuously updated with the status of every Dupline® address in the entire system. Each Master Generator controls its own section with 128 addresses, but can be configured to be influenced by signals from other networks. If for example the Dupline® network on the top floor of a building has a wind speed sensor connected to it, then the Master Generators in all the other Dupline® networks will be able to read and use the

wind in the local roller blind control function. Other examples are the possibility of switching all lights in the entire building by activating one pushbutton on the ground floor, and the option to collect all alarm signals in one Master Generator.

This system topology ensures safe system operation, because in the event of a short circuit or interruption of the RS485 network between Master Generators, the control functions on each Dupline® network will continue to operate, but of course only based on the local signals. Also, if one of the Dupline® networks is short circuited or interrupted, the other Dupline® networks will continue to operate. In these systems, it is common to have a PC with SCADA software for monitoring the entire system and for changing control parameters like temperature set-points and switching times.



In large Dupline® systems, this is achieved by connecting the COM-port of the PC to one of the RS232 ports of the Master Generator operating as RS485 master. This enables the PC to read and control data in all the Dupline® networks, and to read or write a configuration file to any Master Generator using the Modbus protocol. It is also possible to use a PLC or PC as master in the RS485 network. In this case there is no automatic data exchange between the Dupline® networks, but the reaction time on the RS485 network is slightly faster.

Master Generator used as radio modem interface

In some applications it is not practical, or impossible, to run wire on certain stretches. Therefore, the master generator features the

possibility of creating wireless links to other master generators using external radio modems. One master generator must be defined as the

central master generator, and up to 31 Master Generators can be defined as substations. The central master generator continuously polls and updates the Dupline® data from all the substations via the

radio modem network. In this way it makes the entire system operate as one big Dupline network, where all data can be input or output at any point in the system.

Using Dupline as Remote I/O

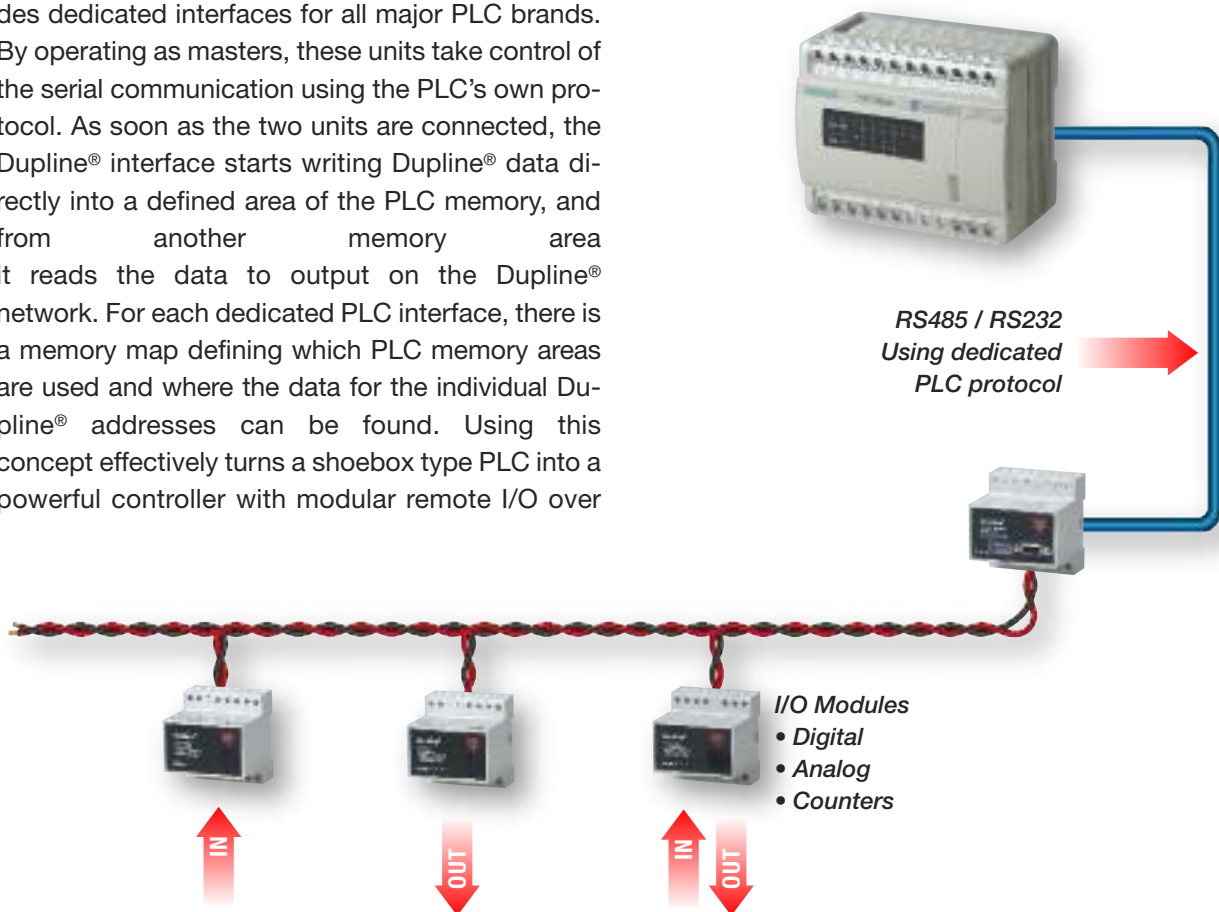
Dupline® is commonly used as a Remote I/O system for PLCs and PCs with SCADA software, typically in applications where the unique Dupline® features matches the system requirements.

In order to facilitate easy and cost-effective interfacing to the control level, a number of serial RS232/RS485 interfaces and fieldbus gateways have been developed.

Dedicated PLC interfaces make integration easy

Even the smallest PLCs have serial communication ports today and this provides an excellent platform for cost-effective interfacing to Dupline®. Many PLC programmers, however, are reluctant to battle with serial communication protocols of external equipment. Therefore, the Dupline® product range includes dedicated interfaces for all major PLC brands. By operating as masters, these units take control of the serial communication using the PLC's own protocol. As soon as the two units are connected, the Dupline® interface starts writing Dupline® data directly into a defined area of the PLC memory, and from another memory area it reads the data to output on the Dupline® network. For each dedicated PLC interface, there is a memory map defining which PLC memory areas are used and where the data for the individual Dupline® addresses can be found. Using this concept effectively turns a shoebox type PLC into a powerful controller with modular remote I/O over

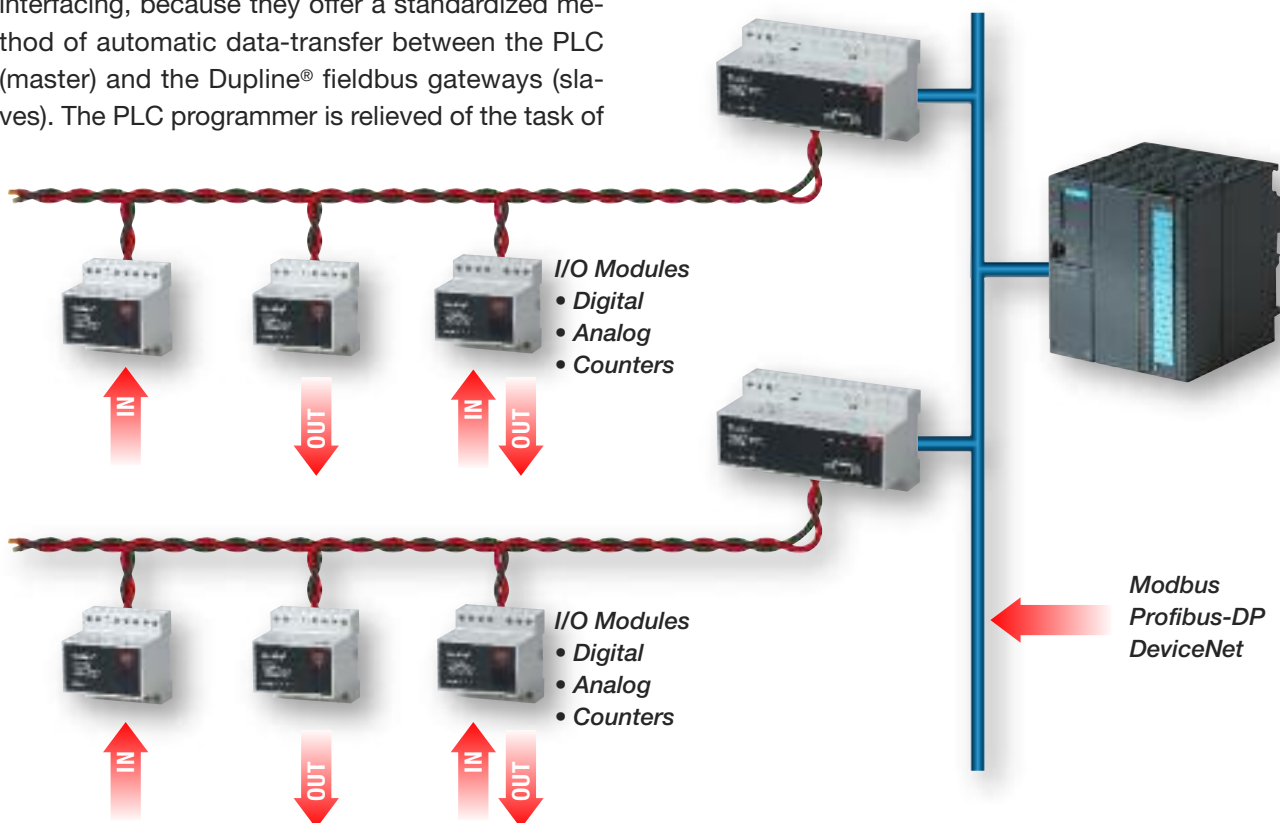
long distances. Interfaces are available for the following PLC brands: Siemens, Allen-Bradley, Group Schneider, Omron, Mitsubishi, GE-Fanuc, Toshiba, Koyo, Idec, Matsushita and LG.



PLC interfacing using fieldbus gateways

Many PLCs are available with fieldbus communication integrated. This is the case for major PLC brands like Siemens using Profibus-DP and Allen-Bradley using Devicenet. Gateways, that translate the Dupline® data into the fieldbus protocol and vice versa, are available for both of these leading fieldbus systems. The fieldbus communication ports on PLCs are useful for Dupline® interfacing, because they offer a standardized method of automatic data-transfer between the PLC (master) and the Dupline® fieldbus gateways (slaves). The PLC programmer is relieved of the task of

working with serial protocols, because the PLC operating system automatically takes care of the communication. Another advantage is the possibility to connect several gateways to the same PLC fieldbus port. This enables design of systems with thousands of I/O points, but still with an updating time of less than one Dupline® cycle.



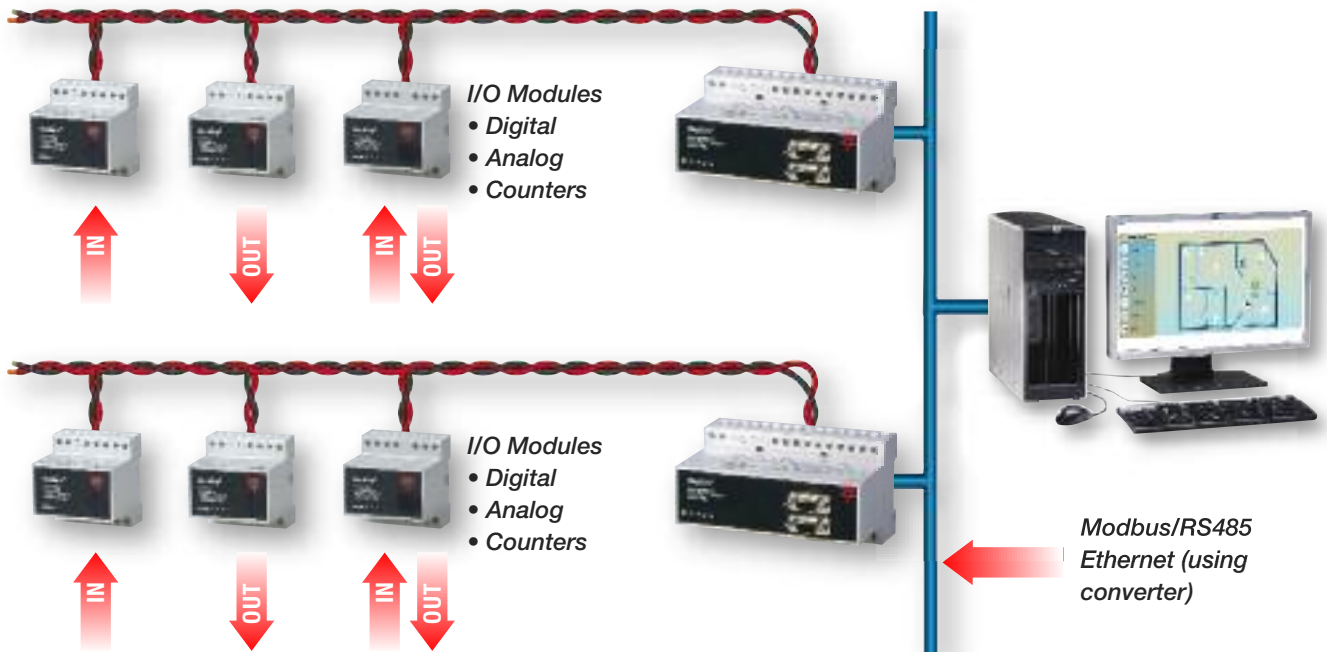
PC with SCADA using Dupline® as Remote I/O

The most common way of interfacing one or more Dupline® networks to a PC with SCADA software is to use one of the serial RS232/RS485 modbus interfaces. Two types are available: The low end modbus master module which can only handle the digital signals and 32 analog values (AnaLink), and the high end Master Generator, which can handle the digital signals, 128 analog values (all protocols) and 128 counters. Up to 32 Master Generators can be networked using RS485. Networking via Ethernet is also possible by using an RS485-to-Ethernet converter.

Most SCADA software packages include serial port drivers for the modbus protocol and can therefore communicate directly with the Dupline® interfaces. But in order to facilitate an even more standardized means of interfacing to a SCADA system, an OPC server for the modbus interfaces will become available. For users that want to develop their own application software, there is a Dupline® ActiveX driver available for handling the serial port communication and the modbus protocol. ActiveX is a Microsoft standard for communication between two software products. In some applications, the key re-

requirement is simply to transfer the Dupline® data into an EXCEL spreadsheet. This is typically the case for energy monitoring applications, where energy counter values need to be saved and analyzed in a PC. With the Dupline® DDE driver, this is solved easily, and without involving an expensive SCADA software package. The desired Dupline®

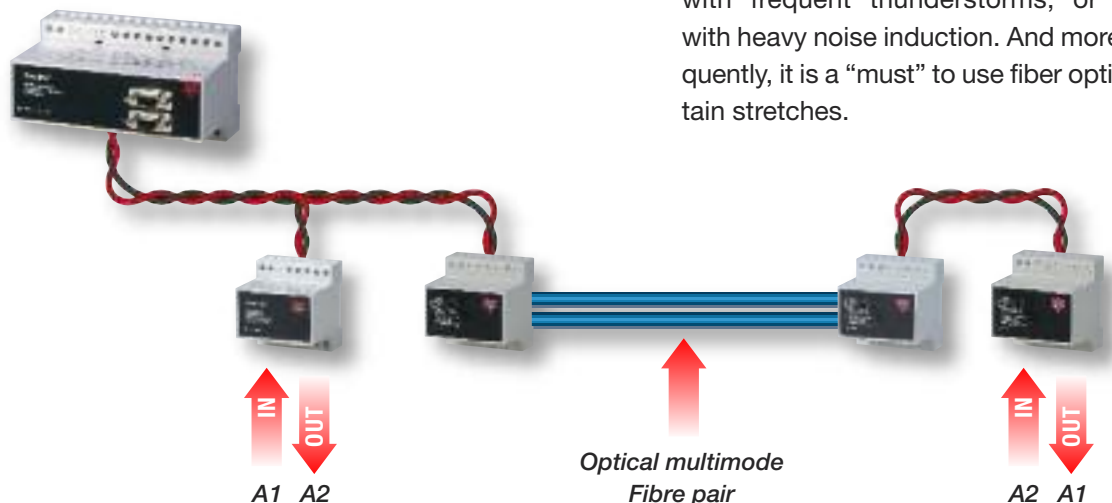
data point is simply selected with the mouse and then pasted into a cell in the EXCEL spreadsheet. From then on, the cell is dynamically updated with real-time Dupline® data. It is also possible to define EXCEL pushbuttons for activating Dupline® addresses and resetting counters.



Transmission of Dupline® signals via optical fiber

The Dupline® Optical Converters enable the use of glass fiber as transmission media on one or more sections of a Dupline® network. One module converts the Dupline® signal from electrical to optical format, while another module converts the carrier signal back from optical to electrical format.

Up to 5 km distance can be achieved on the optical fiber pair. The possibility to freely combine electrical and optical media makes it easier to adapt to the system requirements. Optical fibers can be useful when Dupline® signals have to be transmitted outdoors in geographical areas with frequent thunderstorms, or with sections with heavy noise induction. And more and more frequently, it is a “must” to use fiber optic cable on certain stretches.

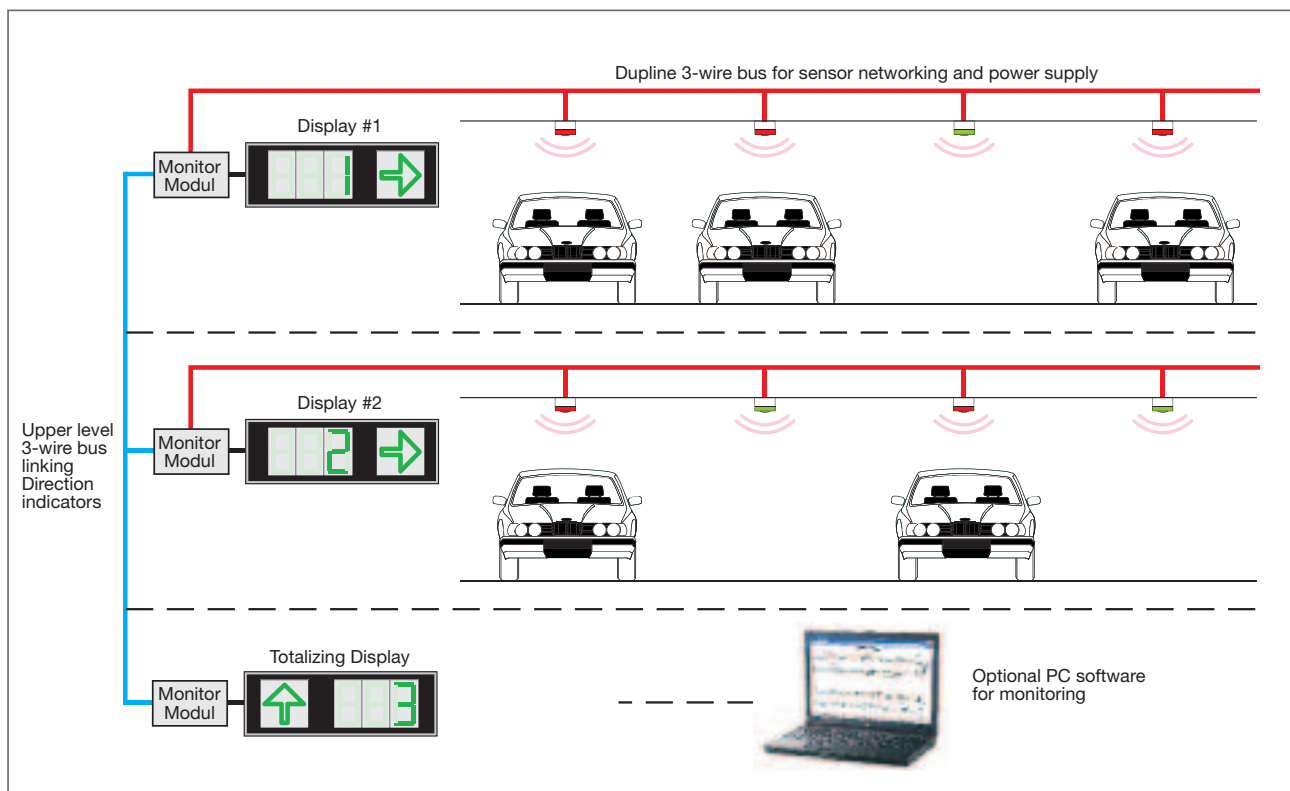


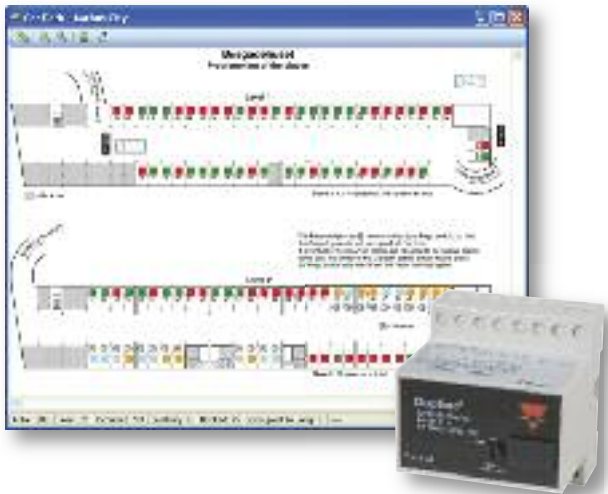
The Dupline[®] Carpark System provides guidance for the drivers

This new innovative system saves time and reduces stress for drivers by leading them to free parking bays by the shortest possible route. Networked Ultrasonic sensors monitor parking bay occupancy, and intelligent displays show the number of free places in the pointing direction, thereby preventing drivers from entering driveways or areas with no free places. The system is completely scalable and can be used within any type and size of indoor parking lot. In spite of the advanced function, the system is surprisingly easy to install and configure.

Stand-Alone Solution

One segment of the Dupline[®] 3-wire bus can link together and supply power for 125 sensors. Each segment can have several Direction Indicators, which are intelligent devices programmed to monitor a certain range of sensor addresses and calculate the number of free parking bays within that segment. The Direction Indicator is typically connected to a slave display for indication of direction and number of free parking bays. The Direction Indicators can be linked together via an upper level Dupline[®] 2-wire bus, thereby enabling Master Indicators to summarize and display the number of free parking bays from several segments.



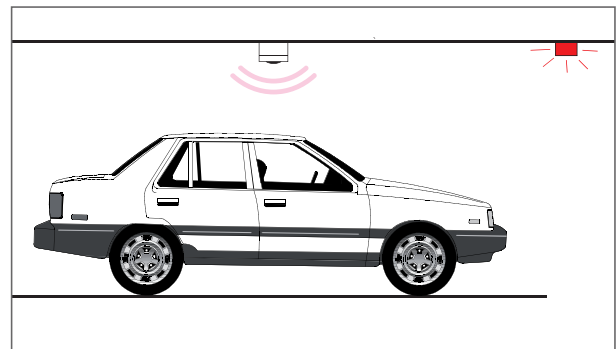


PC Software for Monitoring and Control

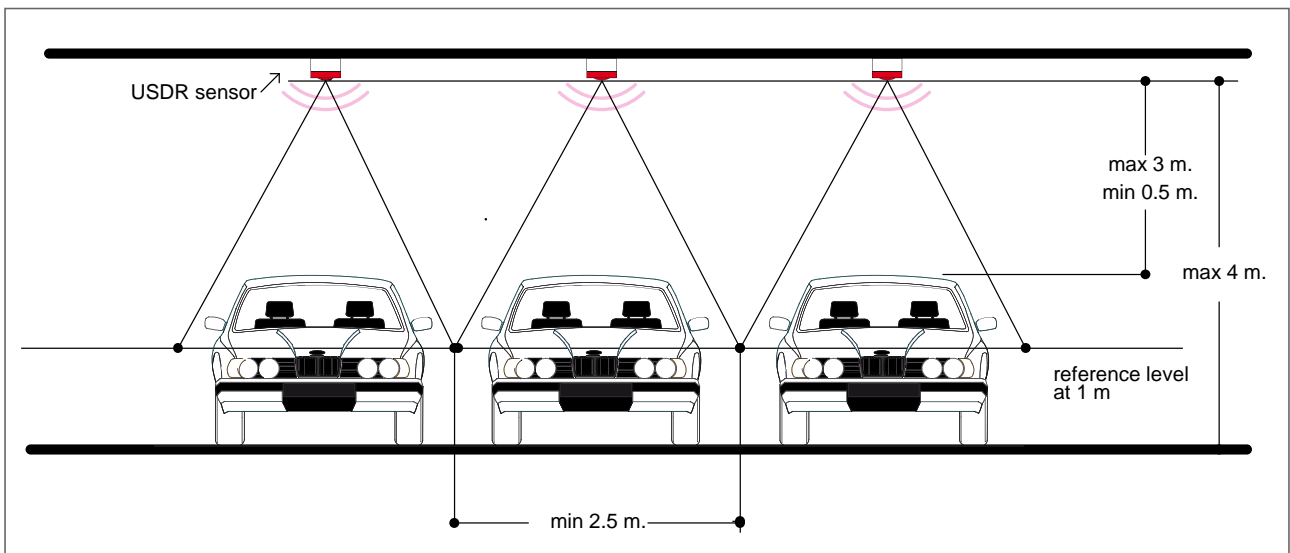
With the PC software it is possible to monitor and control the parking system from one or several central locations. Features include monitoring of real-time status based on graphical images and key figures for the various floors and areas, monitoring of alarms, and the possibility to book places in the parking system. In order to provide useful statistical information, all parking events are stored in a database. Based on this it is possible to obtain historical reports e.g. for occupancy rates, place rotation frequencies, place popularity rates and alarms.

Car Detection with Ultrasonic Sensor

The ultrasonic sensor for car detection is a key component in the guidance system. At regular intervals, the sensor emits an ultrasonic pulse and measures the time delay until the echo pulse is received. If the echo time deviates from the floor echo time measured during calibration, the sensor will assume a car is present. Multiple sensors can be calibrated simultaneously by issuing a calibration command via the network. The sensor is available with built-in LED indication for occupied/free parking



bay, but in many cases it is a better solution in terms of visibility to use a slave LED indicator mounted externally along the carpark driveway. The sensor is equipped with a Dupline[®] 3-wire bus interface for power supply and communication. (See also Application on page 14)



Keep up production and make your plant safe

The trend is clear – big advantages can be achieved using bus communication in safety related systems. Compared to the traditional serial wiring of NC safety switches, the diagnostics is vastly improved. The immediate indication of causes for production stops makes it possible to reduce downtime significantly, especially on large machines and plants. Furthermore, a bus solution is safer, because the risk of undetected bridges over NC safety contacts is reduced considerably.

A unique set of features

DuplineSafe is based on the Dupline® fieldbus, a system that has been used in more than 120.000 installations worldwide in the harshest industrial environments. Dupline® is particularly known for its reliability, simplicity and ability to transmit signals over long distances – all of which are features demanded in safety related systems.

Approved by TÜV according to EN/IEC61508-SIL3 and EN954-1 Cat. 4

The development of the DuplineSafe products has been carried out in close co-operation with TÜV Rheinland Group.

Features

Up to 63 safety signals on a single 2-wire cable

Bus-powered Input Modules

Immediate and precise safety diagnostics

Up to 5 km transmission distance without Repeater

High noise immunity and reliability

Easy to design, install and commission a system

Several safety relays can read the same input modules

Free topology and no requirement for special cable

Safety signals and standard digital/analog I/O's allowed on the same bus

Profibus-DP and Modbus Gateways available

Bus-powered input modules

Bus-powered input modules provide the interface to the safety switches, which may be emergency stop palm buttons, pull-cord switches or another type with NC contact. The small-dimension IP67-rated housing makes it possible to install the input modules inside or near the safety switches, even in rough environments.

Configurable Safety Relay

By means of the handheld DuplineSafe configuration unit, the user can define the addresses of the input modules to be monitored by the safety relay. In operation mode, the safety relay will trip if one or more of these input modules do not send a valid “contact closed” signal or if any fault on the bus is detected. Several relay output modules can be connected to the same bus, and each of them can be configured to monitor any input module. Thereby it is possible to stop several machines at different locations upon activation of a single emergency stop switch.

Diagnostics via PLC, PC or Text Display

DuplineSafe Gateways for Profibus-DP and Modbus RTU make it possible to read out the DuplineSafe diagnostics information via a PLC, PC or Text Display.

Benefits

Reduced wiring cost compared to parallel wired system

No need for local power supplies

Machine stops can be fixed faster leading to higher production efficiency

No need for special modules or special handling when long distances are involved

High system availability - false trips avoided

Reduced risk of human error, steep learning curve, no dependence on specialists, time saving

Easy to make solution where one safety input can be used to stop several machines at different locations

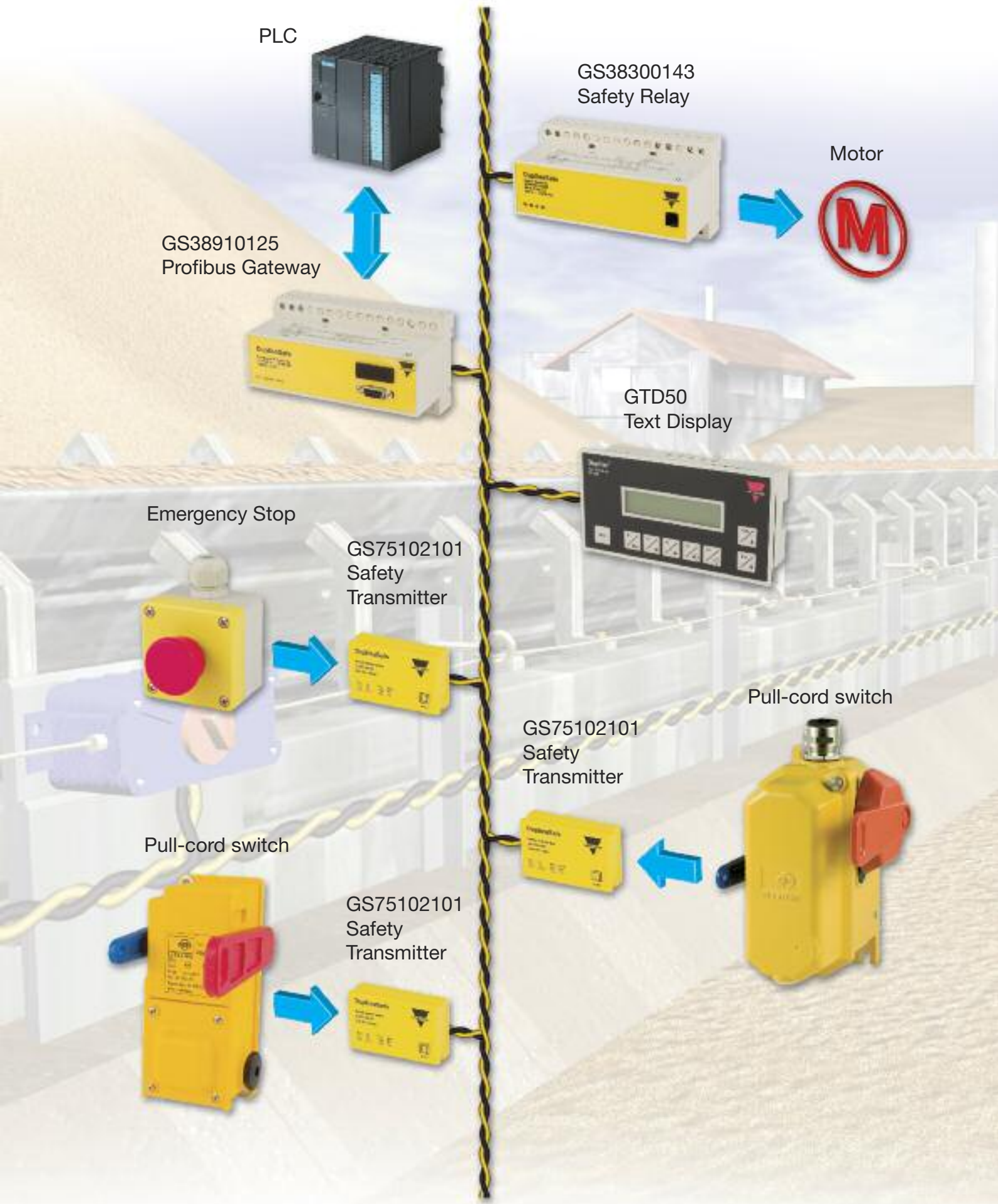
Easy and flexible wiring with possibility to use existing cables

One bus can handle all signals, and safety functions can be added to existing Dupline® systems

Easy to use PLC's, PC's, Text Displays and Touchscreens for monitoring of safety system

(See also application on page 18)

TÜV-approved Safety bus



PLC

GS38300143
Safety Relay

Motor

GS38910125
Profibus Gateway

GTD50
Text Display

Emergency Stop

GS75102101
Safety
Transmitter

Pull-cord switch

GS75102101
Safety
Transmitter

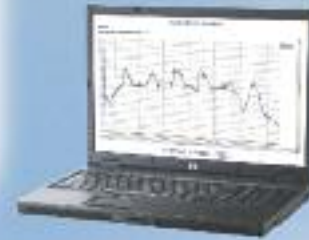
Pull-cord switch

GS75102101
Safety
Transmitter

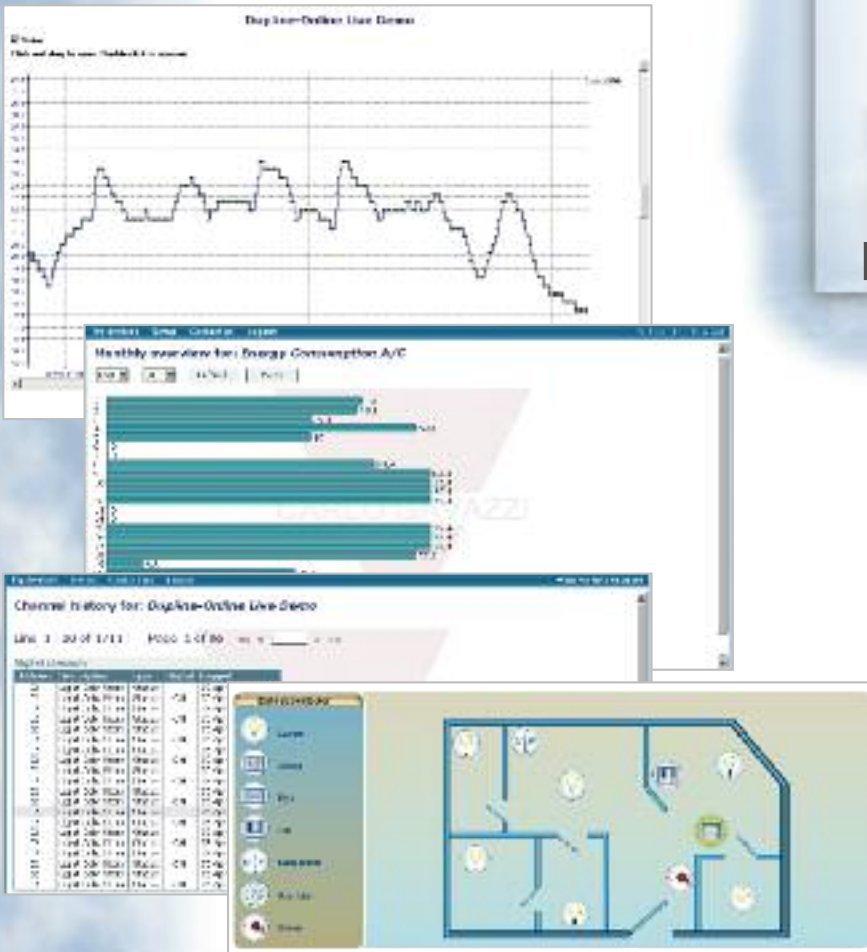
- Monitoring and control of remote or local facilities via GSM, Internet or LAN
- Logging of energy and water consumption, technical alarms, temperature, humidity, flow, level etc.
- High data security and reliability
- Access to real-time and historical data via the Internet or LAN
- SMS alarm messages to mobile phones
- Modular and flexible Dupline® I/O make expansion easy
- Easy to configure and install
- Completely scaleable system



Internet Connection

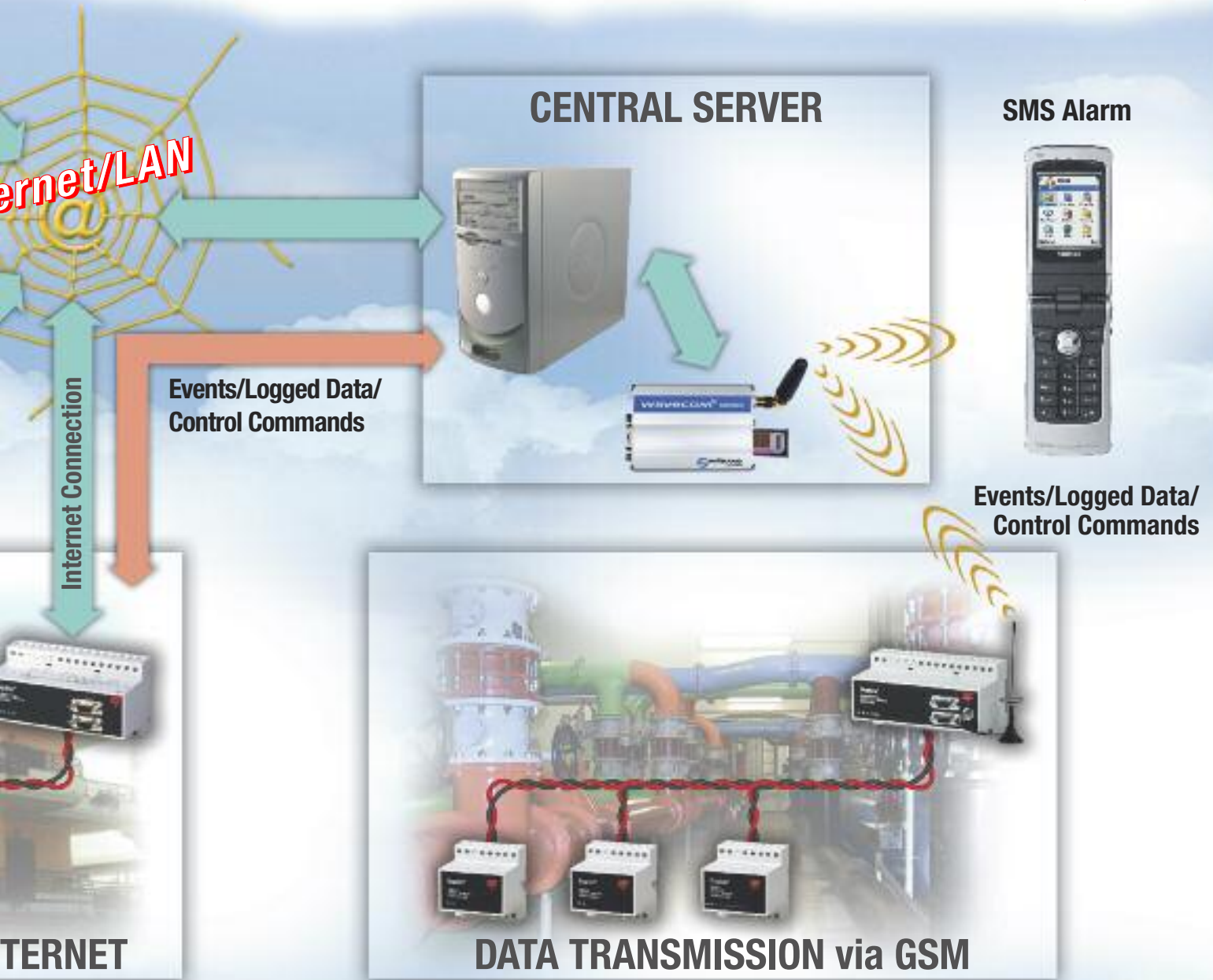


Internet Connection



Data Logging and Alarm Handling

With the Dupline-Online system you can monitor and control remote or local facilities via GSM, Internet or LAN. The system consists of a Dupline® Controller with built-in data logging functions, and server software to be installed on a PC. During configuration of the Data Logger, the user can define which data to log and how often. Digital signals changing status or analog signals crossing threshold values are logged as events in the Data Loggers non-volatile mem-



via GSM, Internet or LAN

ory with time and date tag. The logged data are also sent via GSM, Internet or LAN to the central server PC, and stored in a SQL database. The communication is encrypted to ensure high data security. One server can receive data from multiple remote or local Data Loggers, since each Data Logger has a unique identification code. The web-based user interface makes it possible to access the data from any PC on the network via a standard browser.

Several functions are available such as drawings with icons showing the state or value of signals, trend graphs, bar graphs, alarm handling, SMS or E-mail alarm messaging and export of data to other applications. It is also possible to define several user names with individual passwords and access levels. A typical Dupline®-Online application example is automatic collection of energy consumption from buildings and factories,

often combined with the powerful features of the Dupline® system for saving energy in lighting, heating and standby consumption of machines. Other application examples are monitoring of food temperatures and various alarms in Cold Stores and Super Markets, and monitoring and control of levels, alarms, flow etc. in Water Distribution systems. (See also application on page 16)

Specification Phase

System independency

Dupline® is system independent and can interface to almost any other device (digital, analog, numerical).

Planning as used from conventional installations

Signals and devices can be specified in the same way as if conventional installation were to be used.

Bi-directional communication

Dupline® transmits analog and digital signals in both directions.



Planning Phase

Wiring costs under control

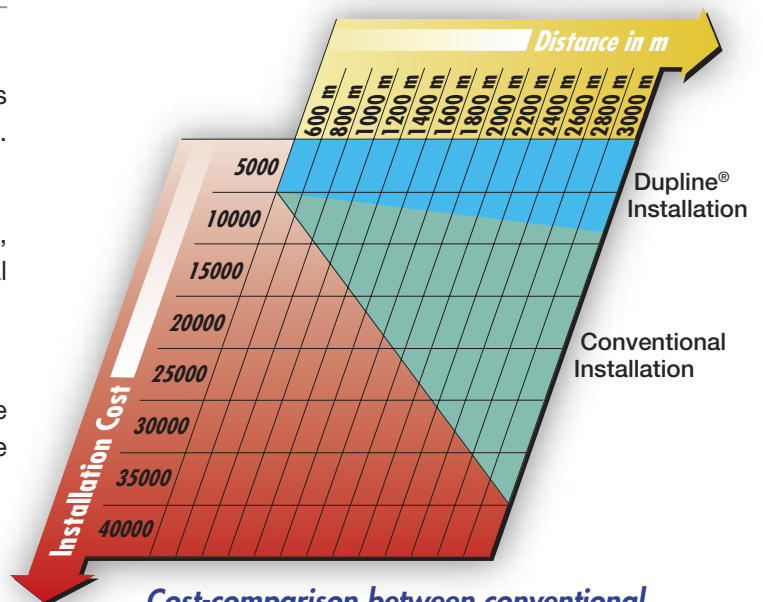
Installation cost savings improve the competitiveness of both the planners and the installation builders.

Cost-effective installation

Compared to conventional point-to-point wiring, Dupline® produces much lower labor and material costs.

Optimized cable routing

Use the best way of cable routing and not the only possible way. Easy dimensioning of cable conduits.



Cost-comparison between conventional installation and Dupline® for 64 signals

Realization

Flexible integration into project process

The installation of Dupline® can easily be harmonized with project development on site.

Last minute changes possible

Changes during the progress of the project are possible without re-arranging of the entire system.

Use of existing wires

Existing cables can be used in many cases. This can further reduce the project cost considerably.



Installation and Start up Phase

Direct-to-wire connection

Dupline® switches, sensors, actuators and displays are connected direct-to-wire reducing the number of auxiliary terminals.

Significant reduction of misconnection

Compared to multi-core wiring, misconnections can be reduced to a big extent.

Easy signal tracking

Dupline® reduces hundreds of individual wires.

Access to any or all signals all the time

Simulating and watching the operation of the system with a handy tester at the point the action takes place.

Time saving cabling check

Input/Output signals are terminated on site. Only two wires have to be checked.



Coding with GAP1605 coding unit

For most of the Dupline® devices the assignment of addresses is carried out by means of the hand-held GAP1605 coding unit. The operation of this device is self explanatory and does not require any particular skills.

Operation and Maintenance

High system availability

Reliable proven technology and worldwide installation practise keep operation time up.

Full system accessibility

Accessibility at any time and any place through GSM modems or the Internet.

Simple to understand and maintain

No special knowledge is required to operate and maintain the system.






Protection of capital investment

Dupline® represents a future-oriented installation concept which continuously takes into account system changes, changes in system usage and replacement of outdated machinery.





Optimized Resource Management

Dupline® offers full transparency of all system data for energy management, water, gas, oil consumption monitoring.







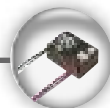
	Channel Generators/Interfaces		
Types	G3490	G3496	G3800
			
Dimensions (mm)	77 x 72 x 70	77 x 72 x 70	77 x 144 x 70
Functions	Standard channel generator.	Plug & Play RS232 /RS485 Interface with built-in protocols for specific PLC brands and Modbus.	Controller and Modbus Interface with built-in GSM Modem (option) or external Radio Modem. Logger (option).
Housing type	DIN-Rail, H4.	DIN-Rail, H4.	DIN-Rail, H8.
Electrical Characteristics			
Number of channels	Selectable	Selectable	Selectable
Features/Signal types		Possibility of 3-wire operation with DC-power on the 3'rd wire.	4 x Contact/NPN input+ 4 x PNP 10-30 VDC output 2 x RS232+1 x RS485 Possibility for alarms, monitoring and control via SMS messages.
Power Supply	024 = 24 VAC 115 = 115 VAC 230 = 230 VAC 824 = 15-30 VDC	700 = 20-30 VDC	800 = 10-30 VDC 230 = 115-230 VAC
General Characteristics			
Degree of protection	IP 20	IP 20	IP 20
Operating temperature	-20°C to +50°C	0°C to +50°C	0°C to +50°C
Storage temperature	-50°C to +85°C	-50°C to +85°C	-20°C to +85°C
Remarks		Built-in protocol for specific PLC brands for easy interfacing.	Up to 32 controllers can be networked together via RS485 or Ethernet via converter module.
References			
Channel Generator	G3490 0000		
Optolink		G3496 0000	
LG		G3496 0001	
GE-Fanuc		G3496 0002	
Mitsubishi		G3496 0003	
Omron		G3496 0004	
Modbus		G3496 0005	
Allen-Bradley		G3496 0006	
Schneider		G3496 0007	
Koyo		G3496 0008	
Matsushita		G3496 0009	
Siemens		G3496 0010	
Toshiba		G3496 0011	
IDEC		G3496 0012	
-GSM Modem, -RS485			G3800 0015
+GSM Modem, -RS485			G3800 1015
-GSM Modem, +RS485			G3800 0016
+GSM Modem, +RS485			G3800 1016
-GSM Modem, +RS485, +Logging			G3800 0036
+GSM Modem, +RS485, +Logging			G3800 1036



	Channel Generators/Interfaces		Digital Input Modules	
Types	G3891	GT150	G3410 5501	G3420
				
Dimensions (mm)	77 x 144 x 70	55 x 70 x 15 mm	77 x 72 x 70	77 x 72 x 70
Functions	Gateways to Fieldbus systems (Profibus-DP, DeviceNet etc.)	Dupline® Modbus RTU Interface module for Text Displays and Touchscreens.	Dupline® powered transmitter with 8 monostable volt-free contacts.	Input module for external supply with optoisolated inputs.
Housing type	DIN-Rail, H8.	Closed plastic housing with 25p male sub-D.	DIN-Rail, H4.	DIN-Rail, H4.
Electrical Characteristics				
Number of channels	Selectable.		8	8
Features/Signal types		Supports Modbus RTU function code 3 and code 16.	Volt-free input contacts.	Contact/NPN Voltage (6-265 VAC/DC).
Power Supply	230 = 115/230 VAC	Powered by RS485 port.	Powered by Dupline®.	024 = 24 VAC 115 = 115 VAC 230 = 230 VAC 800 = 10-30 VDC
General Characteristics				
Degree of protection	IP 20	IP 20	IP 20	IP 20
Operating temperature	0°C to +50°C	-20°C to +60°C	-20°C to +50°C	-20°C to +50°C
Storage temperature	-20°C to +85°C	-50°C to +85°C	-50°C to +85°C	-50°C to +85°C
Remarks			Low power consumption.	
References		GT150		
Profibus-DP with C. G.	G3891 0020			
Profibus-DP analog output multiplex	G3891 0021			
Devicenet	G3891 0050			
Lonworks	G3891 0051			
Modbus / TCP	G3891 0052			
Profibus-DP passive 8 channel	G3891 0120			
Contact/NPN			G3410 5501	G3420 5501
Voltage				G3420 5502







	Digital Input Modules			
Types	G4420 7401	G5010	G6391 0240	G8810 2201
				
Dimensions (mm)	36 x 85 x 58	49 x 22.5 x 56	34.2 x 37.5 x 36.8	28 x 14 x 10
Functions	Input module for counting of pulses from energy meters, item detectors etc.	Dupline powered single input Module.	Plug-in module to EM4 or WM22 with 2 S0 input contacts for measuring water, gas etc.	Small-sized 2-channel monostable transmitter
Housing type	DIN-Rail, H2.	DIN-Rail, Mini-E.	Plug-in.	Plug-in.
Electrical Characteristics				
Number of channels	4	1	2	2
Features/Signal types	S0 contact input (DIN 43 864). Max. count frequency: 14 Hz.	Contact input.	Reads actual internal value of total energy and/or reactive energy from EM4/WM22 and transmits to Dupline®. 2 x S0 contact input.	2 contact inputs for pushbuttons.
Power Supply	230 = 230 VAC 724 = 15-30 VDC	Powered through the Dupline® network.	Powered through the Dupline® network and EM4/WM22.	Supplied by Dupline®
General Characteristics				
Degree of protection	IP 40	IP 20	IP 20	IP 65
Operating temperature	-20°C to +60°C	-20°C to +50°C	0°C to +50°C	-40°C to +70°C
Storage temperature	-20°C to +85°C	-50°C to +85°C	-20°C to +50°C	-40°C to +70°C
Remarks	Decentral counting. Counter values stored in non-volatile memory.			Address coding by GAP 1605.
References				
4 channel Counter	G4420 7401			
1 channel		G5010 1106		
2 channels		G5010 2206		
2 channel plug-in module			G6391 0240	G8810 2201







		Digital Input Modules	
Types		G2110 4401	G8810 1102
Dimensions (mm)		66 x 66 x 23	26 x 39 x 17
Functions		Alarm input module for use with external sensors in windows, doors etc.	Small size enables it to be installed behind power outlets.
Housing type		Open PCB with standard alarm junction box enclosure.	Compact regular with solid cable.
Electrical Characteristics			
Number of channels		4	1
Features/Signal types		4 x Contact/NPN inputs.	1 x voltage input (90 to 265 VAC).
Power Supply		Powered through the Dupline® network or from external 10 to 30 VDC supply.	Powered through the Dupline® network.
General Characteristics			
Degree of protection		IP 20	IP 20
Operating temperature		-20°C to +50°C	-20°C to +50°C
Storage temperature		-50°C to +85°C	-50°C to +70°C
Remarks		Supports Dupline® 3-wire power concept.	
References			
1 channel compact		G2110 4401 700	G8810 1102







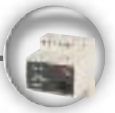
	Digital I/O Modules		Digital Output Modules	
Types	G3440 4443	G3440 5543	G3430 / G3830	G34305545
				
Dimensions (mm)	77 x 72 x 70	77 x 72 x 70	77 x 72 x 70 (H4) 77 x 144 x 70 (H8)	77 x 72 x 70
Functions	Combined I/O module for external supply with optoisolated inputs and relay outputs.	I/O module for digital signals.	Output modules for external supply with isolated outputs or SPST relays for resistive loads	Central relay module with 8 x SPST relays for resistive loads.
Housing type	DIN-Rail, H4.	DIN-Rail, H4.	DIN-Rail, H4. DIN-Rail, H8 (G3830 5543).	DIN-rail, H4.
Electrical Characteristics				
Number of channels	4	6	1, 2, 4, 8	8
Features/Signal types	2 x 6-265 VAC/DC inputs + 2 x SPST relay outputs.	4 opto isolated inputs and 2 SPST relay outputs.	10 A SPDT relay. 10 A SPST relay. 16 A SPST relay. 0.7 A NPN transistor. 0.7 A PNP transistor.	8 x 16A/250 VAC relays Inrush current: <130A.
Power Supply	024 = 24 VAC 115 = 115 VAC 230 = 230 VAC 824 = 15-30 VDC	024 = 24 VAC 115 = 115 VAC 230 = 230 VAC	024 = 24 VAC 115 = 115 VAC 230 = 230 VAC 800 = 10-30 VDC 824 = 15-30 VDC	024 = 24 VAC 115 = 115 VAC 230 = 230 VAC
General Characteristics				
Degree of protection	IP 20	IP 20	IP 20	IP 20
Operating temperature	-20°C to +50°C	-20°C to +50°C	-20°C to +50°C	-5°C to +50°C
Storage temperature	-50°C to +85°C	-50°C to +85°C	-50°C to +85°C	-50°C to +85°C
Remarks				Total module load maximum 32 A.
References	G3440 4443	G3440 5543	G3430 1149 G3430 2249 G3430 4443 G3430 4445 G3830 5543 G3430 5545 G3430 5511 G3430 5521	G3430 5545






	Digital Output Mod.	Analog Input Modules		
Types	G8830 1143	G3429 6470	G3210 1161	G3210 1111
				
Dimensions (mm)	26 x 39 x 17	77 x 72 x 70	77 x 36 x 70	77 x 36 x 70
Functions	Decentral relay module with 1 x SPST relay for control of lights.	Universal analog input module for external supply.	Analog input module powered from Dupline® and input signal.	Dupline®-powered Analog input module for Pt100 temperature sensor.
Housing type	Compact regular, with solid cables. For decentral installation.			
Electrical Characteristics				
Number of channels	1	Selectable	1	1
Features/Signal types	1 x 13A/250 VAC relay Inrush current: <130A.	4 x isolated analog input. Input type individually configurable (0-20 mA, 4-20 mA, 0-10 VDC).	1 x 4-20 mA input.	1 x Pt100 3-wire input Ranges: (-50°C to +40°C) (+30°C to +120°C) (-10°C to +100°C)
Power Supply	Powered through the Dupline® network.	024 = 24 VAC 115 = 115 VAC 230 = 230 VAC 800 = 10-30 VDC	Powered through the Dupline® network and 4-20 mA input signal.	Powered through the Dupline® network.
General Characteristics				
Degree of protection	IP 20	IP 20	IP 20	IP 20
Operating temperature	0°C to +50°C	0°C to +50°C	0°C to +50°C	0°C to +50°C
Storage temperature	-50°C to +85°C	-20°C to +85°C	-50°C to +85°C	-50°C to +85°C
Remarks	Recommended minimum load 100 mA / 12 V.	Protocol freely selectable (Analink, Multiplexed BCD or 8-bit).	Uses Analink 8-bit protocol.	Uses Analink 8-bit protocol. Built-in cable compensation.
References		G3429 6470	G3210 1161	G3210 1111 G3210 1112 G3210 1113
Univesel Analog input				
Dupline powered analog input				
-50°C to +40°C				
+30°C to +120°C				
-10°C to +100°C	G8830 1143			







	Analog Output Mod.	Digital Sensors		Temp. Sensor
Types	G3439 6470	G6110 1145	G8910 1101	G8911 1010
				
Dimensions (mm)	77 x 72 x 70	M18 x 55	Ø11 x 68	67 x 35 x 15
Functions	Universal analog output module for external supply.	Dupline® powered inductive proximity switch.	Dupline® powered magnet proximity switch.	Temperature sensor for outdoor use.
Housing type	DIN-Rail, H4.	M18.	Cylindrical.	Flat pack sensor housing.
Electrical Characteristics				
Number of channels	Selectable	1	1	1
Features/Signal types	4 x analog outputs. Output type configurable for 0-20 mA, 4-20 mA or 0-10 VDC.	Detects proximity of metal objects.	Detects proximity of magnet.	1 x Analink Range: -30°C to +60°C.
Power Supply	024 = 24 VAC 115 = 115 VAC 230 = 230 VAC 800 = 10-30 VDC	Powered through the Dupline® network.	Powered through the Dupline® network.	Powered through the Dupline® network.
General Characteristics				
Degree of protection	IP 20	IP 67	IP 67	IP 67
Operating temperature	0°C to +50°C	-25°C to +70°C	-20°C to +50°C	-25°C to +70°C
Storage temperature	-20°C to +85°C	-30°C to +80°C	-20°C to +70°C	-55°C to +85°C
Remarks	Protocol freely selectable (Analink, Multiplexed BCD or 8-bit).	Available with cable or M12 connector. Flush mounting.	Available in Ø 11 plastic housing or with M14 metal thread.	8-bit resolution.
References				
Universal Analog output	G3439 6470			
Cable		G6110 1145		
M12 plug		G6110 1145-1		
Ø11			G8910 1101	
M14			G8910 1101-G	G8911 1010







	Repeater	Optolink Interface	
Types	D3892 0000	G3491 0000	G3491 0090
			
Dimensions (mm)	77 x 144 x 70	77 x 72 x 70	77 x 72 x 70
Functions	Dupline® signal Repeater for extension of transmission distance.	RS232 to fibre optic interface.	RS232 to fibre opto-link interface.
Housing type	DIN-Rail, H8.	DIN-Rail, H4.	DIN-Rail, H4.
Electrical Characteristics			
Number of channels	Adjusts automatically.	Adjusts automatically.	Adjusts automatically.
Features/Signal types	All Dupline® signal types. Regenerates the Dupline® signal carrier through channel-generator output.	Reads/controls up to 63 Dupline® systems which are networked through optolinks (G3491 0000).	Used as interface between computer or PLC with RS232 and a fibre optic Lan-ring.
Power Supply	024 = 24 VAC 115 = 115 VAC 230 = 230 VAC	024 = 24 VAC 115 = 115 VAC 230 = 230 VAC	024 = 24 VAC 115 = 115 VAC 230 = 230 VAC
General Characteristics			
Degree of protection	IP 20	IP 20	IP 20
Operating temperature	0°C to +50°C	0°C to +50°C	0°C to +50°C
Storage temperature	-50°C to +85°C	-20°C to +85°C	-20°C to +85°C
Remarks		Operates with G3491 0090.	Operates with G3491 0000.
References			
Repeater (Booster)	D3892 0000		
RS232 fibre interface		G3491 0000	
RS232 to optolink interface			G3491 0090







	Converters		Display modules	Power Supply
Types	G3491 0040	G3492 / G3493	G5460 6606	G3485 0000
				
Dimensions (mm)	77 x 72 x 70	77 x 72 x 70	96 x 96 x 78	77 x 72 x 70
Functions	Private line Modem for long distance transmission of Dupline® signals.	Optical repeater for converting Dupline® from electrical to optical transmission media.	LED status indicator for 16 Dupline® channels.	3-wire power supply, used when multiple Dupline® modules are supplied through a DC-bus.
Housing type	DIN-Rail, H4.	DIN-Rail, H4.	Panel mounting.	DIN-Rail, H4.
Electrical Characteristics				
Number of channels	Adjusts automatically	Adjusts automatically	16	Selectable
Features/Signal types	Digital, 8-bit analog, non-multiplexed 3 1/2 digit BCD analog.	All Dupline® signal types.	Each of the 16 LED's indicates the status of the digital channels assigned to it.	Supply current ≤ 4 A (up to 25°C) or ≥ 3 A (up to 50°C)
Power Supply	024 = 24 VAC 115 = 115 VAC 230 = 230 VAC	230 = 115/230 VAC	024 = 24 VAC 115 = 115 VAC 230 = 230 VAC	15-30 VDC
General Characteristics				
Degree of protection	IP 20	IP 20	IP 40	IP 20
Operating temperature	0°C to +50°C	0°C to +50°C	0°C to +50°C	0°C to +50°C
Storage temperature	-20°C to +85°C	-20°C to +85°C	-20°C to +60°C	-20°C to +85°C
Remarks	Operates in pairs.	Operates in pairs. Runs on 50/125, 62.5/125 or 100/140 micro m with STN connectors.		Multiple units can be connected in parallel to increase length and size of a Dupline® system.
References				
Long distance modem	G3491 0040			
Optical/electrical converter		G3492 0000		
Electrical/optical converter		G3493 0000		
LED indicator for Dupline			G5460 6606	
3-wire power supply				G3485 0000



	Software			
Types	DUPDATAACC	DUP-SERV-ADD	DUP-SERV-SW	DUP-PGS-SW
				
Dimensions (mm) Functions	Software package with DDE-driver and ActiveX driver for G3800. Controller and interface unit.	A data logging, visualization and alarm handling software package to be installed in a windows based PC.	A data logging, visualization and alarm handling software package to be installed in a windows based PC.	A data logging, visualization and alarm handling software package to be installed in a windows based PC.
Electrical Characteristics Features/Signal types	All Dupline® signal types. Copy and paste of dynamic Dupline links into EXCEL spreadsheets.	Works only with G3800 xx36. Logs and controls energy consumption, analog values and digital events and alarms.	Works only with G3800 xx36. Logs and controls energy consumption, analog values and digital events and alarms.	Client/server program that is developed to the GP34960005 Carpark Master Module together with Moxa RS485/ethernet connectors
References DDE-Server Dupline-Online One Licens ADD-Licens to Dupline-Online Dupline-Online two licens Dupline Carpark licenses 250 licenses 500 licenses 1000 licenses 2000 licenses 3000 licenses 4000 licenses 5000 licenses 6000 licenses 7000 licenses 8000 licenses 9000 licenses 10000 licenses	DUPDATAACC	DUP-SERV-ADD	DUP-SERV-SW DUP-SERV-SW2	DUP-PGS-SW250 DUP-PGS-SW500 DUP-PGS-SW1000 DUP-PGS-SW2000 DUP-PGS-SW3000 DUP-PGS-SW4000 DUP-PGS-SW5000 DUP-PGS-SW6000 DUP-PGS-SW7000 DUP-PGS-SW8000 DUP-PGS-SW9000 DUP-PGS-SW10000







	Accessories			
Types	GAP1605	GTD50	GTU8	G3282 2002 230
				
Dimensions (mm)	120 x 65 x 22	77 x 116 x 41	145 x 90 x 28	77 x 36 x 70
Functions	Dupline® coding device for assigning addresses to Dupline® I/O modules and sensors.	LCD Text Display with 2 rows x 20 characters.	Dupline® test unit for monitoring and control of Dupline channels.	Dupline® bus separator
Housing type	Handheld.	Panel mounting.	Handheld.	H2 Housing
Electrical Characteristics				
Number of channels	NA	Selectable.	Adjusts automatically.	2
Features/Signal types		Digital and Analink. User defined text messages linked to Dupline® channels. Read-out of Analink values. Dupline® control via front keys.	Digital, multiplexed BCD and 8-bit analog signals. Also prepared to calibrate sensors in Carpark system.	Disconnect the secondary side of the Dupline® bus when a short-circuit is detected.
Power Supply	9 V battery.	18-32 VDC	Powered through the Dupline® network.	230 V
General Characteristics				
Degree of protection	IP 40	IP 65 (front)	IP 40	IP 20
Operating temperature	0°C to +50°C	0°C to +50°C	0°C to +50°C	0°C to +50°C
Storage temperature	-20°C to +60°C	-20°C to +60°C	-20°C to +85°C	-20°C to +85°C
Remarks			Options for latching digital signals and for reading multiplexed BCD values.	
References	GAP1605	GTD50	GTU8	G3282 2002 230






	Accessories			
Types	ADAPT 1605	ANT1	ANT2	D3212 4000
Dimensions (mm)	25 x 50 x 100		15 x 35 x 120	36 x 70 x 77
Functions	Codings adaptor between GAP1605 and Dupline® modules without standard connection plug.	GSM antenna 900 MHz.	Active antenna used for radio controlled clock.	Synchronizer module for analog modules.
Housing type	Handheld box.		Glued plastic casing.	H2 housing.
Electrical Characteristics				
Features/Signal types	4 clip-on terminals for Dupline® modules. Includes a M12 plug for modules like G8911 1010.		Input signal is 77.5 kHz.	Max. 112 analog signals with up to 12 bit resolution.
Power Supply		Powered by G3800 XXXX.	Powered by G3800 XXXX.	Powered by Dupline®.
General Characteristics				
Degree of protection	IP 20	IP 67	IP 40	IP 40
Operating temperature	0°C to +50°C	-25°C to +60°C	0°C to +50°C	-20°C to +50°C
Storage temperature	-20°C to +60°C	-20°C to +60°C	-20°C to +60°C	-50°C to +85°C
Remarks				Transmits always on A1-A4
References	ADAPT 1605	ANT1	ANT2	D3212 4000







	Accessories			
Types	DT01	DT02	ETHCONV 2	ETHCONV 3
				
Dimensions (mm)	17.5 x 70 x 77	17.5 x 70 x 77	22 x 75.2 x 80	22 x 90 x 100.4
Functions	Cable termination unit standard Dupline®.	Cable termination unit Hi-line.	Ethernet to RS232 converter.	Ethernet to RS232 converter.
Housing type	H1 housing.	H1 housing.	Metal housing.	Metal housing.
Electrical Characteristics				
Number of channels			1	2
Features/Signal types	Removes distortion caused by reflection.	Removes distortion caused by reflection.	1 port RJ45 10/100 Mbit TCP/IP based ethernet	2 port RJ45 10/100 Mbit TCP/IP based ethernet
Power Supply	No power needed.	No power needed.	12-48 VDC/130 mA.	12-30 VDC/305 mA.
General Characteristics				
Degree of protection	IP 20	IP 20	IP 20	IP 20
Operating temperature	-20°C to +50°C	-20°C to +50°C	0°C to +55°C	0°C to +55°C
Storage temperature	-50°C to +85°C	-50°C to +85°C	-40°C to +75°C	-40°C to +75°C
Remarks			Automatic dedicated installation tool available.	Automatic dedicated installation tool available.
References				
	DT01	DT02	ETHCONV 2	ETHCONV 3
1 channel				
2 channels				

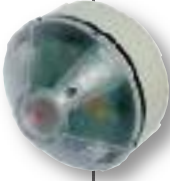


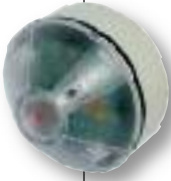


	Output Module	Gateway / Interface	
Types	GS3830 0143	GS3891 0125	GSTI 50
			
Dimensions (mm)	144 x 77 x 70	144 x 77 x 70	55 x 70 x 15 mm
Functions	DuplineSafe relay output module. Monitors up to 63 DuplineSafe inputs.	Profibus-DP Gateway passive with Safety mapping.	Dupline® Modbus interface module with Safety mapping.
Housing type	DIN-rail mounting H8.	DIN-rail mounting, H8.	Compact plastic housing.
Electrical Characteristics			
Number of channels	2		
Features/Signal types	2 x NO Relays Force Guided contact.	Reads/controls up to 128 inputs/outputs through Profibus-DP, Communication speed up to 12 MBaud.	
Power Supply	230 VAC +/- 15%	115 = 115 VAC 230 = 230 VAC	Powered by the RS485 com port.
General Characteristics			
Degree of protection	IP 20	IP 20	IP 20
Pollution degree	3(IEC 60664)		
Operating temperature	-25°C to +50°C	0°C to +50°C	-20°C to +60°C
Storage temperature	-30°C to +70°C	-20°C to +85°C	-30°C to +85°C
Humidity (non condensing)	20 to 80%	20 to 80%	
Remarks	Approved according to IEC/EN 61508 and EN 954 Cat 4 by TÜV.	Certified by PNO.	Supports Modbus RTU function code 3 and code 16.
References	GS3830 0143	GS3891 0125	GSTI 50






	Input Module	Repeater	Configuration tool	
Types	GS7510 2101	GS3892 0000	GS7380 0080	GS7380 0081
				
Dimensions (mm)	57,5 x 36,0 x 16,4	77 x 144 x 70	28 x 90 x 145	25 x 50 x 100
Functions	Bus-powered safety input module.	DuplineSafe signal repeater for extension of transmission distance.	Configuration and test unit for DuplineSafe.	USB Configuration unit for DuplineSafe.
Housing type	-	DIN-Rail H8.	Handheld.	Handheld.
Electrical Character.				
Number of channels	2	Adjusts automatically.		
Features/Signal types	1 x NC contact.	Regenerates the Dupline® signal carrier through channel generator output.		Windows based programming tool for safety output relay module and safety input modules.
Power Supply	Powered through the Dupline® network.	024 = 024 VAC 115 = 115 VAC 230 = 230 VAC	9 V battery 6LR61.	Supplied by the USB port
GeneralCharacter.				
Degree of protection	IP 67	IP 40	IP 40	IP 40
Pollution degree	3(IEC 60664)			3(IEC 60664)
Operating temperature	-20°C to +50°C	0°C to +50°C	-10°C to +45°C	0°C to +50°C
Storage temperature	-30°C to +70°C	-50°C to +85°C	-20°C to +70°C	-20°C to +60°C
Humidity (non condensing)	20 to 80%			
Remarks	Approved according to IEC/EN 61508 and EN 954 Cat 4 by TÜV.		Adapt 7380 is included.	
References				
Cable	GS7510 2101	GS3892 0000	GS7380 0080	GS7380 0081
Plug connector	GS7510 2101-1			

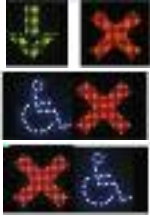





	Sensors	Carpark Interface	Carpark Monitor	Passive indicators
Types	GP6220../GP6240..	GP3496 0005	GP3482 9091	GP6289..
				
Dimensions (mm)	Ø118 x 76	77 x 72 x 70	77 x 72 x 70	Ø118 x 76
Functions	Ultrasonic sensors for detection of cars with or without LED indication.	Interface for Modbus-RTU with the function of a slave.	Configurable device for monitoring of free parking bays in an carpark	Passive indicator for sensor.
Housing type	Direct mounting on ceiling.	Mounting on DIN rail.	Mounting on DIN rail.	Direct mounting on ceiling.
Electrical Characteristics				
Number of channels	2	-	-	-
Features/Signal types	1 x signal for occupancy. 1 x signal for common calibration.	RS232/RS422/RS485 port for making an interface to the control system. Multidropping of up to 16 devices on RS485.	Programmable device with builtin RS485 for displays. 123 sensors can be connected to the Monitor module.	No programming. Only wire connected.
Power Supply	3-wire system with Dupline® and sensor supply.	20-30 VDC 3-wire system	Dupline® 3-wire system with power for the L ₁ and L ₂ bus.	
General Characteristics				
Degree of protection	IP 34	IP 20	IP 20	IP 34
Operating temperature	-40°C to +70°C	-40°C to +50°C	-40°C to +50°C	-40°C to +70°C
Storage temperature	-40°C to +85°C	-50°C to +85°C	-50°C to +85°C	-50°C to +85°C
References				
Red/Green LED	GP6220 2201			GP6289 0101
Red/Blue LED	GP6220 2202			GP6289 0102
Without LED	GP6240 2224			
Dupline® Master Module		GP3496 0005		
Dupline® Carpark monitor			GP3482 9091 724	







	Configuration tool	4-digit display	3-digit display with arrow
Types	GP7380 0080	GP6763 0104	GP6763 0105
			
Dimensions (mm)	28 x 90 x 145	280 x 140 x 70	600 x 240 x 100
Functions	Configuration and test unit for Dupline Carpark modules.	4- digit display.	3-digit display with built in direction indicator.
Housing type	Handheld.	Aluminium box with clear plexiglass front and black fibre plate as cover.	Aluminium box with frosted plexiglass front.
Electrical Character.			
Power Supply	9 V battery 6LR61.	24 VDC min.; 30 VDC max./ 0.10 A (Overvoltage category III (IEC60664)).	85 - 264 VAC 230 VAC / 0.35 A 47 - 63 Hz
Features		- Shows number of free parking places with bright green LED. - RS 485 communication.	- Shows number of free parking places and guides driver the right way. - RS 485 communication.
General Character.			
Degree of protection	IP 40	IP 50	IP 65
Operating temperature	-10°C to +45°C	-25°C to +70°C	-10°C to +50°C
Storage temperature	-20°C to +70°C		
Pollution degree		3(IEC 60664)	3(IEC 60664)
Humidity		20 to 90% non condensing.	20 to 90% non condensing.
References	GP7380 0080	GP6763 0104	GP6763 0105

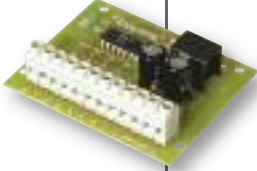
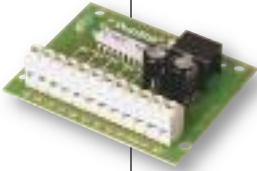
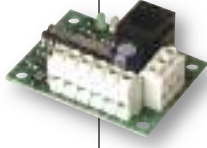


Displays				
Types	GP6763 0106 - 08	GP6763 0109 - 11/16	GP6763 0112 - 14	GP6763 0115
				
Dimensions (mm)	145 x 145 x 60 (06) 145 x 240 x 60 (07 + 08)	145 x 335 x 60 (09+10+11) 145 x 430 x 60 (116)	145 x 910 x 60 (113+114) 145 x 815 x 60 (112)	210 x 1170 x 60
Functions	Able to show green arrow or red cross. GP67630107 and 08 also show disable sign.	High resolution display with many functions.	8 character display. 113+114 has also disabled, red cross or green arrow function.	9 character display. 113+114 has also disabled, red cross or green arrow function.
Housing type	Aluminium box with plexiglass front.	Aluminium box with plexiglass front.	Aluminium box with plexiglass front.	Aluminium box with plexiglass front.
Electrical Character.				
Power Supply	18 - 24 VDC Typical 15-30 watt consumption.	18 - 24 VDC 40-60 watt power consumption.	18 - 24 VDC 35-50 watt power consumption.	18 - 24 VDC Typical 35 watt power consumption.
Features				
	- Guides the driver the right way by showing green arrow, red cross and disable sign. - RS 485 communication.	- Guides the driver the right way by showing green arrow, red cross and disable sign. - RS 485 communication.	- Show a text on max. 8 character. The text is of customer's own choice. - RS 485 communication.	- Show a text on max. 9 character. The text is of customer's own choice. - RS 485 communication.
General Character.				
Degree of protection	IP 55	IP 55	IP 55	IP 55
Operating temperature	-15°C to +50°C	-15°C to +50°C	-15°C to +50°C	-15°C to +50°C
Pollution degree	3(IEC 60664)	3(IEC 60664)	3(IEC 60664)	3(IEC 60664)
Humidity	0 to 90% non condensing.	0 to 90% non condensing.	0 to 90% non condensing.	0 to 90% non condensing.
References				
	GP6763 0106 GP6763 0107 GP6763 0108	GP6763 0109 GP6763 0110 GP6763 0111 GP6763 0116	GP6763 0112 GP6763 0113 GP6763 0114	GP6763 0115

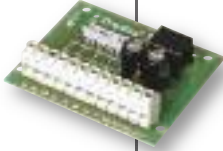




	Digital I/O Modules		Converter		Tools
Types	GH3440 4412	GH6440 4412	GH3485 0000		GHTU8
					
Dimensions (mm)	77 x 72 x 70	80 x 77 x 50	77 x 72 x 70		145 x 90 x 28
Functions	I/O module for irrigation valve control.	I/O module for irrigation valve control.	Dupline® to Hi-Line converter.		Dupline® test unit for monitoring and control of Dupline® channels. Used for Hi-line modules.
Housing type	DIN-Rail, H4.	Fully molded housing for underground installation.	DIN-Rail, H4.		Handheld.
Electrical Characteristics					
Number of channels	4	4	Adjusts automatically		Adjusts automatically
Features/Signal types	2 outputs for control of 3-wire 12 VDC latching valve, and 2 contact inputs.	2 outputs for control of 3-wire 12 VDC latching valve, and 2 contact inputs.	Converts the Dupline® signal to Hi-Line 28 VDC level for control of irrigation valves (see GH3440 4412 and GH6440 4412).		Digital, multiplexed BCD and 8-bit analog signals.
Power Supply	Powered through Hi-Line signal (see GH34850000).	Powered through Hi-Line signal (see GH34850000).	724 = 20-30 VDC.		Powered through the Dupline® network.
General Characteristics					
Degree of protection	IP 20	IP 67	IP 20		IP 40
Operating temperature	0°C to +50°C	0°C to +50°C	0°C to +50°C		0°C to +50°C
Storage temperature	-50°C to +85°C	-50°C to +85°C	-50°C to +85°C		-20°C to +85°C
Remarks					Options for latching digital signals and for reading multiplexed BCD values.
References	GH3440 4412	GH6440 4412	GH3485 0000		GHTU8



	Input Module	Output Modules	Input/Output Module
Types	G2120	G2130	G2140 4421
			
Dimensions (mm)	Open PCB 72.3 x 59 mm	Open PCB 74 x 59 mm	Open PCB 54 x 40 mm
Functions	8 contact inputs for push-buttons or transistors. LED indications for supply and carrier.	8 outputs for control of floor indicators and lamps. LED indications for supply and carrier.	2 push-button inputs. 2 PNP-transistor outputs. LED indications for supply and carrier.
Housing type	Snap locks or DIN-rail (vertical or horizontal).	Snap locks or DIN-rail (vertical or horizontal).	Snap locks or DIN-rail (vertical or horizontal).
Electrical Characteristics			
Number of channels	8	8	4
Features/Signal types	3-wire operation with DC-power on wire 3.	3-wire operation with DC-power on wire 3.	3-wire operation with DC-power on wire 3.
Power Supply	700 = 10 - 30 VDC	700 = 10 - 30 VDC	700 = 10 - 30 VDC
General Characteristics			
Degree of protection			
Operating temperature	-20°C to +50°C	-20°C to +50°C	-20°C to +50°C
Storage temperature			
References			
NPN	G2120 5501 700	G2130 5511 700	
PNP	G2120 5502 700	G2130 5521 700	G2140 4421 700



	Input/Output Module	Master Modules	
Types	G2140 55.0	G2196	G3496
			
Dimensions (mm)	Open PCB 74 x 59 mm	Open PCB 86 x 54 mm	77 x 72 x 70
Functions	4 push-button inputs 4 transistor outputs LED indications for supply and carrier.	128 signals RS 485/RS 232 interface to control system LED indications for supply, carrier and RS485Tx.	Plug & Play RS232 /RS485 Interface with built-in protocols for specific PLC brands and Modbus.
Housing type	Snap locks or DIN-rail (vertical or horizontal).	Snap locks or DIN-rail (vertical or horizontal).	DIN-Rail, H4.
Electrical Characteristics			
Number of channels	8	128 inputs and 128 outputs.	Selectable.
Features/Signal types	3-wire operation with DC-power on wire 3.	3-wire operation with DC-power on wire 3.	Possibility of 3-wire operation with DC-power on the 3'rd wire.
Power Supply	700 = 10 - 30 VDC	700 = 20 - 30 VDC	700 = 20-30 VDC
General Characteristics			
Degree of protection			IP 20
Operating temperature	-20°C to +50°C	-20°C to +60°C	0°C to +50°C
Storage temperature			-50°C to +85°C
Remarks			Built-in protocol for specific PLC brands for easy interfacing.
References			
NPN outputs	G2140 5510 700		
PNP outputs	G2140 5520 700		
Standard protocol			
Lucky Goldstar K-series		G2196 0000 700	G3496 0000
GE-Fanuc 90-30 series		G2196 0001 700	G3496 0001
Mitsubishi FX & A-series		G2196 0002 700	G3496 0002
Omron		G2196 0003 700	G3496 0003
Modbus RTU Slave		G2196 0004 700	G3496 0004
Allen-Bradley		G2196 0005 700	G3496 0005
Schneider			G3496 0006
Koyo			G3496 0007
Matsushita			G3496 0008
Siemens			G3496 0009
Toshiba			G3496 0010
IDEC			G3496 0011
			G3496 0012

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