

Dupline[®] Fieldbus and Installationbus

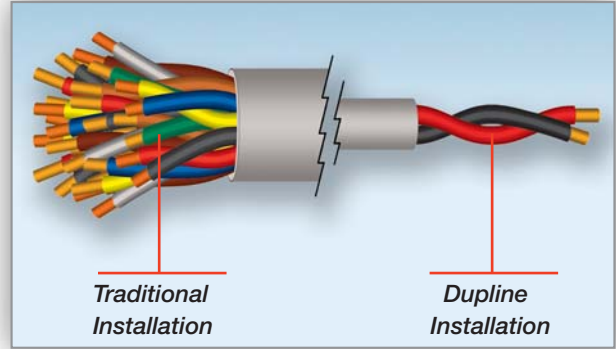


Dupline[®]
Fieldbus Installationbus



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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



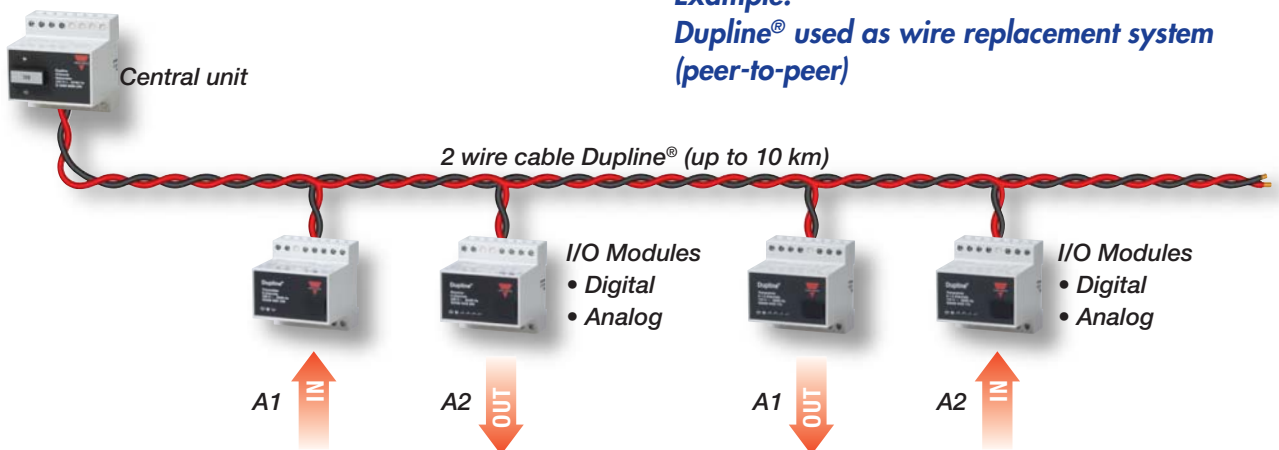
provide cost-effective access to a larger number of signals. This supports the increasing demand for automation systems to collect and use more and more data to optimize cost and performance.

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-

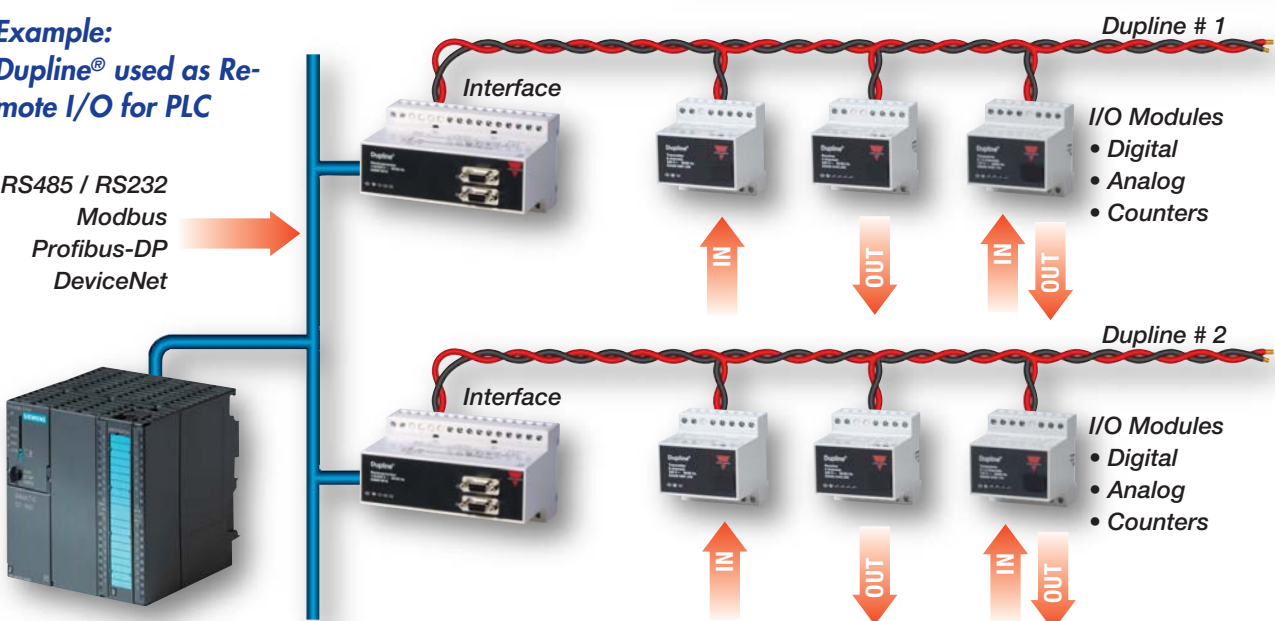
hooting and maintenance, thus eliminating the need for costly service and installation contracts. Dupline® is system independent and open for interfacing with basically any kind of controller. Serial interfaces with Modbus and dedicated PLC protocols, together with gateways for Profibus-DP and DeviceNet,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







Applications

Water Distribution

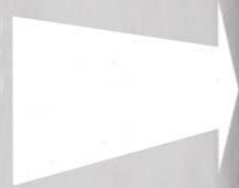
Control and monitoring of pumps, valves, levels, flow etc. over long distances, with or without wires.

Building Automation

Lighting control, temperature control, rollerblind control, ventilation control, monitoring of fire alarms.

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

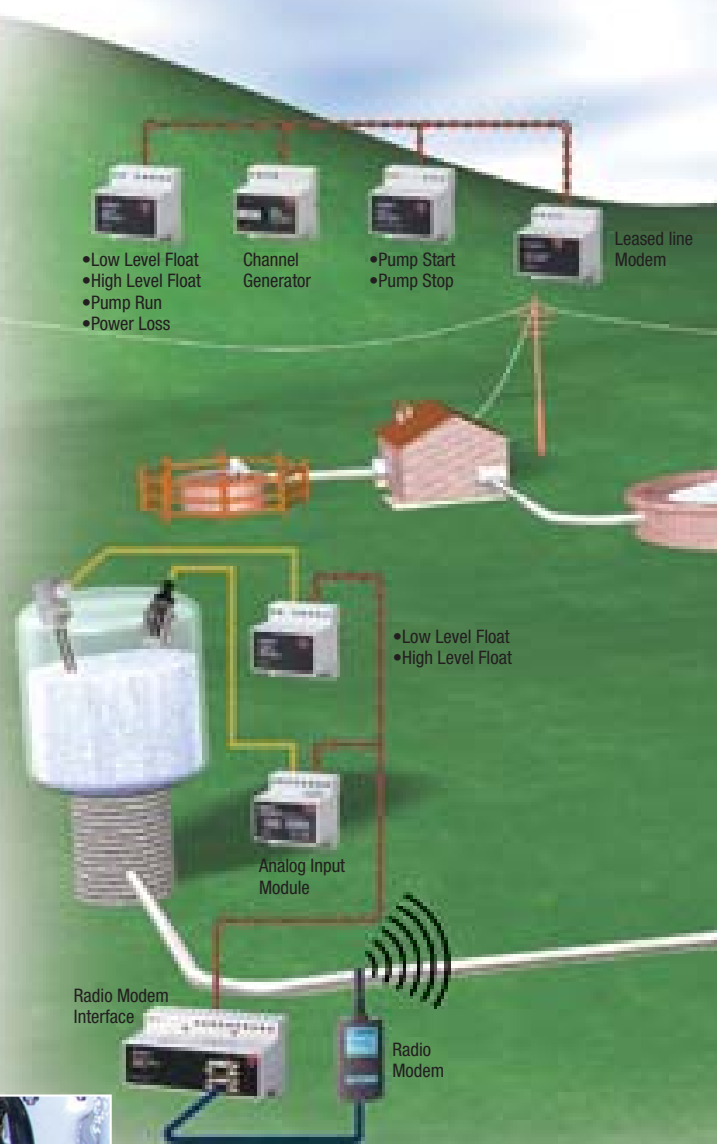
Control and powering of multiple valves, monitoring of flow, valve position and water consumption.

Elevators

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



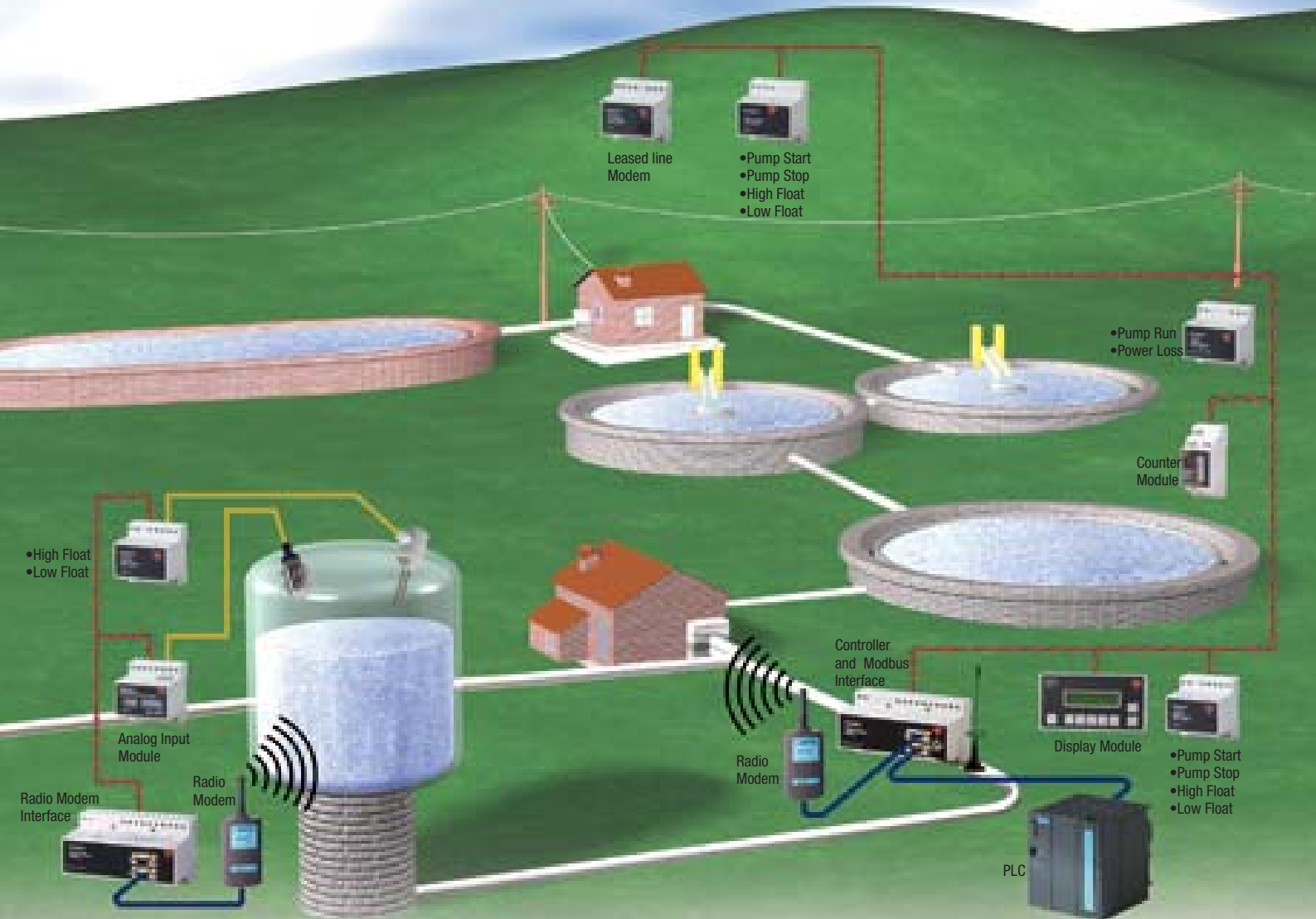
- Up to 10 km transmission distance without Repeaters
- No special cable requirements, existing cable can be used
- Easy handling
- All signals can be controlled and monitored from any point in the system
- Transmission via GSM Modem, Radio Modem or Fiber Optics possible
- Flexible interfacing to PLCs,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

- Control of lighting, roller blinds, HVAC and security in one system
- Monitoring of energy, water and gas consumption throughout the building
- Overview of complete building status anytime and anywhere
- Ethernet or RS485 networking of Dupline[®] controllers, each monitoring and controlling a section of the building
- Flexible interfacing to upper level Building Management System
- Highly flexible for changes and enhancements
- Cost-effective



Fire alarm

Smoke detectors at different locations in the building are the main elements in the fire alarm system. Can be combined with other functions, e.g. lights can be switched on and fans switched off in the case of a fire.



Fire dampers

Control and monitoring of fire damper positions can be implemented with minimized use of expensive fire-resistant cable. Control and monitoring of air outlet and air supply groups.



Lighting control

Local or central control of single or multiple lights on the basis of real-time clock, light switches, movement detectors, light intensity sensors or handheld remote control. Dimming of all types of light loads, programming of light scenarios.



Roller blind control

Control of position and angle of roller blinds from local or central locations by means of pushbuttons or remote control. "All up" or "all down" control of multiple roller blinds. Automatic control based on wind speed or light intensity.



Heating

Temperature control in individual rooms, depending on the time of the day, presence of persons and state of window contacts. Definition of set-points and monitoring of temperatures from a central PC. Local adjustment of set-points and read-out of temperature.



Windows and doors

Monitoring of doors and windows by means of magnet contacts or glass break detectors. This can be combined with room temperature control, for automatically switching of the heating when the window is open.



Energy monitoring

Monitoring of energy, water and gas consumption at multiple locations in the building via pulse counter modules or energy meters with Dupline[®] integrated. Transmission of values to central PC at other location via GSM modem, auto-dial modem or internet.



Control and monitoring via GSM

User-defined SMS messages can be sent to one or several mobile phones in case of an alarm. It is also possible to request and receive data via SMS messages and outputs can be switched.



HMI's

Status on the installation can be visualized and controlled from different locations by means of touchscreens, text displays or LED mimic panels. The Dupline[®] Web-server enables control and monitoring via the internal network or Internet.



Interfacing to Building Management System

Several Dupline[®] networks, each controlling a section of the building, can be linked together. Due to an open protocol with easy accessible data, the entire network can be interfaced to any type of Building Management System



**NOW ALSO
WIRELESS**



Smart solutions for home and Building Automation

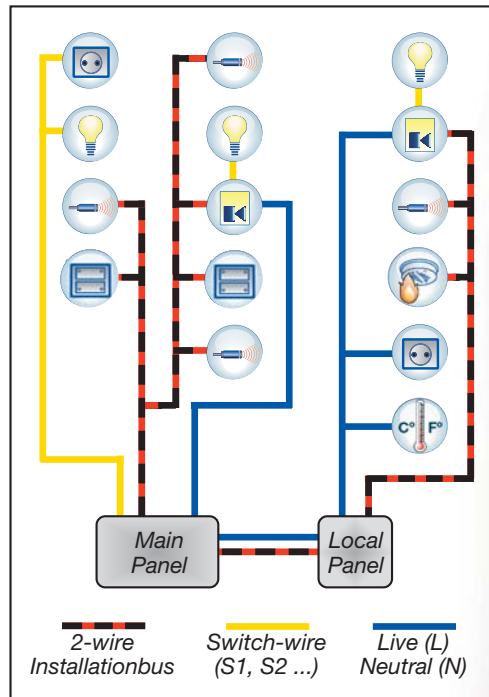
Electrical building installations are in a phase of transition. Conventional electrical installations can fulfill many tasks, but as the functions of the building gradually become more and more complex, and the demands on the interaction between them increase, a different installation technology is required.

The Dupline® installationbus is the solution. Dupline® is a decentralized system, which links together the control and monitoring of lighting, roller blinds, heating, air condition and security. Dupline® opens up new op-

portunities for reducing the energy consumption and increasing the comfort and the safety in the building. Operation, service and maintenance is simplified, with complete status overview anytime and anywhere. The Dupline® product range includes a wide range of dedicated building automation components such as intelligent light switches, movement detectors, light intensity sensors, dimmers, relays and thermostats. All the components in a section use the same two wires to link to the Dupline® Controller, which

makes it possible to implement intelligent functions by combining the signals from the different bus components. Compared to a traditional parallel-wired installation, the wiring of a Dupline® system is much simpler and the flexibility for changes and enhancements are increased significantly. In larger buildings, multiple Dupline® Controllers can be linked together via RS485 or Ethernet for exchange of data, providing a safe system where a cable fault only affects one section of the building.

- Easy handling in all project phases
- Bus and power wires in the same cable or conduit
- Free topology
- User-friendly handheld coding and testing tools
- All signals can be controlled and monitored from any point in the the system at any time
- No problems with transmission distance
- Economical solution in both labor and material



Dupline® is an attractive alternative to the traditional bus solutions used for automation of commercial and industrial buildings.



Within the home automation market, Dupline® meets the demand from installers and end-users for a simple and cost-effective solution.



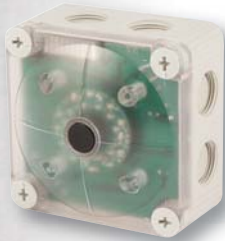
Smart solutions for home and Building Automation

The Dupline® installationsbus introduces a new way to implement the wiring and programming of a building automation system. The system is easy to work with in all project phases and solves the applications in an economical way. The addressing and configuration schemes are straightforward, the tools are few and easy to use, and wiring topology is free. Due to the high noise immunity of Dupline®, no special cable is required and the two bus-wires can follow the wiring path of the

main supply in the same cable or conduit. Consequently, both the power and communication capability needed by sensors and actuators in the building automation system are available throughout the installation. The use of intelligent bus-powered Dupline® components like light switches, movement detectors, temperature sensors and de-central relays make installation easy and flexible, because the need to run bundles of wires back to the central installation panel is eliminated.

The Dupline® Controller offers a selection of predefined functions that simply need to be parameterized. For example, the master function enables one input to trigger the switching of multiple outputs simultaneously, and with the real-time function, outputs can be programmed to switch on or off at specific times of the day and days of the week. Temperature control, roller blind control, alarm system and lighting scenarios are other examples of predefined functions, which make configuration easy.

- 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

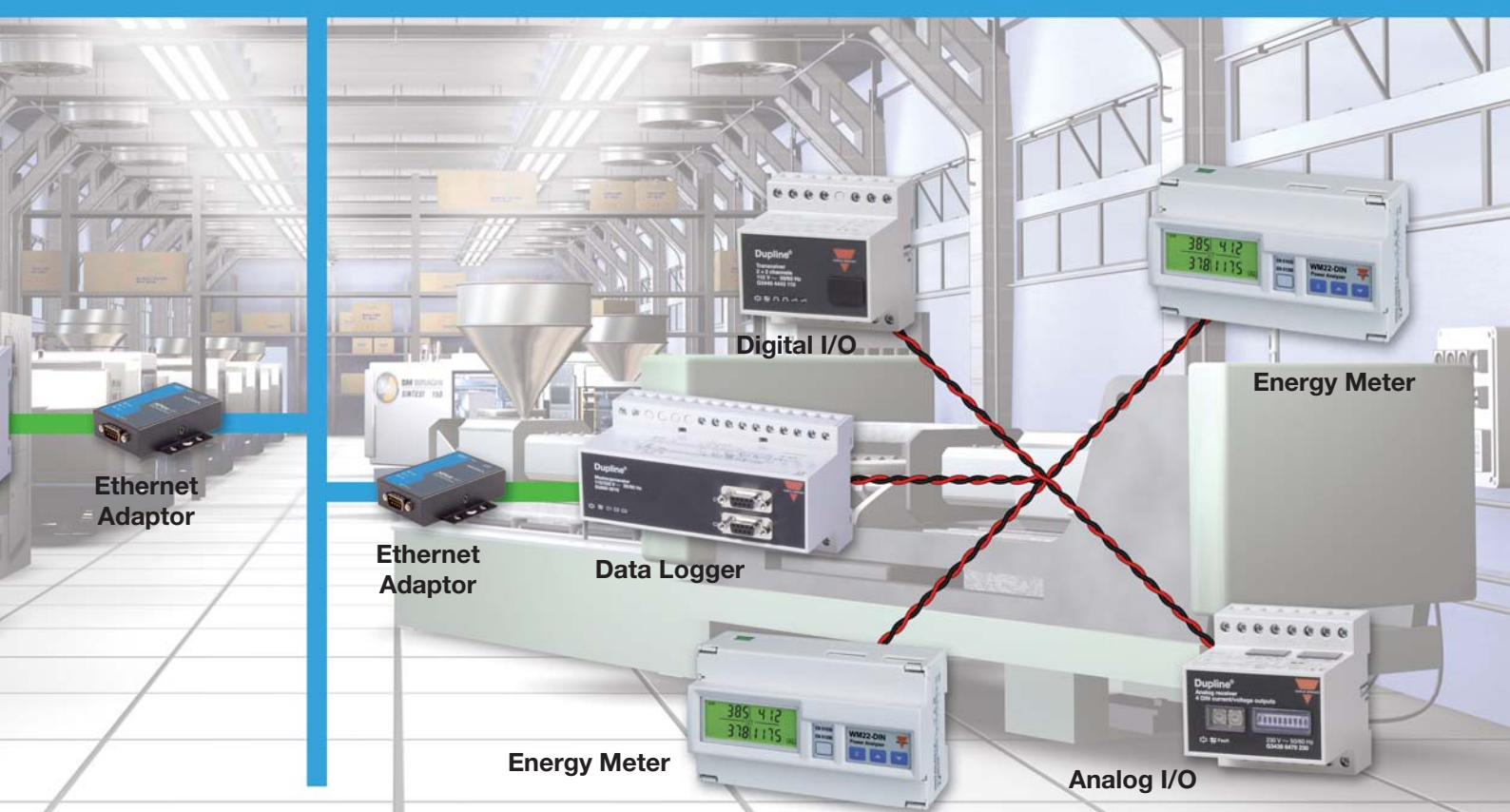
stand-by power loss. The Dupline bus in combination with the energy meter range of Carlo Gavazzi and the Dupline®-Online M2M software offer a powerful solution with all the elements needed in one system:

- 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.

Access to data from any PC on the LAN/WAN



Central Server with Dupline-Online database



Ethernet Adaptor

Ethernet Adaptor

Data Logger

Digital I/O

Energy Meter

Energy Meter

Analog I/O

- 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)

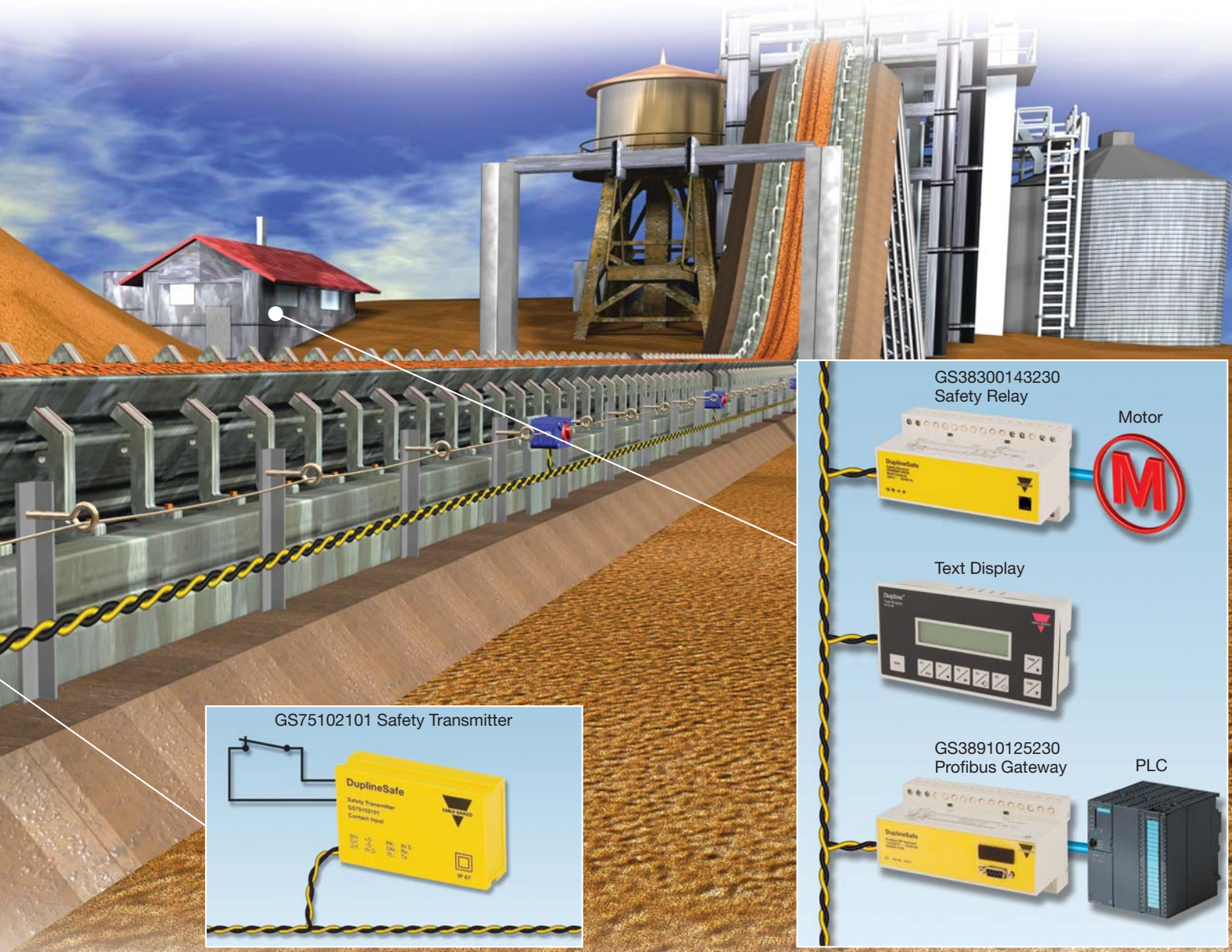
DuplineSafe

- 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



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.

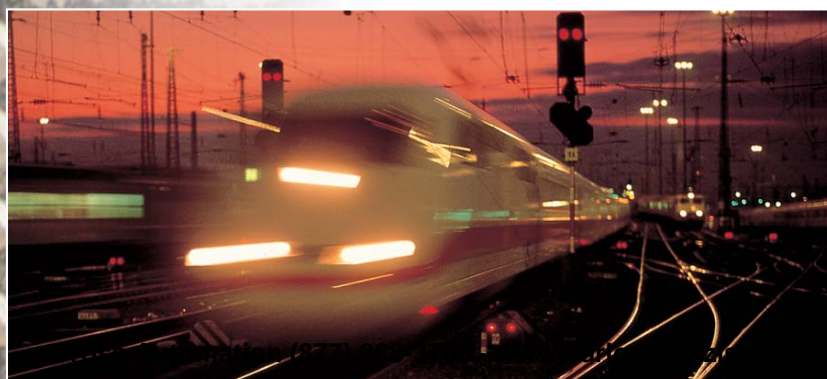
In the machine room, a DuplineSafe Relay Output Module is continuously monitoring the bus and the status of all the safety

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 DuplineSafe 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.

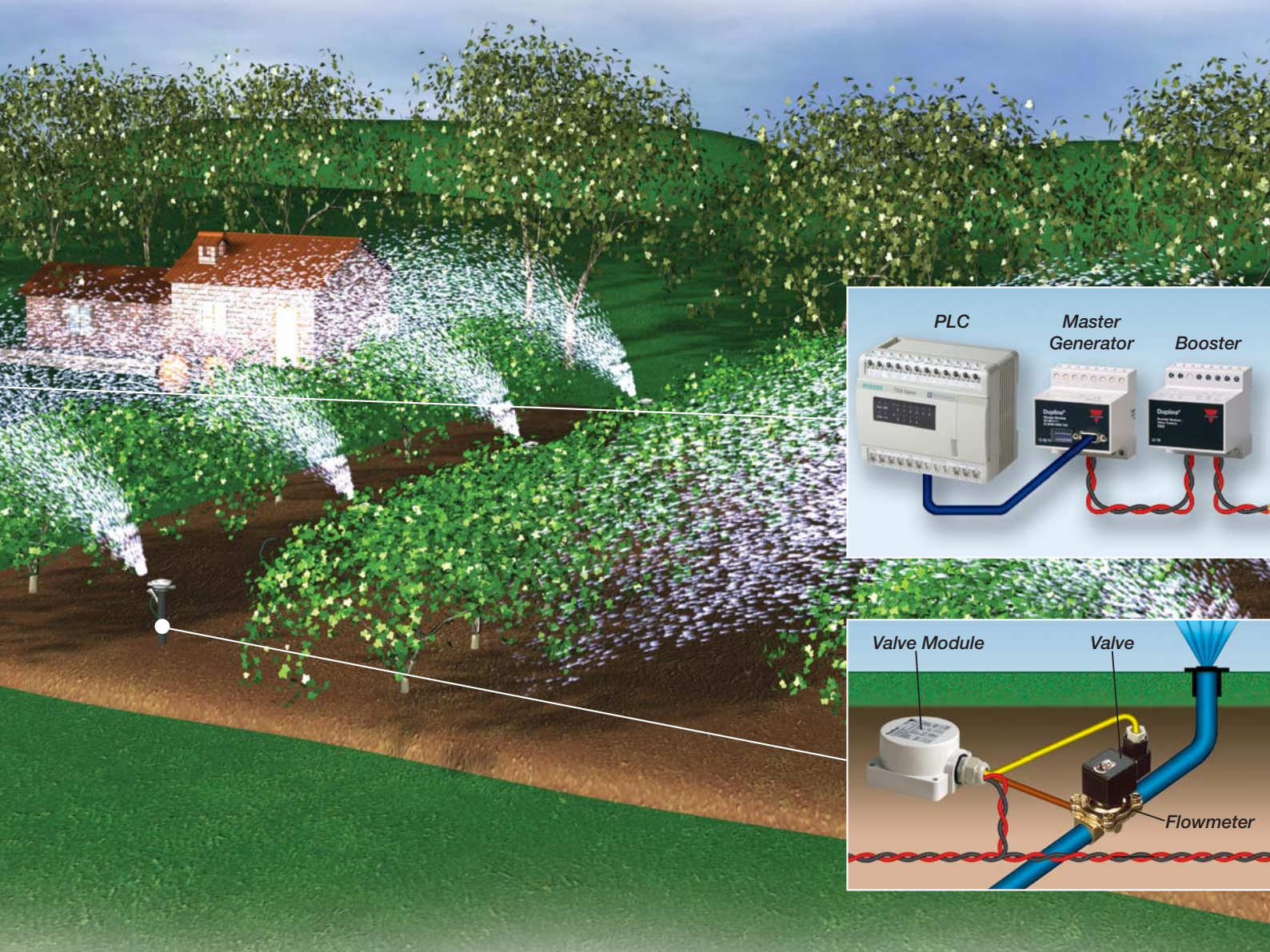
- Reduced installation time
- Reduced cable cost
- Easy to expand or change an installation
- Extremely user-friendly
- Free topology
- Robust, reliable and proven technology
- Flexible interfacing to Irrigation Controllers
- Cost-effective



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.

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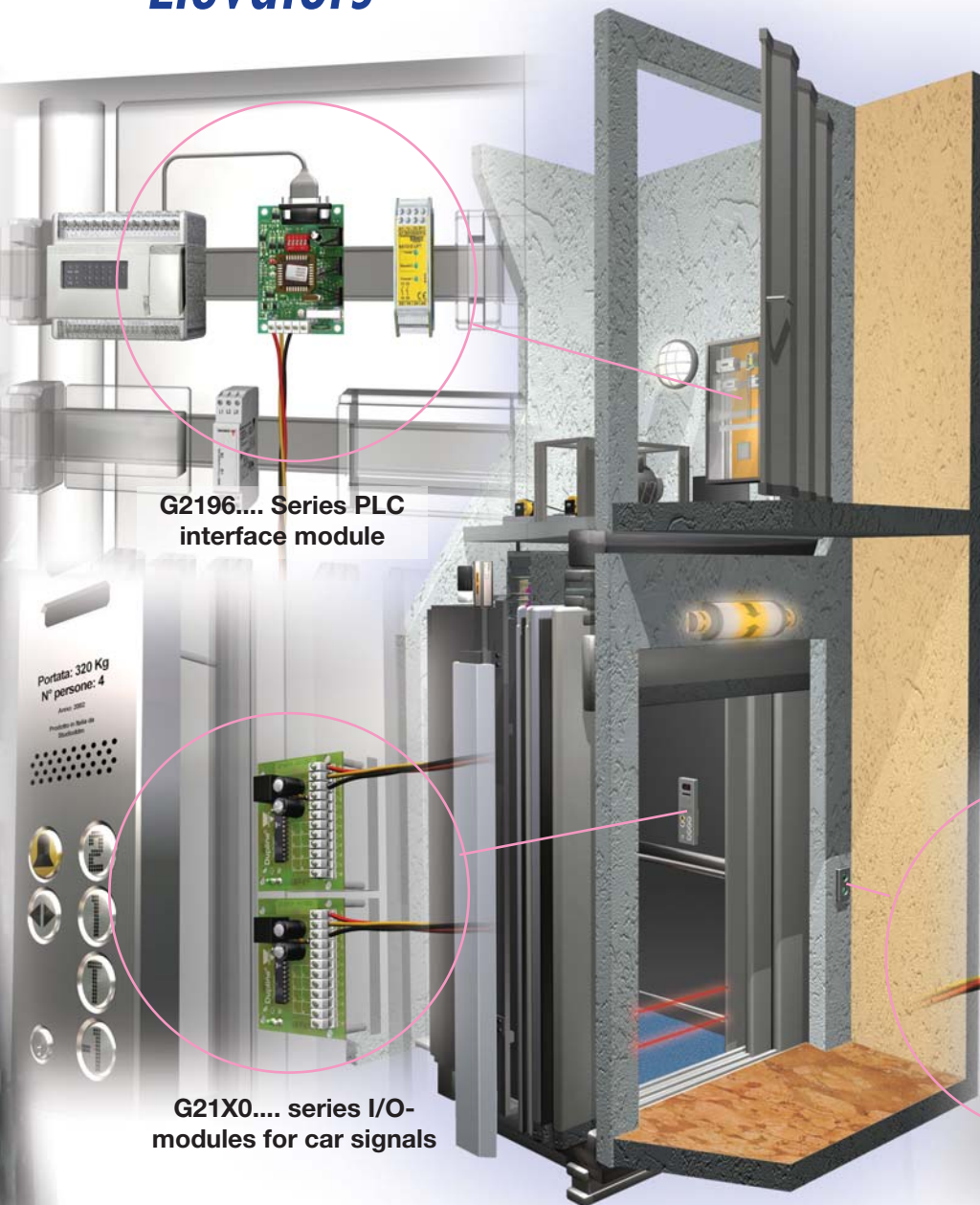
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The Dupline elevator bus system offers a complete solution for serial communication, which is cost-effective and easy to work with. All signals and power run on the same 3 wires, thereby reducing installation and commissioning time significantly.



G2196... Series PLC interface module

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

G21X0 series I/O-module for floor fixtures.

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.

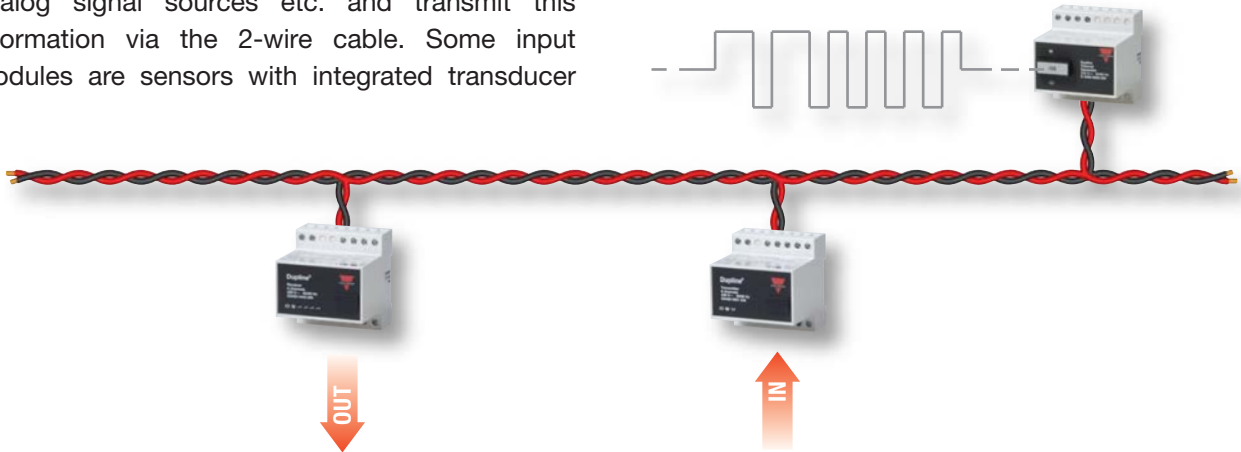
The Master Module interfaces Dupline® to any Elevator Controller with a RS232 or RS485 port. In order to make the integration of Dupline® fast and easy, dedicated plug & play versions have been developed for all major PLC brands. The Master Module continuously scans all the Dupline® I/O boards and reads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



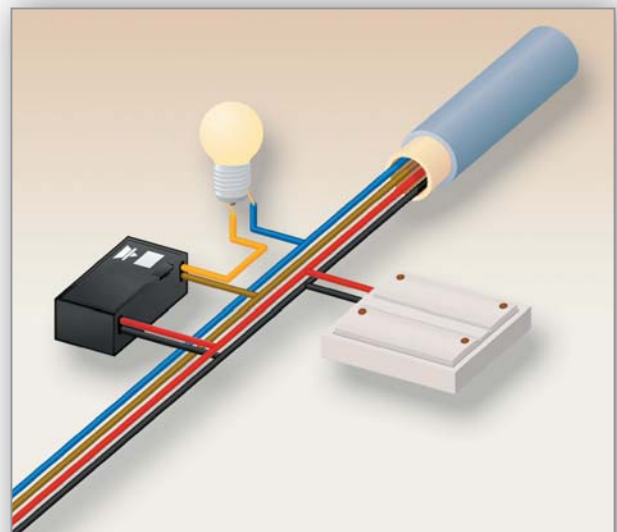
The cable

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.

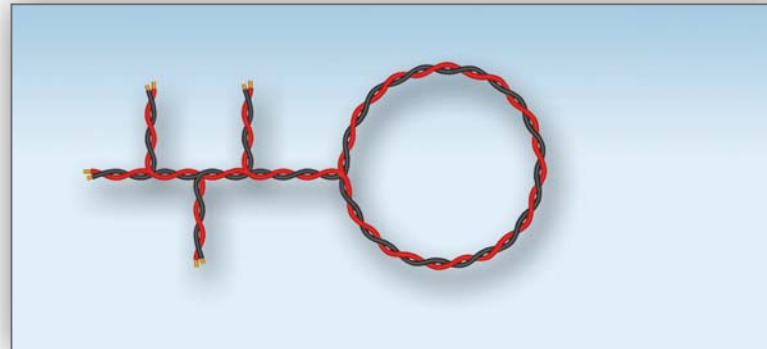
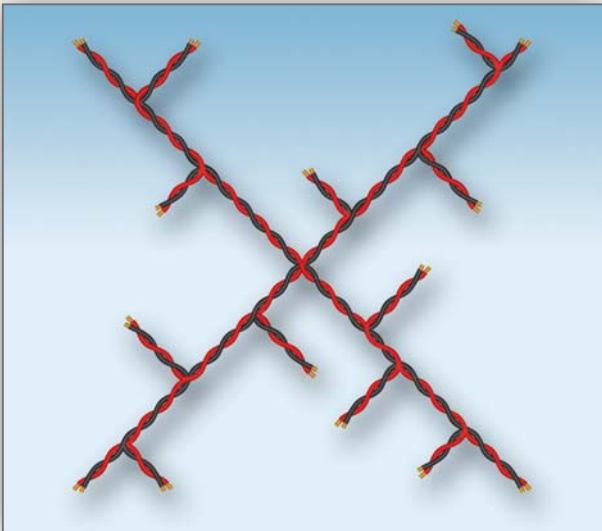
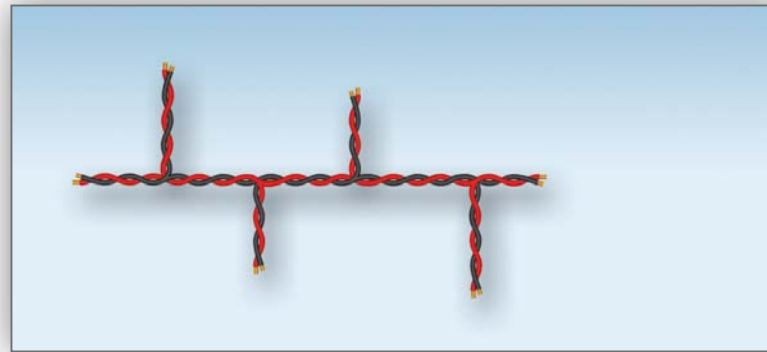
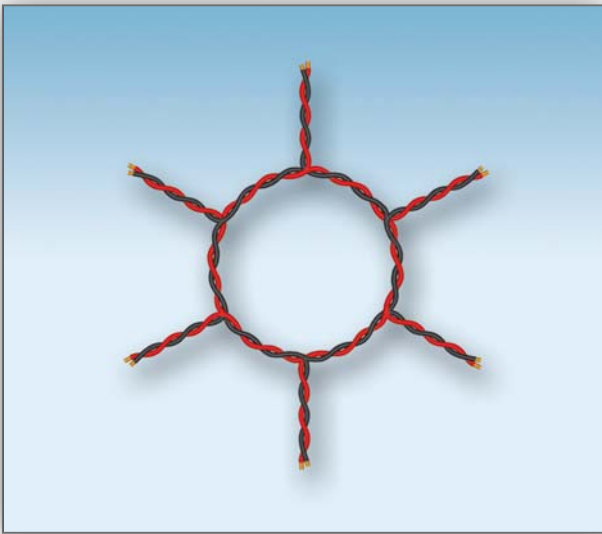
Bus-powered components

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 light switches, small contact input modules and sensors for temperature, light intensity or movement detection, but a bus-powered relay output for de-centralised installation is also available.



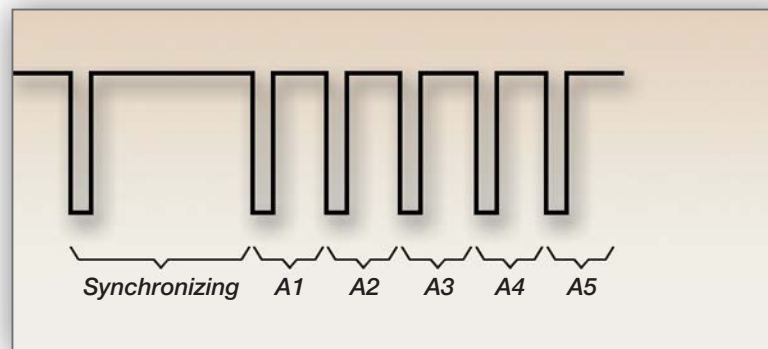
Topology

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.

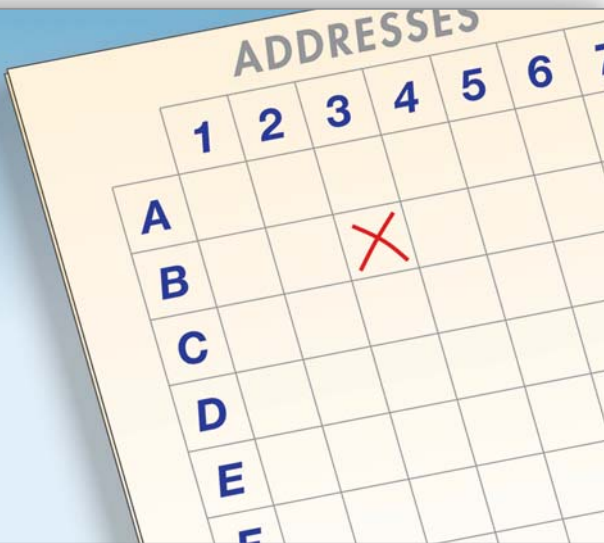


Communication Principle

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

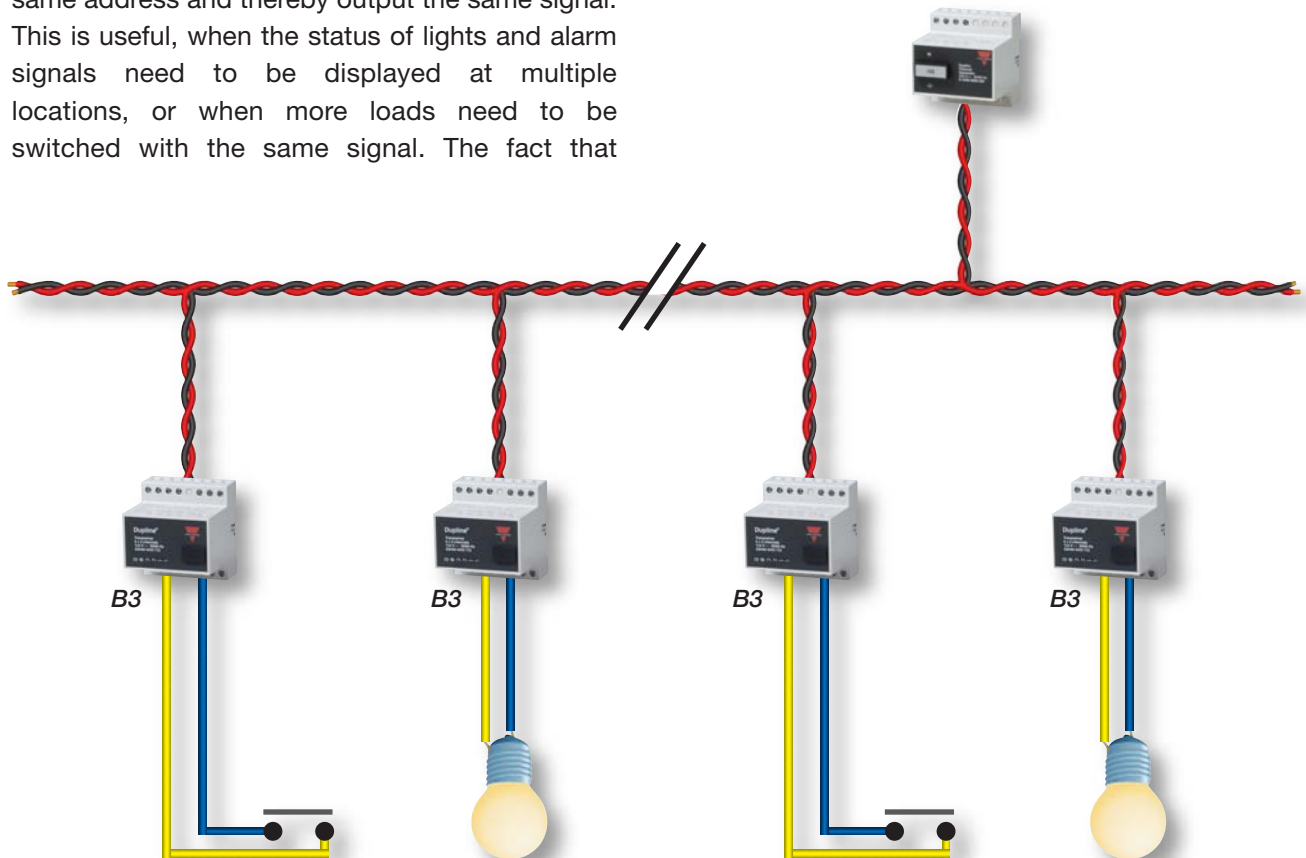
be controlled from light switches mounted at different positions. If the central unit is a standard type or an interface without intelligent functions, it will simply transfer the input status detected on B3, to the B3 outputs.

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 ad-

dress. 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®.



Wireless

Wireless Dupline® components for smart buildings make installation easy and increases flexibility. The wireless devices communicate with a wireless base unit, which acts as a gateway to the wired Dupline® system. The addressing scheme and tools for the wireless modules are identical to the wired system, hence it is easy to make combined systems where wired and wireless components are operating seamlessly together.

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

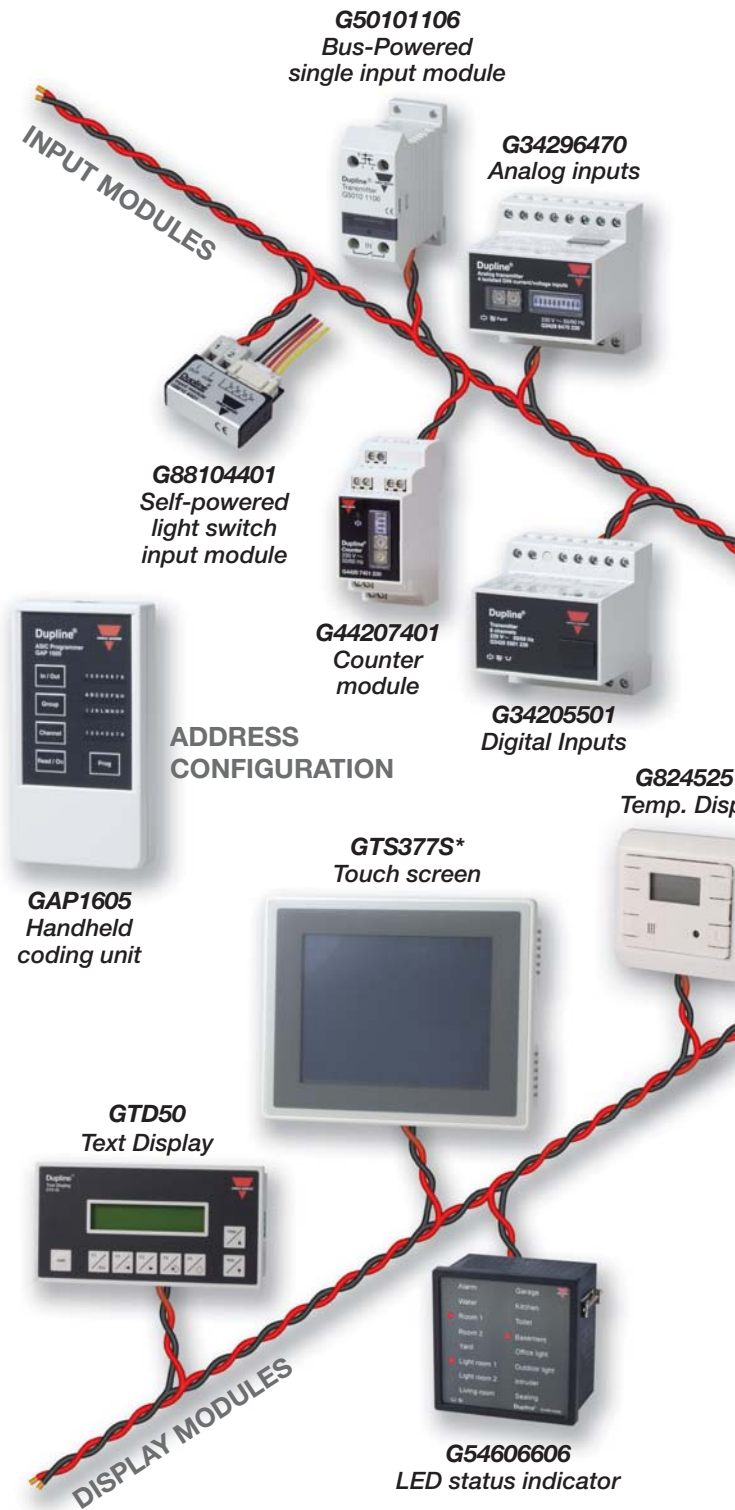
These modules are used to output signals transmitted on Dupline® to field devices. The digital types are available with relay or transistor outputs and the analog types have DIN-norm outputs like 4-20 mA. They typically connect to contactors, lamps, instruments, drives etc.

Sensors

Dupline® sensors are self-powered devices that detect or measures 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.

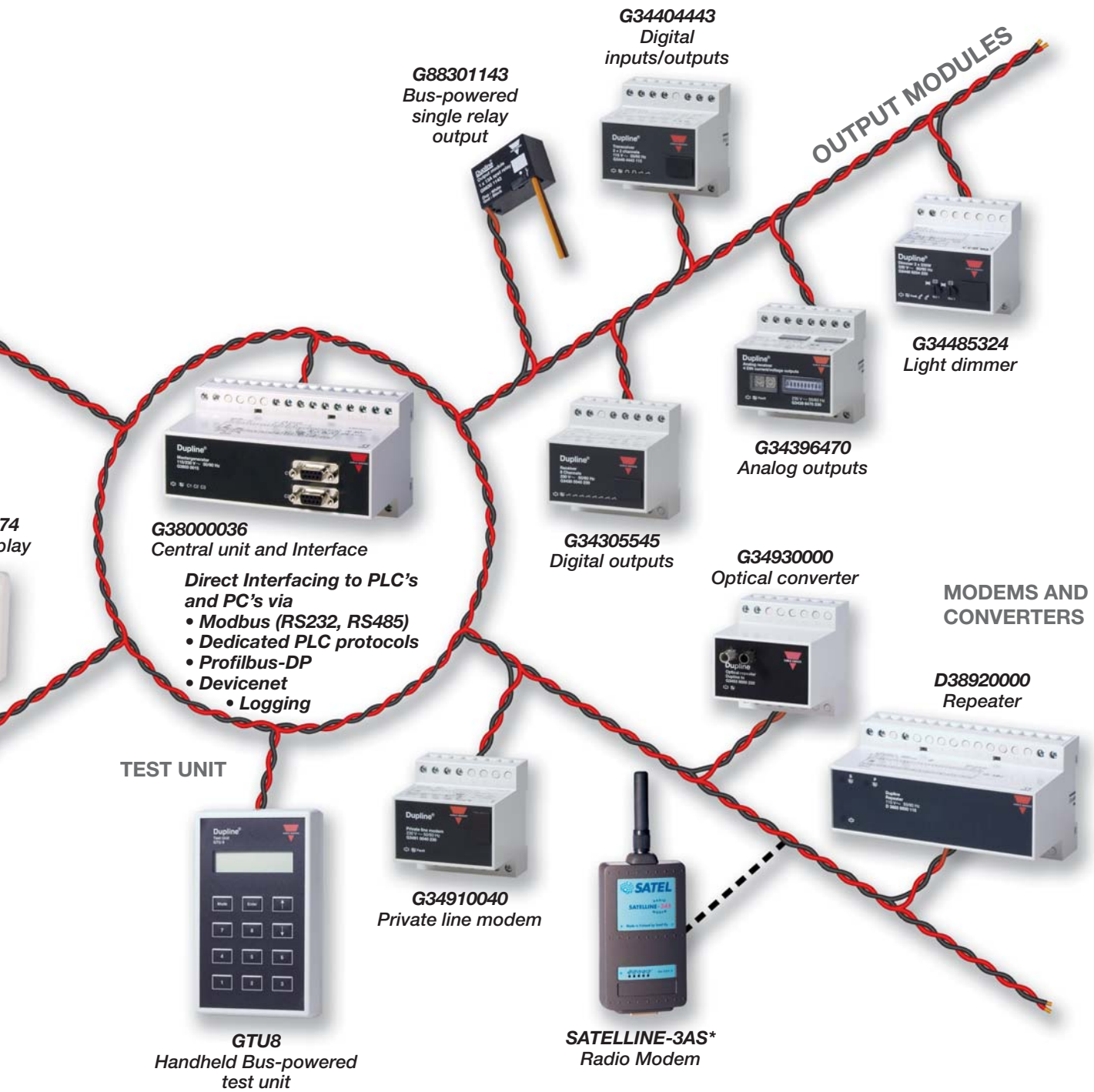
Interface Products

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.

The screenshot shows the 'G38xx36 [Basic-Configuration.x36]' software window. On the left is a menu with options like 'New', 'Open', 'Save', 'Write Generator', 'Read Generator', 'Print', 'Exit', 'Blank', 'Push button', 'Toggle switch', 'Timer', 'Real-time', 'Master function', 'Analog Sensor', 'Motion Detector', 'ISA alarm', 'Smokealarm', 'Intruderalarm', 'Wateralarm', 'Common siren', 'Rollerblind Master', and 'Rollerblind Up/Down'. The main grid has columns 1-8 and rows A-P. Row E is highlighted with a yellow background. Two windows are open: 'E5 Real-time' and 'H7 Roller Blind Up-Down'. Arrows point from the menu and grid to these windows.

E5 Real-time

Switch on		Switch off		Days of week							
Hour	Minute	Hour	Minute	M	T	W	T	F	S	S	H
07	00	08	00	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
07	30	09	00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
09	00	10	00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
19	15	22	00	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Description: Outdoor Light Main Entrance

H7 Roller Blind Up-Down

Roll time: 015 Seconds

Reverse Delay: 0500 Milliseconds

Tilting Blinds

Priority: Up Down

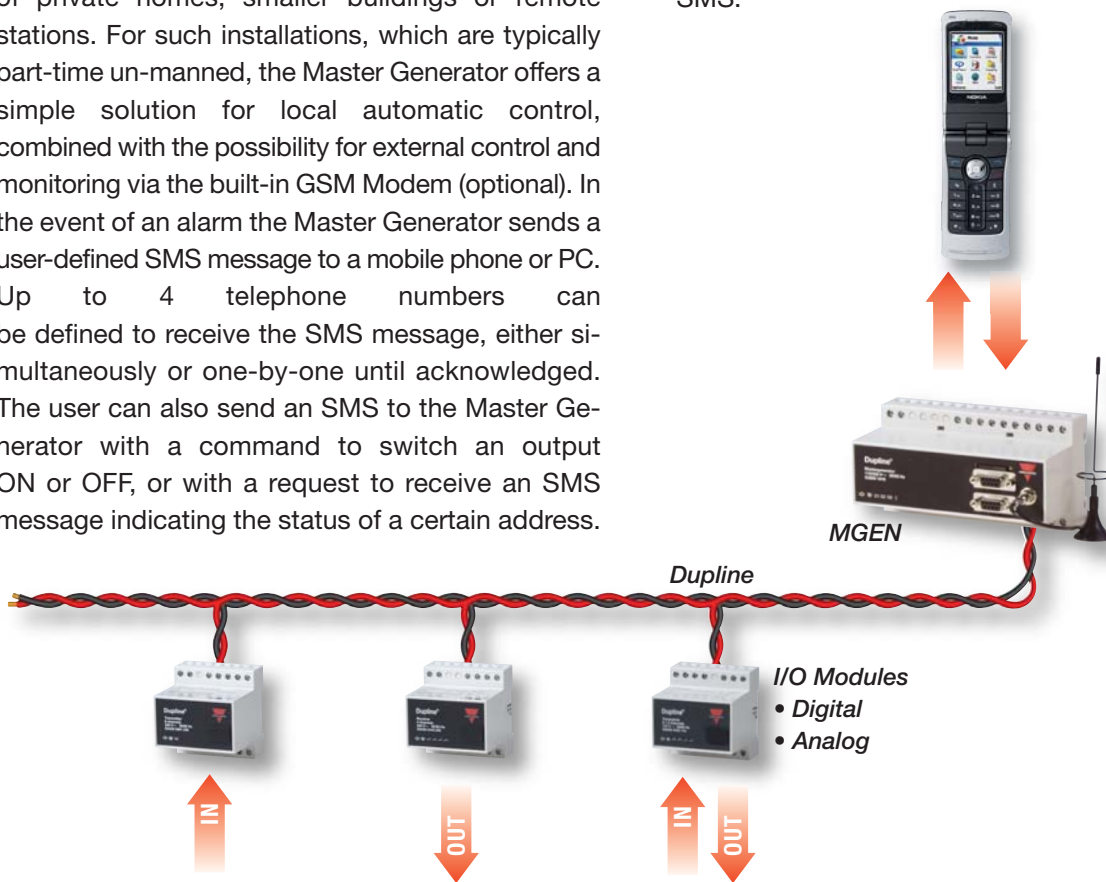
Address: G3

Description: Roller Blind Office #2

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.

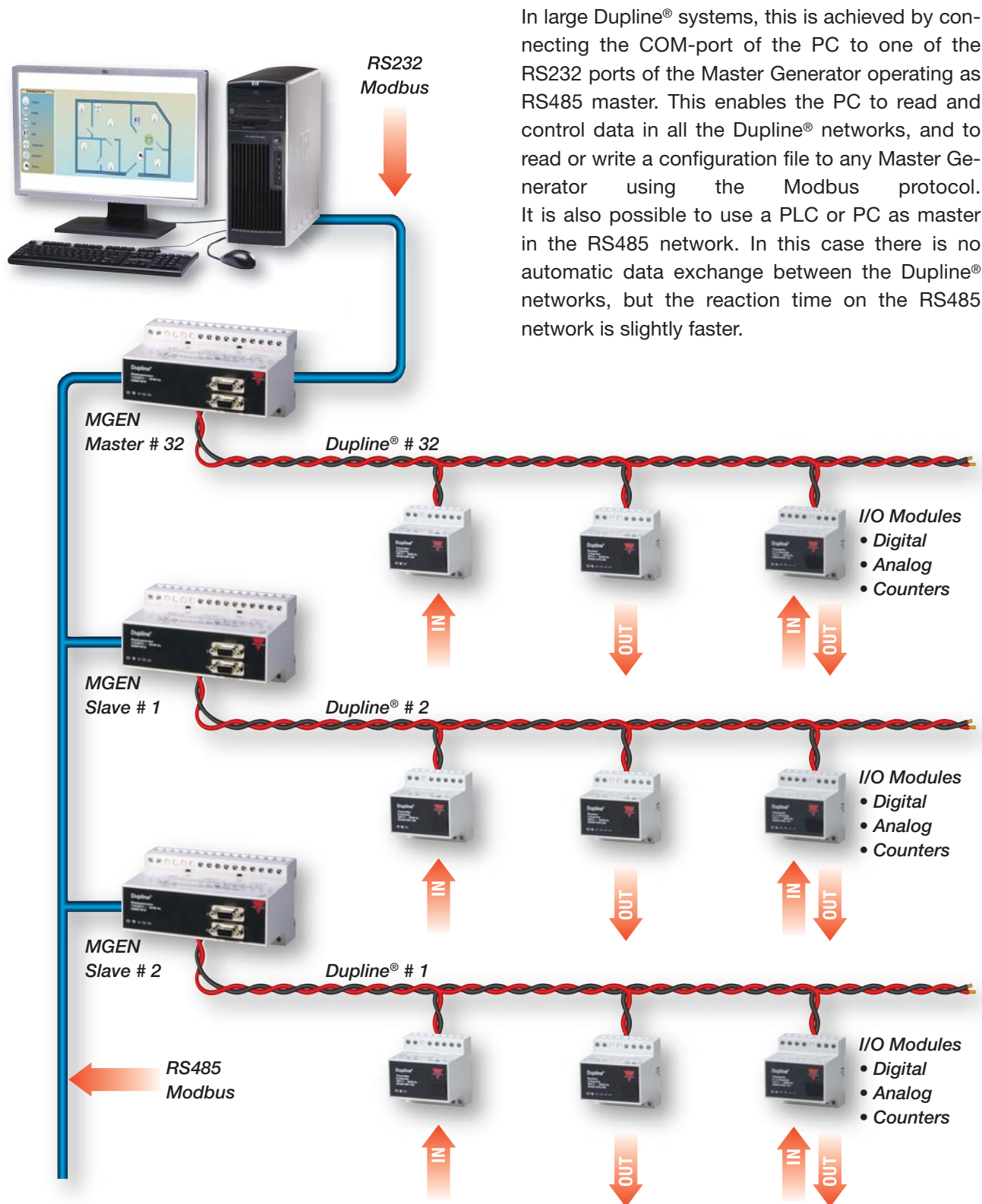


Larger system with a network of Master Generators

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

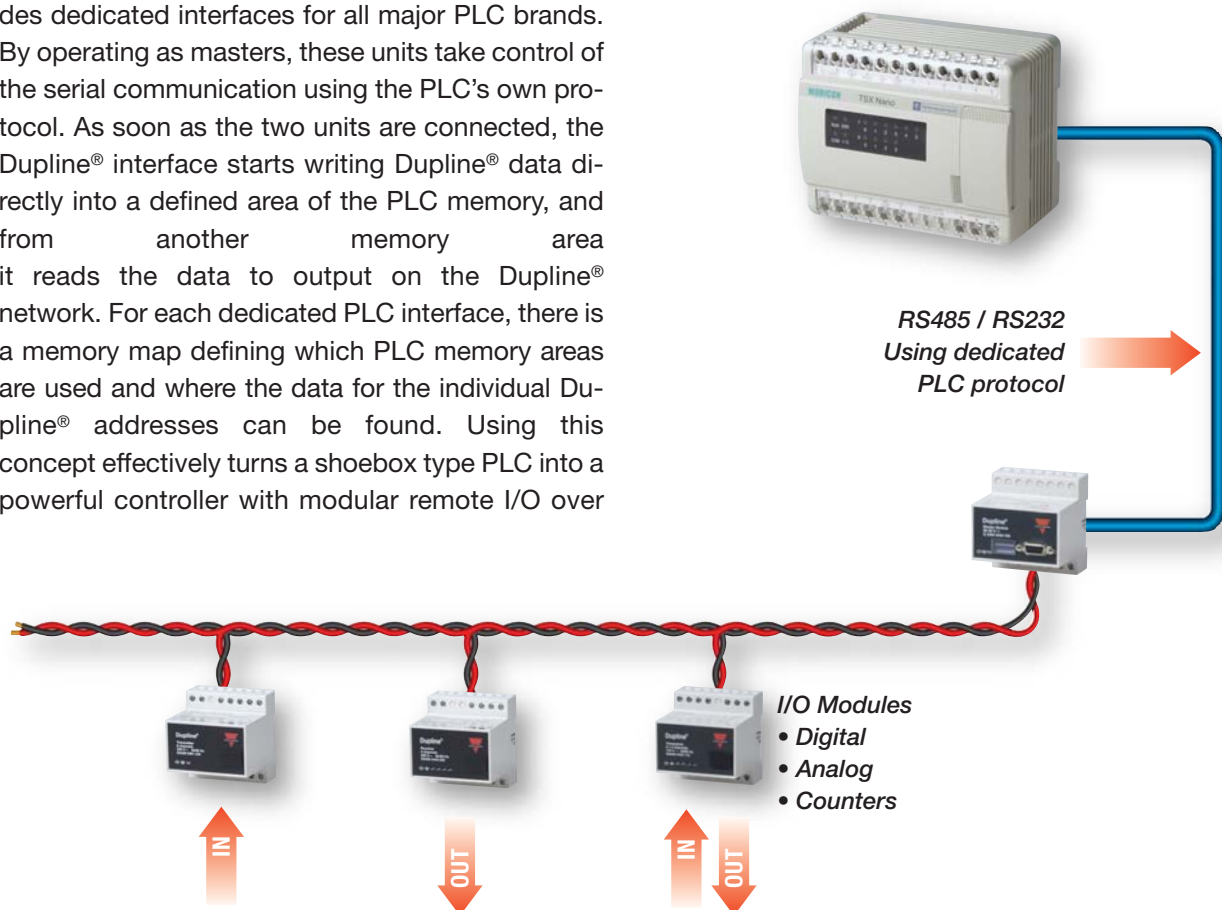
Dupline® is commonly used as a Remote I/O system for PLCs and PCs with SCADA software, typically in applications where the unique Dupline® features matches the system requirements.

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

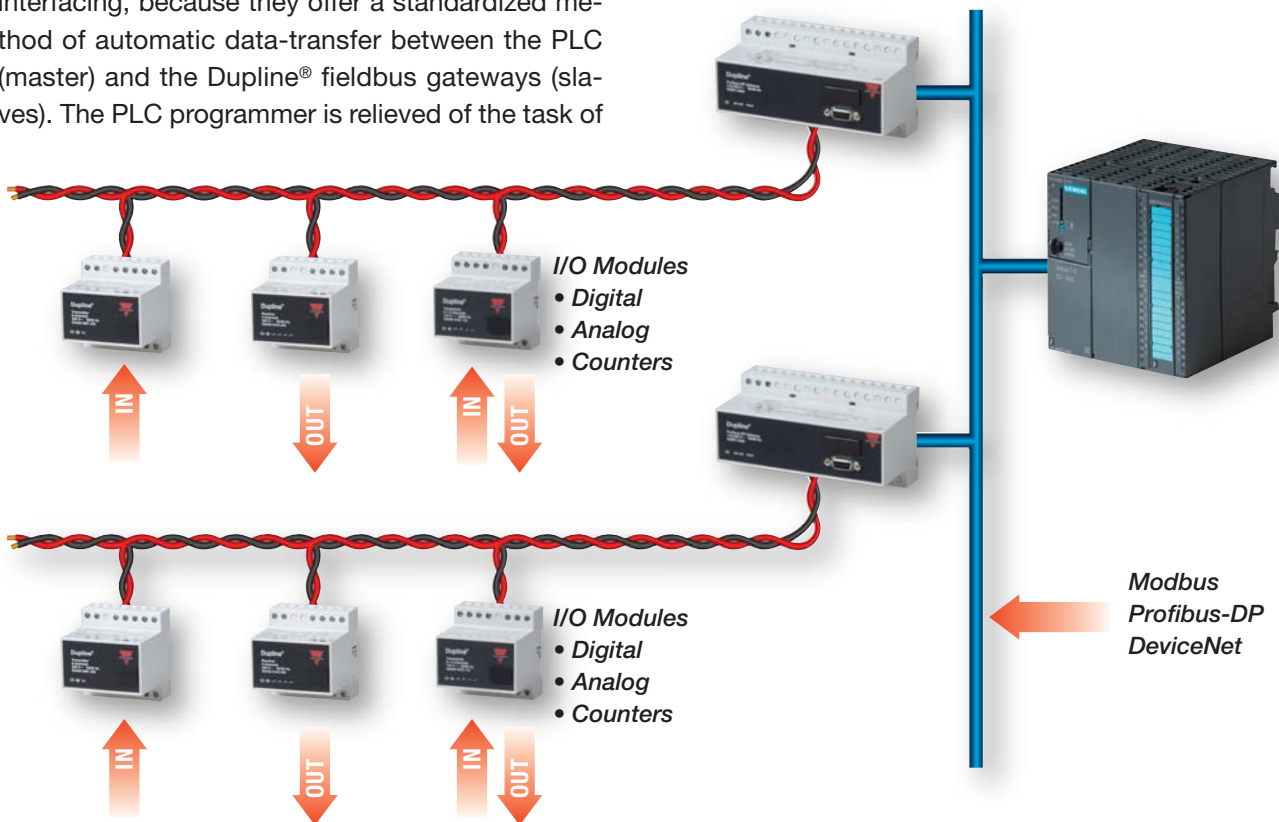
long distances. Interfaces are available for the following PLC brands: Siemens, Allen-Bradley, Group Schneider, Omron, Mitsubishi, GE-Fanuc, Toshiba, Koyo, Idec, Matsushita and LG.



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.



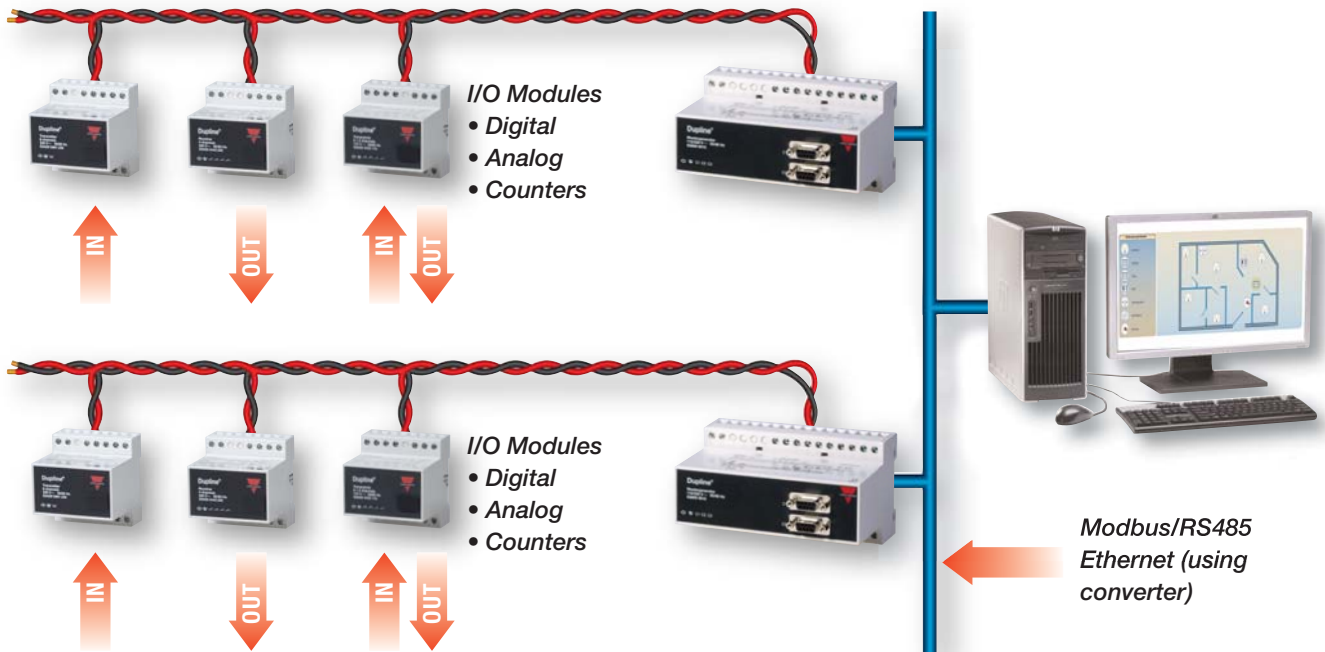
PC with SCADA using Dupline® as Remote I/O

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®

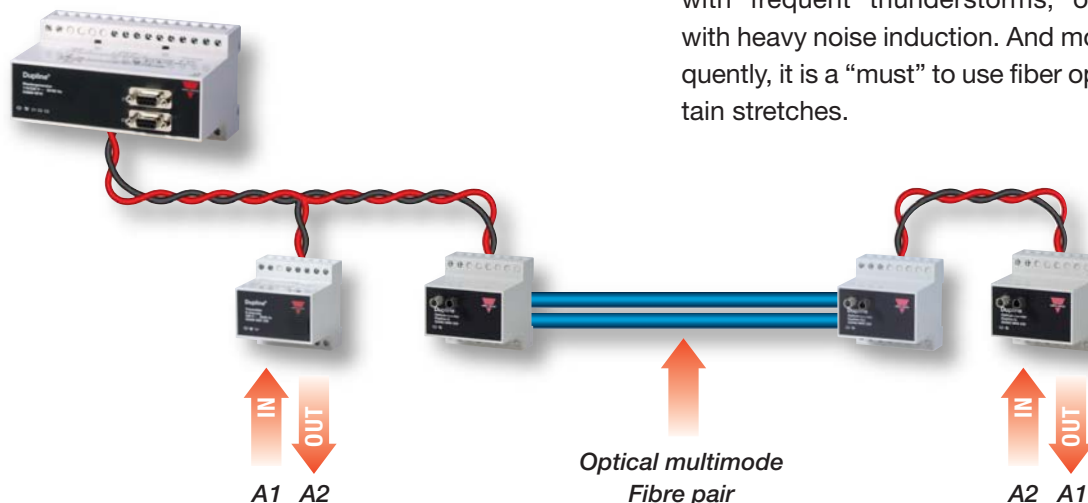
data point is simply selected with the mouse and then pasted into a cell in the EXCEL spreadsheet. From then on, the cell is dynamically updated with real-time Dupline® data. It is also possible to define EXCEL pushbuttons for activating Dupline® addresses and resetting counters.



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.

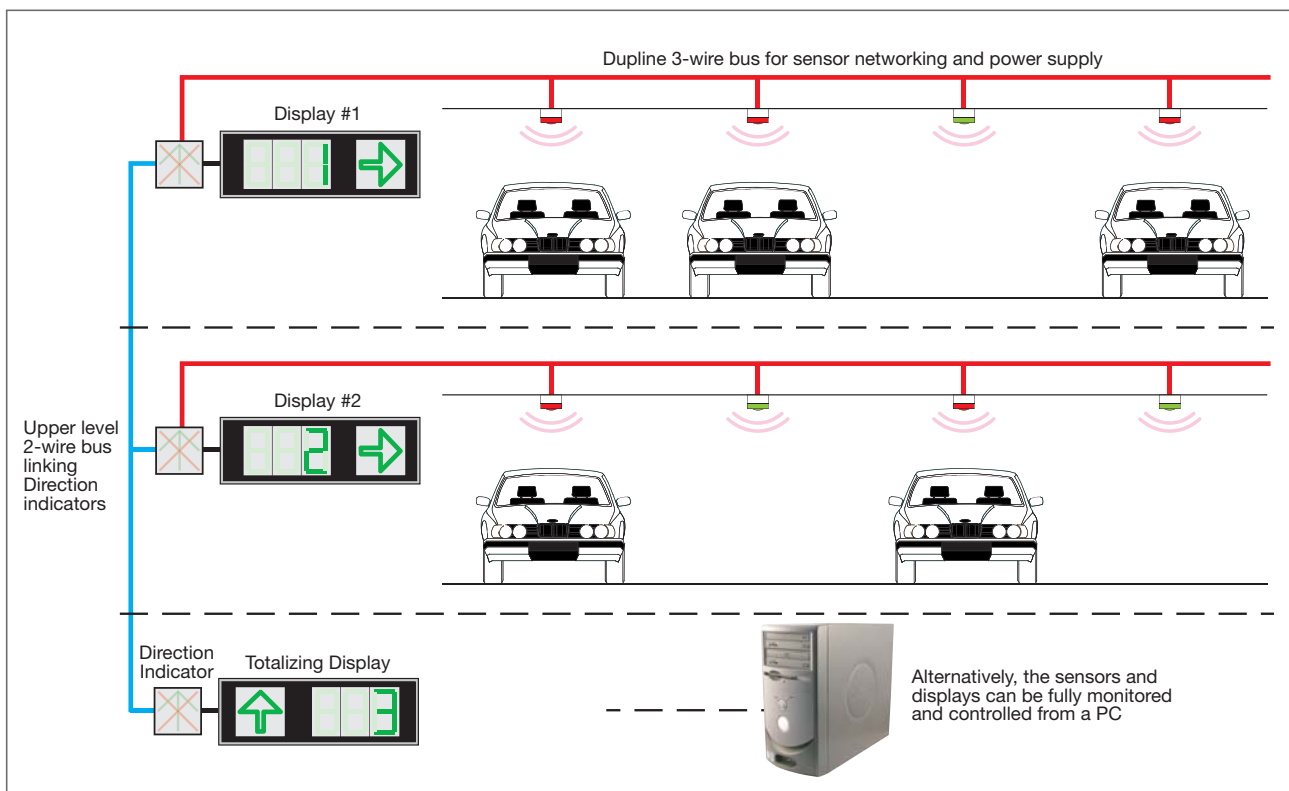


The Dupline[®] Carpark System provides guidance for the drivers

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.



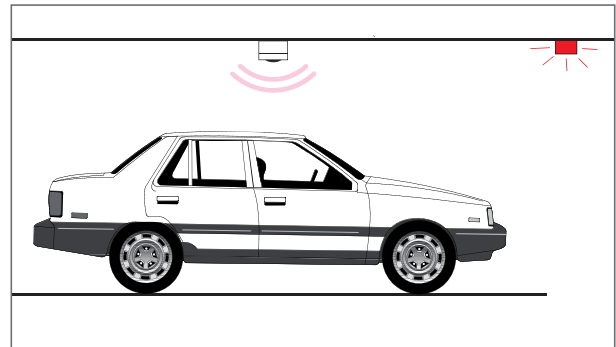
PC-based System

The guidance system can also be implemented as a PC-based solution. In this case, PC software monitors all sensors, controls the sensor occupancy LED's, and defines the numbers and direction arrows shown on the displays. This system is completely scalable in order to be able to handle any size of carpark. A PC-based solution opens up the possibility for additional features such as booking of parking bays, logging of occupation times and statistical tools for analyzing the efficiency and occupancy rate of the carpark.

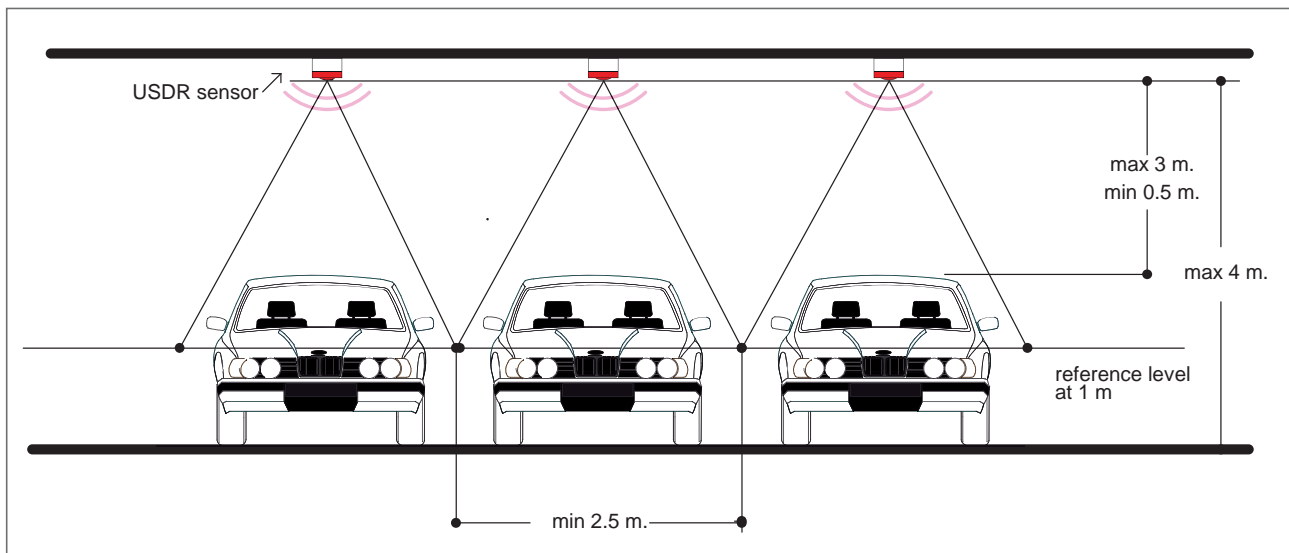


Car Detection with Ultrasonic Sensor

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

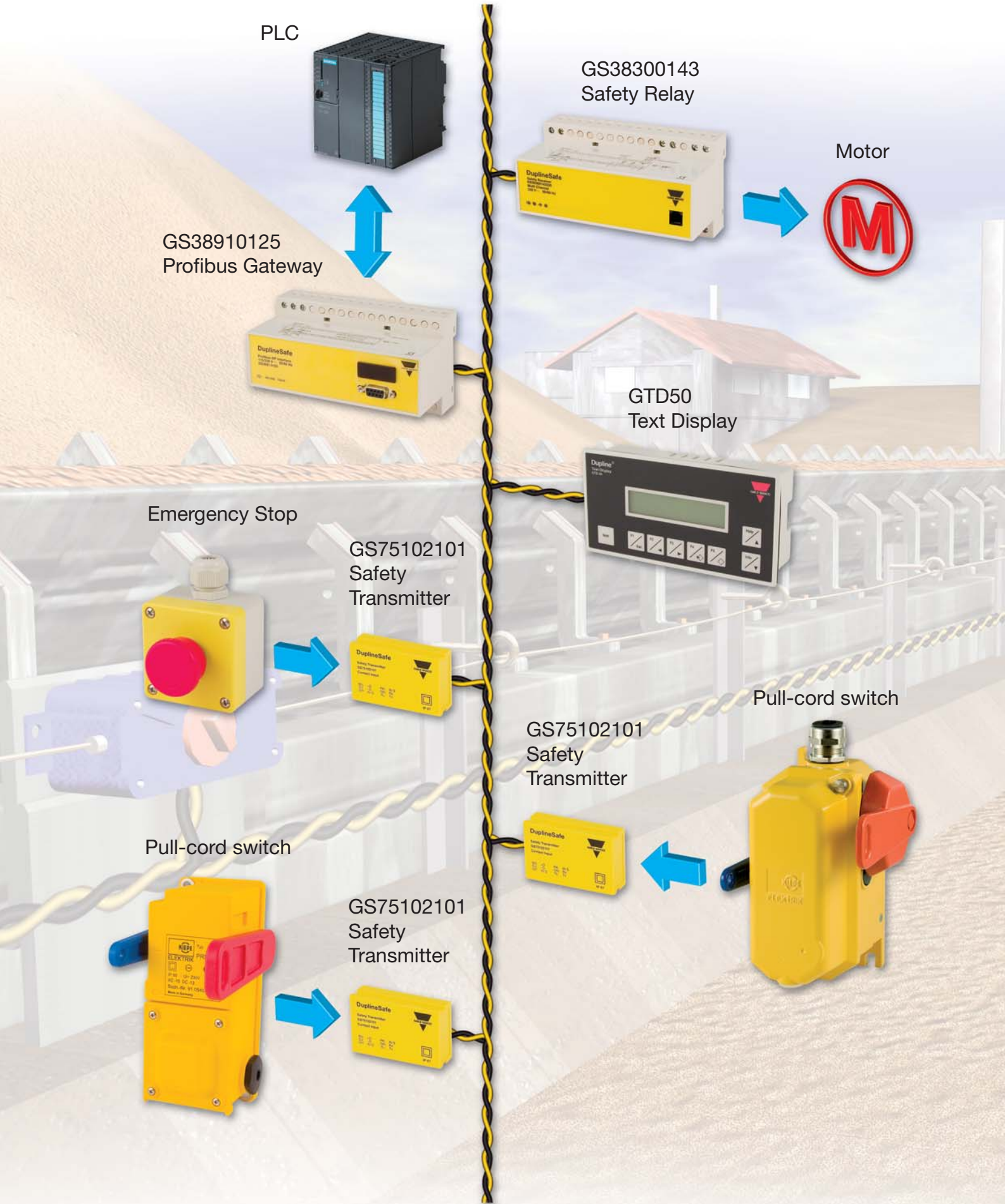
Easy and flexible wiring with possibility to use existing cables

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



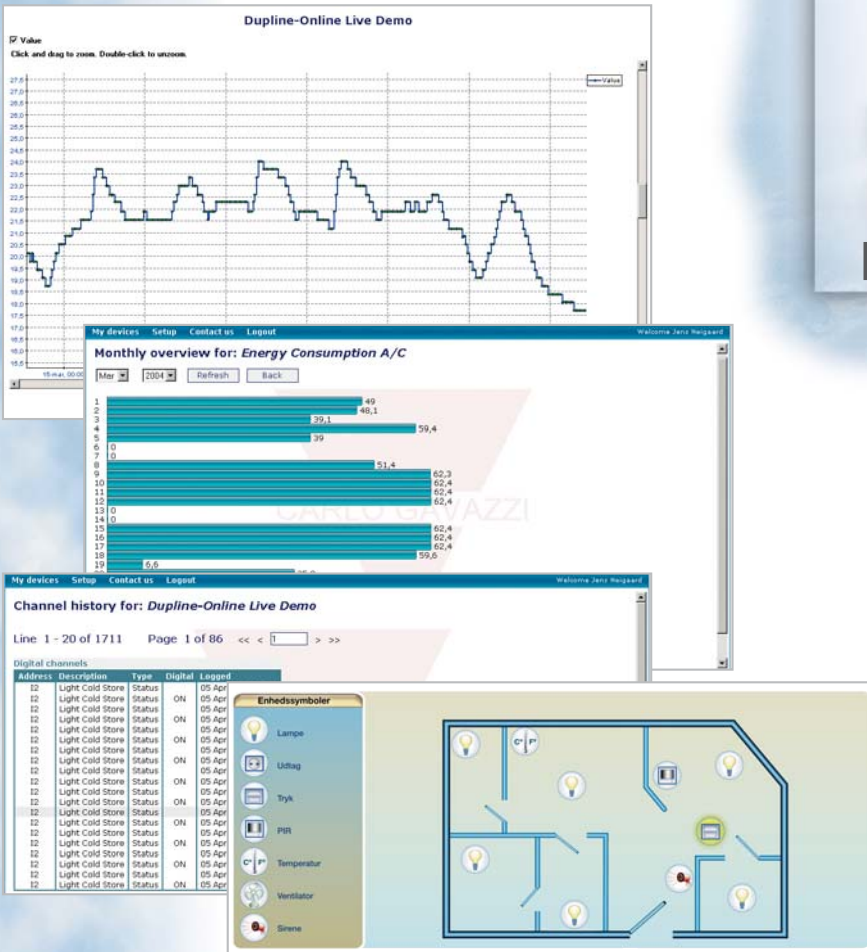
- Monitoring and control of remote or local facilities via GSM, Internet or LAN
- Logging of energy and water consumption, technical alarms, temperature, humidity, flow, level etc.
- High data security and reliability
- Access to real-time and historical data via the Internet or LAN
- SMS alarm messages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



Internet Connection



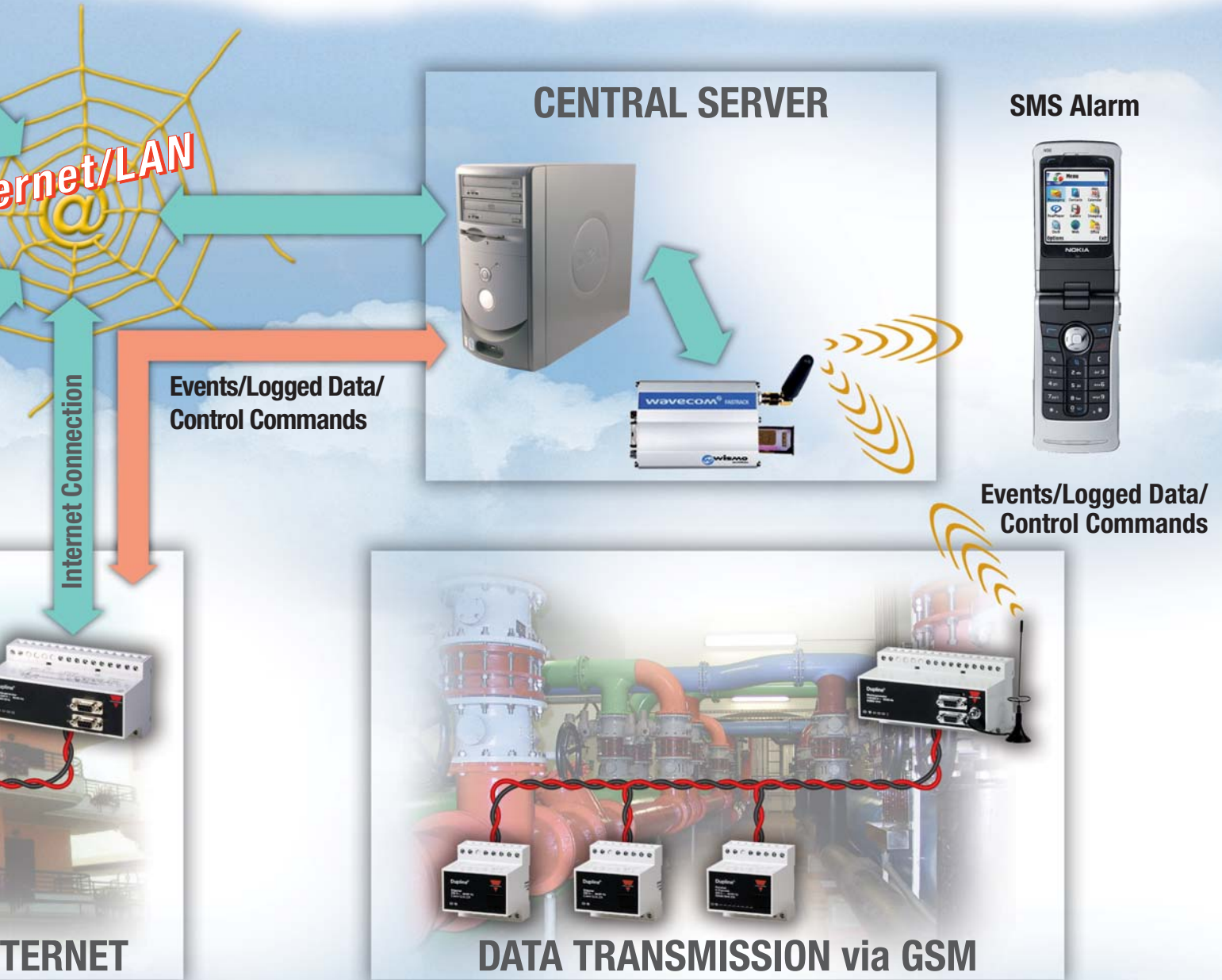
Internet Connection



DATA TRANSMISSION via IN

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

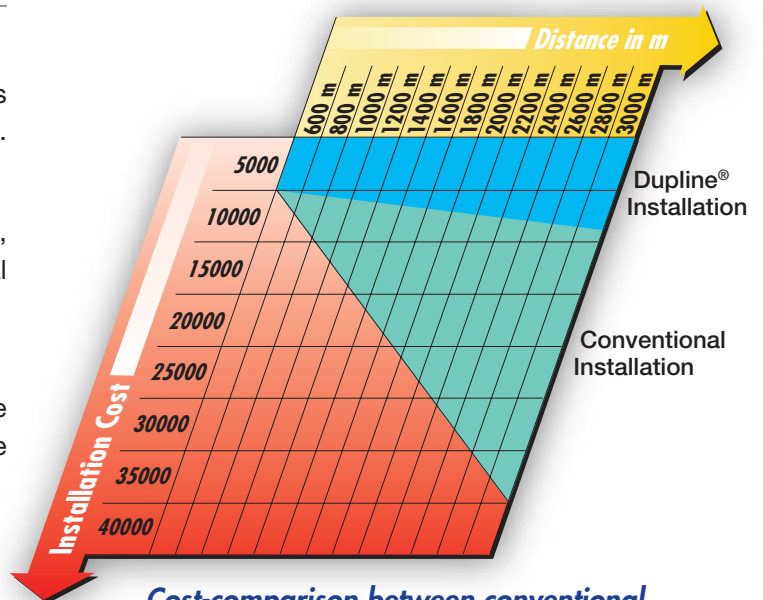
Installation cost savings improve the competitiveness of both the planners and the installation builders.

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)
Functions

77 x 72 x 70
Standard channel generator.

77 x 72 x 70
Plug & Play RS232 /RS485 Interface with built-in protocols for specific PLC brands and Modbus.

77 x 144 x 70
Controller and Modbus Interface with built-in GSM Modem (option) or external Radio Modem. Logger (option).
DIN-Rail, H8.

Housing type

DIN-Rail, H4.

DIN-Rail, H4.

DIN-Rail, H8.

Electrical Characteristics

Number of channels
Features/Signal types

Selectable

Selectable
Possibility for 3-wire operation with DC-power on the 3'rd wire.

Selectable
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
Operating temperature
Storage temperature
Remarks

IP 20
-20°C to +50°C
-50°C to +85°C

IP 20
0°C to +50°C
-50°C to +85°C
Built-in protocol for specific PLC brands for easy interfacing.

IP 20
0°C to +50°C
-20°C to +85°C
Up to 32 controllers can be networked together via RS485 or Ethernet via converter module.

References

Channel Generator

G3490 0000

Optolink

LG

GE-Fanuc

Mitsubishi

Omron

Modbus

Allen-Bradley

Schneider

Koyo

Matsushita

Siemens

Toshiba

IDEC

-GSM Modem, -RS485

+GSM Modem, -RS485

-GSM Modem, +RS485

+GSM Modem, +RS485

-GSM Modem, +RS485,

+Logging

+GSM Modem, +RS485,

+Logging

G3496 0000

G3496 0001

G3496 0002

G3496 0003

G3496 0004

G3496 0005

G3496 0006

G3496 0007

G3496 0008

G3496 0009

G3496 0010

G3496 0011

G3496 0012

G3800 0015

G3800 1015

G3800 0016

G3800 1016

G3800 0036

G3800 1036



	Channel Generators/Interfaces		Digital Input Modules	
Types	G3891	GTI50	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		GTI50		
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	G3891 0120			
8 channel			G3410 5501	
Contact/NPN				G3420 5501
Voltage				G3420 5502

Fieldbus



Digital Input Modules

Types

G4420 7401

G5010

G6391 0240



Dimensions (mm)
Functions

36 x 85 x 58
Input module for counting of pulses from energy meters, item detectors etc.

49 x 22.5 x 56
Dupline powered single input Module.

34.2 x 37.5 x 36.8
Plug-in module to EM4 or WM22 with 2 S0 input contacts for measuring water, gas etc.

Housing type

DIN-Rail, H2.

DIN-Rail, Mini-E.

Plug-in.

Electrical Characteristics

Number of channels

4

1

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.
Powered through the Dupline® network and EM4/WM22.

Power Supply

230 = 230 VAC
724 = 15-30 VDC

Powered through the Dupline® network.

General Characteristics

Degree of protection

IP 40

IP 20

IP 20

Operating temperature

-20°C to +60°C

-20°C to +50°C

0°C to +50°C

Storage temperature

-20°C to +85°C

-50°C to +85°C

-20°C to +50°C

Remarks

Decentral counting.
Counter values stored in non-volatile memory.

References

4 channel Counter

G4420 7401

1 channel

G5010 1106





2 channels

G5010 2206

2 channel plug-in module

G6391 0240



	Digital I/O Modules		Digital Output Modules	
Types	G3440 4443	G3440 5543	G3430 / G3830	G8830 1143
				
Dimensions (mm)	77 x 72 x 70	77 x 72 x 70	77 x 72 x 70 (H4) 77 x 144 x 70 (H8)	26 x 39 x 17
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.	Decentral relay module with 1 x SPST relay for control of lights.
Housing type	DIN-Rail, H4.	DIN-Rail, H4.	DIN-Rail, H4. DIN-Rail, H8 (G3830 5543).	Compact regular, with solid cables. For decentral installation.
Electrical Characteristics				
Number of channels	4	6	1, 2, 4, 8	1
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. 0.7 A NPN transistor. 0.7 A PNP transistor.	1 x 13A/250 VAC relay 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	Powered through the Dupline® network.
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	0°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				Recommended minimum load 100 mA / 12 V.
References				
2 input + 2 output SPST	G3440 4443			
4 input + 2 output SPST		G3440 5543		
1 x 13 A SPST				G8830 1143
1 x 5 A SPDT			G3430 1149	
2 x 5 A SPDT			G3430 2249	
4 x 5 A SPST			G3430 4443	
8 x 5 A SPST			G3830 5543	
8 x 0.7 A NPN			G3430 5511	
8 x 0.7 A PNP			G3430 5521	

Fieldbus



Analog Input Modules

Types

G3429 6470

G3210 1161

G3210 1111



Dimensions (mm)

77 x 72 x 70

Functions

Universal analog input module for external supply.

77 x 36 x 70

Analog input module powered from Dupline® and input signal.

77 x 36 x 70

Dupline®-powered Analog input module for Pt100 temperature sensor.

Housing type

DIN-Rail, H4.

DIN-Rail, H2.

DIN-Rail, H2.

Electrical Characteristics

Number of channels

Selectable

1

1

Features/Signal types

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

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

Operating temperature

0°C to +50°C

0°C to +50°C

0°C to +50°C

Storage temperature

-20°C to +85°C

-50°C to +85°C

-50°C to +85°C

Remarks

Protocol freely selectable (Analink, Multiplexed BCD or 8-bit).

Uses Analink 8-bit protocol.

Uses Analink 8-bit protocol.
Built-in cable compensation.

References

Universel Analog input
Dupline powered analog input

G3429 6470

G3210 1161

-50°C to +40°C

+30°C to +120°C

-10°C to +100°C

G3210 1111

G3210 1112

G3210 1113






	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





Fieldbus



Dupline® Fieldbus: General Purpose




	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 pair-wise.	Operates pair-wise. 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

Fieldbus



	Software		
Types	DUPDATAACC	DUP-SERV-ADD	DUP-SERV-SW
Dimensions (mm)			
Functions	 <p>Software package with DDE-driver and ActiveX driver for G3800. Controller and interface unit.</p>	 <p>A data logging, visualization and alarm handling software package to be installed in a windows based PC.</p>	 <p>A data logging, visualization and alarm handling software package to be installed in a windows based PC.</p>
Electrical Characteristics			
Features/Signal types	All Dupline® signal types. Copy and paste of dynamic Dupline links into EXCEL spreadsheets.	Works only with G3800 xx36. Log and control energy consumption, analog values and digital events and alarms.	Works only with G3800 xx36. Log and control energy consumption, analog values and digital events and alarms.
References			
DDE-Server	DUPDATAACC		
Dupline-Online			DUP-SERV-SW
One Licens		DUP-SERV-ADD	
ADD-Licens to Dupline-Online			
Dupline-Online two licens			DUP-SERV-SW2



Types	Accessories		
	GAP1605	GTD50	GTU8
Dimensions (mm)	120 x 65 x 22	77 x 116 x 41	145 x 90 x 28
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.
Housing type	Handheld.	Panel mounting.	Handheld.
Electrical Characteristics			
Number of channels	NA	Selectable.	Adjusts automatically.
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.
Power Supply	9 V battery.	18-32 VDC	Powered through the Dupline® network.
General Characteristics			
Degree of protection	IP 40	IP 65 (front)	IP 40
Operating temperature	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
Remarks			Options for latching digital signals and for reading multiplexed BCD values.
References	GAP1605	GTD50	GTU8

Fieldbus







	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				
1 channel	DT01	DT02	ETHCONV 2	
2 channels				ETHCONV 3



	Chan. Gen. / Interf.	Digital Input Modules		
Types	G3800	G4420 7401	G5010	G6391 0240
				
Dimensions (mm)	77 x 144 x 70	36 x 85 x 58	49 x 22.5 x 56	34.2 x 37.5 x 36.8
Functions	Controller and Modbus interface with built-in GSM Modem (option) or external radio Modem. Logger (option).	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.
Housing type	DIN-Rail, H8.	DIN-Rail, H2.	DIN-Rail, Mini-E.	Plug-in.
Electrical Characteristics				
Number of channels	Selectable.	4	1	2
Features/Signal types	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.	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.
Power Supply	800 = 10-30 VDC 230 = 115-230 VAC	230 = 230 VAC 724 = 15-30 VDC	Powered through the Dupline® network.	Powered through the Dupline® network and EM4/WM22.
General Characteristics				
Degree of protection	IP 20	IP 40	IP 20	IP 20
Operating temperature	0°C to +50°C	-20°C to +60°C	-20°C to +50°C	0°C to +50°C
Storage temperature	-20°C to +85°C	-20°C to +85°C	-50°C to +85°C	-20°C to +50°C
Remarks	Up to 32 controllers can be networked together via RS485 or Ethernet via converter module.	Decentral counting. Counter values stored in non-volatile memory.		
References		G4420 7401	G5010 1106 G5010 2206	G6391 0240
4 channel Counter	G3800 0015			
1 input	G3800 1015			
2 inputs	G3800 0016			
-GSM Modem, -RS485	G3800 1016			
+GSM Modem, -RS485	G3800 0036			
-GSM Modem, +RS485	G3800 1036			
+GSM Modem, +RS485				
-GSM Modem, +RS485, +Logging				
+GSM Modem, +RS485, +Logging				
2 channel plug-in module				







	Digital Input Modules		Digital Output Modules	
Types	G2110 4401	G8810 1102	G3430 4243	G3430 4249
Dimensions (mm)	66 x 66 x 23	26 x 39 x 17	77 x 72 x 70	77 x 72 x 70
Functions	Alarm input module for use with external sensors in windows, doors etc.	Small size enables it to be installed behind power outlets.	Output module for up/down of two DC rollerblind modules.	Relay module with Interlocking relay for control of 2 rollerblind motors.
Housing type	Open PCB with standard alarm junction box enclosure.	Compact regular with solid cable.	DIN-Rail, H4.	DIN-Rail, H4.
Electrical Characteristics				
Number of channels	4	1	4	4
Features/Signal types	4 x Contact/NPN inputs.	1 x voltage input (90 to 265 VAC).	2 x SPST x 2 DPDT relays 5A/24VDC loads	5 A 250 VAC or 0.25A/250 VDC loads.
Power Supply	Powered through the Dupline® network or from external 10 to 30 VDC supply.	Powered through the Dupline® network.	230 = 230 VAC	024 = 24 VAC 115 = 115 VAC 230 = 230 VAC 824 = 15-30 VDC
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 +50°C	-20°C to +50°C
Storage temperature	-50°C to +85°C	-50°C to +70°C	-20°C to +85°C	-50°C to +85°C
Remarks	Supports Dupline® 3-wire power concept.		Used with G3800 XXXX.	Used with G3800 XXXX.
References				
1 channel compact	G2110 4401 700	G8810 1102	G3430 4243	G3430 4249
2 SPST & 2 DPDT				
2 SPST & 2 SPDT				






	Digital Output Modules			
Types	G3430 4445	G3430 5545	G8230 1143	G8830 1143
Dimensions (mm)	77 x 72 x 70	77 x 72 x 70	40 x 45 x 16	26 x 39 x 17
Functions	4 Channel output module with SPST relay.	Central relay module with 8 x SPST relays for resistive loads.	Decentral receiver for digital signals supplied by Dupline®.	Decentral relay module with 1 x SPST relay for control of lights.
Housing type	DIN-Rail, H4.	DIN-rail, H4.	Compact housing made for PL and OPUS concrete back boxes.	Compact regular, with solid cables. For decentral installation.
Electrical Characteristics				
Number of channels	4	8	1	1
Features/Signal types	16 A 250 VAC	8 x 16A/250 VAC relays Inrush current: <130A.	1 x SPST relay up to 250 VAC / 13 A.	1 x 13A/250 VAC relay Inrush current: <130A.
Power Supply	024 = 24 VAC 115 = 115 VAC 230 = 230 VAC	024 = 24 VAC 115 = 115 VAC 230 = 230 VAC	Powered through the Dupline® network.	Powered through the Dupline® network.
General Characteristics				
Degree of protection	IP 20	IP 20	IP 40	IP 20
Operating temperature	-5°C to +50°C	-5°C to +50°C	-20°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	-50°C to +85°C
Remarks	Bistabile contacts.	Total module load maximum 32 A.		Recommended minimum load 100 mA / 12 V.
References	G3430 4445	G3430 5545	G8230 1143	G8830 1143



	Digital Output Mod.	Dimmers		
Types	G8830 2149	G3448 5134	G3448 5234	G3448 5238
				
Dimensions (mm)	50 x 50 x 30	77 x 72 x 70	77 x 72 x 70	77 x 72 x 70
Functions	Output module for Rollerblind motor.	Dimmer with 1 x 500 W output, and 4 senario functions.	Dimmer with 2 x 230 W outputs, and 4 senario functions each.	Dimmer with 2 outputs (1-10 V), and 4 senario functions each.
Housing type	Compact for mounting in Euro box.	DIN-Rail, H4.	DIN-Rail, H4.	DIN-Rail, H4.
Electrical Characteristics				
Number of channels	2	8	8	8
Features/Signal types	2 x 5 A/250 VAC	1 x 500 W	2 x 230 W	Relay outputs 2 x 250 VAC/10 A.
Power Supply	230 = 230 VAC	230 = 230 VAC	230 = 230 VAC	230 = 230 VAC
General Characteristics				
Degree of protection	IP 20	IP 20	IP 20	IP 20
Operating temperature	-20°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	Built in interlocking to protect motor.	Dimmer speed 3.6 sec (5-100%).	Dimmer speed 3.6 sec (5-100%).	Allows up to 50 mA ballast.
References				
	G8830 2149	G3448 5134	G3448 5234	G3448 5238



Types

	Dimmer	Inductive Sensor	Thermostat
	G3448 5239	G6110 1145	G8110 3394
			
Dimensions (mm)	77 x 72 x 70	55 x 18	FUGA 50 x 50 x 33
Functions	Daylight controller with 2 outputs (1-10 V).	Inductive Sensor. Used to monitor the state of doors etc.	Thermostat with built-in temperature sensor.
Housing type	DIN-rail, H4.	M18 standard alarm.	Fuga and Opus housings.
Electrical Characteristics			
Number of channels	7	1	3
Features/Signal types	Relay outputs 2 x 250 VAC/10 A	1 x digital signal when activated by a metallic object.	
Power Supply	230 = 230 VAC	Powered through the Dupline® network.	Powered through the Dupline® network.
General Characteristics			
Degree of protection	IP 20	IP 67	IP 20
Operating temperature	-5°C to +50°C	-25°C to +70°C	0°C to +50°C
Storage temperature	-50°C to +85°C	-30°C to +80°C	-20°C to +70°C
Remarks	Operates with the G8210 2220. Allows up to 50 mA ballast.		Includes night set-back 4°C.
References	G3448 5239	G6110 1145 G6110 1145-1	G8110 3394 G8210 3394

Types

G8210 3394



Dimensions (mm)

OPUS 66 x 66 x 30



PIR Movement Detectors

Types

G8110 1127

G8210 1128

G8310 1127

G8510 1127



Dimensions (mm)
Functions

FUGA 50 x 50 x 33
Passive infrared detector with built-in transmitter.

OPUS 66 x 66 x 30
Passive infrared detector with built-in transmitter.

25 x 76
PIR sensor for ceiling.

84 x 84 x 48
Passive infrared sensor (PIR) for detection of movement of persons. Used for intruder alarm or light control.

Housing type

Fuga and Opus housings.

Opus housing. Ceiling mounting.

LK ceiling box PL52 and PL55.

ELKO housing.

Electrical Characteristics

Number of channels
Features/Signal types

1

1

1

1

Power Supply

Powered through the Dupline® network.

Powered through the Dupline® network.

Powered through the Dupline® network.

Powered through the Dupline® network.

General Characteristics

Degree of protection
Operating temperature
Storage temperature
Remarks

IP 20
0°C to +50°C
-20°C to +85°C
Detects movements up to 6 meter.

IP 20
0°C to +50°C
-20°C to +70°C
Maximum range 6 m.

IP 20
0°C to +50°C
-20°C to +70°C
Maximum range 6 m.

IP 40
-10°C to +50°C
-30°C to +70°C
Maximum range 10 m.

References

FUGA
OPUS

G8110 1127
G8210 1127

G8210 1128

G8310 1127

G8510 1127

Types





G8210 1127






Dimensions (mm)

OPUS 66 x 66 x 30



	PIR Movement Detector		Mag. prox. sensor	Water sensor
Types	G8910 1127	G8910 2129	G8910 1101	G8910 2116
				
Dimensions (mm)	104 x 55 x 57	104 x 55 x 57	55 x 18	70 x 40 x 16
Functions	Passive infrared sensor (PIR) for detection of movement of persons. Used for intruder alarm or light control.	Passive infrared sensor (PIR) for detection of movement of persons.	Magnetic proximity Sensor. Used to monitor the state of windows etc.	Water Sensor for detection of water on the floor in a building.
Housing type	Direct wall mounting.	Direct wall mounting.	Ø 11 or Ø 14 housing.	Direct wall mounting.
Electrical Characteristics				
Number of channels	1	1	1	2
Features/Signal types	1 x Digital signal when PIR is activated.	1 x Digital signal when PIR is activated.	1 x digital signal when activated by magnet.	1 x signal always activated when sensor is connected. 1 x digital signal when water is detected.
Power Supply	Powered through the Dupline® network.	Powered through the Dupline® network.	Powered through the Dupline® network.	Powered through the Dupline® network.
General Characteristics				
Degree of protection	IP 40	IP 40	IP 67	IP 67
Operating temperature	-10°C to +50°C	0°C to +50°C	-20°C to +50°C	-20°C to +50°C
Storage temperature	-30°C to +70°C	-20°C to +85°C	-20°C to +70°C	-50°C to +85°C
Remarks	Maximum range 10 m.	Used with light controls.		
References				
	G8910 1127	G8910 2129	G8910 1101 G8910 1101-G	G8910 2116
Cable				
M12 plug				



	Smoke Detector	Light Sensors	
Types	G8920 5517	G8511 1120	G8210 2220
			
Dimensions (mm)	Ø 100 x 51	77 x 102 x 40	66 x 66 x 35
Functions	Smoke detector operating according to the Tyndall effect.	Light intensity sensor for indoor and outdoor use.	Light sensor for daylight regulation applications.
Housing type	Direct ceiling mounting.	Direct wall mounting.	Direct ceiling mounting.
Electrical Characteristics			
Number of channels	5	1	2
Features/Signal types	I/01 = Alarm out I/02 = Monitoring of sensor I/03 = Monitoring of battery I/04 = Dirty sensor I/05 = Forced alarming	1 x Analink Range: 0.1 to 100000 LUX and 0.1 to 300000 LUX.	1 x channel for sync. input for light level data. 1 x channel for light level output.
Power Supply	Powered through the Dupline® network.	Powered through the Dupline® network.	Powered through the Dupline® network.
General Characteristics			
Degree of protection	IP 43	IP 44	IP 20
Operating temperature	5°C to +40°C	-10°C to +60°C	0°C to +50°C
Storage temperature	-5°C to +85°C	-20°C to +70°C	-20°C to +85°C
Remarks	Transmission via Dupline® with an individual detection area on 60 m ² .	8-bit resolution.	Works only with G3448 5239.
References			
OPUS	G8920 5517 709	G8511 1120	G8210 2220



Temperature Sensors / Controllers

Types	G8111 2211	G8145 2574	G8611 1010	G8911 1010
Dimensions (mm)	FUGA 50 x 50 x 28	FUGA 50 x 50 x 28	84 x 84 x 37	67 x 35 x 15
Functions	Analink temperatur sensor.	Temperature controller for controlling/monitoring heat or cooling in a single room.	Temperature sensor for indoor use.	Temperature sensor for outdoor use.
Housing type	Direct wall mounting box.	FUGA/OPUS housing.	ELKO	Flat pack sensor housing.
Electrical Characteristics				
Number of channels	2	2 needed + 3 optional	1	1
Features/Signal types	1 x channel sends temperature in Analink format. 1 x channel indicates "heat on". Range: +10°C to +35°C.	Integrated sensor 0-50°C input. Has built-in PID temperature regulator. Can control heat, cooling and night setback. -30°C to +60°C.	1 x Analink Range: -30°C to +60°C.	1 x Analink Range: -30°C to +60°C.
Power Supply	Powered through the Dupline® network.		Powered through the Dupline® network.	Powered through the Dupline® network.
General Characteristics				
Degree of protection	IP 20	IP 20	IP 20	IP 67
Operating temperature	-25°C to +70°C	0°C to +50°C	-30°C to +85°C	-25°C to +70°C
Storage temperature	-30°C to +80°C	-20°C to +70°C	-55°C to +85°C	-55°C to +85°C
Remarks		Must be used with G3800 xxxx for smart-house applications.	8-bit resolution.	8-bit resolution.
References			G8611 1010	
FUGA	G8111 2211	G8145 2574		
OPUS	G8211 2211	G8245 2574		
M12 plug				G8911 1010

Types	G8211 2211	G8245 2574
Dimensions (mm)	OPUS 66 x 66 x 35	OPUS 66 x 66 x 35



Remote Control Modules

Types

G4085 5562

G4185 5531

G8185 5532

G8185 5533



Dimensions (mm)
Functions

63 x 95
IR Remote control transmitter for control of lights, dimming roller blinds etc.

80 x 80 x 37
IR Remote control receiver.

FUGA 50 x 50 x 30
IR-receiver for Dupline® IR remote controller.

FUGA 50 x 50 x 30
IR-receiver for B&O remote control.

Housing type

Handheld.

Direct wall mounting.

FUGA/OPUS housing.

FUGA/OPUS housing.

Electrical Characteristics

Number of channels
Features/Signal types

8
8 x inputs activated by Dupline® handheld remote control.

8
8 x inputs activated by B&O handheld remote control.

Power Supply

Powered by 2 x 1.5 V AA batteries (LR06).

Powered through the Dupline® network.

Powered through the Dupline® network.

Powered through the Dupline® network.

General Characteristics

Degree of protection
Operating temperature
Storage temperature
Remarks

IP 40
-10°C to +45°C
-20°C to +70°C
Designed solely for use with G4185 5531 and G8285 5532.

IP 42
-10°C to +45°C
-20°C to +70°C
Designed solely for use with G4085 5562.

IP 20
0°C to +50°C
-20°C to +70°C
Working with G4085 5562.

IP 20
0°C to +50°C
-20°C to +70°C
Working with B&O remote control.

References

FUGA
OPUS

G4085 5562

G4185 5531

G8185 5532
G8285 5532

G8185 5533
G8285 5533

Types

G8285 5532

G8285 5533



Dimensions (mm)




OPUS 66 x 66 x 30

OPUS 66 x 66 x 30

Fieldbus



Types

	Remote Contr. Mod.	Light Switches	
	G8585 5533	G8110	G8210
			
Dimensions (mm)	84 x 84 x 31	55 x 55 x 11	66 x 66 x 11
Functions	IR-receiver for B&O remote control.	Light switch with built-in bus interface and individually addressable pushbuttons and LED's.	Light switch with built-in bus interface and individually addressable pushbuttons and LED's.
Housing type	ELKO housing.	FUGA design.	OPUS design.
Electrical Characteristics			
Number of channels	8	8	8
Features/Signal types	8 x inputs activated by B&O handheld remote control.	4 x Pushbuttons. 4 x LED indicators.	4 x Pushbuttons. 4 x LED indicators.
Power Supply	Powered through the Dupline® network.	Powered through the Dupline® network.	Powered through the Dupline® network.
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	-20°C to +70°C	-20°C to +70°C	-20°C to +70°C
References	G8585 5533		
Grey colour		G8110 4406	
White colour		G8110 4407	G8210 4406
Light grey colour		G8110 4408	G8210 4408
Charcoal grey colour		G8110 4409	



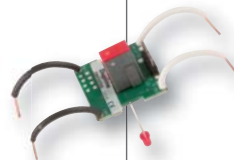
Light Switches

Types

G8510

G8810 4401

G8410 2203/06



Dimensions (mm)
Functions

84 x 84 x 28.5
Light switch with built-in bus interface and individually addressable pushbuttons and LED's.

28 x 28 x 10
Universal light switch interface for use with standard mechanical light switches.

27 x 27 x 12
Decentral digital transceiver designed for GIRA light switch.

Housing type

ELKO design.

Ultrasmall size for decentral installation behind standard light switches.

Open PCB.

Electrical Characteristics

Number of channels
Features/Signal types

6
1 to 3 Pushbuttons (PB).
1 to 3 LED indicators.
Powered through the Dupline® network.

4
4 x Contact inputs.
Powered through the Dupline® network.

2
2 x contact inputs and 3 x LED outputs, where two are external LED's on wire.
Powered by Dupline®.

Power Supply

General Characteristics

Degree of protection
Operating temperature
Storage temperature
Remarks

IP 20
0°C to +50°C
-20°C to +70°C

IP 20
0°C to +50°C
-20°C to +70°C
Max length of input wires 20 cm.

-20°C to +85°C
G8410 2206 has one built-in LED at I/O 7.

References

One button
Two buttons
Three buttons
2 channels
2 channels + LED at I/O 7




G8510 1101
G8510 2201
G8510 3301

G8810 4401


G8410 2203
G8410 2206



Types

	Wireless modules		Power Supply
	G3486 0058	G8186 4407	G3495 0012
			
Dimensions (mm)	72 x 77 x 70	FUGA 55 x 55 x 11	72 x 77 x 70
Functions	Dupline® wireless base unit.	Wireless light switch for smarthouse.	Power supply. Used to supply Dupline® DC modules.
Housing type	H4 Housing.	Direct wall mounting.	H4 Housing.
Electrical Characteristics			
Number of channels	Unlimited	4	
Features/Signal types	Wireless communication with 868 MHz, max. range 100 m.	4 individual inputs with 4 dedicated LED's.	Shortcircuit protected. Output watt = 9.6 W.
Power Supply	230 = 230 VAC	Battery CR2032	115 = 115 VAC 230 = 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 +45°C
Storage temperature	-50°C to +85°C	-20°C to +70°C	-40°C to +85°C
Remarks	Works with G8X86 4407703.	Works with G3486 0058230.	
References	G3486 0058	G8186 4407 G8186 4408 G8186 4409	G3495 0012 G3495 0024
White (FUGA)			
Light grey (FUGA)			
Antracit (FUGA)			
Output 12 VDC			
Output 24 VDC			

Types




	G8286 4406
	
Dimensions (mm)	OPUS 66 x 66 x 11
References	G8286 4406 G8286 4408

Dimensions (mm)




References

White (OPUS)
Light grey (OPUS)






	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
			
Dimensions (mm)	57,5 x 36,0 x 16,4	77 x 144 x 70	28 x 90 x 145
Functions	Bus-powered safety input module.	DuplineSafe signal repeater for extension of transmission distance. DIN-Rail H8.	Configuration and test unit for DuplineSafe.
Housing type	-	-	Handheld.
Electrical Characteristics			
Number of channels	2	Adjusts automatically.	
Features/Signal types	1 x NC contact.	Regenerates the Dupline® signal carrier through channel generator output.	
Power Supply	Powered through the Dupline® network.	024 = 024 VAC 115 = 115 VAC 230 = 230 VAC	9 V battery 6LR61.
General Characteristics			
Degree of protection	IP 67	IP 40	IP 40
Pollution degree	3(IEC 60664)		
Operating temperature	-20°C to +50°C	0°C to +50°C	-10°C to +45°C
Storage temperature	-30°C to +70°C	-50°C to +85°C	-20°C to +70°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		GS3892 0000	GS7380 0080
Cable	GS7510 2101		
Plug connector	GS7510 2101-1		



	Sensors	Direction indicator	Passive indicators
Types	GP6520../GP6540..	GP6565 0201	GP6589..
			
Dimensions (mm)	85 x 85 x 50	110 x 110 x 66	85 x 85 x 50
Functions	Ultrasonic sensors for detection of cars with or without LED indication.	Quick indication of free parking spaces.	Passive indicator for sensor.
Housing type	Direct mounting on ceiling.	Direct mounting on ceiling or wall.	Direct mounting on ceiling.
Electrical Characteristics			
Number of channels	4	4	-
Features/Signal types	1 x signal for occupancy. 1 x signal for booking parking spaces. 1 x signal for booking parking spaces for disabled people. 1 x signal for common calibration.	2 x signals for start marker. 2 x signals for end marker.	No programming. Only wire connected.
Power Supply	3-wire system with Dupline® and sensor supply.	3-wire system with Dupline® and direction indicator supply.	
General Characteristics			
Degree of protection	IP 61	IP 66	IP 61
Operating temperature	-25°C to +70°C	-25°C to +70°C	-25°C to +70°C
Storage temperature	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
References			
Red/Green LED	GP6520 2201	GP6565 0201	GP6589 0101
Red/Blue LED	GP6520 2202		GP6589 0102
Without LED	GP6540 3421		

Fieldbus



Dupline® Fieldbus: Parking Guidance System

Types

4-digit display

GP6763 0104



3-digit display with arrow

GP6763 0105



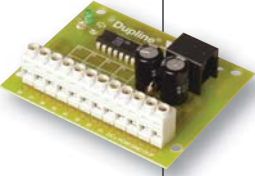
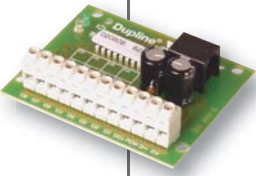
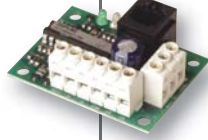
Dimensions (mm)	280 x 140 x 70	600 x 240 x 100
Functions	4- digit display.	3-digit display with built in direction indicator.
Housing type	Aluminium box with clear plexiglass front and black fibre plate as cover.	Aluminium box with frosted plexiglass front.
Electrical Characteristics		
Power Supply	24 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 Characteristics		
Degree of protection	IP 50	IP 65
Operating temperature	-25°C to +70°C	-10°C to +50°C
Pollution degree	3(IEC 60664)	3(IEC 60664)
Humidity	20 to 90% non condensing.	20 to 90% non condensing.
References		
	GP6763 0104	GP6763 0105



	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. Handheld.
Housing type	DIN-Rail, H4.	Fully molded housing for underground installation.	DIN-Rail, H4.		
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). 724 = 20-30 VDC.		Digital, multiplexed BCD and 8-bit analog signals.
Power Supply	Powered through Hi-Line signal (see GH34850000).	Powered through Hi-Line signal (see GH34850000).			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

Fieldbus



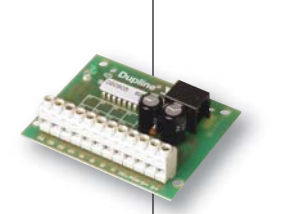
	Input Module	Output Modules	Input/Output Module
Types	G2120	G2130	G2140 4421
			
Dimensions (mm)	Open PCB 72.3 x 59 mm	Open PCB 74 x 59 mm	Open PCB 54 x 40 mm
Functions	8 contact inputs for push-buttons or transistors. LED indications for supply and carrier.	8 outputs for control of floor indicators 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)
Functions

Open PCB 74 x 59 mm
4 push-button inputs
4 transistor outputs
LED indications for supply and carrier.

Open PCB 86 x 54 mm
128 signals
RS 485/RS 232 interface to control system
LED indications for supply, carrier and RS485Tx.

77 x 72 x 70
Plug & Play RS232 /RS485 Interface with built-in protocols for specific PLC brands and Modbus.
DIN-Rail, H4.

Housing type

Snap locks or DIN-rail (vertical or horizontal).

Snap locks or DIN-rail (vertical or horizontal).

Electrical Characteristics

Number of channels
Features/Signal types

8
3-wire operation with DC-power on wire 3.

128 inputs and 128 outputs.
3-wire operation with DC-power on wire 3.

Selectable.
Possibility for 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
Operating temperature
Storage temperature
Remarks

-20°C to +50°C

-20°C to +60°C

IP 20
0°C to +50°C
-50°C to +85°C
Built-in protocol for specific PLC brands for easy interfacing.

References

- NPN outputs
- PNP outputs
- Standard protocol
- Lucky Goldstar K-series
- GE-Fanuc 90-30 series
- Mitsubishi FX & A-series
- Omron
- Modbus RTU Slave
- Allen-Bradley
- Schneider
- Koyo
- Matsushita
- Siemens
- Toshiba
- IDEC

G2140 5510 700
G2140 5520 700

G2196 0000 700
G2196 0001 700
G2196 0002 700
G2196 0003 700
G2196 0004 700
G2196 0005 700

G3496 0000
G3496 0001
G3496 0002
G3496 0003
G3496 0004
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Fieldbus