Doepke

Dupline

Bus System

Planning Aid and Product Information

February 2016 - v2.50

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Chapter 5 - System Components

Chapter 1 Introduction

1.1 General

It has long been accepted in the industrial technology sector, and now it has also become an established part of building installation technique: bus technology.

It enables you as the planner, installer or switching system designer, economically to meet the requirements of your customers in regards to

- Comfort,
- Security,
- flexible utilisation of rooms,
- open communication interfaces and last, but not least,
- minimalizing energy and operating costs.

We too - being specialists in equipment and safety technology - want to offer you the possibility of fulfilling your customers' wishes with our Dupline bus system. Dupline combines easy handling with the flexibility of a bus system. Thanks to its insensitivity to interference and the wide range of products available, it is ideally suited for extensive outdoor applications, such as camping sites and yacht marinas. However, indoors too Dupline can demonstrate its strengths: easy to configure shutter controls, temperature monitors and even fire alarm systems provide straightforward solutions to identifiable problems.

Outstanding characteristics of the Dupline system include its multi-faceted bus technology and the easy installation of the bus. This allows the installer to concentrate on providing the solutions to customers' requirements without having to worry about the technical implementation of the automation system.

1.2 About this Document

This planning aid is intended to acquaint you with the Dupline building automation system and to enable you to plan practical solutions. Because of constantly growing requirements and the new components associated with them, and in line with our policy of continual improvement to existing components and product-relevant optimisation, this document is also subject to frequent changes. In order therefore to ensure that this planning aid is always up-to-date, from now on you will be able to access the newest version online on our homepage at http://www.doepke.de/uk.

If you have any further questions or suggestions please don't hesitate to ask for our support, by e-mail via support@doepke.de or by telephone on +49 4931 1806-888.

1.3 Abbreviations and Terms

Abbreviation	Description
AC	Alternating current
AP	Surface-mounted
Configuration	Adaptation of device's settings to the current application: Some components as „objects“ in ProLine or devices, need settings which determine the device's configuration.
Dupline+	Dupline signal conductor (+)
Dupline-	Dupline signal conductor (-)
DC	Direct current
E/A	Input/Output (I/O) General term for components of bus systems
EEPROM	Electrically-Erasable Programmable Read-Only Memory
EMC	Electromagnetic compatibility
Encoding	Assignment of the Dupline address to a component: When encoding, the Dupline component gets an address (e.g. B5) which enables the device to exchange data with other device.
Firmware	Process or operating system: This „software“ most often is located on fixed programmed, intelligent devices as e.g. DKG 1. It makes basic functionality available.
FPROM	Flash Programmable Read-Only Memory: Memory module, which is permanently programmed with data by applying a voltage.
HMI	Human Machine Interface: Previously called „Men Machine Interface („MMI“), today also called „SCADA“ (see „SCADA“).
LCD	Liquid crystal display
LED	Light emitting diode: Light emitting semiconductor diode
Modbus	Protocol for data exchange via serial interfaces; „Modbus I RTU“, the basic protocol, has been standardised by Messrs. Gould Electronics.
NPN-Transistor	Semiconductor component with np-junction for switching currents: This design permits the switching/controlling of loads which are connected to the supply voltage (e.g. +24VDC).
PCB	Printed Circuit Board
PELV	"Protective Extra Low Voltage", formerly called Operational Low Voltage with Safe Disconnection"; offers protection against electrical shock. It is covered in EN 50178.
PNP-Transistor	Semiconductor component with pn-junction for switching currents: This design permits the switching/controlling of loads which are connected to neutral.
Programming	This, in general, is the configuration (see above) of the channel generator by means of „ProLine“ - there, objects are inserted and configured.
REG	DIN-rail mounted device (device for mounting on distribution facility)

Abbreviation	Description
SCADA	Supervisory Control And Data Acquisition: Software or device that offers the possibility to display and/or to modify process signals.
SELV	"Safety Extra Low Voltage" (formerly "Protective Low Voltage") is a low electrical voltage which, when compared to circuits with higher voltages, offers special protection against electrical shock, due to its low rating and its insulation.
Touch Screen Panel	Touch and control panel: Screen which enables commands to be input by directly touching the screen surface.
UP	Flush-mounted
VAC	AC voltage
VDC	DC voltage

1.4 Related Dokuments

Reference	Description	
[1]	ProLine Configuration Software for the Dupline Bus System - User Manual	59 00 126
[2]	ProLine^{NG} Configuration Software for the Dupline Bus System - User Manual	59 00 142
[3]	Dupline System-Katalog (Carlo Gavazzi GmbH)	CAT DUP GER 13 06/00
[4]	DRTconf Configuration Software for the Dupline DRT 2 Room Thermostat - User Manual	
[5]	German only: DPCamp Diagnose- und Schnittstellensoftware für Freizeitanlagen mit dem Dupline-Bus - Benutzerhandbuch	3931290
[6]	Dupline Modbus Command Reference Modbus Reference for DSI 1 and DKG 20/DKG 21-GSM	

1.5 What is Dupline?

1.5.1 General

Dupline is not a new bus system. This product from Messrs. Carlo Gavazzi stands the test for many years in more than 100,000 industrial applications and has now been optimized for use in building installation by Doepke. By observance of the absolute compatibility between the products of Carlo Gavazzi Industri A/S and those of Doepke, you are able to fall back on a very large product range. Ask us!

1.5.2 The Technology

Dupline is a programme of modules for transmitting signals, which can be configured to provide economic solutions for a very wide range of applications in the industrial sector as well as in building installations.

This system for signal acquisition and remote control could also be termed as follows:

- Building installation bus
- Field bus
- Remote actuating system
- Field multiplexer
- Remote I/O system
- Remote control system
- Decentralized signal acquisition and control system
- Transmission system for monitoring and control
- etc.

The basic function of Dupline can be summed up as follows:

Input of different signals at various remote locations, transmission of these signals to different locations and output of the signals either in the form in which they were input or in a different form. As opposed to conventional point-to-point wiring of all signals in one system, with Dupline all signals are routed via only two industry-standard wires.

The simplicity of Dupline's application makes it very attractive for installers, electricians and control cabinet manufacturers, who want to achieve a reduction in manpower and cabling costs. Dupline is also the ideal system for connecting widely branched monitoring and control signals to a central location, e.g. indicator/control boards. Such facilities and devices can range from e.g. simple push-buttons and indicator lamps, to control programmes for PCs or touch screen panels.

With Dupline almost every building system signal or process (digital, analog, counter, level, temperature etc.) can be connected and transmitted to any desired location.

As opposed to systems which transmit a specific number of signals from A to B, the transmission with Dupline works fully bi-directional and the cable can be branched in many directions. A signal may be received anywhere along these two wires and as often as necessary. At the same time, a signal can be locked on for transmission at any desired point of the two wires.

1.5.3 The Quality

All components of the Dupline system is permanent subject to quality controls, no matter whether within the scope of ISO 9001, CE certification or Europe standardisation, no matter whether the products are manufactured in Denmark or Germany.

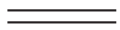
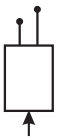
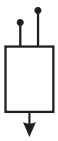
But we also know that quality can not only be described by guidelines. Therefore, many proposals and suggestions for improvements from planners, electrical fitters and end users flow into the design and the handling of our components.

Chapter 2 Dupline - The Basics

2.1 System Configuration

2.1.1 Overview

A Dupline system basically consists of four components:

Component	Symbol	Description
Two wires		A pair of wires connects all Dupline components with each other and thus permits the signals to be relayed.
One channel generator		The channel generator provides the carrier signal on the Dupline bus lead. This signal permits the components of the bus to exchange data by means of the time multiplex method.
Input modules		Input modules, or inputs for short, within a Dupline system detect the switching status or pick up analog data and make these available to other items connected to the bus.
Output modules		Output modules, or outputs for short, emit the signals of the Dupline system, e.g. via relays or instruments.

Inputs and outputs are devices with at least one channel which are connected in parallel via the Dupline net. They can be divided into two categories: those with their own power supply and those without.

Devices with their own power supply should be used wherever possible, because they do not use the Dupline signal as their source of power and thus increase the maximum transmission distance of the whole system.

Devices without their own power supply are supplied directly by the Dupline net. This type of input and output is designed for decentralized measurement acquisition and signal output at locations where no external power supply is available. These devices act as a load on the Dupline bus so that the maximum transmission distance is reduced.

Generally speaking, the maximum allowed distance between the sensors (e.g. contacts, measuring devices) and the input devices is dependent upon the environment; the distance at the input side may not exceed 1 m.

Combined inputs and outputs such as e.g. the DRM 4, provide a practical addition to the Doepke Dupline system. But as they function like standard components they are not specifically listed here.

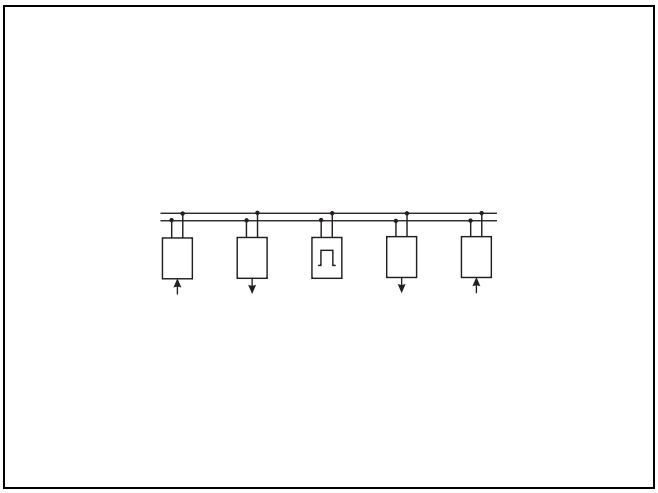
This chapter deals with the structure of single Dupline systems; networks consisting of single systems are described in **Chapter 3 "Networks and Visualisation"** on **Page 16**.

2.1.2 Transmission Line Structure

The principle of data transfer with Dupline systems means that the requirements for the mechanics and configuration of the bus are minimal. Installation of the transmission line may be linear, star-type, ring-type or any combination of the above.

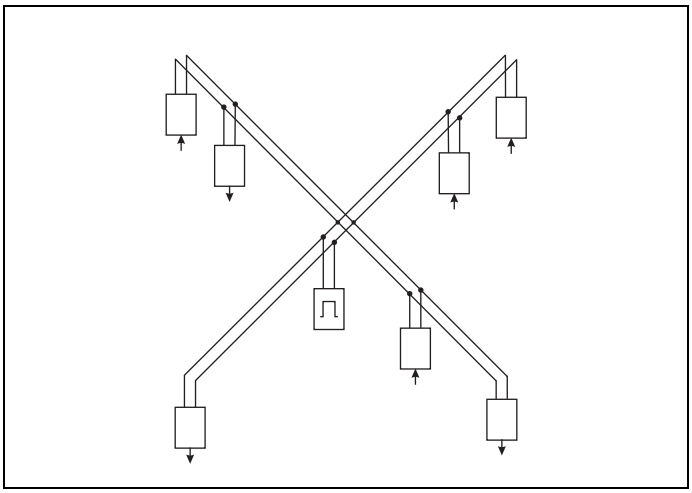
The following diagrams illustrate the possibilities:

Linear Installation:



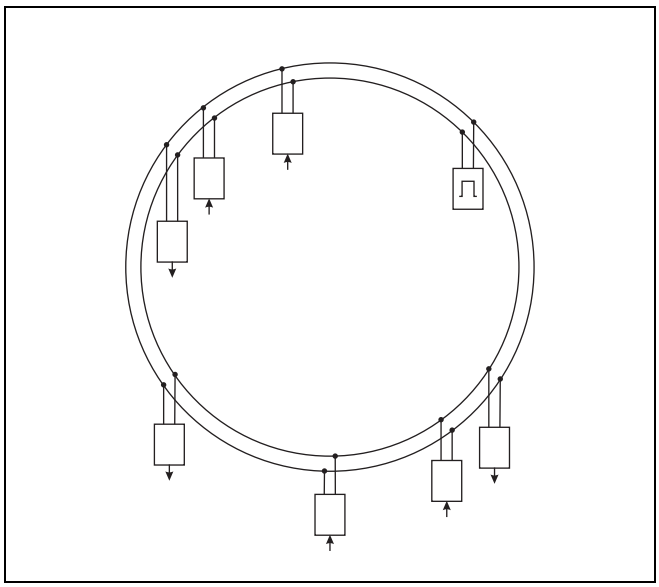
With a total bus line length of approximately 10 km this type of configuration is probably the most frequently used.

Star-type Installation:



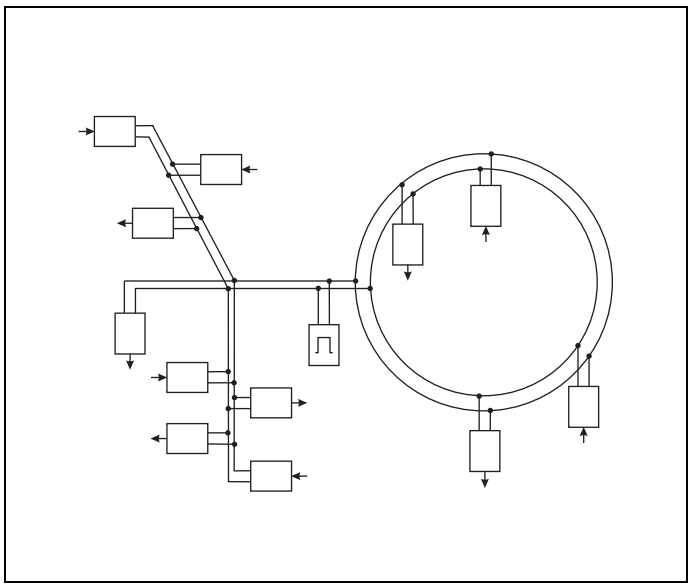
In order to calculate the total bus line length of this type of installation it is only necessary to add the lengths of the two lanes.

Ring-type Installation:



With ring-type installations the circle may be closed.

Combined Installation:

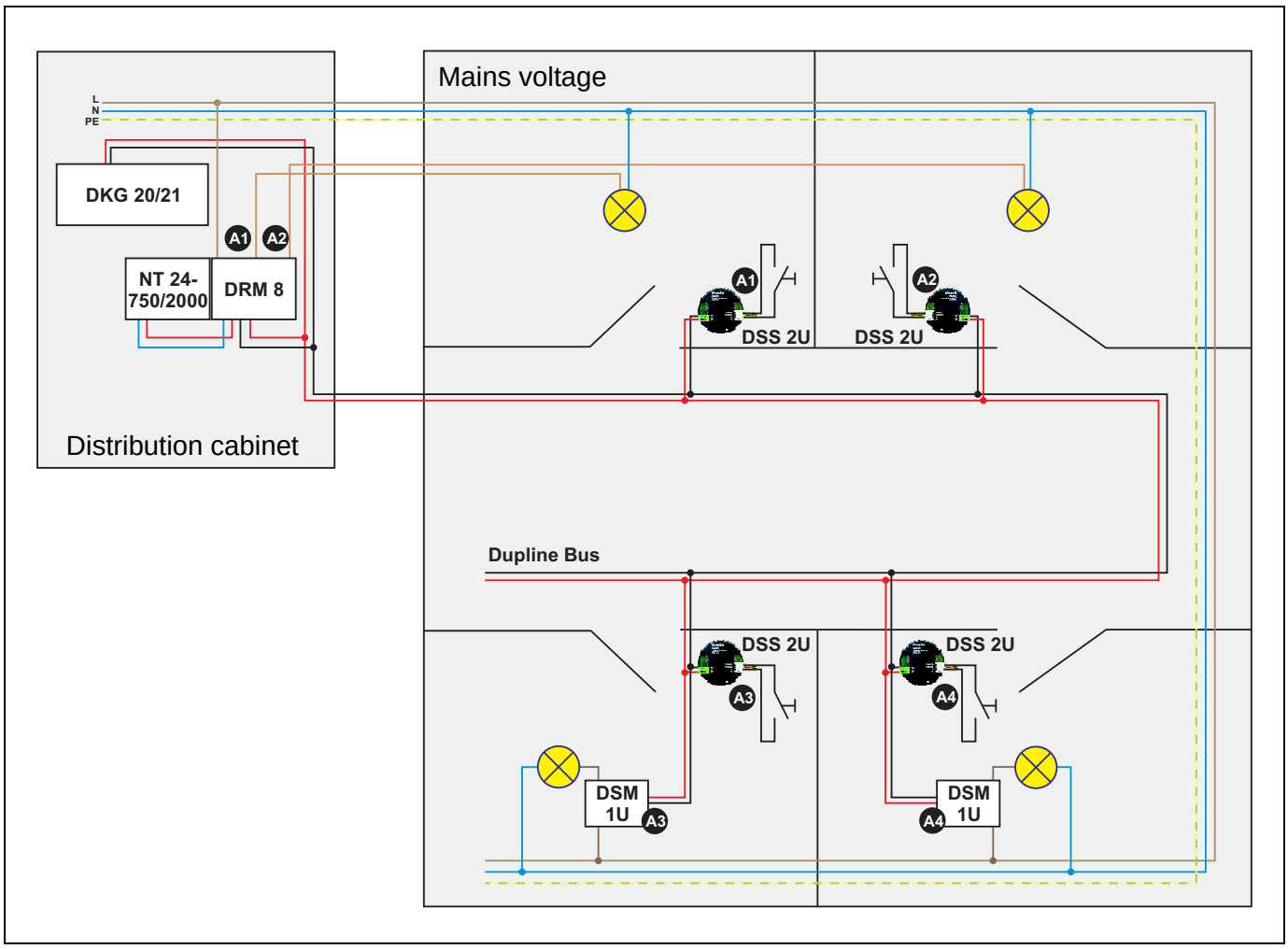


With combined installations all the lengths of the individual lanes must be added together.

Note: Interlocked, closed rings are not allowed.

2.2 Types of Wiring

The following illustration shows two differing types of wiring for the Dupline bus system:



Central system

The lower section shows a purely decentral wiring layout: the DSS 2U sensors, together with the DSM 1U output devices are supplied by the bus signal. Here the advantage of the simple wiring procedure is countered by the more labour-intensive maintenance of components, which are generally located in flush-mounted installation boxes.

Central and decentral system

In the upper section you can see a mixed wiring layout, i.e. central as well as decentral wiring. Here the lamps are switched by the DRM 8 central output device located in the distribution cabinet, while the switches are linked via the DSS 2U decentral operating signal sensors. When compared to the decentral system, the central wiring system has two important advantages: it is cheaper and maintenance of the components is easier. However, the more involved wiring in this latter system is a distinct disadvantage.

2.3 The Basic Principle of Dupline

2.3.1 General

Irrespective of how you design the Dupline system - the illustration in **Chapter 2.2** also shows the basic principle of Dupline, according to which the actuators (here DSM 1U and DRM 8) are generally assigned the same address from the available address range A1...P8. Frequently, however, the separation of input and output signals is also employed, e.g. in cases where links to additional sensors are to be created, such as light sensors or proximity detectors.

Another principle of Dupline is that several actuators or sensors may have the same address. This is particularly suitable when e.g. several switches are to switch the same electrical loads, or where there are several electrical loads that are to be switched simultaneously. A typical example of this would be a long hallway with many switches and lamps.

2.3.2 Assigning Addresses

Nearly every input and output component in the Dupline system requires an address from within the range A1...P8 in order for it "to feel addressed". Assigning the addresses can be carried out in various ways:

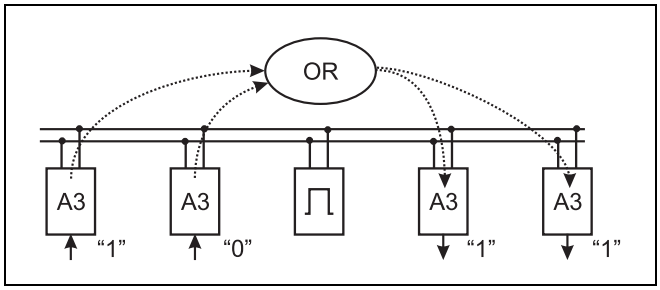
1. Using the DHK 1 hand encoder:
   - operating signal sensors DSS 2U/DSS 4U/DSS 8U/DSS 4R, DBA
   - sensors DTS 1, DPM 1, DBM 1, DWS 1, DRD 3, DIR 2, DLUX, ...
   - relay modules DSM 1U, DSM 4M
   - dimmers DDM 1Rplus, DDMU 1Rplus, DDM 2plus, DDMU 2plus
2. At the device itself:
   - pulse counter DTZ 4
   - radio bus gateway DCI 3FB
   - shutter and relay modules DRM 4 and DRM 8
3. By means of additional software:
   - thermostat DRT 2, touch panel DSC

Irrespective of the method of assigning addresses, the following will apply:

- Any channels not used should always be left uncoded, i.e. they should not be assigned an address, and any pre-assigned addresses should be deleted.
- With output modules (e.g. relays) it is generally possible to define the mode of the outputs in cases of a system fault occurring (e.g. cable break).

If an input and an output have the same address, then the input signal is transmitted directly to the output by a channel generator which has been configured correspondingly. The same address can also be assigned to several input devices so that they act as an „Or“ function. If several outputs have the same address as an input, the input signal will act on all outputs. It is therefore possible for one input signal to be output at several locations simultaneously.

The following diagram illustrates the input of two signals at address A3 with an output at two devices:



For information regarding the hand encoder refer to **Chapter 5.9.1 "DHK 1: Hand Encoder"** on **Page 147**.

2.3.3 Configuration of Channel Generators

The functioning between input and output (e.g. toggle switch function, timer, etc.) is always defined via the configuration of the channel generator with the ProLine software for the relevant address - the majority of Dupline components do not possess intelligence of their own. Only when the configuration is downloaded to the channel generator will the system be able to function.

For further details regarding the configuration of channel generators with ProLine software refer to [1] and [2].

2.4 Signal Transmission

2.4.1 Introduction

Dupline is a bus system based on a time-division multiplex method. The basic idea of this method is to record signal values at fixed times and to transmit them on only two wires, which otherwise are sent on parallel wires („channels“).

In Dupline, this method is realised for in all 128 signal values which means, that every value is transmitted in each cycle. Since the naming of the channels with pure numbers from 1 to 128 is difficult to understand, an address value is assigned to each channel. Thus the signals transmitted by Dupline can be called either „channels“ or „address values“.

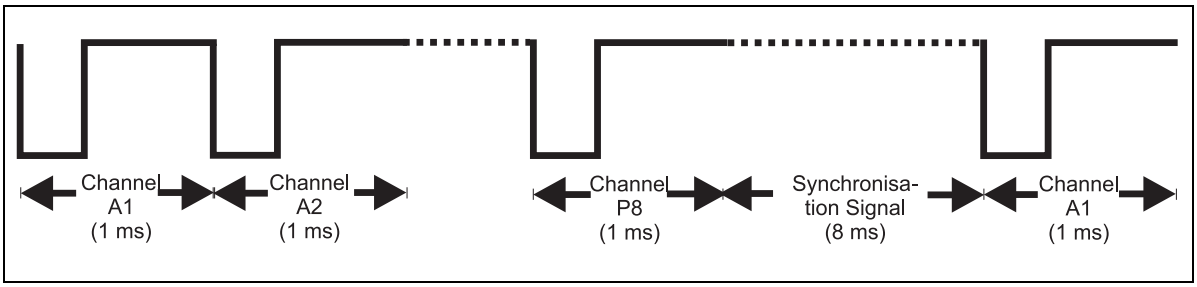
Contrary to other bus systems these addresses, or channels, do not serve as a physical response to inputs or outputs but represent a function, e.g. input and output signals. Such a function could be - to quote the simplest example – the switching of a lamp. This function is then carried out simply by the configuration of the input and the output with precisely this address.

If the input now switches the signal on (i.e. it activates the function), the output will react accordingly.

2.4.2 Carrier Signal and Channel Addresses

Inputs and outputs require a „transportation“, so called „carrier signal“, for transmission of signals; this one is generated by the channel generator (DKG).

This carrier signal consists of a synchronising signal of 8 ms length and up to 128 channel pulses each with a length of 1 ms. The following diagram illustrates the signal sequence and the address assignment:



The channel pulse following immediately after the synchronising signal is always assigned to channel address A1. In general, the cycle time T_{cyc} with n channels can be expressed by the following equation:

$T_{cyc} = 8\ ms + 1\ ms \times n_{channels}$

As the figure above illustrates, a definite address is assigned to each channel; the addressing of these channels is in groups (A to P) of 8 channels each (1 to 8). With a maximum configuration of 128 channels, the first channel has the designation A1 and the last the designation P8.

With the aid of the “ProLine“ configuration software, the number of channels within the 16 to 128 range can be set up, in steps of 8 channels, so that depending upon the channel number the following addresses and cycle times result:

Number of Channels	Addresses	Cycle Time
16	A1..B8	24 ms
32	A1..D8	40 ms
64	A1..H8	72 ms
128	A1..P8	136 ms

For further information on the channel generator and its functions see **Chapter 5.2 "Central Units"** on **Page 28**.

2.4.3 Transmission Procedure

2.4.3.1 Overview

On the Dupline bus there are three different transmission formats for relaying input data:

- Control status (ON/OFF)
- Counter values
- Analog measurements by the AnaLink method

This chapter shall give you an insight into the details of the transmission methods, that however goes far beyond the absolute necessary knowledge about Dupline.

2.4.3.2 Control status

This standard transmission format is employed in the majority of standard inputs and outputs. It represents, for example, the status of a switch, i.e. “OFF“ or “ON“ and uses exactly one freely programmable channel. Such control states are also called “binary coded values“.

2.4.3.3 Analog measurements (AnaLink)

Analog measurements can be transmitted as AnaLink or as BCD data (see following chapter).

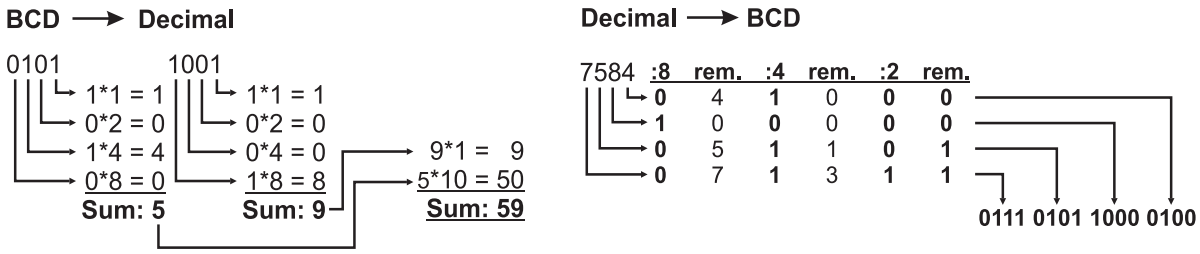
With the AnaLink procedure the data are transmitted serially via only one freely eligible channel or address, e.g. "P5". In this process the states ("0" or "1") are added up over a total of 256 cycles. This means that, in an extreme case, nothing but "0" values equate to an analog value of 0%, while nothing but "1"s correspond to 100%. The absolute value will always depend upon the measuring range of the sensor.

Because of the serial transfer this procedure is primarily suitable for the transfer of slowly graduating measurements.

2.4.3.4 Counter data (time-division multiplex method)

In the transfer of counter/meter data a distinction should be made between the transfer format and the transfer mode of the data:

The **transfer format** for counter/meter data is normally by means of the so-called BCD representation. This representation is based on decimal points (power of ten) in which the values 0 to 9 are each expressed by 4 bits. The following diagram illustrates the conversion of data into BCD representation and of BCD into decimal format:



The number of BCD places used (and thereby the number of Dupline channels used) generally depends upon the range of the input channels. Thus the DTZ 4 pulse counter (see **Chapter 5.3.14 "DTZ 4: 4-Channel Pulse Counter/Hours-Run Meter, DIN-Rail"** on **Page 79**) can, for example, be configured for ranges up to 99, up to 9,999 or up to 99,999,999, thus requiring up to four channel groups for the transfer.

If you wanted to transfer several data in BCD format, the total number of available Dupline channels would soon be exhausted. For this reason an additional **transfer mode** was introduced: the time-division multiplex method. This procedure permits the transmission of data from several independent channels via

the same channels.

The selection of the counter/meter readings to be transmitted is carried out with an address mechanism via the channels B2 to B8: the channel generator writes a bit sample to these addresses which corresponds to that set of the input channel. If the input module recognizes "its" address, it makes the appropriate counter/meter reading available on the configured channels of the bus.

The firmware up to version 1.03 of channel generators DKG 1/DKG 2 does not support this type of counter value transmission. Generators from version 3.0 and also DKG 20 and DKG 21-GSM are able to handle up to 128 counter values.

Chapter 3 Networks and Visualisation

3.1 Networks

3.1.1 Overview

The use of Dupline in large buildings or commercial installations may result in requirements exceeding the 128 channels made available by a single system. Frequently it will be possible to use several Dupline systems which work independently of each other. However, if data are to be exchanged between the systems then interlinking is unavoidable.

DKG 20 and DKG 21-GSM are designed for interlinked applications. Although DKG 1 and DKG 2 are able to be interlinked, we will not go further into this: The effort is too high. Of course we offer corresponding documentation on demand, e.g. if you would like to extend existing installations.

3.1.2 Installation of RS485-Networks

When setting up a RS485 network with DKG 1, DKG 2, DKG 20 and DKG 21-GSM please note the following points:

- A linear layout is essential: running continuously - **not** radially - from DKG to DKG.
- Use only twin-core, shielded cabling; the shielding must reach all bus members. The cross-section of the cabling should be at least 0.8 mm.
- The shielding should be low-impedance connected to earth potential.
- The maximum cable length from the first to the last DKG is limited to **1000 m** at max. 115,000 baud.
- You should provide a **termination** at the first and the last bus member (in the case of DKG 20/DKG 21 by inserting jumper wires).
- It is recommended that you **install all DKGs** of a network **at one location** and thus benefit from the advantage Dupline has over the RS485 network: the long cable lengths.

3.1.3 Networks with DKG 20 / DKG 21-GSM

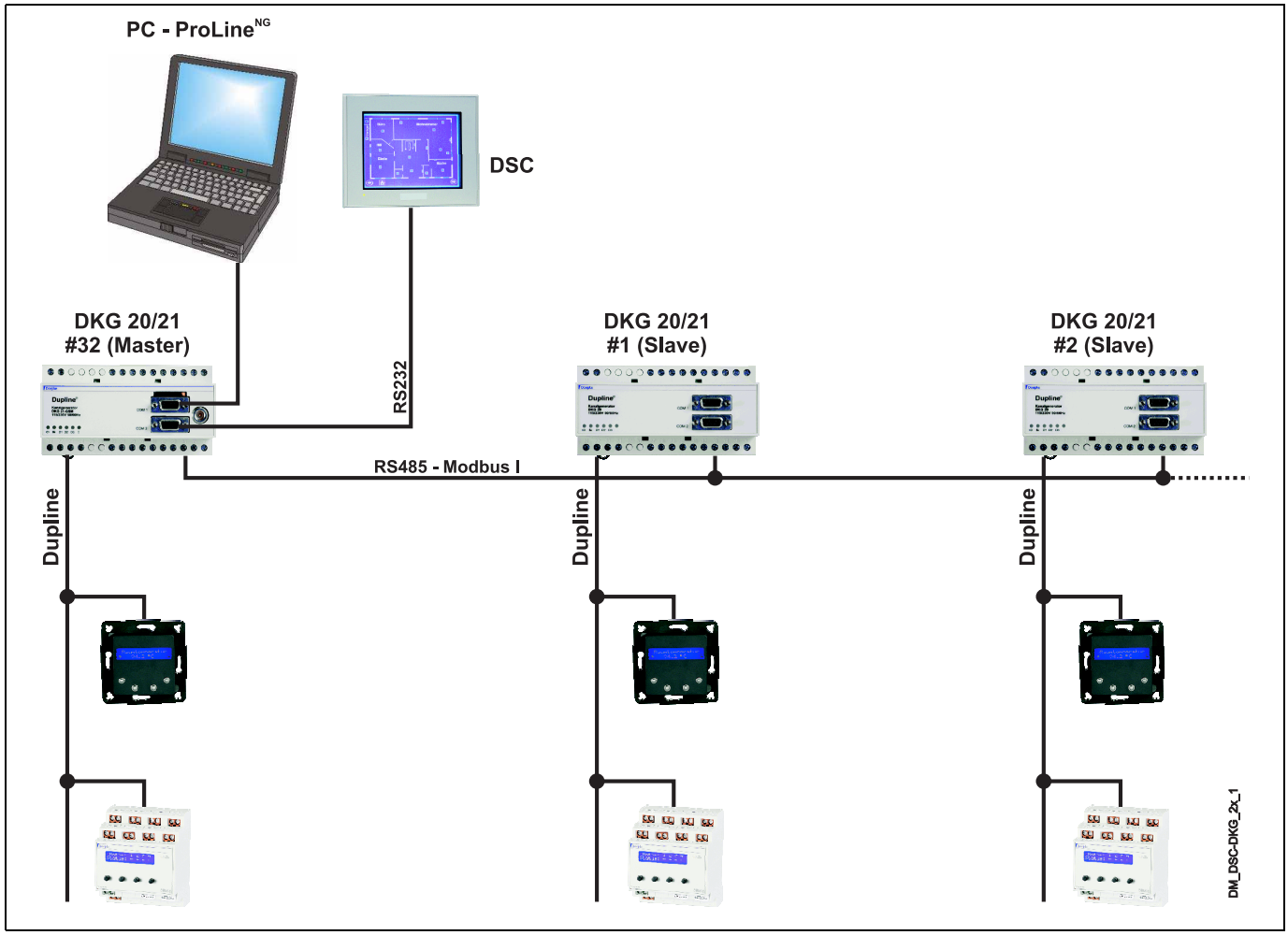
The new generation of channel generators (DKG 20 / DKG 21-GSM) have been equipped with an enhanced Modbus interface offering the following advantages:

- Up to 32 channel generators can be linked to form a network;
- Interface converters are no longer required (RS485 connection is direct at the DKG);
- Configuration of all network members is via the PC connected to the master - in addition, the DCI 2 allows remote configuration (see **Chapter 5.7.2** on **Page 128**);
- Automatic data transfer by the channel generator configured as master, i.e. a PC or touch screen is no longer required;
- Easy access to data of other channel generators by means of external references;
- Visualising is possible at every DKG (with some qualifications; see **Chapter 3.2 "Visualisation"** on **Page 18**);
- Synchronisation of clocks of all DKGs via the master in the network;
- Network masters (device address 32) do not deliver any Analog-Multiplex values.

When setting up such a network please note - in addition to the points in **Chapter 3.1.2 "Installation of RS485-Networks"** on **Page 16** - the following:

- Allocation of device addresses to the slaves should start with "1" and be consecutive; i.e. gaps in the numbering are to be avoided as these may cause delays in communication.
- If a DCF and / or GSM antenna is to be connected to the master, it is important to select the correct positioning. Such antenna may normally not be fitted in the distribution box.

For details on installation and operation refer to the operating instructions for the DKG 20/DKG 21-GSM and to **Chapter 5.2.2 "DKG 20 / DKG 21-GSM: Channel Generators, DIN-Rail"** on **Page 33**. The following illustration shows the layout of a modbus network with DKG 20 and DKG 21-GSM:



Please note that the visualisation at several PCs or touch panels is a functionality of the visualising software and hardware.

3.2 Visualisation

3.2.1 Overview

Dupline offers numerous possibilities of visualising: the open modbus protocol permits the linking of the most diverse display devices (HMI or SCADA) from PC to touch screen.

There are two basic ways of linking:

1. Directly at the serial port of the channel generator, or
2. Via the DSI 1 modbus interface.

The following table illustrates which functions in respect of visualisation are available with the individual system configurations:

	via DKG					via DSI 1				
	Channel Switch Status (read/write)	AnaLink Values (read-only)	Counter Values (read-only)	Setpoint Values (read/write)	Switching Times (read/write)	Channel Switch Status (read/write)	AnaLink Values (read-only)	Counter Values (read-only)	Setpoint Values (read/write)	Switching Times (read/write)
One DKG 1/DKG 2				-	-			-	-	-
One DKG 20/DKG 21-GSM								-	-	-
System with two DKG 1/DKG 2	-	-	-	-	-			-	-	-
Modbus Network DKG 1/DKG 2				-	-			-	-	-
Modbus Network DKG 20/DKG 21								-	-	-

Detailed information on networks in provided in **Chapter 3.1 "Networks"** on **Page 16** above.

Note: If, for example, you want to employ several touch screens, which are to have access to the same data records, then this can be accomplished within one network by using several DSI 1s.

3.2.2 Visualising at the Channel Generator

3.2.2.1 DKG 1 / DKG 2

The first generation of channel generators permits connection of a visualising component not only locally at the device but also within the network - but not at one and the same time.

Within the network the visualising component must adopt the function of the Modbus master. The master has the task of exchanging the data between the other members; this also means that should there be a failure of the visualising component, then the data exchange will also stop. This data exchange has normally to be programmed - either via scripts on a touch screen, or via scripts or HLLs in software components.

3.2.2.2 DKG 20 / DKG 21-GSM

The new generation of channel generators provides the option of reaching the data of all other network members via the channel generator which functions as the Modbus master.

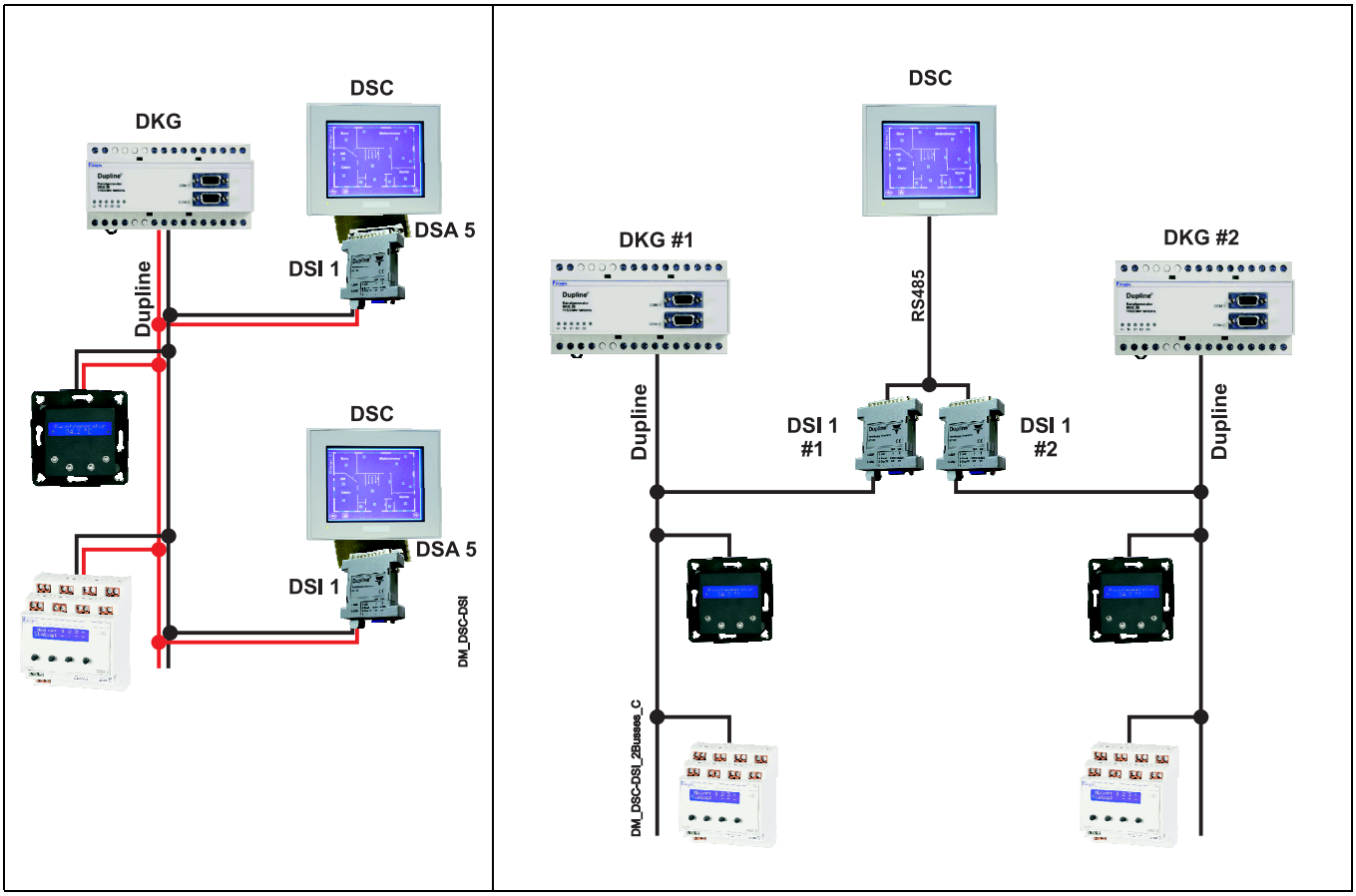
If the visualising component is connected to one of the slaves, the data of the other network members can

normally be read but not written. Both options are illustrated in the diagram on **Page 16** in **Chapter 3.1.3 "Networks with DKG 20 / DKG 21-GSM"**.

It should be pointed out that, when using the solution with the DKG 20 and DKG 21-GSM, a breakdown of the visualising component would not impair the data transfer between the channel generators; and, furthermore, additional functions, e.g. changing of set-point and switching time, are available.

3.2.3 Visualising with the DSI 1 Modbus Interface

When employing the DSI 1 for visualising it is basically immaterial whether this takes place within a network or which channel generators are being used. You have the possibility of operating practically any number of DSI 1s on a Dupline bus (see illustration below left).



The right-hand illustration shows the visualisation in two systems with one DSC. In this constellation two different addresses have to be assigned to the DSI.

For detailed information on the DSI 1 please refer to **Chapter 5.7.5 "DSI 1: Dupline - Modbus - Interface"** on **Page 139**.

Chapter 4 Notes on Wiring and Installation

4.1 General Notes

This chapter provides an overview of suitable measures to prevent problems with the Dupline bus system.

Basically, because inputs and outputs only detect the pulse-pause ratio of the bus signals, the interference liability is very low, provided the influences effect both signal conductors equally. This means, in effect, that both signal wires should be installed together and have the same characteristics.

Problems may arise when external sources of interference in “rugged“ environments are able to effect the signal conductors in different degrees. Because the operative ranges of Dupline are manifold and the influence quantities, which may have effects on the system, are unknown, we - as the manufacturer of the system - only can give hints for the proper usage of Dupline.

Generally, following applies:

- As applicable for conventional technics, the installation has to be carried out according to the regulations - not least for the protection of humans and animals.
- The longer the lines and the expected interferences are, the higher the wire quality must be.
- On large line lengths (from 1.5 km), the position of the bus components must be observed and the possible usage of a line termination should be considered.
- Existing cables may be used if they fulfil the requirements listed in the table in **Chapter 4.3.1** on **Page 21**.

For your assistance, the following table shows the most important line characteristics for the two different areas of applications. If you have doubts concerning influence quantities in your application, use the higher demands coming from industrial buildings and don’t hesitate to ask us.

4.2 Installation Guidelines

Anything applicable to conventional installations is also applicable - if not more so - to the installation of a bus system. Here, once more, is a résumé of the important guidelines for installing a Dupline system:

- The installation may only undertaken by an authorised electrician.
- The installation has to be carried out in accordance with the applicable national or international regulations. Thus, installations in Germany must meet VDE 0100 specifications.
- Dupline is a system which works predominantly with protective extra low voltages (SELV/PELV).

  For this reason particular care must be taken that all signals directed to the Dupline system (e.g. input signals at operating signal sensors DSS and DBA), meet the requirements for protective extra low voltages. In practice, this means e.g:

  – Do not route any leads with mains voltage through flush-mounted installation boxes, in which DSS 2/4/8U or DBA modules are located;

  – The power supply for DIN-rail mounted components (24 VDC) must be from sources meeting the requirements for protective extra low voltages. Such is the case when using our NT 24-750 or NT 24-2000 power supply units (refer to **Chapter 5.8.2 "NT 24-750 / NT 24-2000: 24 VDC-Power Supply Units, DIN-Rail"** on **Page 144**).

4.3 Bus Cables

4.3.1 General

When planning and installing the bus cables, please observe following notes:

	Domestic buildings	Industrial buildings
Cable twist	Not necessary.	Yes, approximately 5 times per meter.
Shielding	Only when installed near to consumers with more than 1 kW.	Advisable.
	The shielding must have an earth wire resistance of less than 2 Ohm and may only be earthed at one point.	
Cross-section, capacity, resistance	You **will** find cable recommendations in **Chapter 4.3.2** on **Page 22**.	
		Use only cable with same characteristics.
Insulation resistance and dielectric resistivity	The insulation resistance should meet the requirements for protective low voltage (VDE0100, Part 410 and DIN EN 50090-9-1).	Insulation resistance: at least 1,000 kOhm(1) Dielectric resistivity: at least 500 V
Multicore cables	• The usage of such cables is uncritical in respect to Dupline. All unused wires have to be earthed at one point. • It is not allowed to connect multi-wire cables in parallel in order to increase the size of cross-section. • When using multiple voltage levels in one multicore cable, the national regulations for protective low voltage have to be observed.	
Cable routing	Not critical.	Do not install near to power cables (more than 500 V).
	At no place, bus wires of different Dupline systems may have contact.	
Cable branching and terminals	The resistance of the clamp terminals should be as low as possible - pay special attention to the clamp contacts being properly tightened.	
Positioning of modules	On line lengths of more than 1,5 km or high line resistance, the arrangement of the modules may influence the functionality of the Dupline system. The channels generator then should be located **in the centre of the application**. Where this is not possible, the channel generator should be installed **near to the highest concentration of input modules**.	
Line termination	Should be considered on line length of more than 1.2 km. See **Chapter 4.3.4** on **Page 22**.	

(1) Measured with a test voltage of at least 500 V. If the resistance of existing installations is less than 1,000 kOhm, all junction boxes and terminal points of cables must be tested.

4.3.2 Cable Recommendations

Following cable types have been proven in practise:

	Type	Capacity in nF	Remark
Indoor Use	J-YY	100	
	J-Y(ST)Y	100	
	JE-Y(ST)Y	100	
	J2Y(ST)Y	52	
	RD-Y(ST)Y	100	flexible
	NYM-O		
Outdoor Use	A-2Y(L)2Y	55	flexible
	A-2YF(L)2Y	55	flexible
	NYY-O		

4.3.3 Cable Length and Resistance

Even if the use of very different cable types hardly causes problems in practise, the following cross-section and capacity values on given length must be observed:

Maximum length(1)	Min. cross-section / diameter	Max. capacity
up to 1000 m	0.6 mm ∅	100 nF/km
1000 m ... 3000 m	0.8 mm ∅	75 nF/km
3000 m ... 5000 m	1 mm²	60 nF/km
more than 5000 m	1.5 mm²	55 nF/km

(1) This is the distance between channel generator and the outermost lying component which is supplied with voltage by the bus signal.

For exact determination of the allowed length it has to be considered that the voltage drop for the outermost lying components must not go beyond 2 V. This voltage drop depends on following characteristics:

1. the specific loop resistance of the line;
2. the distance between channel generator and the outermost lying component;
3. the maximum current.

An example:

You are using a standard cable with a loop resistance of 120 Ohm/km. The local components you're going to employ have an overall power consumption of 5 mA, which approximately corresponds to 10 pieces of the operating signal input DSS 4U (you will find the power consumption of each module in the data sheet or in our calculation scheme).

Assuming that all components are located at the outermost end of the bus conductor, the maximum line length can be calculated as follows (where „S" is the value for the loop resistance):

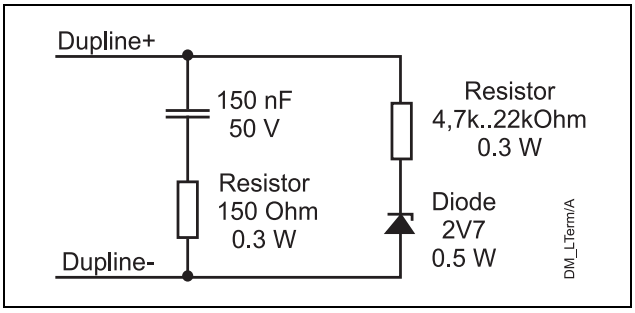
$$I = \frac{U}{S \cdot l} \qquad l = \frac{2\,V}{120\frac{\Omega}{km} \cdot 5\,mA} = 3.33\,km$$

Thus, the maximum line length (l) is 3.3 km.

4.3.4 Line Termination

With longer distances (> 1.2 km) between channel generator and line terminals there is a danger of signal

reflections occurring which adversely effect the transmission. In such cases it is advisable to fit terminal resistors at both line terminals. The line termination should be arranged as illustrated below:



The line termination is also available separately as a DIN-rail mounted device (DT 01, 37 501 006). You'll find details **Chapter 5.9.4.2 "DT 01 Cable Termination Unit"** on **Page 153.**

4.4 Input and Output Modules

In order to ensure the long lasting functioning of the Dupline bus system, please observe the following notes during both planning and construction.

4.4.1 Sensor Lines

Pay particular attention to the connections between transmitting devices and sensors, such as e.g. the **DSS xU** operating signal sensors and the inputs of the **DRO 1U**:

- **In the case of input modules without external power supply keep the sensor lines short!**
- **Do not - under any circumstances - prolong the system cables of the DSS xU operating signal sensor!**

4.4.2 Power Supply

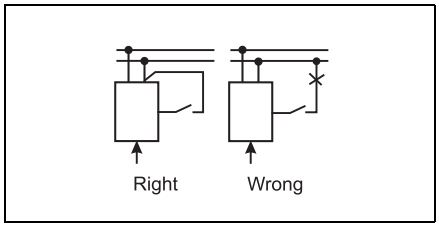
It is imperative that you observe the following:

- **At no point within the system may the bus leads have connection to the power supply of components or any other voltages.**
- **The power supplies of different Dupline systems may not be interconnected with each other, i.e. one power source may supply one system only.**
- **If DIN-rail devices of a Dupline system are located in different sub-distributions, then each of these sub-distributions must have its own power source.**

4.4.2.1 Components with power supply by Dupline

In the case of components which are supplied by the Dupline bus signal, the Dupline signal conductor (-) has to be utilized for supplying e.g. switching contacts (see DSS 4U).

In so doing it should be ensured, however, that the distance between the connection to the neutral conductor and the component is not too long, as shown in following figure:



- **Lines should be kept identically long: therefore, even if you only need to use the signal conductor (-), always install the signal conductor (+) as well. Different line lengths can cause transmission faults.**
- **Supplying power to switching contacts by the Dupline signal conductor (+) results in the termination of the data transfer and is therefore not permissible.**

4.4.2.2 Components with external supply (DSS 4UR, DRT 2, ...)

Bus components installed in remote locations, which require an external power supply (e.g. the **DSS 4UR** operating signal sensor or the **DRT 2** room thermostat) must be supplied by a separate power source.

- **It is not recommended that DIN-rail mounted devices and external components be supplied by one power source.**

4.5 Standards and Enclosure Protection

4.5.1 Standards

In order to ensure that the widest possible range of applications is covered, Doepke Dupline components are designed to meet the latest IEC/EN Standards.

This applies to the standards IEC60669, EN55022 / EN6100-6-3, EN55024 / EN61006-1.

4.5.2 Enclosure Protection Type

Unless otherwise specified, the Doepke DIN-rail devices offer enclosure protection type IP 40 after installation in the distribution board. With other designs the protection type is normally specifically stated.

The technical specifications of the protection type conform to IEC Regulation 529 VDE 0470T1.

This international protection code (IP) defines the degree of protection which the enclosure provides against contact with dangerous voltage at components, penetration of solid objects and water. A suffix gives additional information concerning special protection.

The following deals only with those protection types which are relevant to Doepke Dupline components.

Key to the "IP" protection code

First index number: Protection against contact and foreign objects

2: Protection against finger contact and protection against medium-sized (12.5 mm) solid objects

4: Protection against contact with tools, wires or similar of over 1 mm diameter

6: Dust-proof (no penetration of dust)

Second index number: Protection against water

0: No special protection

5: Protected against water jet

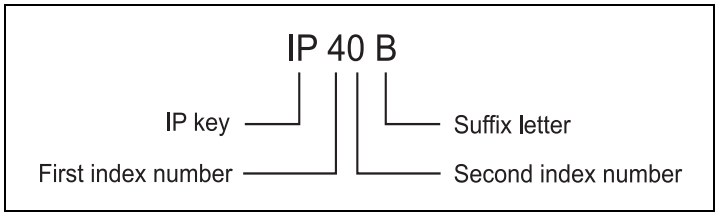
6: Protected against strong water jet

7: Protected against short immersion in water

Suffix letter

B: Finger-contact safe VBG4
Articulated test probe (ø 12 mm, length 80 mm)

D: Wire safe (ø 1.0 mm, length 100 mm)



Chapter 5 System Components

5.1 General Information

5.1.1 Overview

In the following chapters the available system components are introduced and their technical characteristics described in detail.

The components are subdivided into the following groups and chapters respectively:

5.1.2 Notes on Product Descriptions

The description of every component normally includes the following sub-sections:

Characteristics

Here you will find a short summary of the most significant characteristics.

Product Description

This section provides a detailed description of the product and its characteristics.

Application Information

This section generally includes a connection diagram, or an example thereof, and gives information on the configuration and employment of the component.

Important notes on planning and applications are also contained in this section.

Dupline channel allocation

If provided, a table shows the assignment and function of the available Dupline channels (addresses). With the aid of the DHK 1 hand encoder any addresses can be assigned to these channels. A component normally has 8 channels to which one channel group is assigned (e.g. group “A“). Should some of these channels not have a function, then all channels should be assigned a single address and those without a function explicitly no address.

Connections

In addition to the connection diagram, the table for the connections shows in a clear and easily understood manner the existing terminals and connecting lines.

Indicators

If components are equipped with indicators, their function is described under this heading.

Technical data

Any data relevant to the components are specified here. In addition to the order references of the component itself, any optical accessories and repeat order data are listed.

Dupline

Here the relevant data of the module in respect of the Dupline bus connection are listed, e.g.:
Current input: The current requirements of the device which are covered by the Dupline bus.
Input channels: The number of channels or addresses on the Dupline bus which supplies the module with data.
Output channels: The number of channels or addresses on the Dupline bus from which the module receives data and which it then outputs.

General technical data

Here you will find data of a general nature.
Ambient temperature: It is necessary to keep within this temperature range in order to ensure the proper functioning of the device. In respect of the *Storage temperature*, for which no details are specified, it may safely be assumed that this covers a range approximately ±20°C larger than that of the ambient temperature.
Atmospheric humidity: This specification always assumes in the case of DIN-rail devices that they are not exposed to dew; condensation can, under certain circumstances, render the device unserviceable.
Enclosure protection type / Standards: Here the standards applicable to the device are listed. In the case of DIN-rail devices the enclosure protection type refers only to the status after connection in the distribution board.

Note: If not mentioned differently, the component described has been designed for usage within buildings.

5.2 Central Units

5.2.1 DKG 1: Channel Generator 24 V DC, DIN-Rail

- Generator for up to 128 channels
- LCD-display for real-time clock and control functions
- Channel characteristics, time functions and logic functions configurable with “ProLine“ PC-software
- Operating voltage 24 V DC

Product Description

The DKG 1 channel generator is an intelligent, configurable central unit which generates the Dupline carrier signal for 128 channels and therefore is the necessary central unit for every system.

The graphic configuration software “ProLine“, which can be run on Windows® 95/98/NT/2000 and XP, permits easy implementation of the control functions.

The channel generator offers a multitude of functions, some of which are listed below:

Different channel types

The channel generator supports existing inputs and outputs in the form of channel types. These are configured by use of ProLine and can be combined as desired. The following „items“ are currently available for selection:

- Push-buttons
- Touch contacts
- Timer with delay feature
- Time switch with 4 switch on and off times
- Central control
- Analog sensors (measurements sensors, light-, wind- and temperature sensors)
- Proximity detectors with time extension
- ISA, fire, water and intruder alarm systems (make and break contacts, acknowledgement, reset, lamp check and audio-alarm signal)
- Shutter control and central shutter control

Logic connectives

The channel generator permits up to 64 logic combinations to be programmed with the following operators:

- AND / OR / XOR (Exclusive Or)
- Rising/Falling flank
- Disabling of operators.

In addition to the 128 Dupline channels, also 32 internal markers from W1 up to Z8 may be used.

LC-Display

The back-lit, 4-digit LCD-display shows all relevant information concerning the device which can be changed by use of the control buttons. The time clock is displayed as a standard feature; in the event of an error, an error code will appear.

Time clock

The time of the integrated real-time clock is used in the sequencing programme and is also shown on the LCD display. It incorporates time of day, date, day of the week and year, and can be set either via the control buttons or by means of ProLine.

Serial interface

On the one hand the interface enables the DKG to be connected to the PC in order to carry out the configuration with the ProLine software, and on the other it serves to couple two Dupline bus systems for the purpose of data exchange and in order to increase the number of channels.

Power failure back-up

In the event of the operating voltage supply failing, the real-time clock will continue to be powered by a condenser of sufficient capacity to ensure that at normal ambient temperatures the date and time of day will continue to run internally for approximately 5 days. To provide back-up for longer outages, an external 9 VDC power supply needs to be connected. The configured sequencing programme is permanently stored in a FPROM immediately after downloading to the DKG.

Watchdog (Alarm) function

The channel generator is equipped with a so-called "watchdog" output which displays the status of the bus. When the system is operating properly the transistor will be blocking, in the event of a bus signal fault or the power supply failing it will connect.

Notes on Applications

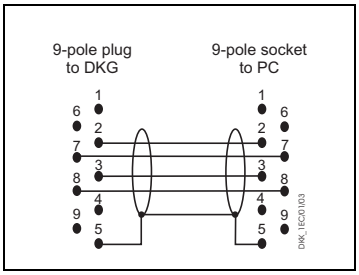
For detailed information on applications refer to the operating instructions of the channel generator and the “ProLine“ configuration software. The latter offers complete menu-guided operation for ease of use.

Number of channel addresses

Reducing the number of channels will speed-up the configuration time and the maximum cycle time on the Dupline bus (see also **Chapter 2.4 "Signal Transmission"** on **Page 13**).

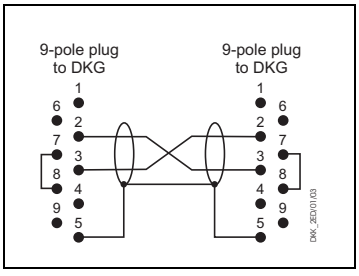
Connection between DKG and PC

The connection between the DKG and a PC for configuration with ProLine preferably should be done by means of the optionally available interface cable DKK 1. In case of using a self-made cable, the maximum length of 10 m should not be exceeded. The following figure shows the connection:



Interconnection of two Dupline nets

Coupling two Dupline nets is applicable in cases where data need to be exchanged between two systems. These two nets can also “share“ inputs and outputs whereby the allocated addresses of such components may be assigned only once. The channel generators use the Modbus I-RTU protocol for the data exchange and are connected as follows via their serial interface:



Here also, the length should not exceed more than 10 m. The cable DKK 2 which is preconfigured with these connections, can be ordered separately.

Visualisation

The serial connector of the DKG may also be used as an interface for visualisation components. For this purpose the DKK 1 standard cable may be used.

Parallel operation of configuration with ProLine and visualisation is not possible. You will find further details about visualisation in **Chapter 3.2 "Visualisation"** on **Page 18**.

Changing the configuration during operation

The channel generators permit configuration changes to be carried out while the system is in operation; any changes of processes which are relevant to safety should nevertheless only be undertaken while the process is in a “non-dangerous“ state, because the change is not without jolts.

Documentation

ProLine offers various functions for providing documentation. It is thus possible to print out following information:

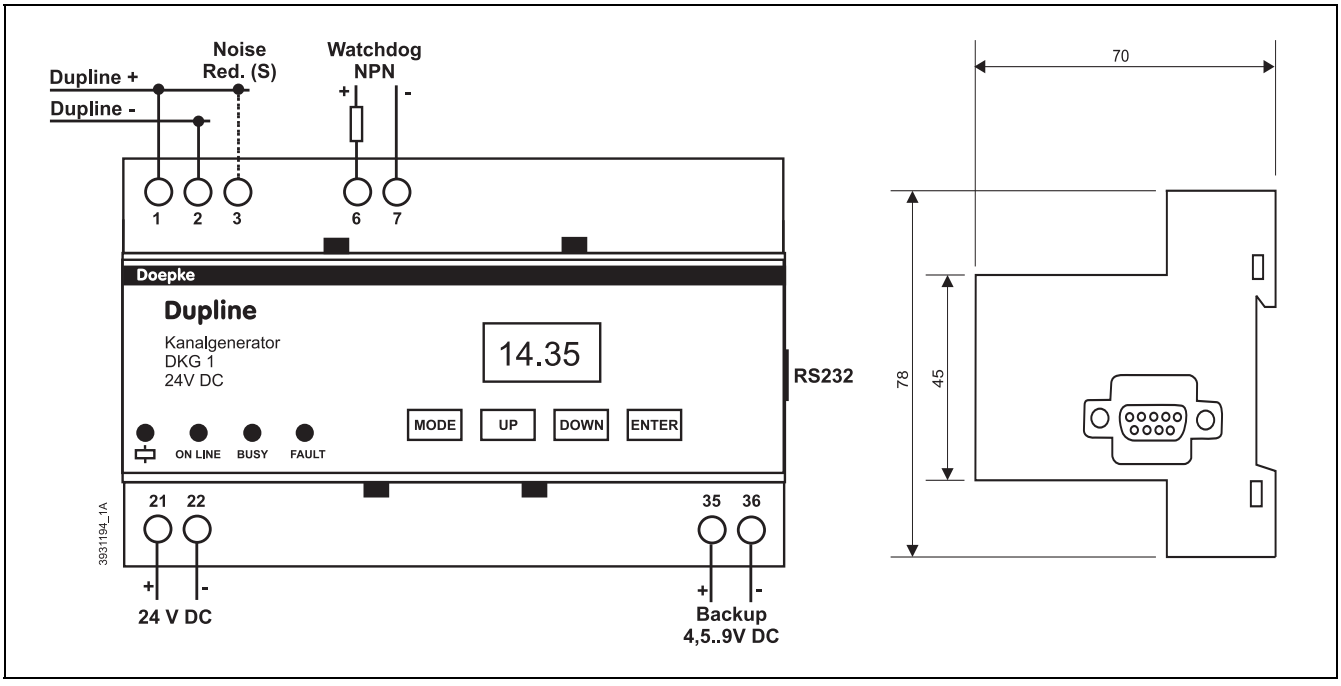
- channel addresses
- time switch channels
- logic connectives
- central/master channels.

Installation in distribution cabinets

When installing the channel generators in distribution cabinets, it should be noted that the serial connection has to be arranged from the right hand side. This means that a free space of approximately 3 module widths needs to be provided here in order to allow the programming plug to be inserted.

The space required for the connector can be reduced by using the optionally available DKA 1 front adapter. It allows the serial cable to be connected from the front and has a width of only one module (see also **Chapter 5.9.4 "Adapters, Cables and Special Accessories"** on **Page 152**).

Wiring Layout and Dimensions DKG 1



Connections

Terminal	Description	Terminal	Description
1	Dupline signal conductor + (Dupline+)	2	Dupline signal conductor - (Dupline-)
3	Compensating connector for highly inductive lines		
7	Watchdog (-)	6	Watchdog (+)
35	Back-up battery 9 VDC	37	Back-up battery 0 VDC
21	Operating voltage 24 VDC	22	Operating voltage 0 VDC

Indicators

Indicator	Description
Green LED	Power supply: Off – no power / On – OK
Yellow LED „ON LINE“	Dupline bus signal: Off – bus fault / On – bus OK
Yellow LED „BUSY“	Processing a job via serial connection: Off – no processing / On – processing in progress
Red LED „FAULT“	Fault: Off – no fault / On – fault has occurred

Technical Data

	Min.	Typ.	Max.
Dupline			
Output voltage			8.2 V, pulsed
Output current			100 mA
Frequency	approx. 1 kHz		
Watchdog			
Type	NPN-transistor (closed, when Dupline bus is OK)		
Voltage			35 VDC
Rated current / load rating			100 mA
Interfaces			
Type	RS 232, 9-pole SUB-D socket		
Length of line			10 m
Rated operating voltage	10 VDC	24 VDC	30 VDC
Power consumption		approx. 7 W	
Security of data in the event of power failure			
Configuration	10 years		
Clock and calendar		approx. 5 days(1)	
Switching status	not secure (priority selectable on modules)		
Real-time clock			
Accuracy	Better than ± 1 minute/month		
Buffer time		5 days	
Terminals			
Type	Screw terminals		
Contact area	0.4 mm ∅		2.5 mm²

Technical Data (Continued)

	Min.	Typ.	Max.
Housing			
Type	Distribution installation housing for mounting on rails according to DIN EN 60715:2001-09		
Dimensions	144 x 78 x 65 (W x H x D in mm) / 8 modules		
Material	Polycarbonate		
General technical data			
Ambient temperature	-10°C		+45°C
Atm. humidity			85%
Encl. protection type / standards	IEC 60669, EN 55022 / EN 61000-6-3 and EN 55024 / EN 61000-6-1		
Order number, description	09 501 122, channel generator 24 VDC DKG 1(2) 09 501 129, interface cable DKK 1, PC - DKG 09 501 137, interface cable DKK 2, DKG - DKG 09 501 143, angled adapter DKA 1		

(1) Without backup power supply.
(2) Phase-out model, available only limited time.

5.2.2 DKG 20 / DKG 21-GSM: Channel Generators, DIN-Rail

- Generators for 128 channels each
- Serial ports for configuration and visualisation
- Channel properties, time functions and logic functions configurable with ProLine^{NG} PC software
- Four each integrated semiconductor inputs and outputs
- Simplest possible set-up of networks with up to 32 DKG 20 or DKG 21-GSM
- Remote control and remote monitoring via mobile phone (SMS) if connected to optional GSM antenna (DKG 21-GSM only)
- Operating voltage 115/230 V AC

Product Description

The DKG 20 and DKG 21-GSM channel generators are intelligent, configurable central units which generate the Dupline carrier signal for 128 channels and are thus indispensable components for every system.

Compared to the DKG 1 and DKG 2 channel generators (see **Chapter 5.2.1** on **Page 28**) this new generation provides higher performance, offers more functions in respect of visualisation and network construction, and supports the use of a radio modem.

The DKG 21-GSM features the basic equipment of the DKG 20 but is additionally fitted with an integrated GSM modem which enables the system not only to be remotely controlled but also to transmit events via SMS.

In terms of software, too, these new DKGs are provided with most of the functions of the DKG 1 and DKG 2; any differences are explained in detail below.

Note: DKG 20 and DKG 21-GSM with a production date of February 2016 and later do not support the DCF antenna anymore.

Configuration

These channel generators are to be configured with ProLine^{NG} (see **Chapter 5.10.1** on **Page 159**). The remote configuration is possible by means of the DCI 2 (see **Chapter 5.7.2** on **Page 128**).

DKG networks

You can link up to 32 DKG 20 or DKG 21-GSM - or a mixture of both - into one network, thus having the use of 4,096 channels. The RS485 Modbus I communication is via a shielded standard cable (e.g. J-Y(ST)Y 2 x 0.8 mm), which may be up to 1,000 m long and is connected directly to the terminals of the DKGs. It is thus no longer necessary to provide interface converters.

The necessary termination of the RS485 bus - at the start and at the end - is accomplished by the simple expedient of inserting jumper wires. A failsafe circuit can also be provided in this way; it will ensure that any breakdown of network members is quickly and reliably detected.

For details refer to the respective operating instructions and to **Chapter 3.1 "Networks"** on **Page 16**.

The transfer rate is selectable between 2,400 and 115,200 baud and can thus be adapted to any possibly adverse environmental conditions. The communication parameters are set once - with the aid of the new ProLine^{NG} software - directly via the modbus master; repeated unplugging/replugging is therefore unnecessary.

When all channel generators (one master and up to 31 slaves) have been configured with ProLine^{NG}, the master will automatically initiate the data exchange whereby every individual DKG receives a transcript of the data of all other DKGs.

Access to the data of other DKGs is always "source addressed", i.e. it is restricted to read-only. There are

two options of including external data, the so-called "references":

1. Direct access within the channel objects
   Every configured channel contains a list which can be filled with external references to channels of other DKGs. Every channel listed here is "or-linked" to the configured channel.
2. Indirect access via status channels
   With the new "Status Channel" object you can "import" external channels so that the status channel always adopts the value of the imported channel. This enables easy processing in logic connectives.

To summarize: it could be said that on the one hand the new implementation of the network capabilities is easy, and yet on the other that it also opens up many new possibilities.

Note: It is not possible to couple channel generator types DKG 1 or DKG 2 to a network based on DKG 20/ DKG 21-GSM.

Visualisation

Visualisation is closely linked to the network's structure. Every DKG has an additional COM2 port, which may be utilized either for connecting a visualising component or for operating a radio modem.

This port, too, offers the Modbus I protocol on the basis of a RS232 connection so that standard touch screens (e. g. the Doepke DSC 40 series) or visualising programmes on PCs can be employed, there being the option of setting a transfer rate between 2,400 and 115,200 baud. You will find a complete Modbus reference in [6].

The extent of data access depends upon which channel generator is used for the connection:

- Without network:
  Here you can read and write the data of the DKG.
- In a network at the master
  Here you can read and write the data of the master and all the slaves.
- In a network at a slave
  Here you can read and write the data of the connected slave, but only read the data of all other network members.

The possibilities of visualisation have also been extended by some configuration data. It is thus now in addition possible to change the following data:

- Time entries of the "Real-time Switch" object;
- Limit data of AnaLink objects (light sensor, temperature sensor, wind sensor and general sensor);
- Reading and writing of the channel generator clock.

Please refer to **Chapter 3.2 "Visualisation"** on **Page 18**.

Internal real-time clock

Like their predecessors the DKG 2x are also equipped with an internal, back-up battery supported real-time clock. You can improve its accuracy by configuring in ProLine^{NG} a calibration with the mains frequency.

Note: If a network is used, the master will always update the clocks of the connected slaves.

Integrated semiconductor inputs and outputs

Both the DKG 20 and the DKG 21-GSM are equipped with 4 each semiconductor inputs and outputs which have to be separately supplied with a voltage of between 10 and 30 V DC. The processing of the signals takes place in the logic connectives, where 8 markers are reserved for input and output.

Terminals	Description	Markers
7..10	semiconductor inputs In1..In4	Q1..Q4

Terminals	Description	Markers
13..16	semiconductor outputs Out1..Out4	Q5..Q8

Saving the status upon power failure

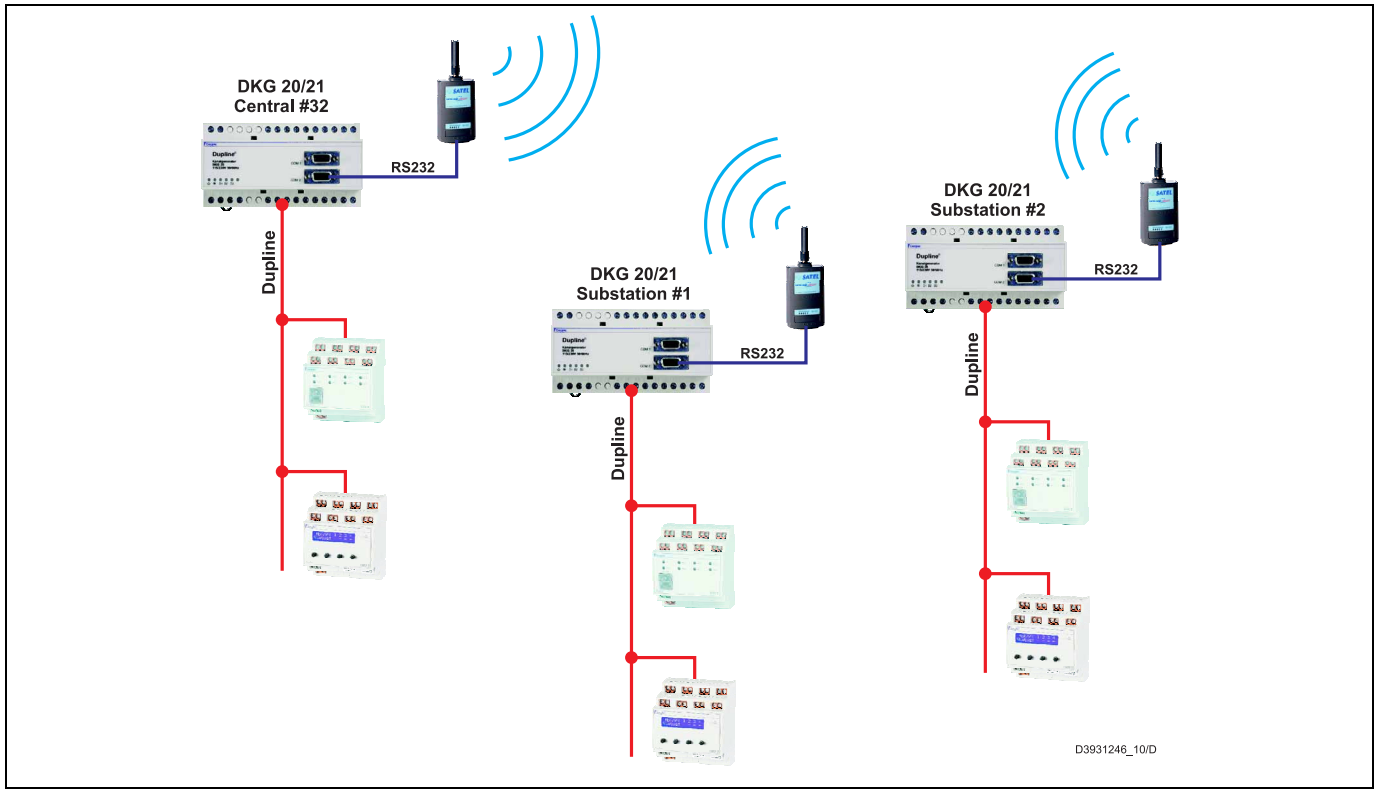
The built-in EEPROM memory now makes it possible permanently to save the status of all channels in the event of a new start or a power failure. This means that the switching status of e.g. toggle-switch functions and real-time switches are restored when restarting, provided this option is activated in the configuration.

Radio modem

In addition to the modbus protocol for visualisation, the COM2 port offers the option of operating the radio modem by the Finnish manufacturer Satel. With the aid of this modem it is possible to set up a locally dispersed Dupline system whereby the distance between the radio modem master and the associated slaves can be up to 3 km.

Even if such a system consists of several channel generators - one master ("Radio Modem Central") and up to 31 slaves ("Radio Modem Substation") - a total of 128 addresses will be available. The master undertakes all automatic tasks within the system and polls cyclically the data of the connected slaves. The latter do not get their own configuration.

The following diagram illustrates the structure of such a system:



Note: It is not possible to transmit AnaLink data (e.g. temperature or light level data) via the radio modem - in this case it is necessary to make use of multiplex analog data.

GSM modem for SMS data transfer (DKG 21-GSM only)

The DKG 21-GSM is equipped with a GSM modem which enables remote control of the system via SMS, enquiry of current data, or transmission of events in the form of SMS messages.

To operate this modem you require the following accessories:

1. A mobile phone antenna with FME connector, e.g. the Doepke DGA 1;

2. A standard 3V SIM card from a mobile phone service whose transmitter network covers the location of the DKG 21-GSM. This card requires the preset PIN code "9090" and must have been enabled for SMS data transfer.

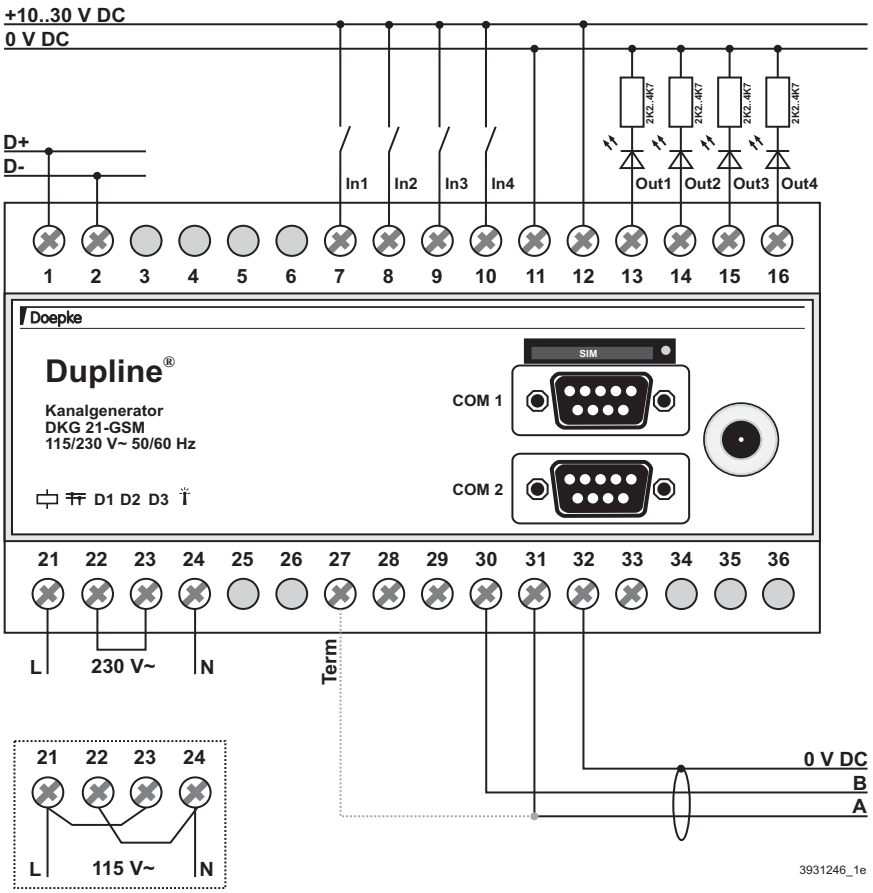
The range of functions of the GSM modem is the same as that of the - now no longer available - GSM 8:

- Specification of up to 4 mobile phone numbers, which can poll data or have events transmitted to them;
- Event messages are sent either to all 4 phone numbers, or sequentially to one after the other until an acknowledgement is received;
- Specification of up to 4 mobile phone numbers to which changes in switching status can be restricted (generally all mobile phones can send commands);
- Password protection
- Specification of a facility identification text which is always contained in the SMS message.

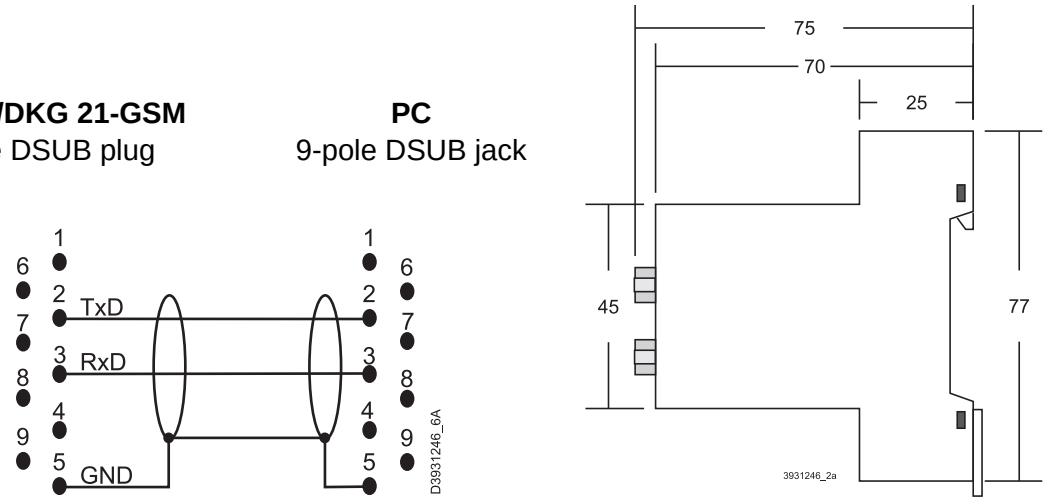
Depending upon the mobile network, event messages may also be transferred to landline numbers and will there be output as a spoken report. Alternatively, it is often possible to forward the SMS to landline numbers of fax machines; in which case the result will be in the form of a protocol printout.

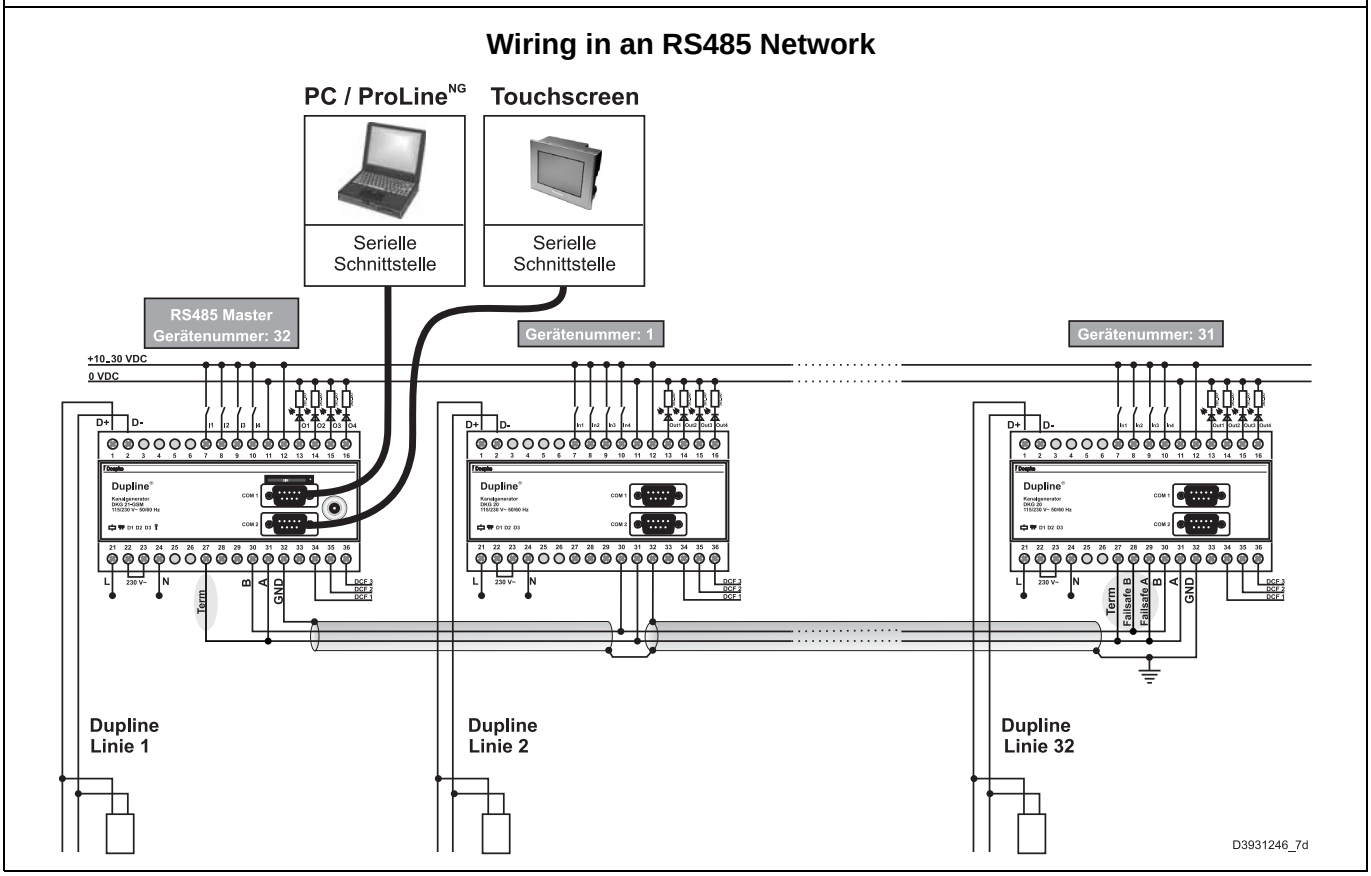
A list of the supported objects can be found in the ProLine^{NG} manual.

Wiring Layout and Dimensions



Note: The wiring layout of the DKG 20 corresponds to that of the DKG 21-GSM with the exception of there being no GSM antenna socket.





Connections

Terminal	Description	Terminal	Description
1	Dupline signal conductor + (D+)	2	Dupline signal conductor - (D-)
7..10	Semiconductor inputs In1..In4	11	**0 VDC** operating voltage for inputs/outputs
12	**+10..30 VDC** operating voltage for inputs/outputs	13..16	Semiconductor outputs Out1..Out4
21	Operating voltage: 115/230 VAC (L)	24	Operating voltage: 115/230 VAC (N)
27	RS485 bus termination	28	RS485 failsafe termination B

Connections (Continued)

Terminal	Description	Terminal	Description
29	RS485 failsafe termination A	30	RS485 signal B (+)
31	RS485 signal A (-)	32	**0 VDC** operating voltage output for inputs/outputs(1)
33	**+10..30 VDC** operating voltage output for inputs/outputs(1)		

(1) This voltage output may only be used for the power supply of the semiconductor inputs/outputs when the RS485 connector is not used.

Indicators

Indicator	On	Off	Flashing	Pulsing	Pauses	Description
Green LED 						**Power supply**
	■					Power OK
		■				No power
Yellow LED 						**Dupline bus**
	■					Bus OK
		■				No signal
			■			Short-circuit - manual restart required
				4	4	Short-circuit - automatic restart
Red LEDs „D1“ and „D2“						**RS232 (D1: COM 1 / D2: COM2)**
	■					Data transfer
		■				No communication
			■			Transfer of application in progress
				4	4	Data transfer error
				5	3	Transfer of application failed
Red LED „D3“						**RS485 (network connection)**
		■				No communication
			■			Data transfer
Red LED (DKG 21-GSM only) 						**GSM modem (DKG 21-GSM only)**
		■				OK or no modem present
				1	3	Connecting to net
				2	2	SIM card missing
				3	5	No mobile phone network present
				5	3	No answer from modem
				1		Sending SMS
				2		Receiving SMS

Technical Data

	Min.	Typ.	Max.
Dupline			
Output voltage	8.2 V, pulsed, frequency approx. 1 kHz		
Output current			130 mA
Cycle time (16/128 channels)	24 ms		136 ms
Short-circuit protection	yes		
Operating Voltage			
Rated operating voltage	115/230 V AC ±15% (45..65 Hz)		
Power consumption	typ. 7 VA / 3 W		
Power-on delay			2.5 s
Output voltage Terminals 32/33	10 VDC ±1 V		
Digital Outputs			
Type	4 PNP-transistors, programmable		
Short-circuit protection	no		
Rated operating voltage			35 V DC
Rated current / load rating			100 mA
Digital Inputs			
Type	Semiconductor		
Threshold limit	on: > 5.5 V, off: < 1.5 V		
Rated operating voltage	6 V AC/DC		30 V AC/DC
Rated current			6 mA
Serial interface COM1			
Type	RS 232, 9-pole SUB-D socket, Modbus-I-RTU		
Transmission speed		115 kBaud	
Transmission parameters	8 bit, no parity, 1 stop bit		
Line length			3 m
Serial interface COM2			
Type	RS 232, 9 pole SUB-D socket, Modbus-I-RTU		
Transmission speed	adjustable: 2400, 4800, 9600, 19200, 38400, 57600, 115200 Baud,		
Transmission parameters	8 bit, no parity, 1 stop bit		
Line length			3 m
Serial interface RS 485			
Type	RS 485, terminals, Modbus-I-RTU		
Transmission speed	adjustable: 2400, 4800, 9600, 19200, 38400, 57600, 115200 Baud,		
Line length			1000 m
Real-time clock			
Accuracy	better than ± 1 minute/month		
Buffer time		48 h	
GSM modem (DKG 21-GSM only)			
Type	Siemens TC35 Dual band (EGSM900 and GSM1800)		
Antenna connector	FME socket		
Output power	typ. 2 W (EGSM900) / 1 W (GSM1800)		

Technical Data (Continued)

	Min.	Typ.	Max.
Terminals			
Type	Screw terminals		
Contact area	0.4 mm ∅		2.5 mm²
Housing			
Type	Distribution installation housing for mounting on rails according to DIN EN 60715:2001-09		
Dimensions	144 x 78 x 75 (W x H x D in mm) / 8 modules		
Material	Polycarbonate		
General technical data			
Ambient temperature	0°C		+50°C
Atm. humidity	max. 80% (exposure to dew not permissible)		
Weight	640 g		
Encl. prot. type / standards	IEC 60664, IP 20		
Order numbers, description	09 501 190, GSM antenna DGA 1 09 501 188, channel generator DKG 20 09 501 189, channel generator DKG 21-GSM		

5.3 Inputs

5.3.1 DBM 1: Surface-Mounted Proximity Detector

- Passive infrared sensor, which reacts to human movement
- For indoor use
- Range up to 10 m with a 90° angular coverage, reaction time selectable
- Power supplied by the Dupline bus

Product Description

The DBM 1 infrared proximity detector detects the movement of people inside rooms and transmits the data via the Dupline bus. It is therefore suitable e.g. for lighting control purposes.

The DBM 1 has a range of 10 m and an angular coverage of 90°. Its various switches permit selection of the transmission time on the Dupline bus and the configuration of the switching characteristic (“normally open“ or “normally closed“ - sabotage control setting), and the activation of the LED indicator.

Any slow movements, which correspond to a scanning frequency of less than 0.5 pulses/second, are not detected. Neither are fast movements corresponding to a scanning frequency above 5 pulses/second are registered.

Several DBM 1 units installed in one room do not affect each other.

It does not require an external power supply as it is supplied by the Dupline signal line.

Notes on Applications

Installation

The DBM 1 should not be mounted in the following locations:

- in outdoor areas;
- in locations which are exposed to either sunlight or car headlights (direct exposure);
- in locations subject to direct air flow from heating or air conditioning equipment;
- in locations subject to rapid temperature changes;
- in locations subject to strong vibrations;
- in the vicinity of glass or other objects which reflect the emitted infrared rays.

LED

As the Dupline address, which is encoded at channel 5, directly controls the LED many different, individual functions can be realised (e.g. flashing signals). It is only necessary that this address is equal to that at channel 1 to signal a movement.

Maximum capacity

Up to 32 proximity detectors may be connected to one Dupline bus. With 32 connected DBM 1 no further inputs or outputs can be operated.

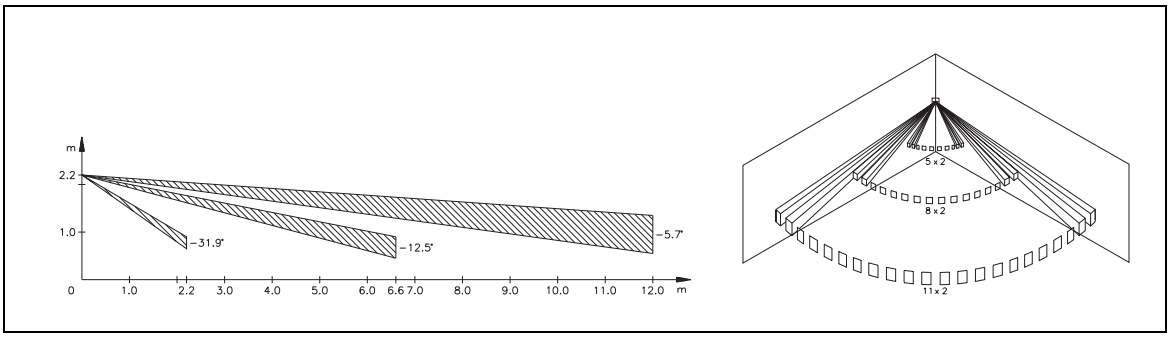
Area covered

The following illustration shows the area covered by the DBM 1 and the division of the scanned area. The latter is angled at 14°.

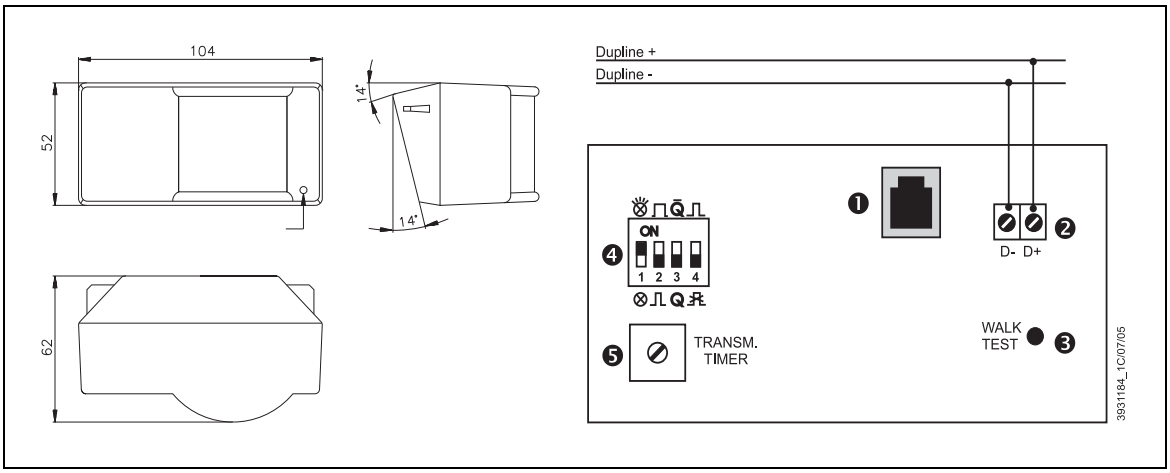
Scanning angle/distance

The following diagram illustrates the relationship between scanning angle and pick-up distance:

Scanning angle / distance



Wiring Layout and Dimensions



1: Western socket for address encoding.
2: Terminals for connecting the Dupline bus
3: LED for movement test
4: DIP switches (see below)
5: Potentiometer for fine tuning the transmission time

Connections

Terminal	Description	Terminal	Description
D+	Dupline signal conductor + (Dupline+)	D-	Dupline signal conductor - (Dupline-)

Dupline Channel Allocation

Channel	Description	Channel	Description
1	Movement signal (NCC or NOC)	5	LED control signal
2	Permanent signal (sabotage signal)	6	Not assigned
3..4	Not assigned	7..8	Not assigned

Indicators

Indicator	Description
Red LED	Indicator for movement test (disconnectable)

DIP Switches

Switch	Description	OFF	ON
1	Indicator for movement test(1)	LED off	LED on
2	Transmission time	12 s to 2 min	1 min to 10 min
3	Switching characteristic on Dupline bus	NOC	NCC
4	Time prolongation of the alarm signal	Off	On

(1) The Dupline address adjusted at channel 5 controls the LED. With this DIP switch the LED can be de-activated permanently.

Technical Data

	Min.	Typ.	Max.
Dupline			
Current input		2.6 mA	3.5 mA
Input channels	1 (LED control signal)		
Output channels	2 (movement signal, sabotage signal)		
Switch-on delay		1 min	
Sensor			
Type	Infrared, wavelength 7 to 14 µm		
Scanning method	24 zones in 3 areas		
Scanning angle	90°		
Scanning range			10 m
Response rate	0.5 pulses/s		5 pulses/s
Terminals			
Type	Screw terminal		
Contact area	0.4 mm ∅		1.5 mm²
Housing			
Type	White surface-mounted housing		
Dimensions	104 x 55 x 57 (W x H x D in mm)		
Material	Housing: ABS, Lens: polyethylene		
General technical data			
Ambient temperature	-10°C		+50°C
Atm. humidity	20%		80%
Encl. protection type / standards	IP 40 (for indoor use)		
Weight	approx. 150 g		
Order number, description	09 501 134, Proximity detector DBM 1		

5.3.2 DIR 2: Infrared Remote Control

- 8 x 8 different transmission channels (64 switching options)
- Power supply of receiver provided by the Dupline bus
- Range of 15 m
- Receiver also usable in conjunction with „Harmony“ series of manufacturer Logitech
- Transmitter powered by standard batteries

Product Description

The DIR 2 is a infrared remote receiver designed for the Dupline bus system. It can be actuated by the system native remote transmitter DIR 2T, but also by remote controls from third party suppliers (see below).

Each DIR 2 receiver is capable of receiving 8 switching commands and of transmitting these to the coded channels of the Dupline system. Up to 8 switching commands each pertaining to one of the 8 switching groups A...H can be selected via the DIP switch of the DIR 2 and via the rotary switch of the DIR 2T transmitter. However, the switching groups (A...H) have no connection with the channel groups of the Dupline system.

By grouping it is thus possible to configure up to 64 switching commands with 8 receivers and one or more hand transmitters and to remotely operate within one room. Provision for labelling on the back of the transmitter facilitates the operation.

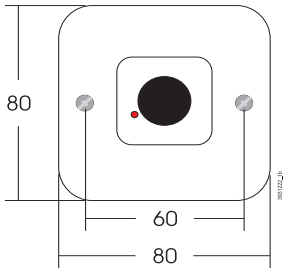
The DIR 2 also supports IR commands from other brands of remote controls. There especially exists an integration of the programmable remote controls of the „Harmony“ series from manufacturer Logitech. You can configure these devices very easily for use with the receiver by means of the configuration data available on internet. You'll get further information on the homepage of Logitech under http://www.logitech.com.

Notes on Applications

1. Receiver

The receiver must be sited so that “visual contact“ between hand transmitter and receiver is ensured and reflection reception is possible. In so doing, the maximum range of 15 m may not be exceeded. Walls and glass panes prevent reception and are therefore to be avoided. In addition, light and exposure to sun can impair reception characteristics.

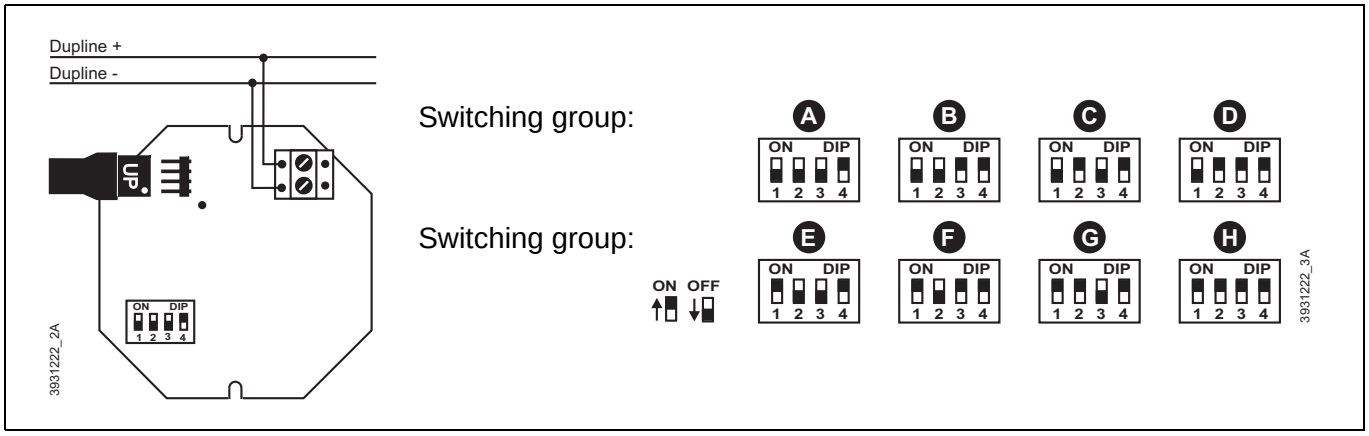
The following diagram shows the recommended mounting of the receivers on the wall:



2. Transmitter

The transmitter is powered by two standard “AA mignon cell“ batteries

Wiring Layout and Dimensions / DIP-Switches



Connections

Terminal	Description	Terminal	Description
1	Dupline signal conductor + (Dupline+)	2	Dupline signal conductor - (Dupline-)

Dupline Channel Allocation

The assignment between Dupline addresses and the switching commands is independent from the channel groups of the transmitter/receiver unit and is as follows:

Channel	Description	Channel	Description
1..4	Transmitter switching commands 1..4	5..8	Transmitter switching commands 5..8

Indicators

Indicator	Description
Red LED	Reception of valid telegrams: Off: No, or invalid, telegram received On: Valid telegram received(1)

(1) After switching on the bus the LED remains activated until the first valid command has been received.

Technical Data Receiver

	Min.	Typ.	Max.
Dupline			
Current input		1.8 mA	3.2 mA
Input channels	none		
Output channels	8 switching commands		
Terminals			
Type	Plug terminals, screw terminals included in package		
Contact area	0.4 mm ∅		2.5 mm²

Technical Data Receiver (Continued)

	Min.	Typ.	Max.
Housing			
Type	Neutral, polar-white housing		
Dimensions	80 x 80 x 15 (W x H x D in mm), surface- or flush-mounted		
Material	Polycarbonate		
General technical data			
Ambient temperature	-10°C		+45°C
Atm. humidity			85%
Encl. protection type / standards	IP40, DIN EN 50428		
Order number, description	09 501 169, IR-receiver DIR 2		

Technical Data Transmitter

	Min.	Typ.	Max.
Operating voltage			
Type	2 “AA mignon cell“ batteries, 1.5 V		
Transmission			
Type	Infrared light, 950 nm		
Carrier frequency	38 kHz		
Range(1)	approx. 15 m		
Number of switching channels	8		
Number of channel groups	8, “A” to “H”		
Housing			
Type	Gray / Side parts black (rubberized)		
Dimensions	63 x 95 x 28 (W x H x D in mm)		
General technical data			
Ambient temperature	-10°C		+45°C
Atm. humidity			85%
Encl. protection type / standards	IP40, DIN EN 50428		
Order number, description	09 501 219, IR-transmitter DIR 2T		

(1) The maximum range is dependant upon the ambient temperature and light intensity and may therefore vary.

5.3.3 DLUX: Surface-Mounted Light Level Sensor

- Permits the transmission of light levels via the Dupline bus
- Light range from 0.1 Lux to 100 kLux
- Compact size
- Power supplied by the Dupline bus
- Suited for outside use

Product Description

The DLUX analog light level transmitter is designed to convert analog light intensity data for transmission via the Dupline bus.

The light intensity data is transmitted on one freely encodable channel which can be used several times in the channel generator for light dependend switching of electrical loads. Because of its compact design, the DLUX can be mounted unobtrusively on e.g. walls of houses. It does not require an external power source as it is supplied by the Dupline signal line.

Notes on Applications

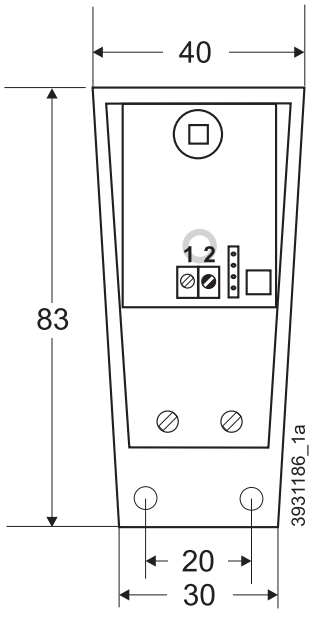
Installation

The DLUX should normally be fitted in a position where light from outside illuminates the room to be controlled, e.g. on a wall with windows which are to be blacked-out by shutters. Any shadow thrown on the sensor by e.g. eaves or similar protrusions results in the sensor‘s registering higher levels of darkness and, if it is functioning as a twilight switch, leads to its loads being switched on too early and switched off too late, which has to be considered when defining the threshold values.

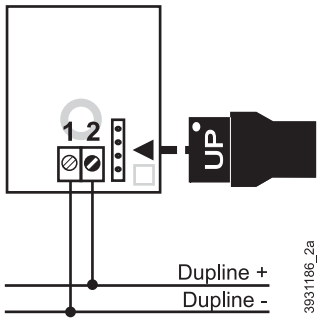
Optic feedback from light shining on the DLUX must be avoided as far as possible, as the effect of such light on the sensor when the lighting is switched on may result in a cyclic make and break operation.

When selecting the installation site, consideration should also be given to environmental factors (dust, dirt, and snow) which over the longer term will reduce the light transmission of the DLUX.

Wiring Layout



Encoding Flat Pack Connector



Connections

Terminal	Description	Terminal	Description
Grey (1)	Dupline signal conductor - (Dupline-)	Red (2)	Dupline signal conductor + (Dupline+)

Dupline Channel Allocation

Channel	Description	Channel	Description
1	Light intensity value	2..8	Not assigned

Technical Data

	Min.	Typ.	Max.
Dupline			
Current input	710 µA	750 µA	790 µA
Input channels	none		
Output channels	1 light intensity output, AnaLink method		
Reaction time	6 s(1)		34 s(2)
Light Sensor			
Type	Photodiode with linearized characteristic(3)		
Measuring range	0.1 Lux		100 kLux
Deviation from characteristic(4)	-10%		+10%
Measuring error over temperature range(4)	-30%		+30%
Terminals			
Type	Screw terminal		
Contact area	0.4 mm ∅		1.5 mm²
Housing			
Type	Transparent surface-mounted housing		
Dimensions	40 x 83 x 43 (W x H x D in mm)		
Material	Lexane		
General technical data			
Ambient temperature	-10°C		+60°C
Atm. humidity			90%
Encl. protection type / standards	IP44, DIN EN 50428		
Order number, description	09 501 110, Light level sensor DLUX		

(1) When put into service, channel generator with 16 channels.
(2) When put into service, channel generator with 128 channels.
(3) Characteristic adapted to human perception of brightness.
(4) In relation to linearized value.

5.3.4 DPM 1: Presence Detector

- Extra sensitive, passive infrared sensor, which reacts to thermal movement
- Radius of detection max. 5 m, 360º
- Integrated twilight switch and power input
- Selection of operating modes
- For use indoors

Product Description

The DPM 1 presence detector is a locally installed component of the Dupline installation system and enables the presence of people to be monitored and any movements within rooms to be detected. Its highly sensitive infrared optical unit, with a 360º scanning angle and a mounting height of approx. 2 m above the persons to be detected, can register the slightest temperature movements of people, animals or objects within a 5 m radius.

Being equipped with an integrated twilight sensor enables the DPM 1 to be operated dependent upon the light conditions in the room. The light level below which the detector is to be triggered is adjustable between 0.2 and 200 Lux via the potentiometer on top of the housing.

The signal function of the DPM 1 can be influenced via the Dupline bus; thus the Dupline channels can permanently enable, or disable, the infrared sensor. By means of feeding back the switching channel for the light to the detector you therefore have the possibility of preventing a continuous switching on/off.

With the rotary switch, accessible when the housing is opened, the desired operating mode can be set: AUTO (internal twilight switch utilized), ON (without twilight switch) and OFF (external twilight switch useable).

In addition, the DPM 1 offers one electrically isolated 0..30 V AC/DC input, via which an external signal may be input in the Dupline bus and processed further.

Notes on Applications

Mounting

The location of the DPM 1 substantially affects its functionality. For this reason please observe the following points:

- The DPM 1 is designed exclusively for ceiling mounting.
- Do not install the DPM 1 in the immediate vicinity of heat sources such as e.g. lamps or radiators.
- Do not install the DPM 1 near moving objects such as ventilators.
- Please ensure that the DPM 1 is not exposed to strong air flows as these might be registered as movements.
- Attach the DPM 1 only to surfaces free from vibration.
- Please ensure that the twilight sensor is not exposed to a direct light source as this might result in undesired switching.
- The scanned area should not be restricted by large objects such as e.g. furniture.
- If only small or few movements are to be detected, then a time delay, configured at the channel generator, can prevent the premature switching off of the lighting.

The DPM 1 can be either surface-mounted, using the mounting plate supplied, or flush-mounted in an installation box (dia. 68 mm). In both cases the fixing screws supplied can be used.

Operating Modes

The DPM 1 is equipped with two controls:

- a rotary potentiometer for setting the switching threshold, this is located next to the infrared

lens and
- the operating mode rotary switch on the circuit board.

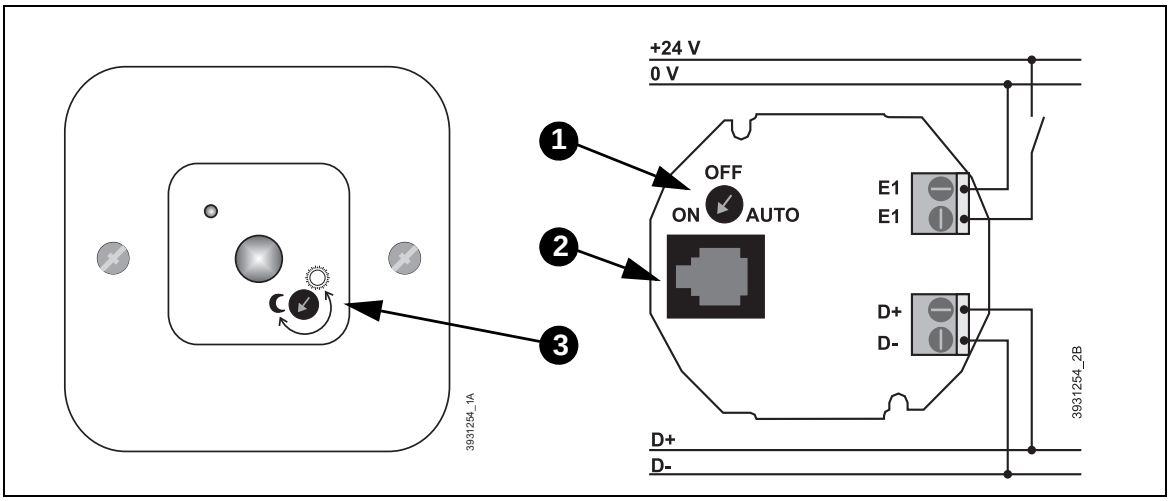
These controls enable you to influence the function of the twilight sensor in relation to the presence detector. Thus different applications are possible:

- Twilight-dependent operation of the presence detector:
  The DPM 1 operates automatically in accordance with the selected twilight setting. Only when the lighting is below the set level will the DPM 1 respond upon detecting a person and can thus be used to switch the lighting in a room on/off.
- Twilight-independent operation of the presence detector:
  The DPM 1 ignores the light conditions in the room and responds every time a person is detected. It can thus be used purely as a proximity detector.
- Operating the presence detector as a slave in a group of DBAs:
  Any number of DPM 1s can signal the presence of a person in dependence upon a twilight sensor. With this group option you can ensure that all presence detectors in a room with different lighting zones are working in unison.

Sabotage Protection

Channel 7 of the DPM 1 generates a static "1" signal. If it is disconnected from the Dupline bus, this can be detected by means of an appropriate configuration in the channel generator, and an alarm signal triggered. For this purpose it is advisable to use an alarm system in the DKG.

Wiring Layout



1: Operating mode rotary switch

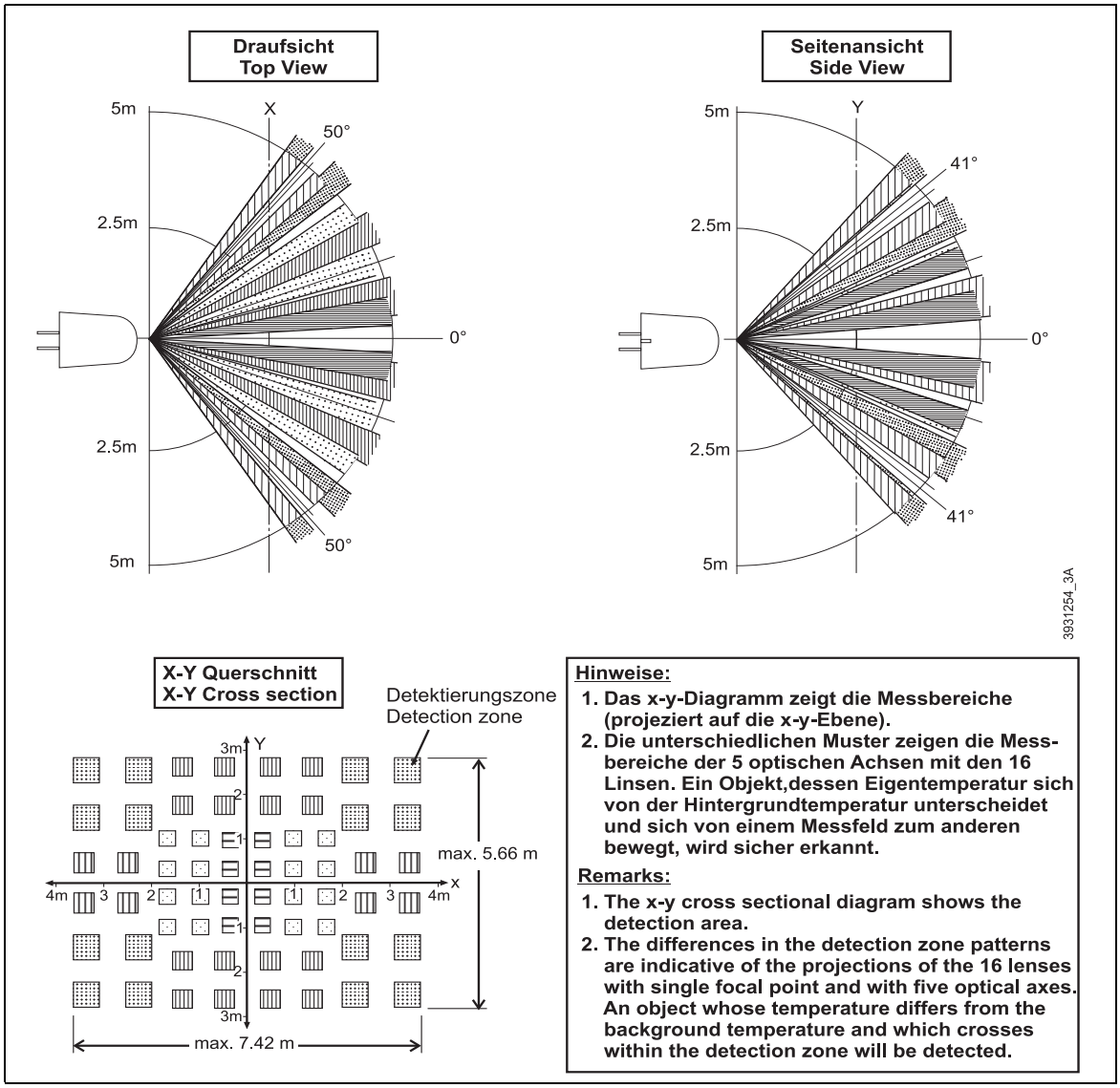
2: RJ12 jack for address encoding.

3: Potentiometer for adjustment of twilight sensor’s switching threshold.

Connections

Terminal	Description	Terminal	Description
D+	Dupline signal conductor + (D+)	D-	Dupline signal conductor - (D-)
E2	Opto-decoupled input, potential 1 (0..30V AC/DC)	E2	Opto-decoupled input, potential 2 (0..30V AC/DC)

Scanning Angle / Distance



Dupline Channel Allocation

Channel	Description	Channel	Description
1	Enable infrared sensor(1)	5	Movement detection
2	Disable infrared sensor(2)	6	Twilight switch active
3	Not assigned	7	Permanent signal(3)
4	Not assigned	8	Status opto-decoupled input

(1) With Auto mode: Feedback from channel 5.
With Off mode: Activation of DPM 1 by manual enabling.
(2) Has priority over channel 1.
(3) Signal for sabotage protection.

Indicators

none

Technical Data

	Min.	Typ.	Max.
Dupline			
Current input	0.7 mA	0.9 mA	1.1 mA
Input channels	4 (proximity, twilight switches, sabotage protection, input)		
Output channels	2 control channels (infrared sensor enable/disable)		
Infrared sensor			
Type	Passive infrared sensor with heat detection		
Scanning Radius(1)			5 m
Scanning angle			360°
Response time(2)		45 s	
Twilight sensor			
Type	Light-dependent resistor, sensitivity adjustable		
Switching threshold	0.2 Lux		200 Lux
Hysteresis factor			1.5
Input			
Type	1 opto-decoupled semiconductor input for DC and AC voltage		
Input voltage	0 V		30 V
Switching threshold	3 V		
Operating voltage			
	Not required (from Dupline signal conductor)		
Terminals			
Type	Screw terminals		
Contact area	0.4 mm ∅		2.5 mm²
Housing			
Type	polar-white housing for surface- and flush-mounting		
Dimensions	surface-mounted: 80 x 80 x 35 (W x H x D in mm) flush-mounted: surface 15 mm, depth 20 mm		
Material	Polycarbonate		
General technical data			
Ambient temperature	-10°C		+50°C
Atm. humidity	max. 85% (exposure to dew not permissible)		
Encl. protection type / standards	IP20, DIN EN 50428		
Order number, description	09 501 201, Presence detector DPM 1		

(1) When mounted 2 m above the persons to be detected.
(2) After bus voltage is applied.

5.3.5 DRD 3: Smoke and Fire Detector

- Smoke detector according to Tyndall effect
- Detection of smouldering fires and flaming fires with smoke development
- Without radioactive sources
- Detection of up to 60 m²
- Transmission of alarms and life signal via Dupline
- Operating voltage supplied by Dupline bus

Product Description

The smoke detector DRD 3 allows an early detection of smouldering fires as well as flaming fires that develop smoke. It operates on the proven light scatter principle. Inside the sensing chamber a light source and a light sensor are arranged so that light normally does not fall on the sensor. It is only when airborne particles enter the chamber that light is scattered onto the sensor (Tyndall effect) to produce the electrical signal. This design means that no radioactive source is required.

The DRD 3 only needs the connection to the Dupline conductors. The smoke alarm as well as the status signal, which indicates the correct connection between the smoke detector and the in-built Dupline circuit board as well as a successful self-test, are transmitted via the Dupline bus.

Besides the alarm, the LED in the housing of the DRD 3 shows also the state of function of the device. At the same time, the LED is the test button which allows a visual check of the alarm function, whereas also an alarm is given via Dupline bus.

The power supply solely is done by means of the bus signal - a battery is not required.

Notes on Applications

To achieve a minimum protection, one DRD 3 should be installed in front of the of each sleeping area respectively in each floor. A better protection will be reached if one smoke detector is present in every room (except for the kitchen and the bath - here, false alarms are possible due to steam development).

When using the DRD 3, following issues have to be observed:

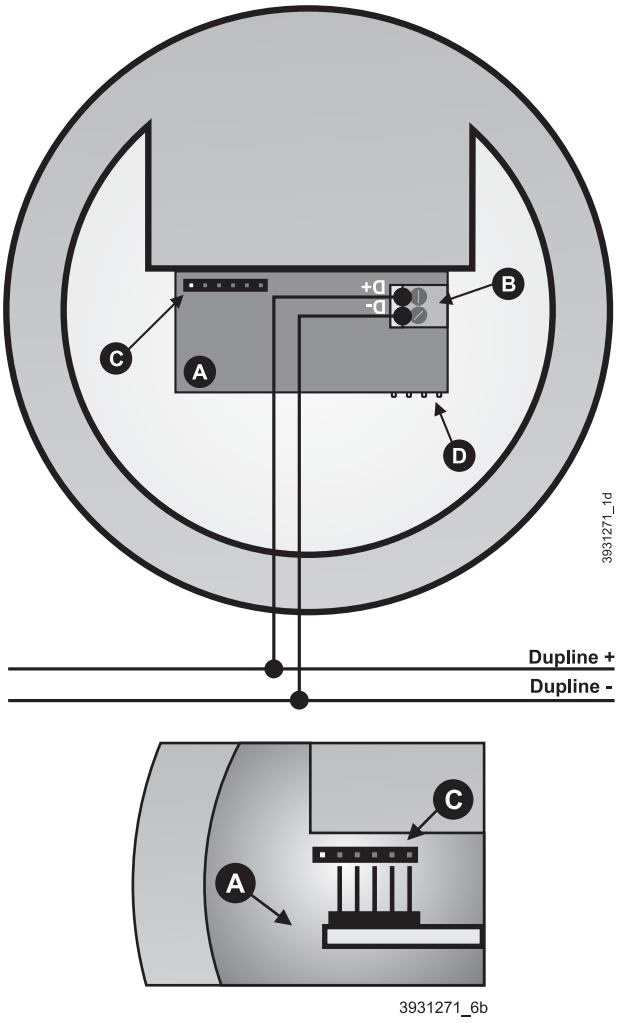
- Rooms may have a floor area of up to 60 m² and a height of up to 6 m;
- Hallways and narrow corridors may have a width of 3 m and a length of 15 m;
- The mounting location shall be as near as possible in the centre of the room;
- A gap of at least 0.5 m must be maintained from walls and furniture.

The DRD 3 must **not** be mounted at following locations:

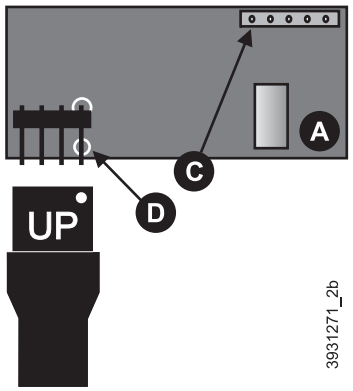
- near to ventilation ducts or strong draughts;
- directly in the apex of pitched roofs (a minimum distance of 30 cm from the apex must be kept);
- in rooms where - under normal conditions - a lot of steam, dust or smoke is present (for example in workshops, bathrooms and laundry rooms);
- in rooms where the temperature rises above +40 °C or falls below +5 °C.

The bus interface board DFMS 3, which is integrated in DRD 3, may also ordered separately. Doing this, it is possible to connect smoke detectors equipped with a battery or siren to Dupline systems. Please ask us!

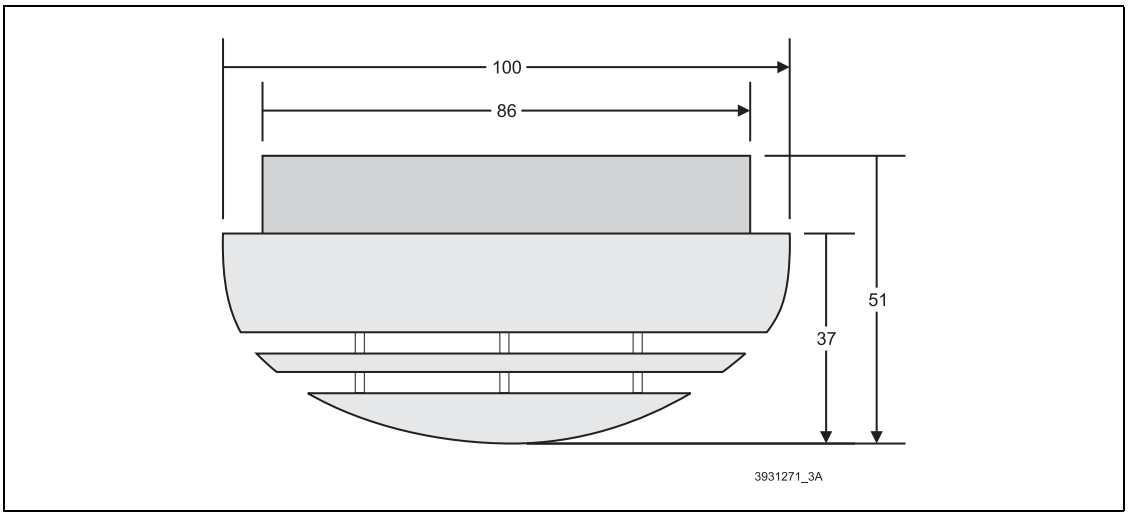
Wiring Layout



Position of the PCB (A) in DRD 3: The orientation of the PCB has to be so that the 5-pin terminal (C) runs into the five wholes of the base PCB (counted from center to border).



Address coding of the PCB (A) with hand encoder cable DKP 2 at the terminal (D).



Connections

Terminal	Description	Terminal	Description
red (1)	Dupline signal conductor + (Dupline+)	grey (2)	Dupline signal conductor - (Dupline-)

Dupline Channel Allocation

Channel	Description	D(1)	Channel	Description	D(1)
1	Alarm signal (active on alarm)	A1	3..8	Not assigned	-
2	Status signal(2)	-			

(1) Default channel address encoding ex-factory
(2) Active when signal conductors and smoke detector are connected: every 50 s this channel is active for two cycles.

Indicators

Indicator	Description
Red LED	Operation indicator: Short flash one time every 50 s (life signal): Smoke detector is OK Short flash every 0.6 s: Fire alarm

Technical Data

	Min.	Typ.	Max.
Dupline			
Current input		450 µA	800 µA
Input channels	2 (alarm signal, status signal)		
Output channels	none		
Detector			
Type	optical (to Tyndall effect)		
Operating voltage			
	not necessary (from Dupline signal)		
Terminals			
Type	Strain-relief clamps		
Contact area	0.4 mm ∅		1.5 mm²
Housing			
Type	Housing for installation at ceilings		
Dimensions	∅ 100 x 51 (in mm)		
Material	Polycarbonate		
General technical data			
Ambient temperature	-10°C		+60°C
Atm. humidity	20%..90% (exposure to dew not permissible)		
Encl. protection type / standards	CE, IP 43, DIN EN 50428, EN ISO 12239; this model bases on a device with the VdS-Certification G 202055		
Order number, description	09 501 217, Smoke detector DRD 3		

5.3.6 DRT 2: Room Thermostat with 2-line Display, 24 VDC

- Ergonomic room thermostat with monochrome LCD display
- Selection of different control programmes
- 16 Dupline channels can be displayed and operated
- 2-line display each with 16 alphanumerical characters on a visible display area of 43.9 mm x 10.0 mm (W x H)
- Configuration via DRTconf software, runs on Microsoft® Windows® 2000, Windows®XP, Windows® Vista and Windows® 7
- Direct connection to Dupline bus
- 24 VDC power supply

Product Description

The DRT 2 room thermostat is a component of the Dupline bus system and serves to regulate the temperature of rooms. The strength of the DRT 2 lies in its extensive application spectrum made possible by a whole range of configuration settings. The configuration requires the free-of-charge Windows software "DRTconf", which can be downloaded in its most up-to-date version from our homepage http://www.doepke.de/uk.

The DRT 2 offers two basic operating modes, "Terminal" and "Thermostat" operation:

Terminal mode

In the "Terminal" mode the thermostat simply measures the room temperature and transmits it, together with the desired temperature settings, to a superset control circuit. As neither the heating nor the cooling channels are being activated by the DRT 2, a superset control has to be programmed in such a way that it adjusts the temperature via heating valves or cooling units.

Thermostat mode

In the "Thermostat" mode the DRT 2 operates independently and controls the heating valve, or cooling unit, via Dupline channels in accordance with the set values. Based on the room temperature measured by the integral sensor, the 2-point thermostat triggers the channels for the heating or cooling signals so that the temperature of the room reaches the corresponding, manually selected set values.

When in this mode the DRT offers - with a corresponding configuration - various temperature programmes:

- Standard
  In the 'normal programme' the DRT compares the actually measured room temperature with the pre-selected set values for cooling and heating. If the measured temperature is below the heating set value, it energizes the 'heating' switching channel, if it exceeds the cooling setting, it energizes the 'cooling' switching channel. The difference between the set values must be at least 2 K, the thermostat works internally with a hysteresis of 0.5 K (ºC).
- Night-time lowering (standby mode)
  This programme, i.e. a reduction in the room temperature by a configurable amount, can be activated either via a Dupline channel or manually. If the device is operating in party mode, it can be switched off by manually activating the night-time lowering.
- Party (comfort) mode
  This programme extends the "comfort temperature control", i.e. the setting of the room temperature according to the pre-selected night-time lowering. This function can only be manually activated or de-activated at the DRT 2.
- Thermostat inhibit

In order to be able to stop the thermostat altogether (e.g. in the event of condensation of the cooling unit) you can activate and de-activate the thermostat inhibit manually at the DRT 2 or via a Dupline channel. De-activation of this programme has also to be carried out manually.

- Heat/frost protection
  The thermostat can be switched - via the Dupline bus - into protective mode, whereby only the separately configurable values for heat and frost protection in the room are monitored. Upon exceeding, or falling below, these values the DRT 2 energizes the relevant output channels, irrespective of the set values for cooling and heating.
- Thermostat reset
  The thermostat can be returned to a defined initial status via the Dupline bus. When the relevant reset channel is transmitted via Dupline, the thermostat discards all manually activated changes made hitherto and reloads the original configuration (default settings).

Display and Operation

The DRT 2 is able to display three basic types of pages: thermostat functions, Dupline channels and display groups (submenus). In the display groups it is possible to combine thermostat functions and Dupline channels so that an intuitively operated structure is created. The external button keys are used to scroll through the pages, while the inner keys are used to enter into the display groups or to change thermostat settings (e.g. desired temperatures, run time of the comfort mode) and Dupline channel states (On/Off).

Thanks to the easy to understand representation of texts on the two lines of the blue LCD display, and the option of grouping, intuitively operable surfaces can be generated. The readability of the display is further facilitated by the configurable back lighting, which can be set either to permanently On and Off mode, to operation at the touch of a button with preset time, or activation by a Dupline channel.

Protection against accidental, or unauthorised operation, is provided by a key lock and a PIN: the basic key lock can be cancelled by simultaneously pressing two button keys, the PIN enquiry by entering a four-digit, numerical code.

Data Types

The DRT 2 can display digital or analogue Dupline channels. Digital channels, such as e.g. push-button functions, time switch channels and master controls, can also be operated (switched On or Off) provided the channel generator is so programmed. Analogue channels, such as e.g. those of light level or temperature channels, can be scaled and displayed with the relevant physical unit. Shutter control objects which occupy two channels (Up/Down) are shown on one page so that switching in both directions is possible without scrolling to another page.

Note: Analogue data, which are transmitted by the DRT 2, always have a measuring range of 0ºC to 45ºC. This applies to e.g. room temperature, but also to any set values which are transmitted.

Configuration

The configuration of the display is carried out via the free "DRTconf" software which can be downloaded from our from our homepage http://www.doepke.de/uk. With the aid of this programme you can

- ...specify the operating mode of the DRT 2 (Terminal / Thermostat),
- ...combine thermostat and channel functions into folders (max. 16),
- ...configure which channels are to be displayed (max. 16 channels,)
- ...define the sequence of the pages in the display,
- ...specify the text of the displayed channels,
- ...determine which of the displayed channels are changeable,
- ...scale analogue (AnaLink®) channels,
- ...determine the parameters of the temperature regulator,
- ...configure the LED back lighting,
- ...configure the key lock,
- ...select the language of the DRT system menu.

The configuration can be transferred to, and read out from, the DRT 2 at any time. As it is saved in Flash-PROM it will be retained even in the event of a power failure.

The configuration is via the 9-pole SUB-D port fitted on the back of the device; for this purpose you can utilize the DKK 1 interface cable which is also used when configuring the channel generators.

Notes on Applications

Structure, Mounting and Design

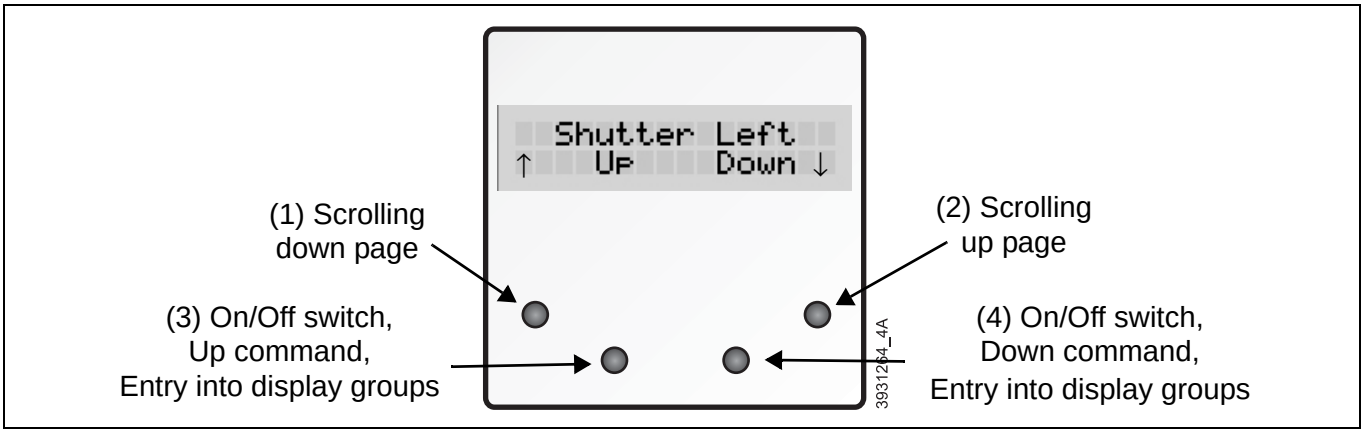
The DRT 2 is designed for fitting into deep flush-mounted installation boxes (dia. 68 mm). The DRT 2 can be integrated here as the cover enables you to use the adapting frames of most standard switch programmes. Please check beforehand that the DRT can be fitted into the individual switch programme.

In order to guarantee the DRT 2's fully functioning please take not of the following points:

- Position the device so that it is not exposed to a direct heat source, e.g. from the sun or a radiator.
- Make sure that the DRT 2 is not exposed to draughts, e.g. near windows, which could affect the measurements taken by the internal temperature sensor.
- Ensure that the output of the controlled heating facilities, e.g. radiator panels, is matched to the room to be regulated. If the calorific output is too low, or too high, it could negatively affect the control behaviour of the DRT 2.
- The DRT 2 should be installed at eye-level. If positioned too low the visible display section of the device would be reduced and readability impaired.
- The maximum lengths of the leads for the power supply cables is limited to approx. 50 m with the NT 24-750 and NT 24-2000 supply units.

Controls

The DRT 2 features the following controls:



In addition to the button functions detailed in the illustration, the following combinations provide further functions:

Combination	Description
(1) and (2)	Calls up the system menu (see next chapter) Exits from display groups to the group element above
(2) and (4)	Disables the key lock: When you have invoked the key lock during configuration in DRTconf or in the system menu, operation of the DRT 2 can be temporarily enabled (for approx. 2 minutes) with this combination.
(2) and (4)	Resets the DRT after a bus fault.

System Menu

Even after having been configured with DRTconf and installed, you can change some basic settings on the DRT 2 itself:

- The settings of the back lighting
- The correction figure and
- The key lock.

Press buttons (1) and (2) simultaneously to access the system menu. To navigate within the menu use buttons (1) - to move up - and (2) - to move down. The settings can be changed with buttons (3) and (4). The menu is structured as follows:

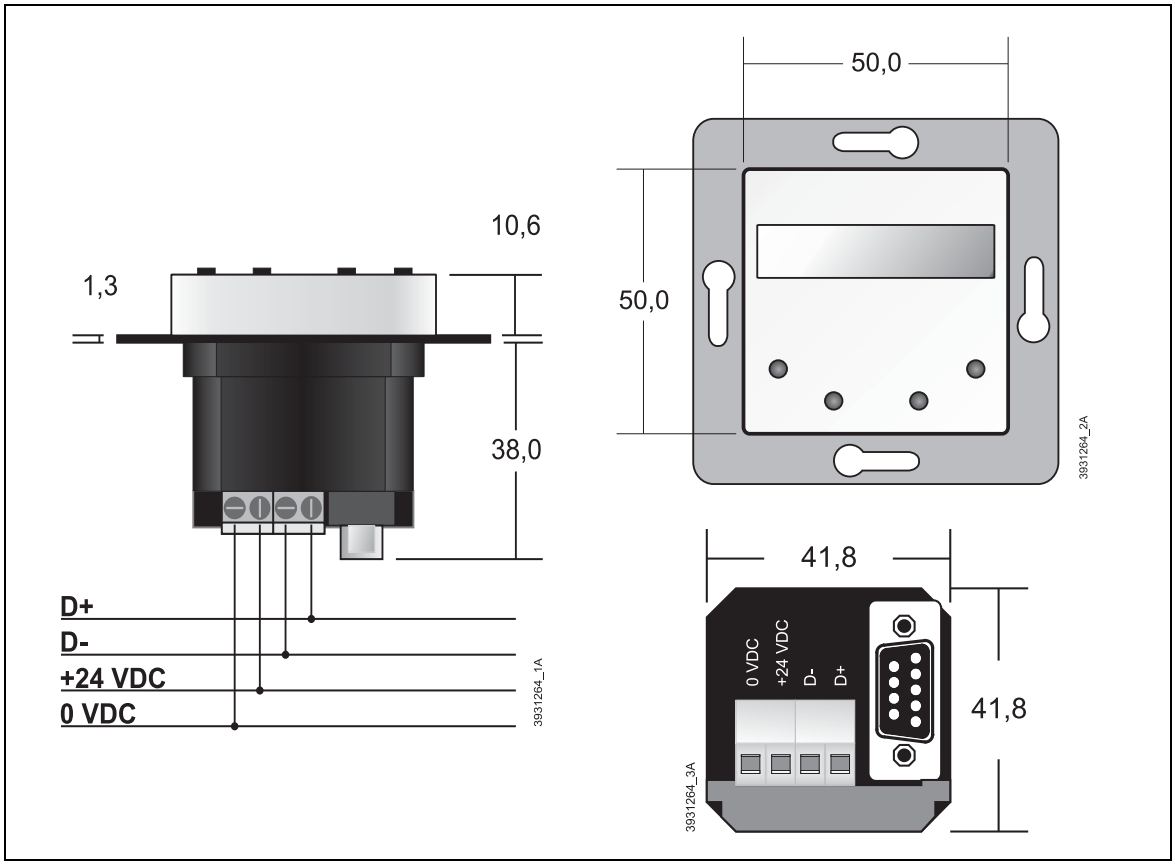
Menu Item	Selection	Description
Language:	German	Displays the current menu language(1)
Lighting:	On	The back lighting will always be switched on.
	Key	By pressing a button the back lighting will be switched on for the length of time defined in DRTconf.
Key lock:	Off	Operation is not protected by key lock.
	Key	To operate the DRT 2 the key lock must first be disabled.
	PIN	Operation is protected by a 4-digit PIN between 0...9 as configured in DRTconf. After entering the correct PIN operation becomes possible.
Temp. correction	-9.8..+9.8°C	Enables the room temperature measured by the DRT to be corrected down- or upwards (e.g. for compensation for a possible temperature rise within the device itself).
System version	x.yz	Displays the version of the DRT 2's system software.

(1) The default language of the DRT 2 upon delivery is English. The existing language is dependent upon the language setting during configuration.

Connections

Terminal	Description	Terminal	Description
D+	Dupline signal conductor + (D+)	D-	Dupline signal conductor - (D-)
+24 VDC	Operating voltage +24 VDC	0 VDC	Operating voltage 0 VDC

Wiring Layout and Dimensions



Technical Data

		Min.	Typ.	Max.
Dupline				
	Current input	0.8 mA	0.9 mA	1 mA
	Channels	16 general Dupline channels + channels for temp. control		
Display				
	Type	Alphanumeric LC display		
	Display format	2 lines each with 16 characters		
	Display size	43.9 x 10.0 (W x H in mm)		
	Character matrix	5 x 6 Pixel		
	Size of characters	3.55 x 2.24 (W x H in mm)		
	Background lighting	LED (switch-on time/duration configurable)		
Controls				
	Control keys	2 positioned outside, 2 inside		
Thermostat Functions				
	Operating modes	Thermostat (heating and cooling) / Terminal (control unit)		
	Type of control	Switching 2-point control		
	Programmes	Standard, standby, comfort (party), thermostat inhibit, heat/frost protection, thermostat reset		
Sensor	Measuring range	0 °C		45 °C
	Resolution		0.25 K (°C)	
	Measuring error	-1 K (°C)		+1 K (°C)

Technical Data (Continued)

	Min.	Typ.	Max.
Hysteresis		0.5 K (°C)	
Set value, heating	10 °C		30 °C
Set value, cooling	10 °C		40 °C
Frost protection	0 °C		10 °C
Heat protection	20 °C		45 °C
Standby lowering	0 K (°C)		10 K (°C)
Comfort time	0 h		5 h
Application Data			
Number of pages			38(1)
Configurable Dupline channels			16
Configurable groups			16
Data formats	Digital, analogue (AnaLink®)		
Initialisation time(2)			20 s
Programming Software			
Name	DRTconf		
Languages	German, English, Dutch, Polish		
Platforms	Microsoft® Windows® 2000, Windows® XP, Vista, Windows® 7		
Operating Voltage			
Rated operating voltage	22 VDC	24 VDC	27 VDC
Current input	22.5 mA	28 mA	33 mA
Terminals			
Type	Screw terminals		
Contact area	0.4 mm ∅		2.5 mm²
Housing			
Type	Front covers in brill. white, blue and anthracite, housing black		
Dimensions, front cover	50.0 x 50.0 x 10.6 (W x H x D in mm)		
Dimensions, housing	42.3 x 42.3 x 38.0 (W x H x D in mm)		
Material	Polycarbonate (PC)		
General Technical Data			
Operating temperature	0°C		+45°C
Atm. humidity	max. 85% (exposure to dew not permissible)		
Encl. protection type/standards	IP20, DIN EN 50428		
Order number, Description	09 501 700, Room thermostat DRT 2-we, white 09 501 701, Room thermostat DRT 2-an, anthracite 09 501 702, Room thermostat DRT 2-bl, blue		

(1) Total number of pages, including thermostat functions, group objects and Dupline channels.
(2) After operating voltage is applied.

5.3.7 DBA 1T/DBA 2T/DBA 4M: Operating Signal Sensor Basic Modules

- Connection for various types of EIB/KNX switches
- Max. 4 push-button and 2 acknowledge signals
- Easy, decentralized installation behind the push-button
- Address assignment even after installation
- No external power supply required

Product Description

The DBA is a component of the Dupline bus system and serves to adapt conventional-design rocker switches of various manufacturers as an operating option within Dupline.

Depending upon the design of the base module, 1- or 2-way rockers with or without illuminated window can be utilized. The module is able to handle up to four operating signals and up to two acknowledgment signals in total.

Its direct installation in flush-mounted knock-out boxes and the encoding option, even after installation, means that the DBA is particularly easy and economical to use. Furthermore, power for the device is supplied by the Dupline bus and no additional source of power is required.

The type designation of the DBA is coded as follows[1]:

	Description	Possible versions
x	Number of operating signals	1-/2-/4-way button
y	Design of button	T: Button position
		M: Central position
-z	Manufacturer	e.g.: J = Jung, B = Berker, etc.

Depending upon the design of the DBA the switch programmes of the following manufacturers can be employed:

DBA xy-B Berker	DBA xy-G GIRA	DBA xy-J Jung	DBA xy-M Merten
Modul 2	System 55	AS 500 / A plus	System Basis
K.1 / K.5	S-Classic	A 500 / SL 500	System M
Arsys	S-Color	CD 500 / CD plus	System Fläche
Twinpoint	E22	LS 990 / LS plus	OCTOCOLOR
S.1 / B.1 / B.3 / B.7 Glas		Aluminium, Stainless Steel, Anthracite	

Notes on Applications

Not all push-button product ranges permit levelling-out flush with the plaster. Please also observe the notes in the instructions for the switch programmes.

Dupline Channel Allocation

Channel	Description	Channel	Description
1	Input operating signal Bottom Left	5	Acknowledge channel LED 1 (left)

1. Not all combinations are necessarily available; for further information visit our website at www.doepke.de or call our support for advice.

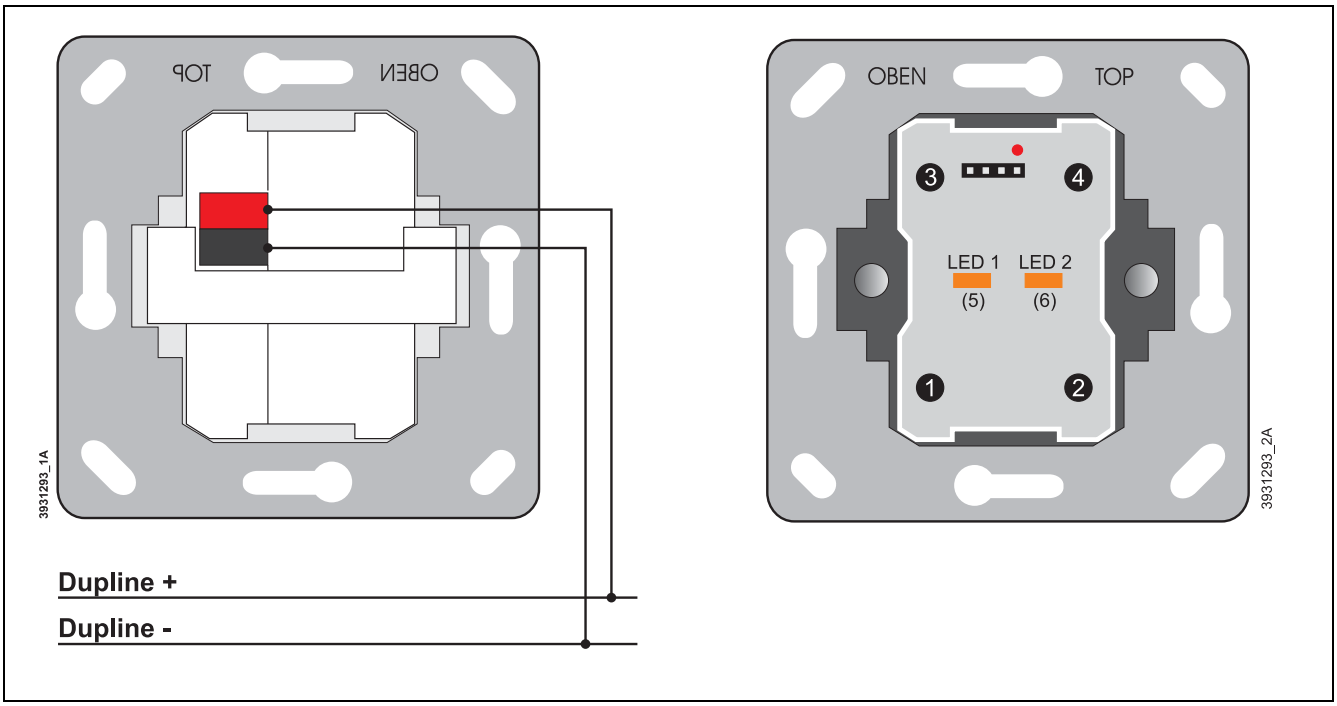
Dupline Channel Allocation (Continued)

Channel	Description	Channel	Description
2	Input operating signal Bottom Right	6	Acknowledge channel LED 2 (right)
3	Input operating signal Top Left	7	Not assigned
4	Input operating signal Top Right	8	Not assigned

Indicators

Indicator	Description
LED 1/2	Freely encodable signal LEDs, e.g. as feedback of operating commands or as orientation light for hallways.

Wiring Layout and Dimensions



Connections

Terminal	Description	Terminal	Description
D-	Dupline signal conductor -	D+	Dupline signal conductor +

Technical Data

	Min.	Typ.	Max.
Dupline			
Current consumption (LEDs Off)	500 µA	750 µA	1.0 mA
Current consumption (LEDs On)	1.5 mA	1.8 mA	3.5 mA
Input channels	4 operating signals		
Output channels	2 LED acknowledgment signals		
Inputs			
Type	4 button contacts with signal prolongation		

Technical Data (Continued)

	Min.	Typ.	Max.
Indicators			
Type	2 orange LEDs, freely encodable		
Operating Voltage			
Type	supplied by Dupline signal conductors		
Connections			
Type	2-pole spring-loaded terminals with quadruple connecting points		
Contact area	0.6 mm ∅		0.8 mm²
Housing			
Type	flush-mounted box insert		
Dimensions, fl.-m. box insert	49 x 49 x 32 (W x H x D in mm)		
General technical data			
Operating temperature	-10°C		+45°C
Atm. humidity	max. 85% (exposure to dew not permissible)		
Encl. protection type / standards	IP20, DIN EN 50428		
Order number, Description	09 501 239, 1-way Jung basic module DBA 1T-J 09 501 238, 2-way Jung basic module DBA 2T-J 09 501 236, 4-way Jung basic module DBA 4M-J		

5.3.8 DSS 2U/DSS 4U/DSS 8U: Flush-Mounted Operating Signal Inputs

- Connection for 2, 4 or 8 key signals
- Easy, decentralized installation behind the push-button
- Simplified installation with prefashioned connection cables
- Power supply via the Dupline bus

Product Description

The operating signal sensors DSS 2U, DSS 4U and DSS 8U are input modules for up to eight operating signals and permit either conventional push-buttons or potential-free switching contacts to be connected.

The sensors only differ in the number of their inputs: the DSS 2U has two, the DSS 4U has four and the DSS 8U has eight inputs. The inputs are prevented from contact bounce of up to 10 ms by integrated filters.

As the sensor are supplied by the Dupline signal, they do not require any external power supply.

Notes on Applications

Because of its compact design the operating signal transmitter will fit behind the button in a normal socket installation box.

This new generation of operating signal sensors comes equipped with three system cables. These are fitted at the sensor end with 4-pole system plugs and at the switch end with wire end ferrules and thus greatly facilitate the connection of the switches. The extension of these cables is not allowed.

All sensors are equipped with a 4-pole push-on connector for encoding the addresses with the aid of the DHK 1 (encoder cable DKP 2). It is not possible to carry out a bus test with the DTG 1 tester via this connection.

Dupline Channel Allocation

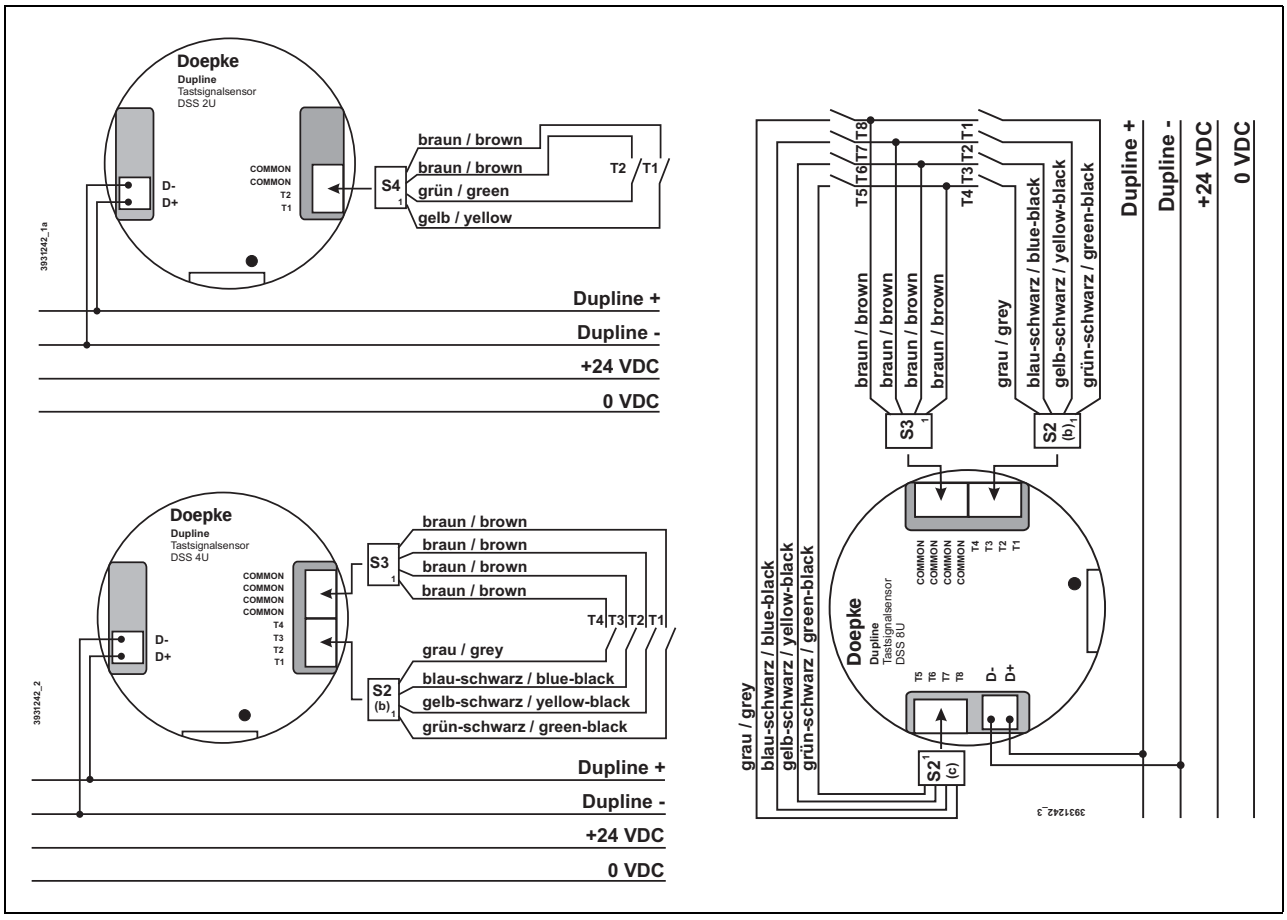
DSS ...			Channel	Description	Channel	Description
8U	4U	2U	1	Input operating signal 1	2	Input operating signal 2
			3	Input operating signal 3	4	Input operating signal 4
			5	Input operating signal 5	6	Input operating signal 6
			7	Input operating signal 7	8	Input operating signal 8

Dupline channels without any corresponding inputs are not used and should not get an address.

Indicators

none

Wiring Layout



Connections

	DSS 2U	DSS 4U	DSS 8U	Pin	Color	Signal
Cable Loom 2 (S2)				1	green-black	Input operating signal T1 or T5
				2	yellow-black	Input operating signal T2 or T6
				3	blue-black	Input operating signal T3 or T7
				4	grey	Input operating signal T4 or T8
Cable Loom 3 (S3)				1	brown	Common (T1..T4 resp. T8)
				2	brown	Common (T1..T4 resp. T8)
				3	brown	Common (T1..T4 resp. T8)
				4	brown	Common (T1..T4 resp. T8)
Cable Loom 4 (S4)				1	green	Input operating signal T1
				2	yellow	Input operating signal T2
				3	brown	Common (T1/T2)
				4	brown	Common (T1/T2)

Technical Data

		Min.	Typ.	Max.
Dupline				
Current input DSS 2U		440 µA		540 µA
Current input DSS 4U		440 µA		1.0 mA
Current input DSS 8U		440 µA		1.3 mA
Input channels		2 (DSS 2U), 4 (DSS 4U) or 8 (DSS 8U) operating signal inputs		
Output channels		None		
Inputs				
Type		Semiconductor inputs		
Power supply		Provided by inputs		
Current consumption		not applicable		
No load voltage			8.0 VDC	
Contact load				1 mA
Permissible inh. contact resistance				1 kOhm
Length of line				0.25 m(1)
Operating Voltage				
		not required (from Dupline signal)		
Terminals				
Spring-loaded terminals	Type	Spring loaded terminals, 2-pole with double connection points for bus signal		
	Contact area	0.4 mm ∅		0.8 mm ∅
Cable Looms	DSS 2U DSS 4U DSS 8U	1 x 4 leads LiYv with end ferrules (S4) 2 x 4 leads LiYv with end ferrules (S2/S3) 3 x 4 leads LiYv with end ferrules (S2/S2/S3)		
	Contact area		0.25 mm²	
Housing				
Type		Flush-mounted socket installation enclosure		
Dimensions		∅ 54 x 13.5 (W x H in mm)		
Material		Polyamide, glass fibre reinforced		
General Technical Data				
Operating temperature		-10°C		+45°C
Atm. humidity		Max. 85% (exposure to dew not permissible)		
Encl. protection type / standards		IP20, DIN EN 50428		
Order number, description		09 501 194, Operating Signal Sensor DSS 2U 09 501 195, Operating Signal Sensor DSS 4U 09 501 196, Operating Signal Sensor DSS 8U		

(1) Length of cable looms provided.

5.3.9 DSU 1U: Flush-mounted 1-Channel Binary Signal Converter

- Converts 1 input signal
- AC voltage from 90 VAC to 265 VAC
- Easily fitted into local flush-mounted installation box
- Power supply via Dupline bus

Product Description

The DSU 1U signal converter is an input unit for one signal voltage which data is converted for transmission on the Dupline bus.

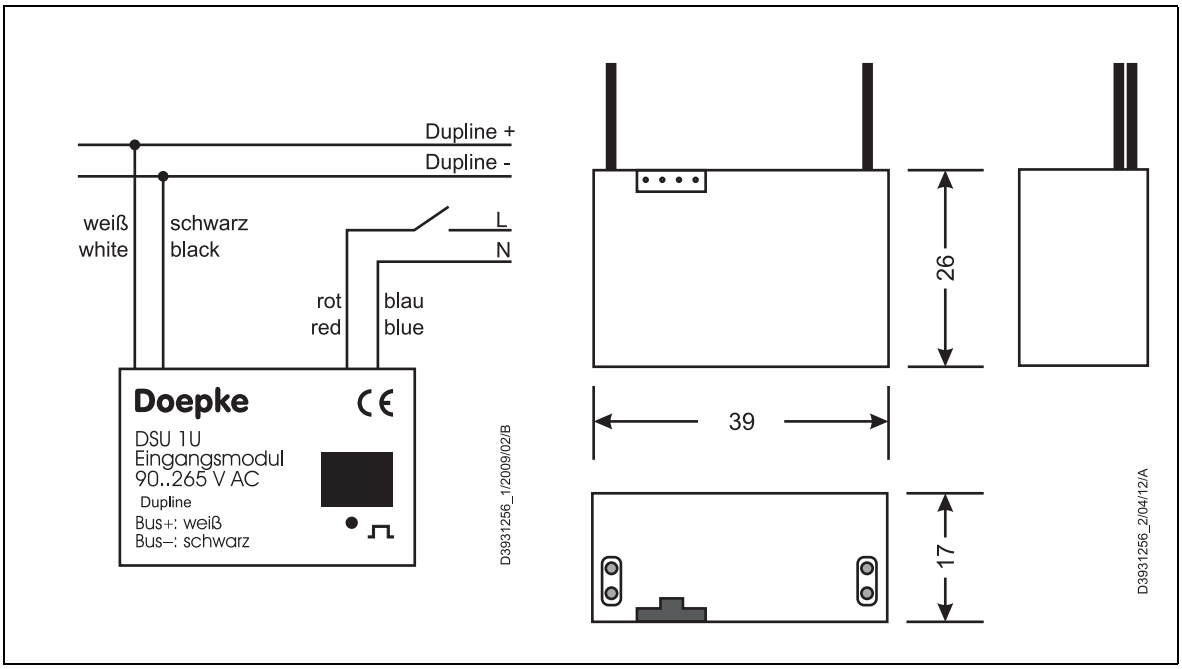
The input is suitable for AC voltages from 90 V to 265 V. There is no need to observe a specific polarity. The signal converter activates the encoded channel when exceeding a voltage difference of 90 VAC and disables the channel when the voltages drops below 60 VAC.

As it is supplied by the Dupline bus and due to the compact housing size of the device, it is excellently suited for mounting e.g. in switch socket boxes or cavities.

Notes on Applications

The DSU 1U is equipped with a 4-pole flat plug connection for coding the addresses with the DHK 1. The bus can not be tested via this connection with the DTG 1 tester.

Wiring Layout and Dimensions



Connections

Terminal	Description	Terminal	Description
Red	Input signal	Blue	Input signal
White	Dupline signal conductor + (Dupline+)	Black	Dupline signal conductor - (Dupline -)

Dupline Channel Allocation

Channel	Description	Channel	Description
1	Input signal	2..8	Not assigned

Indicators

none

Technical Data

	Min.	Typ.	Max.
Dupline			
Current input	1 mA		1.4 mA
Input channels	1 input signal		
Output channels	none		
Inputs			
Type	Potential-free input for AC voltages		
Voltage	90 V		265 V
Power consumption			0.5 W
ON voltage level	≥ 90 VAC		
OFF voltage level	≤ 60 VAC		
Operating voltage			
Rated operating voltage	Not required (supplied by Dupline signal line)		
Terminals			
Type	Cable connection		
Cable Type Dupline	∅ 0.75 mm, 150 mm		
Cable Type Input	1.5 mm², 150 mm		
Housing			
Type	Black flush-mounted installation housing		
Dimensions	26 x 29 x 17 (W x H x D in mm)		
Material	Noryl GFN 1		
General technical data			
Ambient temperature	-20°C		+50°C
Atm. humidity			80%
Encl. protection type / standards	IP 20, IEC 60664		
Order number, description	09 501 206, Signal converter DSU 1U		

5.3.10 DSU 2U: Flush-mounted 2-Channel Binary Signal Converter

- Converts 2 input signals
- DC voltage from 20 VDC to 300 VDC
- AC voltage from 20 VAC to 250 VAC
- Easily fitted into local flush-mounted installation box
- Power supply via Dupline bus

Product Description

The DSU 2U signal converter is an input unit for up to two signal voltages whose data are converted for transmission on the Dupline bus.

By using opto-decoupled inputs, it is possible to employ both inputs for DC as well as AC voltage, which can also take place simultaneously. In neither case is there a need to observe polarity.

The DSU 2U is supplied by the Dupline signal and thus does not require its own power supply. Its compact design means that it will fit into a standard switch installation box.

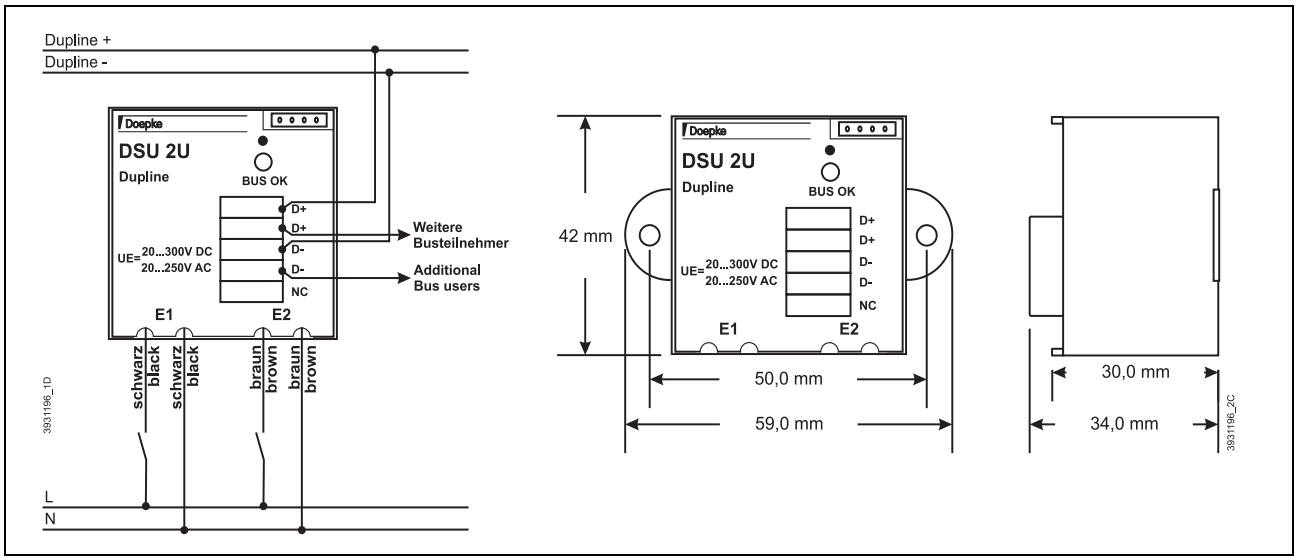
Notes on Applications

With proper installation, and using only one type of voltage for both channels, the device meets the requirements for protective low voltage between mains and control circuit.

The two-pole plug terminals permit through-looping of the Dupline bus signal.

The DSU 2U is equipped with a 4-pole flat plug connection for coding the addresses with the DHK 1. The bus can not be tested via this connection with the DTG 1 tester.

Wiring Layout and Dimensions



Connections

Terminal	Description	Terminal	Description
E1	Input signal 1	E2	Input signal 2
D+	Dupline signal conductor + (Dupline +)	D-	Dupline signal conductor - (Dupline -)

Dupline Channel Allocation

Channel	Description	Channel	Description
1	Input signal 1	3..8	Not assigned
2	Input signal 2		

Indicators

Indicator	Description
Green LED “BUS OK”	Dupline bus: Off – bus fault / On – bus OK

Technical Data

		Min.	Typ.	Max.
Dupline				
	Current input			500 µA
	Input channels	2 signal inputs		
	Output channels	none		
Inputs				
	Type	Opto-decoupled; AC/DC voltage		
DC	Rated Voltage	20 VDC		300 VDC
	Current input	100 µA		
AC	Rated Voltage	20 VAC		250 VAC
	Current input		15 mA	
Operating voltage				
	Rated operating voltage	Not required (supplied by Dupline signal line)		
Terminals				
Control terminals				
	Type	2-pole plug terminals (fitted)		
	Contact area	0.6 mm ∅		0.8 mm ∅
Mains terminals				
	Type	4 leads LiY with wire end ferrules		
	Contact area		0.75 mm²	
Housing				
	Type	Strap-type enclosure		
	Dimensions	42 x 42 x 34 (W x H x D in mm)		
	Material	Polyamide PA6		
General technical data				
	Ambient temperature	-10°C		+35°C
	Atm. humidity			85%
	Encl. protection type / standards	IP20, DIN EN 50428, DIN EN 60669-1, DIN EN 60669-2-1		
	Order number, description	09 501 136, Signal converter DSU 2U		

5.3.11 DSU 8*plus*: 8-Channel Binary Signal Converter, DIN-Rail

- converts 8 input signals
- input voltages from 0 V to 230 V AC/DC
- switching thresholds 20 V/190 V adjustable for each input
- simulation of input signals
- simple, intuitive usage by means of 2-row LC display and push buttons for configuration and manual operation

Product Description

The DSU 8plus input module is a component of the Dupline bus system for converting up to 8 voltage signals for transmission over the Dupline bus.

The inputs of the unit are opto-isolated and make it possible to analyse DC and AC voltage signals ranging from 0 V to 230 V. The switching thresholds of 20 V and 190 V can be adjusted individually for each input.

The unit can be configured and operated in a user-friendly manner by using the keys and the LC display on the front of the unit. For example, configuring Dupline addresses, switching thresholds and the backlighting are all supported

Notes on Applications

- The terminals for the power supply and for the Dupline signal conductors must only be operated using voltages that meet the requirements for safety extra-low voltage (SELV) according to VDE 0100 Part 410.
- In case of connection to hazardous voltages (e.g. mains voltage) of different phases, the sequence of connection must ensure that L and N alternate.
- Mixing of input signals with safety extra-low voltage (e.g. 24 V DC) and voltages which may endanger human life (e.g. mains voltage) is only permitted provided at least the requirements of the above-mentioned standard are met when the device is installed.
- In case of mixed connection (see above) at least one terminal must be left unconnected between such connections. The spare terminal must be permanently protected against use and the installation's documentation must include an appropriate reference to this.
- The inputs are only suitable for implementing dimmed mains voltages to a limited extent, e.g. from the outputs of leading-edge or trailing-edge dimmers. The frequency of the applied voltages must not exceed 60 Hz.

Connections

Terminal	Description	Terminal	Description
1.1/1.5	Input Signal 1 (IN 1)	1.2/1.6	Input Signal 5 (IN 5)
2.1/2.5	Input Signal 2 (IN 2)	2.2/2.6	Input Signal 6 (IN 6)
3.1/3.5	Input Signal 3 (IN 3)	3.2/3.6	Input Signal 7 (IN 7)
4.1/4.5	Input Signal 4 (IN 4)	4.2/4.6	Input Signal 8 (IN 8)
1.3	Dupline signal conductor - (Dupline-)	1.7	Dupline signal conductor + (Dupline+)
1.4	0 V DC operating voltage	1.8	+24 V DC operating voltage

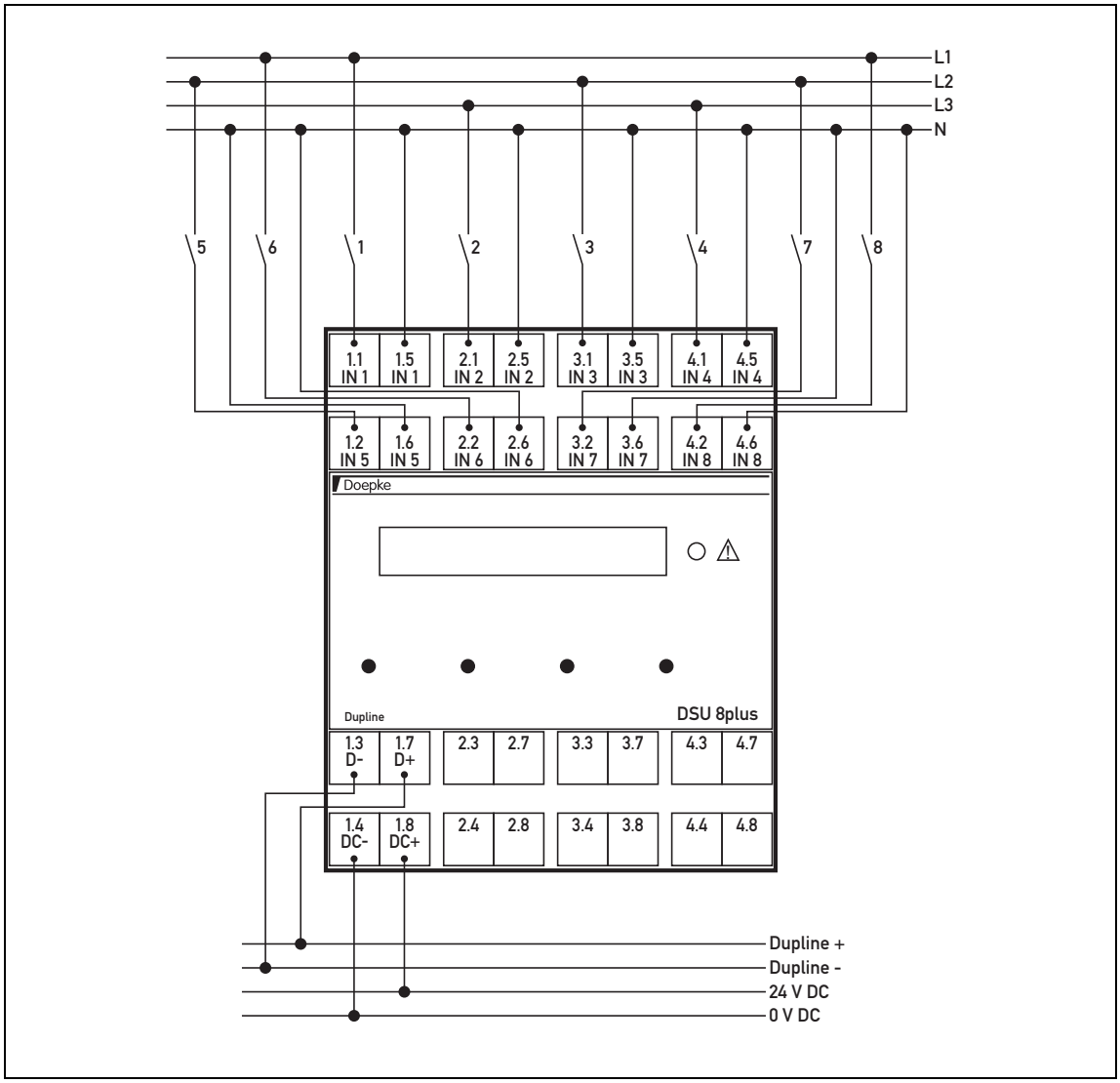
Dupline Channel Allocation

Channel	Description	Channel	Description
1..4	Input signal 1..4	5..8	Input signal 5..8

Indicators

	Message	Description
⚠	Continous On	The unit is in manual operation mode and is „off-line“.
	flashing 1/s	The bus signal is not present. This fault also is displayed in manual operation mode.

Wiring Layout and Dimensions



Technical Data

	Min.	Typ.	Max.
Dupline			

Technical Data (Continued)

	Min.	Typ.	Max.
Current input	0.8 mA	0.9 mA	1.0 mA
Input channels	8 input channels (channels 1..8)		
Output channels	none		
Display			
Type	alphanumeric LC display		
Display format	max. 2 lines each with 16 characters		
Display size	43.9 x 10.0 (B x H in mm)		
Background lighting	LED (switch-on time configurable)		
Controls			
Operating/navigation keys	4		
Inputs			
Art	8 opto-decoupled semi-conductor inputs		
Rated input voltage	0 V AC/DC		230 V AC/DC
Rated input frequency	0 Hz		50 Hz
Input sensitivity / switching threshold	adjustable: Low (20 V AC/DC) / High (190 V AC/DC)		
Current input (24 V DC / 230 V AC)			0.1 / 7.5 mA
Operating Voltage			
Rated operating voltage	21.5 VDC	24 VDC	26.5 VDC
Current input	13 mA(1)	17 mA	25 mA(2)
Ripple voltage			100 mV_{pp}
Terminals			
Type	Strain-relief clamps		
Contact area	0.4 mm ∅		2.5 mm²
Torque			0.6 Nm
Housing			
Type	Distribution installation housing for mounting on rails according to DIN EN 60715:2001-09		
Dimensions	72 x 85 x 58 (W x H x D in mm) / 4 modules		
Material	Polycarbonate		
General technical data			
Ambient temperature	-10°C		+45°C
Atm. humidity	max. 85% (exposure to dew not permissible)		
Encl. protection type / standards	IP20, EN 60669-2-1, EN 50428, EN 50491-3/-4-1/5-1/5-2		
Order number, description	09 501 244, 8-way signal converter DSU 8plus		

(1) without background light
(2) with fault indicator LED

5.3.12 DTS 1: Surface-mounted Temperature Sensor

- Temperature sensor with PT1000 probe
- Temperature range -30°C to +60°C
- Compact housing
- Power supply via the Dupline bus
- Suited for outside use

Product Description

With the DTS 1 temperature sensor analog temperature data can be converted for transmission via the Dupline bus. The temperature measurement is transmitted on an independently encodable channel.

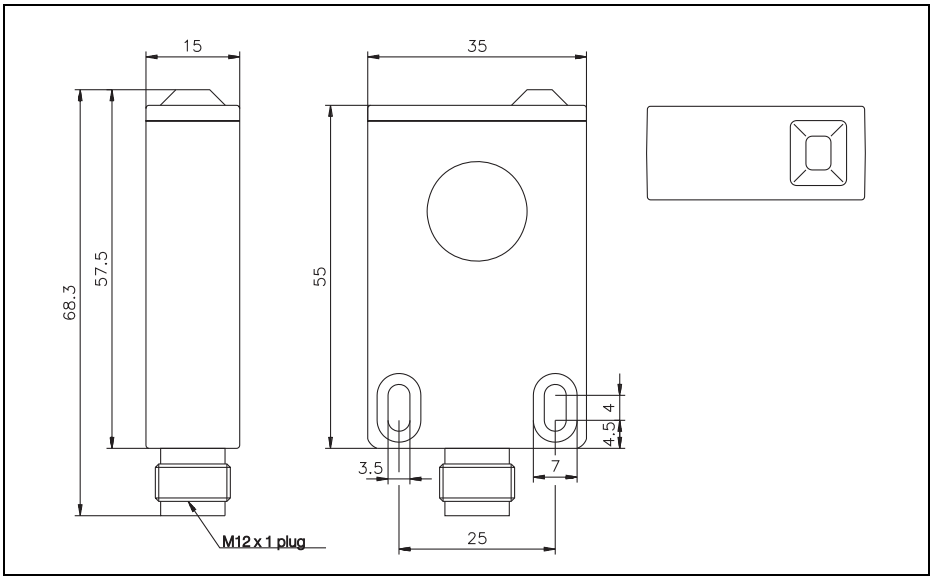
The DTS 1 is suitable for applications in both indoor and outdoor areas and can be mounted unobtrusively because of its compact design.

It requires no external power supply as it is supplied by the Dupline signal line.

Notes on Applications

When measuring the air temperature the DTS 1 should not be mounted directly on to a wall. The temperature sensors should be fully exposed to the air flow.

Wiring Layout



Connections

The standardized M12-connection cable is provided with up to 4 wires. The following table specifies the assignment of the wires.

Wire	Description	Wire	Description
Brown	1-Dupline signal conductor + (Dupline+)	Black	4-Dupline signal conductor - (Dupline-)
Blue	3-Dupline signal conductor - (Dupline-)	White	2-Dupline signal conductor - (Dupline-)

Connections (Continued)

The 4-pole M12-socket of the housing has the following configuration:

Pin	Description	Pin	Description
1	1-Dupline signal conductor + (Dupline+)	4	4-Dupline signal conductor - (Dupline-)

The M12-connecting cable, DKM 1, must be arranged separately. The coding of addresses requires a special cable (DKP 3).

Dupline Channel Allocation

Channel	Description	Channel	Description
1	Temperature data	2..8	Not assigned

Indicators

none

Technical Data

	Min.	Typ.	Max.
Dupline			
Current input		800 µA	
Input channels	1 temperature data output, AnaLink method		
Output channels	none		
Temperature sensor			
Type	PT1000		
Measuring range	-30°C		+60°C
Time constant	Typ. 450 s (air flow = 0 m/s), 350 s (air flow = 1 m/s)		
Resolution	8 bits (approx. 0.35°C / bit)		
Measuring error			+2%
Operating voltage			
Operating voltage	Provided by Dupline bus		
Terminals			
Type	M12-socket connector		
Housing			
Type	Flat-pack design		
Measurements	35 x 68 x 15 (W x H x D in mm)		
Material	Polycarbonate, light grey		
General technical data			
Ambient temperature	-30°C		+60°C
Encl. protection type / standards	IP 67		
Order number, description	09 501 112, Temperature sensor DTS 1 09 501 140, DKM 1 (M12-cable, 2 m) 09 501 141, DKP 3 (coding cable for DHK 1)		

5.3.13 DTS 2: Temperature Sensor in Installation Housing

- Temperature sensor with PT1000 probe
- Temperature range -30ºC to +60ºC
- Neutral white coloured combined surface or flush-mounted installation housing
- Easiest possible address encoding via modular socket
- Power supply via Dupline bus
- Suitable for use inside buildings

Product Description

The DTS 2 temperature sensor permits conversion of analog room temperature data for transmission via the Dupline bus. The temperature measurement is transmitted on an independently encodable channel.

Notes on Applications

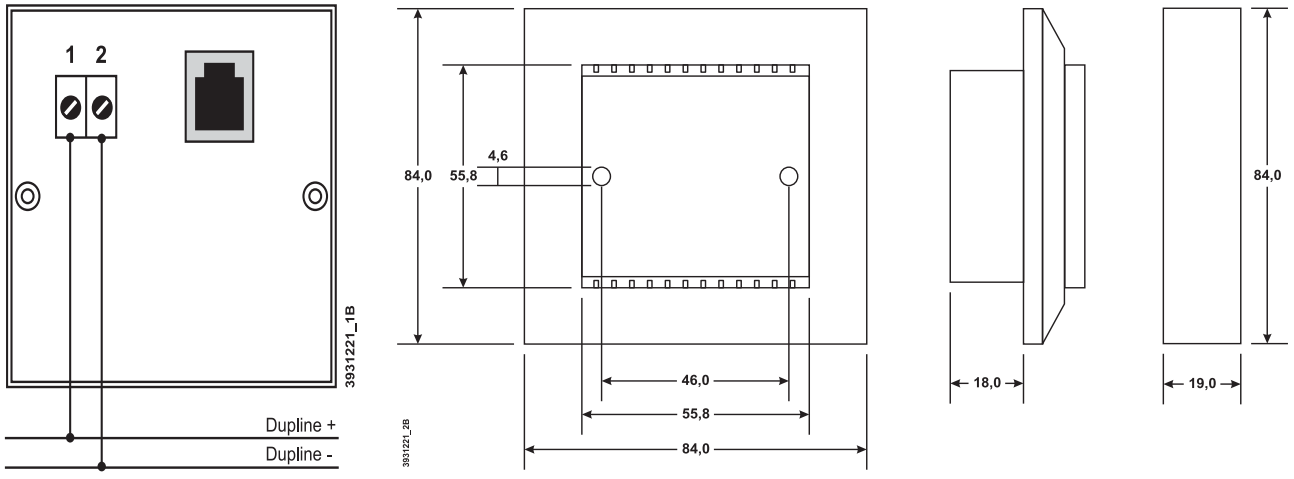
The DTS 2 is designed for use in internal areas and should be so mounted that the air vents are not obstructed by items such as e.g. curtains.

The installation housing, consisting of an air-permeable cover, the installation frame and a surface-mounted frame, is suitable for both surface-mounting and flush-mounting in standard socket boxes. The DTS 2 is also available as an open circuit-board without housing (Order no. 09 501 172, DTS 2-P) if the sensor electronics are to be fitted into the installation housing of another manufacturer.

The DTS 2 requires no external power supply as it is supplied by the Dupline signal line.

The analog data are transmitted in the AnaLink process, i.e. the transmission of a complete measurement takes approx. 35 sec. The DTS 2 is therefore suitable only for slowly changing temperatures.

Wiring Layout and Dimensions



Connections

Terminal	Description	Terminal	Description
1	Dupline signal conductor + (Dupline+)	2	Dupline signal conductor - (Dupline-)

Dupline Channel Allocation

Channel	Description	Channel	Description
1	Temperature Data	2..8	Not assigned.

Indicators

none

Technical Data

	Min.	Typ.	Max.
Dupline			
Current input		800 µA	
Input channels	1 Temperature data output, AnaLink method		
Output channels	None		
Temperature sensor			
Type	PT1000		
Measuring range	-30°C		+60°C
Time constant	Typ. 450 s (air flow = 0 m/s), 350 s (air flow = 1 m/s)		
Resolution	8 Bit (approx. 0.35°C/Bit)		
Measuring error			+2%
Operating Voltage			
Rated operating voltage	Not required (supplied by Dupline signal line)		
Terminals			
Type	Strain-relief clamps		
Contact area	0.4 mm ∅		2.5 mm²
Housing			
Type	Housing for surface and flush mounting		
Dimensions	84 x 84 x 34 (W x H x D in mm)		
Material	ABS, white		
General technical data			
Ambient temperature	-30°C		+60°C
Encl. protection type / standards	IP 20		
Order number, description	09 501 168, Temperature sensor DTS 2 09 501 172, Temperature sensor circuit-board DTS 2-P		

5.3.14 DTZ 4: 4-Channel Pulse Counter/Hours-Run Meter, DIN-Rail

- 4-channel counter for pulses and running times
- S0-type inputs to DIN 43 864
- Measuring range from 0 to 99,999,999
- Resolution 20 Hz and 1 s respectively
- Enclosure protection type IP 40 (with installation in distribution board)
- 24 VDC power supply

Product Description

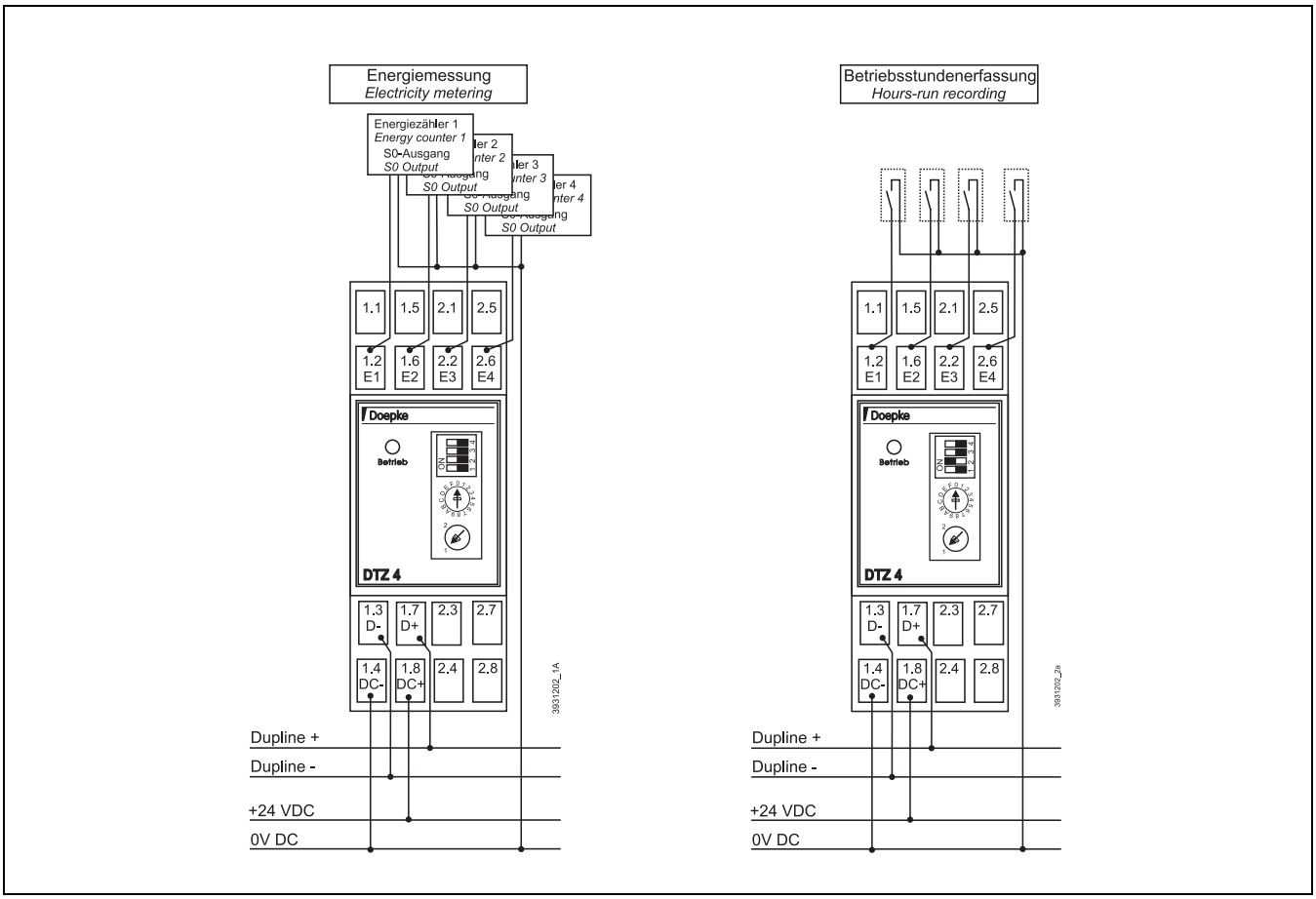
With the DTZ 4 pulse counter running times can be recorded or pulses counted at four inputs. Measured data can always be read, and reset, via the Dupline bus making the DTZ eminently suitable for recording energy consumption on camping sites and yachting marinas.

The measured data are transmitted by the multiplex procedure; the data being in BCD code. The measuring range is selectable from 0..99 to 0..99,999,999; the set range thereby determining the number of multiplex channels (1 to 4 channel groups). For further information see **Chapter 2.4.3.4 "Counter data (time-division multiplex method)"** on **Page 14**.

Notes on Applications

Up to 128 counter channels are available for use in a Dupline system (32 DTZ 4 @ 4 channels). The four channels of a DTZ 4 always work in one operating mode (running time recording or pulse counting).

Wiring Layout



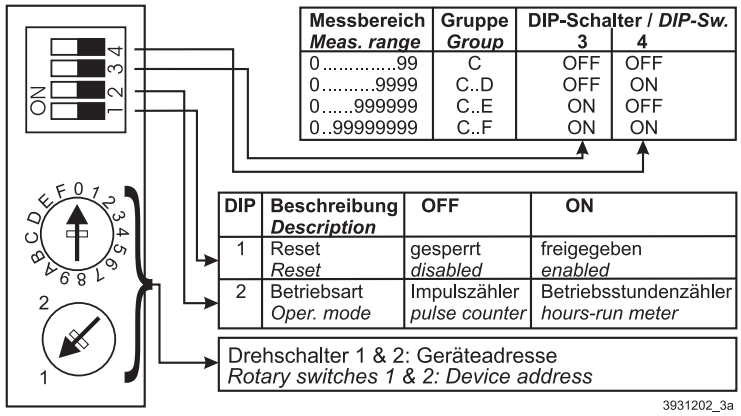
Connections

Terminal	Description	Terminal	Description
1.2	Input counter 1	1.3	Dupline signal conductor - (Dupline-)
1.6	Input counter 2	1.7	Dupline signal conductor + (Dupline+)
2.2	Input counter 3	1.4	Operating voltage 0 VDC (DC-)
2.6	Input counter 4	1.8	Operating voltage 24 VDC (DC+)

Dupline Channel Allocation

Groups	Description	Groups	Description
B	Measuring range 0..99	B..D	Measuring range 0..999,999
B..C	Measuring range 0..9,999	B..E	Measuring range 0..99,999,999

DIP Switch / Rotary Switch



Indicators

Indicator	Description
Green LED “Betrieb”	Status indicator: Off – equipment malfunction or no power / On – equipment OK

Technical Data

	Min.	Typ.	Max.
Dupline			
Current input		10 µA	
Input channels	4 counter inputs in multiplex procedure		
Output channels	none		
Inputs			
Art	S0 inputs to DIN 43 864		
Measurement range	0..99		0..99,999,999
Output voltage		24 VDC	
Rated current per channel(1)			8 mA
Resolution with running time recording	1 s		

Technical Data (Continued)

	Min.	Typ.	Max.
Accuracy with running time recording	0,5%		
Resolution with pulse counting			20 Hz
Length of line(2)			5 m
Operating voltage			
Rated operating voltage	21.5 VDC	24 VDC	26.5 VDC
Current input		10 mA	
Terminals			
Type	Strain-relief clamps		
Contact area	0.4 mm ∅		2.5 mm²
Housing			
Type	Distribution installation housing for mounting on rails according to DIN EN 60715:2001-09		
Dimensions	35 x 85 x 58 (W x H x D in mm) / 2 modules		
Material	Polycarbonate		
General technical data			
Ambient temperature	-20°C		+60°C
Atm. humidity			95%
Encl. protection type / standards	IP20, DIN EN 50428		
Order number, description	09 501 145, Pulse Counter DTZ 4		

(1) At moment of pulse
(2) Between counter input and pulse generator output

5.3.15 DWS 1: Water Stop Sensor

- Detection of water leakage
- Unobtrusive installation at baseboards
- Transmission of a life signal
- Decentralised module with low current consumption
- Protection type IP 67

Product Description

The DWS 1 water stop sensor permits the detection of water leakage and the transmission of the alarm via the Dupline bus.

The sensor is equipped with two Dupline channels: the alarm channel and a channel for the transmission of a life signal. While the alarm channel is activated only in the event of water penetration, the live signal is permanently switched on.

The detection of a water leakage is done by means of two electrodes which are located at the lower PCB border.

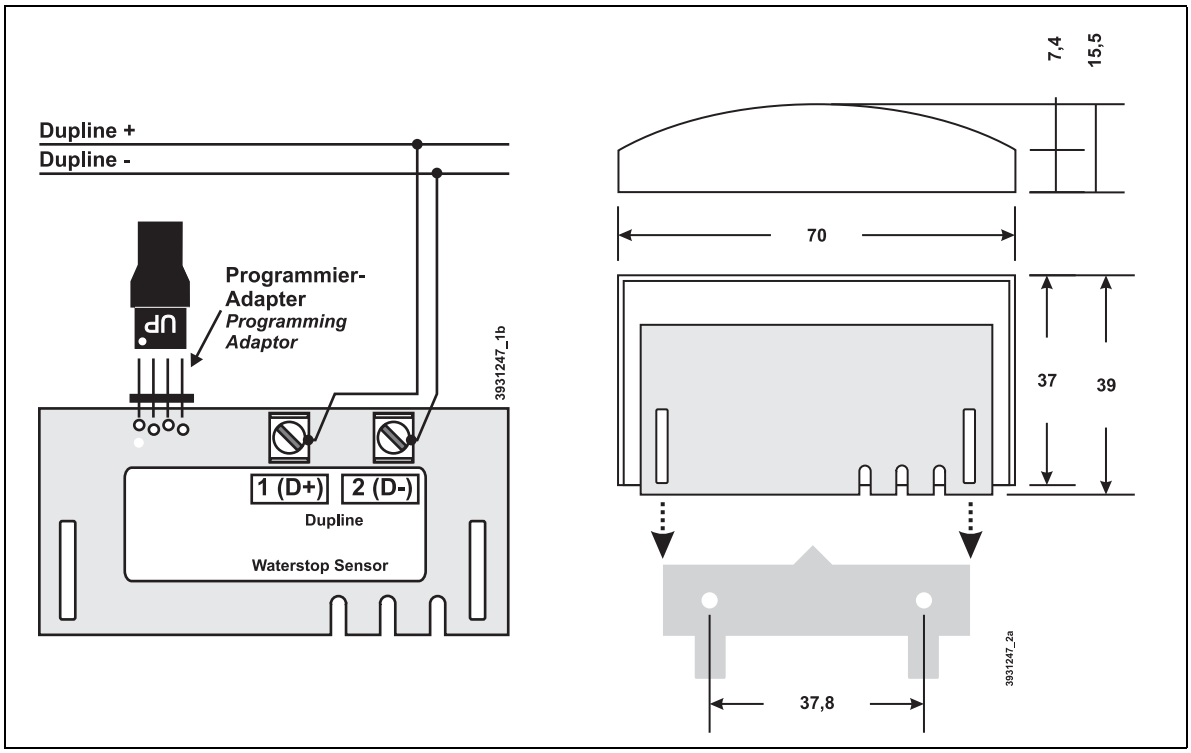
Notes on Applications

Due to the removable mounting plate, the installation is very easy. The mounting location should be selected so that the sensor only temporarily is exposed to water.

Note: The sensor meets the requirements of the IP 67 standard and is thus protected against temporary immersion. It may not, however, be immersed in water for longer periods or used for the monitoring of other fluids.

For encoding the sensor PCB is equipped with a pin strip feed-through. The hand encoder can be connected to the PCB by means of the pin strip connector provided with the sensor.

Wiring Layout and Dimensions



Dupline Channel Allocation

Channel	Description	Channel	Description
1	Alarm channel	2	Life signal

Connections

Terminal	Description	Terminal	Description
1 / D+	Dupline signal conductor + (D+)	2 / D-	Dupline signal conductor - (D-)

Technical Data

	Min.	Typ.	Max.
Dupline			
Current input		1.3 mA	
Input channels	2 input signals (alarm / live Signal)		
Output channels	None		
Inputs			
Type	integrated		
Rated voltage			8 VDC
Trigger resistance	150 kΩ		470 kΩ
Operating Voltage			
Rated operating voltage	Not required (supplied by Dupline signal line)		
Terminals			
Type	Screw terminals		
Contact area	0.4 mm ∅		0.8 mm²
Housing			
Type	White surface-mounted housing		
Dimensions	70 x 40 x 16 (W x H x D in mm)		
Material	ABS		
General technical data			
Ambient temperature	-20°C		+50°C
Encl. protection type / standards	IP 67		
Order number, description	09 501 197, Water stop sensor DWS 1		

5.4 Outputs

5.4.1 DDM 1Rplus: 1-Way Lighting Scene Dimmer, DIN-Rail

- Automatically controlled dimming up and dimming down according to memory setting
- Stores 6 lighting scenes in memory
- Acknowledgement of switching status
- Switching/dimming capacity for up to 600 W
- AC modulation and phase angle control dimming selectable on the front
- Control output for up to ten LT 500/LT 1200 load modules

Product Description

The DDM 1R***plus*** dimmer permits different types of lamps to be switched and dimmed. The lighting is switched on via a bulb-preserving soft start function. The dimmer setting selected last is stored in the built-in memory and can be reselected next time the lighting is switched on.

The dimmer also provides for six lighting arrangements to be stored, which can be retrieved by means of channel combinations. The lighting scenes are preset at the factory in 15% steps within a range of 25% to 100% and are safeguarded against inadvertent changes. This block can easily be disabled and restored after any changes have been carried out.

The load output of the dimmer provides up to 600 W for various types of loads (e.g. incandescent lamps, HV halogen lamps and LV halogen lamps). The change-over from phase angle control to AC modulations control dimming and vice versa is carried out via the rotary switch on the front of the housing. The output is electronically protected against overloads and short-circuits. Faults are indicated by a LED on the front panel.

Located next to the load output is a control output to which up to ten LT 500 or LT 1200 load modules may be connected to increase dimming capacity. Mixed operation of LT 500 and LT 1200 modules, even when connected to different phases, is possible too.

The following are also located on the front panel:

- a button for switching on and off as well as dimming;
- the coding and test socket with integrated LED to indicate that the Dupline bus signal is functioning properly.

As a safeguard in the event of a bus fault, the status of the output can be preconfigured with the DHK 1 hand encoder. The dimmer is preset at the factory so that they switch off when a fault occurs; this has the advantage that the dimmer can then still be operated via the dimmer switch on the front panel.

In addition to the functions described above the DDM 1R***plus*** also offers, on two further channels, an acknowledgement facility of the dimmer (output on/off) as well as of the alarm status.

Notes on Applications

In order to safeguard against accidental resetting, and as the switch is disabled during operation, the required operating mode should be selected before connecting the Lin phase..

Turn to the left:
AC modulation control

Turn to the right:
Phase angle control

Although an incorrect setting will result in malfunctions, it will not cause irreparable damage to the dimmer.

An alarm signal caused by an overload will automatically be reset upon removal of the overload. An alarm

caused by a short-circuit has to be reset manually, after the fault has been rectified, by disconnecting the Lin phase for approx. 3 seconds from the mains supply.

The lighting scenes are retrieved via a combination of the Dupline channels 1...4 of the dimmer; the following table provides an overview of the combination:

	Inputs				Factory Setting of Light Value
	Channel 1	Channel 2	Channel 3	Channel 4	
Dimming		■			10 %..100 %
0%	■				0 % (not changeable)
Light. scene 1			■		55 %
Light. scene 2				■	100 %
Light. scene 3	■		■		25 %
Light. scene 4	■			■	40 %
Light. scene 5			■	■	70 %
Light. scene 6	■		■	■	85 %
100 %(1)	■	■	■	■	100 % (not changeable)

(1) This scene is the priority switching in the event of a bus fault. The light value is achieved in approx. 3 seconds.

Every lighting scene can be retrieved via one or more channels. In order to recall e.g. lighting scene 4, the input channels 1 and 4 have to be activated simultaneously. All lighting scenes are preset at the factory with the dimming factors specified in the table; they can be altered to any value.

In order to design lighting scenes with several dimmers, the individual dimmers simply require an identical channel configuration (e.g. addresses A1, A3, A4 for input 1, 3, 4) for retrieval and storage of lighting scenes and input 2 for the individual setting of the lighting scenes. By using central control items in Pro-Line it is thus very easy to set up “made-to-measure” lighting arrangements.

Connections

Terminal	Description	Terminal	Description
1.2 / 1.6	Pulse-width modulated output (S-/S+)	4.1 / 4.5	Dimming channel 1 (L_{IN} / L_{OUT})
3.1 / 3.5	N-conductor input		
1.3	Dupline signal conductor - (Dupline-)	1.7	Dupline signal conductor + (Dupline+)
1.4	0 V (DC-)	1.8	24 VDC (DC+)

Dupline Channel Allocation

Channel	Description	Channel	Description
1	Central Off / Lighting scenes 3/4/6	5	Ackn. signal dimming output
2	Dimming / On / Off	6	Ackn. signal alarm(1)
3	Lighting scene 1 (3/5/6)	7	Not assigned.
4	Lighting scene 2 (4/5/6)	8	Not assigned.

(1) Overload at output: cycling slowly - short-circuit at output: permanently on.

Indicators

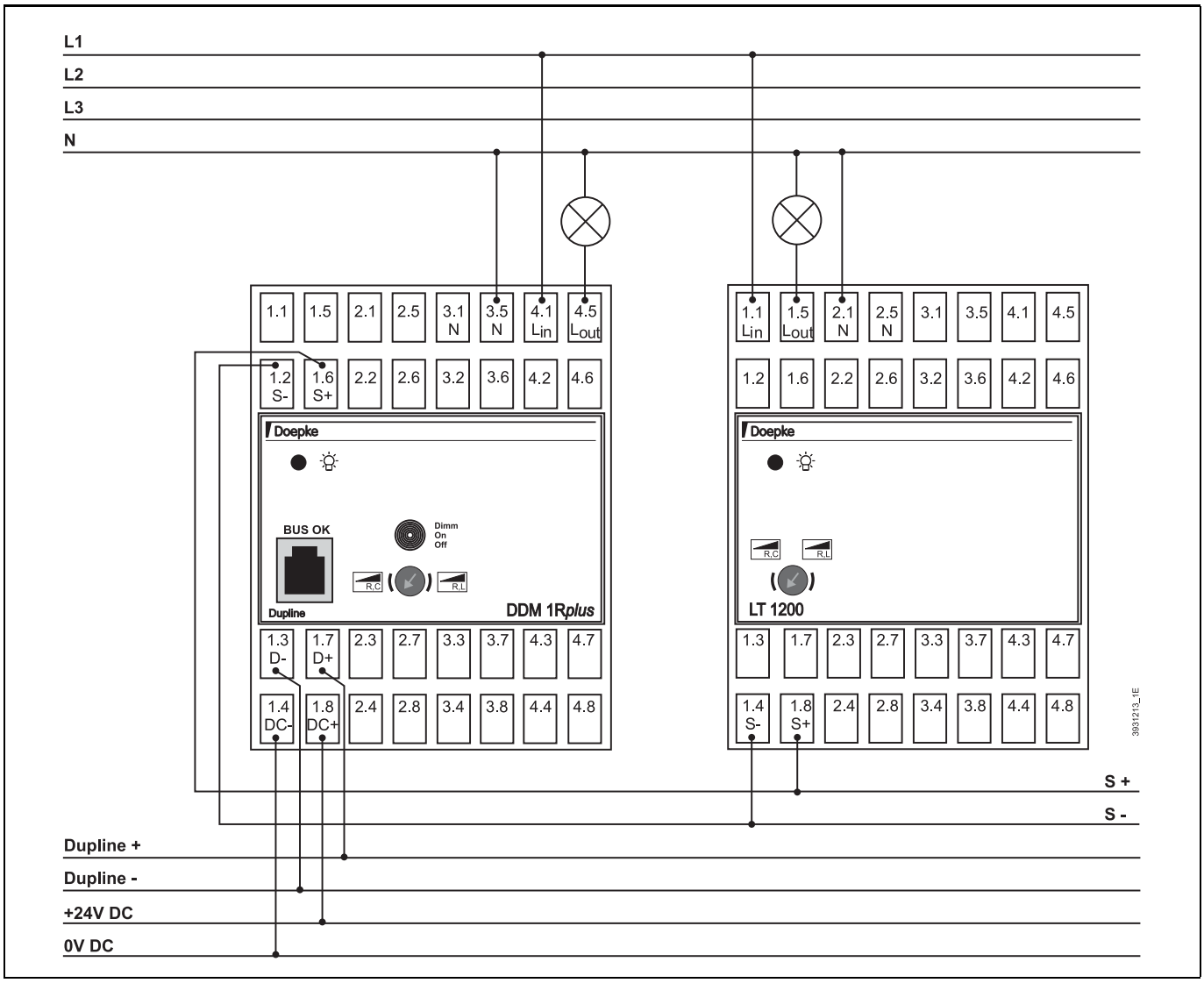
Indicator	Description
Green “BUS OK” LED	Dupline bus: Off – bus fault / On – bus OK

Indicators (Continued)

Indicator	Description
Alarm signal	Monitoring: Off – status OK / On (flashing slowly) – overload / On (flashing rapidly) – short-circuit

Wiring Layout and Dimensions

The N-connection is essential for the operation of the dimmer. The following example of a circuit layout shows the control of an LT 1200 load module on the PWM output and of a lighting medium at the dimming output:



Technical Data

	Min.	Typ.	Max.
Dupline			
Current input	60 µA		90 µA
Input channels	None / 2 acknowledge signals		
Output channels	4 control channels (channels 1..4)		
Outputs			
Type	Dimming output		

Technical Data (Continued)

		Min.	Typ.	Max.
Voltage		215 VAC	230 VAC	250 VAC
Rated current / load capacity(1)				600 W
Dimming velocity(2)			4 s	
Types of Dimmable Lamps(3)		AC modulation control dimming: incandescent lamps, HV-halogen lamps and LV-halogen lamps with electronic ballast		
		Phase angle control dimming: incandescent lamps, LV-halogen lamps with conventional transformer		
Outputs				
Type		PWM(4) control output, approx. 70 Hz		
Rated voltage		20 V	24 V	26 V
Rated current / load capacity(5)				80 mA
Operating voltage				
Rated operating voltage		21.5 VDC	24 VDC	26.5 VDC
Current input		11 mA	13 mA	15 mA
Terminals				
Type		Strain-relief clamps		
Contact area		0.4 mm ∅		2.5 mm²
Housing				
Type		Distribution installation housing for mounting on rails according to DIN EN 60715:2001-09		
Dimensions		72 x 85 x 58 (W x H x D in mm) / 4 modules		
Material		Polycarbonate		
General technical data				
Ambient temperature		-10°C		+45°C
Atm. humidity		max. 85% (exposure to dew not permissible)		
Encl. protection type / standards		IP20, DIN EN 50428, DIN EN 60669-1, DIN EN 60669-2-1		
Order number, description		09 501 175, Lighting scene dimmer DDM 1R*plus*		

(1) The dimming capacity is dependent upon the ambient temperature and applies to the specified range. There should be sufficient ventilation in the distribution box. If several dimmers are mounted next to each other and are subject to heavy loads, provision of a ventilation space of approx. 10 mm is recommended.
(2) Dimming from 10% up to 100% or from 100% down to 10%.
(3) Observe the manufacturer's instructions.
(4) Pulse width modulation
(5) Any current consumption at this signal output represents an additional load on the 24 V supply. One LT 500 or LT 1200 typically requires 1 mA.

5.4.2 DDMU 1R*plus*: 1-Way Lighting Scene Dimmer 1..10V, DIN-Rail

- Stores 6 lighting scenes in memory
- Acknowledgement of switching status
- Switching/dimming capacity for up 25 electronic ballast devices, each with 58 A
- Control output for up to ten LT 500/LT 1200 load modules
- Automatically controlled dimming up and dimming down with memory value

Product Description

The DDMU 1R*plus* lighting scene dimmer is a component of the Dupline installation system. It permits electronic ballast and Doepke load modules to be dimmed and switched on or off; the operating status being indicated by means of a LED on the front panel as well as via a Dupline acknowledgement channel.

The outputs can be dimmed and switched on or off with the aid of the push-button on the front panel and Dupline channel 2. Upon switching off, the dimmer setting selected last is stored as a so-called "memory setting" in the internal memory and is reselected next time the lighting is switched on. A power failure will erase the memory setting.

The dimmer also provides for six lighting arrangements to be stored, which can be retrieved by means of channel combinations. The lighting scenes are preset at the factory in 15% steps within a range of 25% to 100% and are safeguarded against inadvertent changes. This block can easily be disabled and restored after any changes have been carried out.

The lighting is invariably switched on via a bulb-preserving soft-start function. Delays by electronic ballast may lengthen the switching-on process.

In addition to the 1...10 V output the DDMU 1R*plus* is equipped with a control output to which up to ten LT 500 or LT 1200 load modules, or a mixture thereof, may be connected. This provides for an additional output capacity of up to 12,000 W.

The dimmer is factory-fitted with a jumper wire so that the full voltage range is available at the 1...10 V output (characteristic A). Removal of this jumper wire will result in characteristic B being set, which limits the output voltage to max. 6.5 V. The setting of the characteristic does not affect the PWM output.

As a safeguard in the event of a bus fault, the status of the outputs can be preconfigured with the DHK 1 hand encoder. The dimmers are preset at the factory so that they switch off when a fault occurs; this has the advantage that the dimmers can then still be operated via the dimmer switch on the front panel.

Notes on Applications

The wiring from output to electronic ballasts should not be installed in parallel to live mains cables. If necessary, provide shielding.

The lighting scenes are retrieved via a combination of the Dupline channels 1...4 of the dimmers; the following table provides an overview of the combination:

	Inputs				Factory Setting of Light Value
	Channel 1	Channel 2	Channel 3	Channel 4	
Dimming		■			10 %..100 %
0%	■				0 % (not changeable)
Light. scene 1			■		55 %
Light. scene 2				■	100 %
Light. scene 3	■		■		25 %
Light. scene 4	■			■	40 %

	Inputs				Factory Setting of Light Value
	Channel 1	Channel 2	Channel 3	Channel 4	
Light. scene 5					70 %
Light. scene 6					85 %
100 %(1)					100 % (not changeable)

(1) This scene is the priority switching in the event of a bus fault. The light value is achieved in approx. 3 seconds.

Every lighting scene can be retrieved via one or more channels. In order to recall e.g. lighting scene 4, the input channels 1 and 4 have to be activated simultaneously. All lighting scenes are preset at the factory with the dimming factors specified in the table; they can be altered to any value.

In order to design lighting scenes with several dimmers, the individual dimmers simply require an identical channel configuration (e.g. addresses A1, A3, A4 for input 1, 3, 4) for retrieval and storage of lighting scenes and input 2 for the individual setting of the lighting scenes. By using central control items in Pro-Line it is thus very easy to set up “made-to-measure” lighting arrangements.

Connections

Terminal	Description	Terminal	Description
1.2	Pulse-width modulated output S-	1.6	Pulse-width modulated output S+
2.1	Switching channel L_{IN} el. ballast	2.5	Switching channel L_{OUT} el. ballast
3.1 / 3.5	N-conductor input		
1.3	Dupline signal conductor - (Dupline-)	1.7	Dupline signal conductor + (Dupline+)
1.4	0 V (DC-)	1.8	24 V DC (DC+)

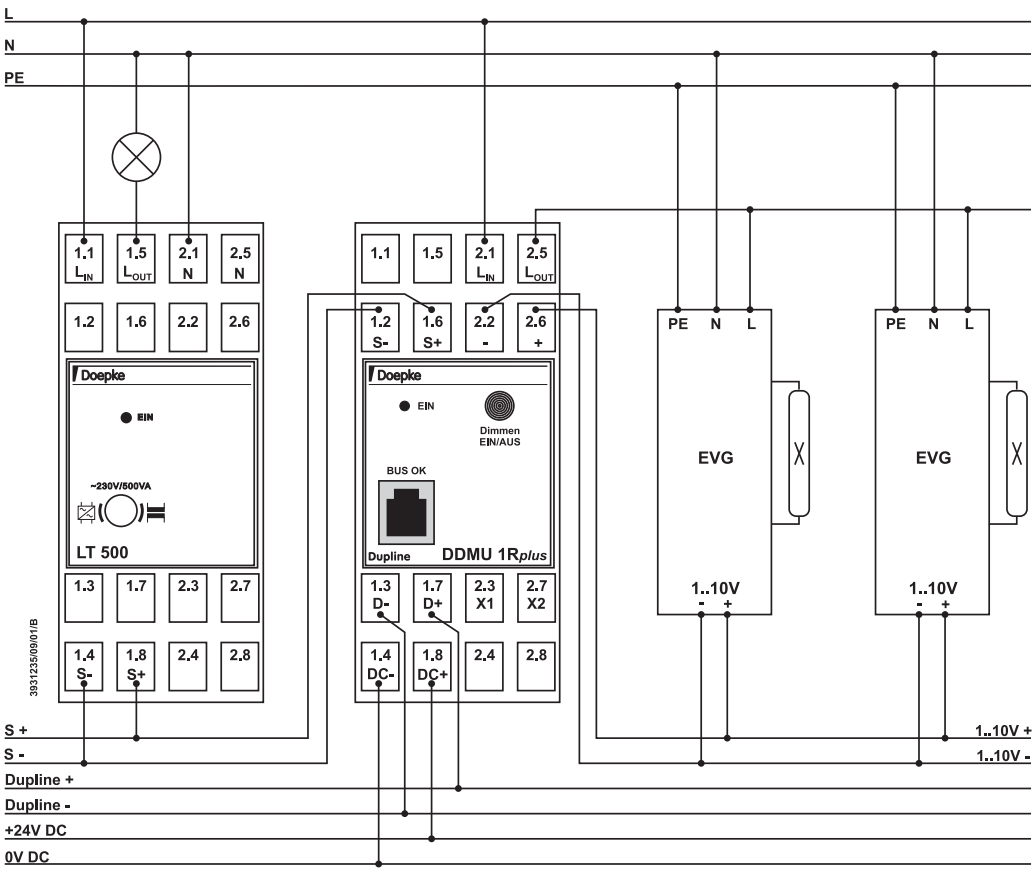
Dupline Channel Allocation

Channel	Description	Channel	Description
1	Central Off / Lighting scenes 3/4/6	5	Ackn. signal dimming output
2	Dimming / On / Off	6	Not assigned.
3	Lighting scene 1 (3/5/6)	7	Not assigned.
4	Lighting scene 2 (4/5/6)	8	Not assigned.

Indicators

Indicator	Description
Green “BUS OK” LED	Dupline bus: Off – bus fault / On – bus OK
Red LED „EIN“	Off: 1..10 V resp. PWM control output are switched off On: 1..10 V resp. PWM control output are switched on

Wiring Layout and Dimensions



Technical Data

	Min.	Typ.	Max.
Dupline			
Current input		50 µA	
Input channels	1 acknowledge signals (dimmer on/off)		
Output channels	4 control channels (channels 1..4)		
Outputs El. Ballast(1)			
Type	Semiconductor control output for el. ballast (sink), electrically isolated from operating, bus and mains voltage		
Rated voltage	1 V		10 V
Rated current / load capacity			80 mA
Dimming velocity(2)		4 s	
Relay output for El. Ballast			
Type	Relay contact, 1 NOP, zero-potential		
Switching voltage	12 VAC	230 VAC	250 VAC
Rated current / load capacity	10 A (max. 25 EVG, each with 58 W)		
Outputs LT 500/LT 1200			

Technical Data (Continued)

	Min.	Typ.	Max.
Type	PWM(3) control output, approx. 70 Hz		
Rated voltage	20 V	24 V	26 V
Rated current / load capacity(4)			80 mA
Length of control cable	Max. 100 m, for lengths exceeding 2 m shielded cables should be used and the shielding connected to 0V (DC-)		
Dimming velocity(2)		4 s	
Operating voltage			
Rated operating voltage	21.5 VDC	24 VDC	26.5 VDC
Current input	19 mA	26 mA	29 mA
Terminals			
Type	Strain-relief clamps		
Contact area	0.4 mm ∅		2.5 mm²
Housing			
Type	Distribution installation housing for mounting on rails according to DIN EN 60715:2001-09		
Dimensions	35 x 85 x 58 (W x H x D in mm) / 2 modules		
Material	Polycarbonate		
General technical data			
Ambient temperature	-10°C		+45°C
Atm. humidity	max. 85% (exposure to dew not permissible)		
Encl. protection type / standards	IP20, DIN EN 50428, DIN EN 60669-1, DIN EN 60669-2-1		
Order number, description	09 501 181, Lighting scene dimmer DDMU 1R*plus*		

(1) The wiring should not be installed in parallel to live mains cables. If necessary, provide shielding.
(2) Dimming from 10% up to 100% or from 100% down to 10%.
(3) Pulse width modulation
(4) Any current consumption at this signal output represents an additional load on the 24 V supply. One LT 500 or LT 1200 typically requires 1 mA.

5.4.3 DDM 2*plus*/DDMU 2*plus*: 2-way Dimmer, DIN-Rail

- DDM 2*plus*:
  – 2 outputs each of 250 W, protected against overload, short-circuit, overvoltage, outage
  – Adjustable minimum dimming value for improved control of energy-saving lamps
- DDMU 2*plus*:
  – 2 outputs 1...10 V for up to 25 el. chokes à 58 W
  – 2 PWM outputs for each up to 10 LT 500 resp. LT 1200
- 6 storable and lockable lighting scenes
- Switch for automatic dimming reduction and increase with memory setting
- Acknowledgement of operational status of both channels via electrically isolated outputs

Product Description

The dimmers of the DDMx 2 series permit the switching and dimming of different lamp types or el. ballast with a 1..10 V output. Both offer in addition the possibility of individually storing, and recalling via Dupline, up to six lighting scenes per channel.

Both dimmers are fitted on the front panel with a button for dimming, and for switching lamps off and on again with the light level setting last saved ("memory setting"). The button therefore has the same function as the Dupline channel 2 of the devices but, in the event of a bus failure, it can also be used for controlling the lighting manually.

The dimmers are able to store up to six light level settings (preset at the factory) between 0% and 100%. Several dimmer channels can thus be combined to create lighting scenes.

The procedure for saving lighting scenes has been simplified in comparison to single-channel dimmers. After disabling the lock at the dimmer's rotary switch, all that is required is to set the relevant light level and to actuate for more than 3 seconds the channel combination, which is also used for recalling the lighting scene (normally configured at one button). When the lock is then applied, the lighting scene will again be safeguarded against overwriting.

The dimmer equipped with load outputs (DDMU 2*plus*) is provided with comprehensive protective mechanisms to safeguard against overloads, overvoltage and short-circuits. If the dimmer should switch off as a result of one of these problems, an integrated automatic restart facility will be activated and this will attempt up to three times to restore operations automatically. Should this prove impossible, the user can switch on again manually - once the fault has been remedied - by operating the dimmer button on the device or via Dupline.

The DDMU 2*plus* is provided with 1..10 V outputs for connecting el. ballast and also incorporates a special feature: a rotary switch on the front panel of the device which is used for selecting one of two dimming characteristics for these outputs. The dimmer can thus be adapted to the sensitivity of the electronic ballast.

In addition to the 1...10 V output the DDMU 2*plus* is equipped with a control output to which up to ten LT 500 or LT 1200 load modules, or a mixture thereof, may be connected. This provides for an additional output capacity of up to 12,000 W.

The status of the outputs can be preconfigured - for the event of a bus fault - by means of the DHK 1 hand encoder. The dimmers are preset at the factory so that they retain their current status should a fault occur and the dimmer can then also be operated via the dimmer switches on the front panel. Alternatively, the outputs can be configured so that they switch to 100% in the event of a bus fault; however, manual operation is then no longer possible.

For indication of the operating status both dimmers are equipped with a LED on the front panel, as well as

with acknowledge outputs which, in the case of the DDM 2*plus*, also display the error code. These outputs are electrically isolated and can be routed e.g. to inputs of a DRM 4 or DSU 8*plus*. An example of a connection layout is provided under **Wiring Layout and Dimensions**.

The following table illustrates the functions of the dimmers:

	DDM 2*plus*	DDMU 2*plus*	Notes
Memory setting	■	■	Saving the dimmer setting selected last
Dimming/On/Off channel	■	■	Multi-function channel
Central-On channel	■	■	100% per soft-start ON
Central-Off channel	■	■	Switch off directly via Dupline
Acknowledge semiconductor output	■	(1)	Acknowledgement of operation, overvoltage, load outage, overload and short-circuit. Linked to Dupline via input modules
Dimming/On/Off button	■	■	Manual operation option in the event of a bus fault, corresponds to channel 2 or 6
Operating mode switch	■		Switch-over between phase angle and AC modulation control
Minimum Dimming Value	■		Storable minimum dimming value for improved control of energy-saving lamps
Characteristics change-over switch		■	Switch-over between two drive characteristics
Lighting scenes	■	■	6 lighting scenes can be stored and recalled
Lighting scene switch	■	■	Enabling, disabling and resetting lighting scenes via rotary switch
2 outputs of 250 W each	■		Load outputs, individually dimmable
2 outputs 1..10 V		■	1..10 V outputs, individually dimmable
2 outputs PWM		■	Control outputs for p to 10 remote load modules LT 500 and LT 1200
Detection of overload, overvoltage, short-circuit, of load outage	■		Automatic disconnection of outputs

(1) Indicates only operational status.

Notes on Applications

When using energy saving lamps (ESL):

For each dimming channel please use only dimmable compact fluorescent bulbs of the same manufacturer and type.

Background:

The dimming behaviour is largely dependent upon manufacturer and type. The dimming characteristic curve linked to each dimmer has been optimised for incandescent bulbs, i.e. when dimming there is a linear change in brightness; however, the characteristics of dimmable compact fluorescent lamps (energy savers) vary considerably depending upon manufacturer and type. A mixed operation could result in non-synchronous dimming.

When calculating the maximum load, the output data of comparable incandescent bulbs apply. These are generally higher by a factor of 5 above the output of the compact fluorescent lamp. Please observe any information to the contrary supplied by the manufacturer.

Example:

Compact fluorescent lamps rated 20 W - equating to 100 W incandescent lamp output - should be used. A dimmer with a maximum permissible load of 250 W may therefore be connected to only 2 compact fluorescent lamps of this type.

If the minimum level of brightness has been increased in order to prevent a possible flicker effect of compact fluorescent lamps (see operating instructions), then inductive halogen transformers may not be operated in phase-angle control mode.

Background:

In order to facilitate a quick start of the compact fluorescent lamps, the soft start function should be switched off in cases of modified minimum brightness. With conventional transformers this will result in overvoltages and thus to a safety switch-off by the dimmer.

Procedure for adjusting the minimum brightness setting

If the brightness is dimmed from 0% onwards, or switched on via soft-start from 0% brightness (memory On or lighting scene retrieval), then this slow increase in brightness can delay the compact fluorescent bulbs' igniting.

In order to prevent this, the minimum brightness level may be increased. This will then result in a jump from 0% direct to the new level, i.e. the soft-start function has been deactivated.

To determine the required minimum brightness level it is recommended to proceed as follows:

1. Slightly increase the brightness from minimum setting and store in the memory as per operating instructions (soft-start switched off).
2. By short actuations of channel 2 (Dimming/On/Off) switch the lamp off and on.
3. If the lamp continues to flicker, then the current minimum brightness is still too low. The latter should now be increased in steps, and stored as per Item 1 above, until the lamp ignites without flickering as per Item 2.
4. To lower the minimum brightness setting, e.g. when changing the bulb, the value has to be reset to the factory setting of the relevant channel according to the operating instructions.

1..10V wiring

The wiring should not be installed in parallel to live mains cables. If necessary, provide shielding.

Retrieval of lighting scenes

The lighting scenes are retrieved via a combination of the Dupline channels 1...4 of the dimmers; the following table provides an overview of the combination:

	Dimmer channel A				Dimmer channel B				Factory Setting of Light Value
	Ch. 1	Ch. 2	Ch. 3	Ch. 4	Ch. 5	Ch. 6	Ch. 7	Ch. 8	
Off (0%)	■				■				0 % (not changeable)
Dimming		■				■			10 %..100 %
Light. scene 1			■				■		55 %
Light. scene 2				■				■	100 %

	Dimmer channel A				Dimmer channel B				Factory Setting of Light Value
	Ch. 1	Ch. 2	Ch. 3	Ch. 4	Ch. 5	Ch. 6	Ch. 7	Ch. 8	
Light. scene 3	■		■		■		■		25 %
Light. scene 4	■			■	■			■	40 %
Light. scene 5			■	■			■	■	70 %
Light. scene 6	■		■	■	■		■	■	85 %
100 %(1)	■	■	■	■	■	■	■	■	100 % (not changeable)

(1) This scene is one possible setting for the priority switching in the event of a bus fault.

Every lighting scene can be retrieved via one or more channels. In order to recall e.g. lighting scene 4 of dimmer channel A, the input channels 1 and 4 have to be activated simultaneously. In the case of dimmer channel B these would be channels 5 and 8. All lighting scenes are preset at the factory with the dimming factors specified in the table.

In order to design lighting scenes with several dimmers, the individual dimmers simply require an identical channel configuration (e.g. addresses A1, A3, A4 for input 1, 3, 4) for retrieval and storage of lighting scenes and input 2 for the individual setting of the lighting scenes. By using central control items in Pro-Line it is thus very easy to set up “made-to-measure” lighting arrangements.

Dupline Channel Allocation

Channel	Dimming Ch.	Description	Channel	Dimming Ch.	Description
1	A	Central-Off (light. scene 3, 4, 6)	5	B	Central-Off (light. scene 3, 4, 6)
2		Dimming/On/Off	6		Dimming/On/Off
3		Light. scene 1 (3,5,6)	7		Light. scene 1 (3,5,6)
4		Light. scene 2 (4,5,6)	8		Light. scene 2 (4,5,6)

Connections

	Terminal	Description	Terminal	Description
DDM 2*plus*	3.1/3.5	Supply L_{in} channels **A** & **B**	1.1/1.5	Output L_{out} channel **A**
	2.1/2.5	Supply N channels **A** & **B**	4.1/4.5	Output L_{out} channel **B**
	1.2/2.2	Supply R_{in} (10..30 VDC) ackn. channel **A**/channel **B**(1)	1.6/2.6	Acknowledge output R_{out} channel **A**/channel **B**(1)
	1.3	Dupline signal conductor - (D-)	1.4	0 VDC (DC-)
	1.7	Dupline signal conductor + (D+)	1.8	+24 VDC (DC+)

Connections (Continued)

	Terminal	Description	Terminal	Description
DDMU 2*plus*	1.1/1.5	Switching channel **A** L_{IN}/L_{OUT}	4.1/4.5	Switching channel **B** L_{IN}/L_{OUT}
	2.1/3.1	El. ballast control output 1..10 V **(-)** channel **A**/channel **B**	2.5/3.5	El. ballast control output 1..10 V **(+)** channel **A**/channel **B**
	1.2/2.2	Supply R_{in} (10..30 VDC) ackn. channel **A**/channel **B**(1)	1.6/2.6	Acknowledge output R_{out} channel **A**/channel **B**(1)
	3.4/3.8	PWM output **(S-/S+)** channel **A**	4.4/4.8	PWM output **(S-/S+)** channel **B**
	1.3	Dupline signal conductor - (D-)	1.4	0 VDC (DC-)
	1.7	Dupline signal conductor + (D+)	1.8	+24 VDC (DC+)

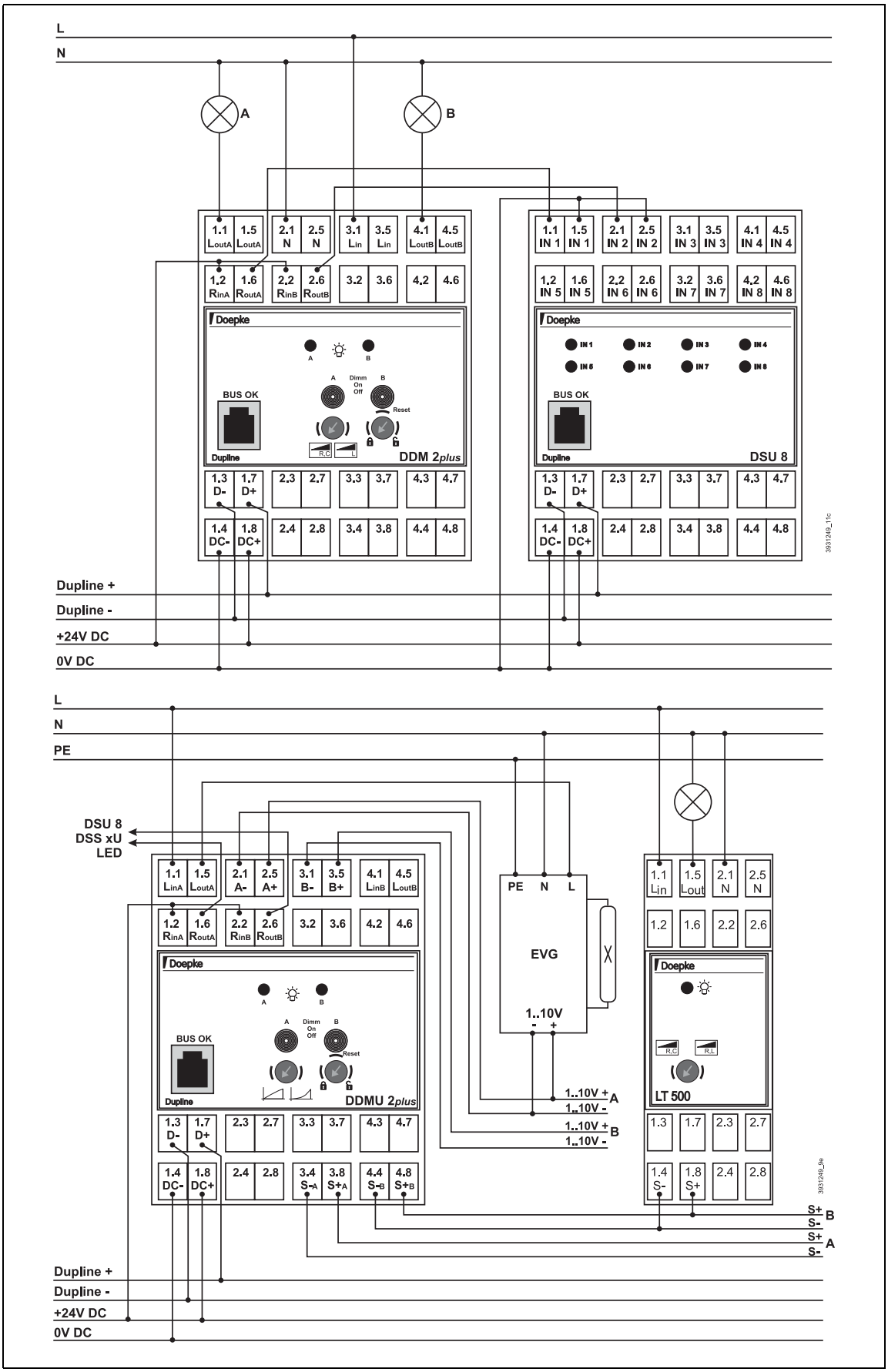
(1) The potentials between individual acknowledgement channels and between the acknowledgement channels and the operating voltage are isolated.

Indicators

Indicator	Description	
Green LED „BUS OK“	**Dupline bus:**	
	Off	Bus fault
	On	Bus is OK
2 red LEDs „A“ / „B“ 	**Acknowledgement Dimmer Channels A and B:**	
	Off	Output switched off
	On	Ouput switched on, trouble-free operation
	Slow alternate flashing(1) (A-B-A-B...)	No mains power
	Rapid steady flashing(1) (AB-AB...)	Short-circuit or overvoltage (automatic switch-on attempt after 30 s)
	Slow steady flashing(1) (AB-AB...)	3 unsuccessful attempts at switching on (further attempts by activating the dimming channel or pressing the dimmer button) / load outage of both outputs
	Slow single flashing(1) (A or B)	Overload (excess temperature): Switch-on after cooling down / load outage

(1) Only with DDM 2plus!
Slow flashing: 1 x per second; rapid flashing: 3 x per second.

Wiring Layout and Dimensions



Technical Data

		Min.	Typ.	Max.
Dupline				
Current input			150 µA	
Input channels		None		
Output channels		8 control channels (Output A: 1..4, Output B: 5..8)		
Outputs (DDM 2*plus*)				
Type		2 MOS-FET dimmer outputs		
Rated voltage		215 VAC	230 VAC	250 VAC
Rated current/load capacity(1)				250 W
Dimming speed(2)		3.5 s		4.0 s
Types of dimmable lamps(3)		AC modulation control: incandescent lamps, HV-halogen lamps with electronic ballast		
		Phase angle control: LV-halogen lamps with conventional transformer; max. phase shift: 21% (38º)		
Outputs PWM (Pulse width modulation, DDMU 2*plus* only)				
Type		PWM control output, approx. 110 Hz		
Rated voltage		15 V	21 V	26 V
Rated current/load capacity(4)				80 mA
Outputs El. Ballast (DDMU 2*plus* only)				
Type		Semiconductor control output for el. ballast (current sink), electrically isolated from operating, bus and mains voltage		
Rated operating voltage		1 V		10 V
Rated current/load capacity				40 mA
Dimming speed(2)		3.5 s		4.5 s
Relay output for El. Ballast (DDMU 2*plus* only)				
Type		Relay contact, 2 NOCs, zero potential		
Operating current		12 VAC	230 VAC	250 VAC
Rated current/load capacity		10 A (max. 25 el. ballast of 58 W each) per relay		
Outputs (Acknowledgement, both Dimmers)				
Type		Semiconductor outputs		
Rated voltage		10 VDC		30 VDC
Rated current/load capacity				50 mA
Voltage drop			0.7 V	
Operating voltage				
Rated operating voltage		21.5 VDC	24 VDC	26.5 VDC
Current input DDM ...		7.0 mA		12.0 mA
Current input DDMU ...		6.5 mA		32.0 mA
Terminals				
Type		Strain-relief clamps		
Contact area		0.4 mm ∅		2.5 mm²

Technical Data (Continued)

	Min.	Typ.	Max.
Housing			
Type	Distribution installation housing for mounting on rails according to DIN EN 60715:2001-09		
Dimensions	72 x 85 x 58 (W x H x D in mm) / 4 modules		
Material	Polycarbonate		
General technical data			
Ambient temperature	-10°C		+50°C
Atm. humidity	max. 85% (exposure to dew not permissible)		
Encl. protection type / standards	IP20, DIN EN 50428, DIN EN 60669-1, DIN EN 60669-2-1		
Order number, description	09 501 187, DDM 2*plus* lighting scene dimmer 09 501 185, DDMU 2*plus* 1..10 V lighting scene dimmer		

(1) The dimming capacity is dependent upon the ambient temperature and applies for the specified range. Ensure that there is sufficient ventilation in the distribution box. If several dimmers are mounted next to each other in a distribution box and are subject to heavy loads, provision of a ventilation space of approx. 10 mm is recommended.
(2) Dimming up from 10% to 100% or down from 100% to 10.
(3) Observe the manufacturers' instructions.
(4) Any current consumption at this signal output represents an additional load on the 24 V supply. One LT 500 or LT 1200 typically requires 1 mA.

5.4.4 DRM 8: 8-Channel Relay Module / 4-Ch. Shutter Control, DIN-Rail

- 8-channel multi-function relay module for 8 switched, electrical loads or 4 drives
- Powerful 16 A relays
- Compact design with 4 module width for installing in distribution board
- Indication of switching status via LC display with 2 x 16 characters
- Option of manual operation via menu
- Configuration without the need of a hand encoder

Product Description

The DRM 8 is a latest generation multi-function relay module which, thanks to its configurable operating modes, represents the natural successor to the following modules:

1. 4-way shutter control unit:
   In this operating mode you can control up to four drives for e.g. roller blinds, awnings and skylights; whereby the device automatically observes the transit times between the directions of shutter movement. With appropriate configuration of the channel generator it is possible to achieve slat control in steps of seconds.
2. 4-way Venetian blind control unit with step-mode:
   This operating mode is particularly suitable for actuating Venetian and vertical-slatted blinds because the hardware offers a step mode for fine adjustment. This enables stepped pulsing of 100 ms duration.
3. 8-way relay module for switching up to eight independent loads:

With its back-lit display on the front panel and its four navigation buttons, the relay module provides for very simple menu-guided configuration and operation. It supports, among others, the following functions:

- Setting of Dupline addresses and priority switching in the event of bus failure, thereby obviating the need for a DHK 1 hand encoder when commissioning;
- Setting the pulse/pause ratio from 100 ms:900 ms to 800 ms:200 ms when in the Venetian blind control mode;
- Option of manual operation of all channels when off-line, e.g. during commissioning.

In „standard mode“ the display shows the current switching mode of the 16 A relays, which feature large capacity reserves especially for the „Roller blind“ and „Venetian blind modules“. An additional LED gives visual warning of disruptions, e.g. a missing bus signal.

Notes on Applications

Total loading capacity and heat development

In order to prevent excessive heat developing inside the device please adhere to the following maximum limits:

- With circuits fuse-protected to 10 A each, up to 8 inputs may be used.
- With circuits fuse-protected to 16 A each, up to 4 inputs may be used.

Configuration

For the configuration process the device needs a 24 V power supply. However, a bus connection is not required.

„Step-Mode“ („Venetian blind module“ operating mode)

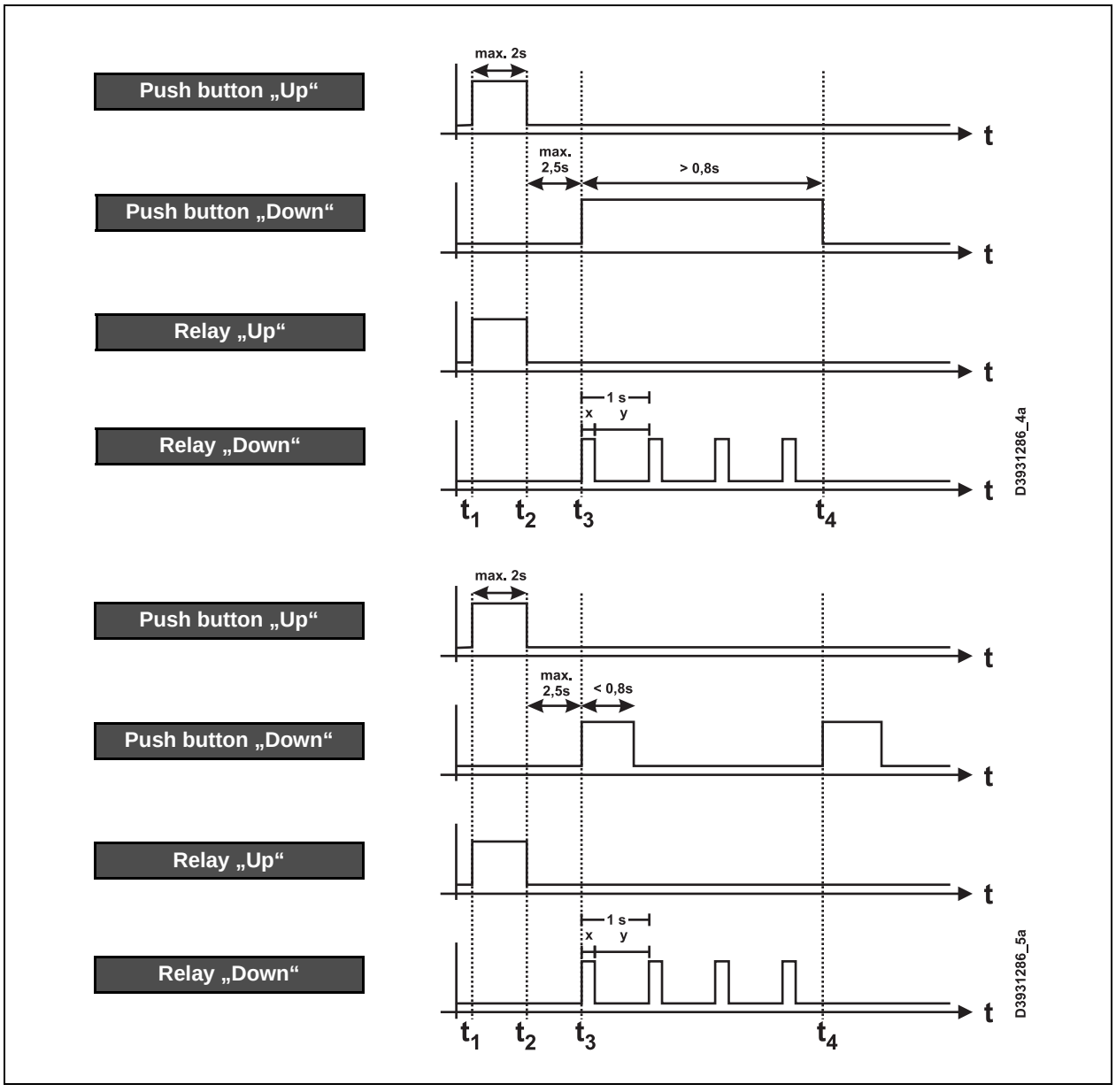
This operating mode facilitates the positional adjustment of Venetian blinds and vertical-slatted hangings. The device will normally adopt the so-called „Step-mode“ when the Up command is activated for no more

than 2 seconds followed immediately (max. 2.5 sec. later) by the Down command. In this case the device will start to pulse with the set pulse/pause ratio in the Down direction. And, of course, correspondingly likewise for the opposite direction.

When using the unit as Venetian blind control modules, please observe the following points:

- Not every drive is suitable for the step-mode. Operate the device therefore only with those drives which - according to the manufacturer - will not be damaged by frequent pulsing of 100 ms duration. This specification is met by e.g. the „JA xx Soft“ model range of Messrs. Elero.
- Due to the multitude of different Venetian blinds on the market, an exact slat position adjustment cannot be guaranteed.
  In case of doubt check the interplay between the DRM 8 and the blind beforehand.
- Because slat adjustment with the DRM 8 is carried out by hardware, the „Slat adjustment“ option in ProLine or ProLine^{NG} should be switched off.
- In order to be able to employ the step-mode, select a minimum setting of 500 ms for the transit time when configuring the „Roller blind control“ object in ProLine or ProLine^{NG}.

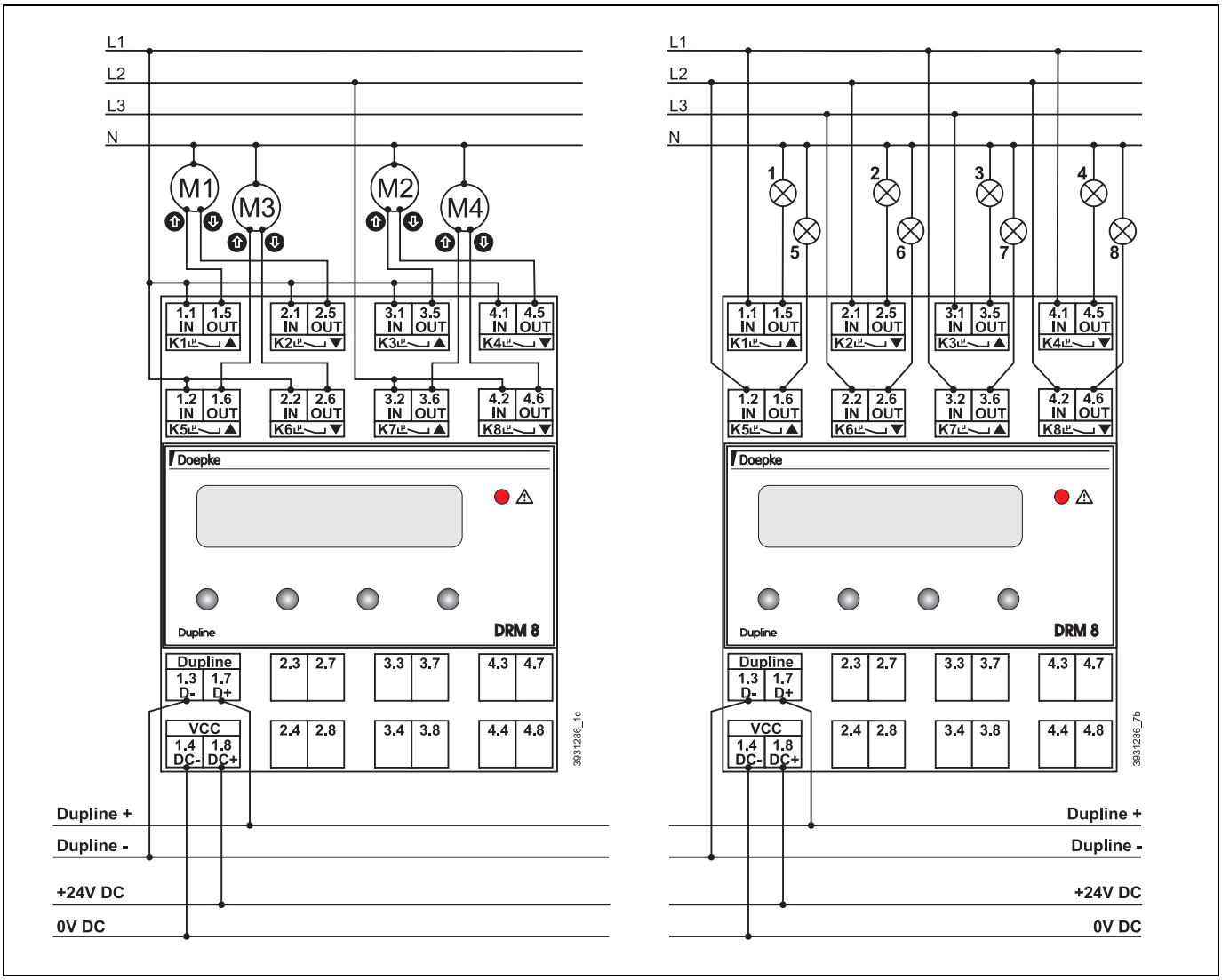
The timing of the step-mode is as follows:



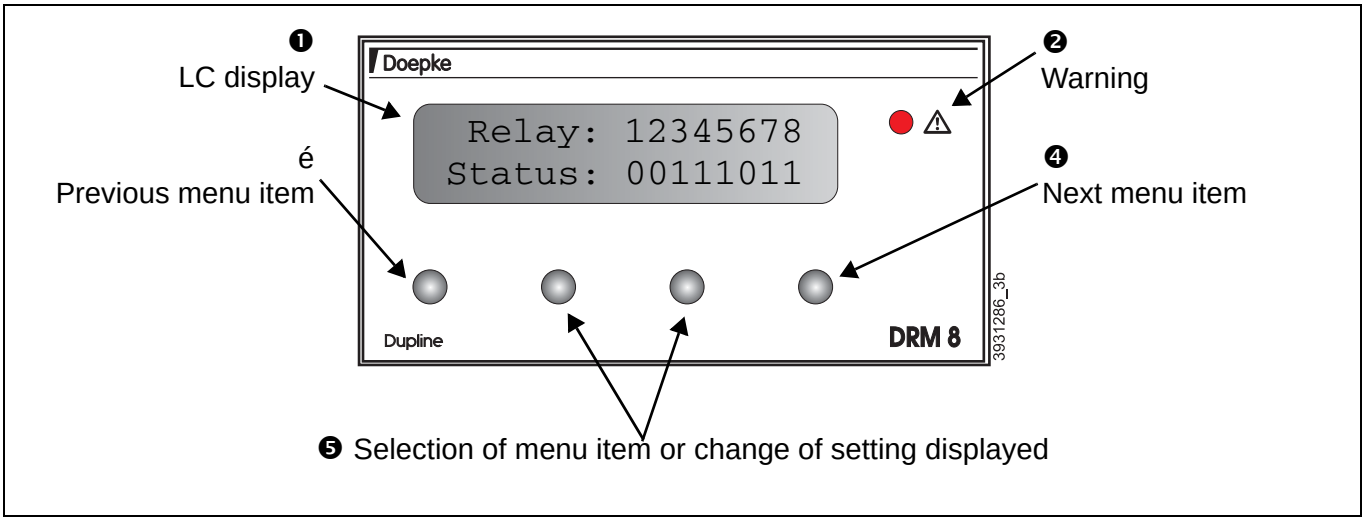
Connections

Terminal	Description	Terminal	Description
1.1	Phase input relay K1	1.5	Relay K1 / motor 1 output **UP**
2.1	Phase input relay K2	2.5	Relay K2 / Motor 1 output **DOWN**
3.1	Phase input relay K3	3.5	Relay K3 / Motor 2 output **UP**
4.1	Phase input relay K4	4.5	Relay K4 / Motor 2 output **DOWN**
1.2	Phase input relay K5	1.6	Relay K5 / Motor 3 output **UP**
2.2	Phase input relay K6	2.6	Relay K6 / Motor 3 output **DOWN**
3.2	Phase input relay K7	3.6	Relay K7 / Motor 4 output **UP**
4.2	Phase input relay K8	4.6	Relay K8 / Motor 4 output **DOWN**
1.3	Dupline signal conductor - (D-)	1.7	Dupline signal conductor + (D+)
1.4	0 VDC operating voltage	1.8	+24 VDC operating voltage

Wiring Layout



Displays and Operation:



„Warn-“LED:

	Message	Description
⚠	Continous On	The DRM 8 is in manual operating mode and is „off-line“; it therefore does **not** react to switching commands
	Flashing 1/s	There is no bus signal. This malfunction will also be indicated when in manual operating mode.

Technical Data

		Min.	Typ.	Max.
Dupline				
	Current input	0.8 mA	0.9 mA	1.0 mA
	Input channels	None		
	Output channels	8 control channels (Switching relay outputs 1..8)		
Display				
	Type	Alphanumeric LC display		
	Display format	max. 2 lines each with 16 characters		
	Display size	43.9 x 10.0 (B x H in mm)		
	Background lighting	LED (switch-on time configurable)		
Controls				
	Operating/navigation keys	4		
Outputs				
	Type	All-or-nothing relay		
AC(1)	Voltage	12 VAC		250 VAC
AC(1)	Load capacity (per output)	100 mA		16 A
DC	Voltage	12 VDC		30 VDC
DC	Load capacity (per output)	100 mA		10 A
	Total load			80 A

Technical Data (Continued)

		Min.	Typ.	Max.
Lamp Loads(1)	Incandescent lamps			3000 W
	HV-halogen lamps			2500 W
	Fluorescent lamps			2400 W
	Fluorescent lamps with el. ballast			600 W
	Gas discharge lamps	max. 1000 W (70 µF), 1250 W (100 µF(2))		
	Capacitor for compensation	max. 70 µF (100 µF(2))		
	Energy-saving lamps, conv. ballast			1250 W
	Energy-saving lamps, el. ballast(3)			300 W
Operating Voltage				
	Rated operating voltage	21.5 VDC	24 VDC	26.5 VDC
	Current input	14 mA		166 mA(4)
	Ripple voltage			100 mV_{pp}
Terminals				
	Type	Strain-relief clamps		
	Contact area	0.4 mm ∅		2.5 mm²
	Torque			0.6 Nm
Housing				
	Type	Distribution installation housing for mounting on rails according to DIN EN 60715:2001-09		
	Dimensions	72 x 85 x 58 (W x H x D in mm) / 4 modules		
	Material	Polycarbonate		
General technical data				
	Ambient temperature	-10°C		+45°C
	Atm. humidity	max. 85% (exposure to dew not permissible)		
	Encl. protection type / standards	IP20, DIN EN 50428, DIN EN 60669-1, DIN EN 60669-2-1		
	Order number, description	09 501 233, 8-way multi-function relay module DRM 8		

(1) The data relate to a minimum service life of 25,000 switching cycles and the connection requirements as per EN 60069.
(2) Min. 5,000 switching cycles.
(3) These data are largely dependent upon the manufacturer. In case of doubt, please refer!
(4) All relays and background lighting switched on.

5.4.5 DRO 1U: Flush-Mounted 1-Channel Shutter Control Unit

- Controls one shutter actuator - 230 VAC / 2 A
- 3 input channels for connecting standard push-buttons or contacts
- Locking provided electronically as well as by software to prevent simultaneous raising and lowering
- Power supply via 230 V mains connection
- Compact outside dimensions to fit into standard flush-mounted installation box

Product Description

The locally installed DRO 1U shutter control permits the control of a shutter motor, or a drive of blinds and skylights. The all-or-nothing relay is designed for voltages up to 230 VAC and 2 A.

The DRO 1U is equipped with a safety facility which prevents, both electronically and by means of the software, the simultaneous raising and lowering of shutters; furthermore, any incorrect operation is avoided by the channel generator's logic facility.

Three non-electrically isolated inputs permit e.g. connection of standard push-buttons for raising or lowering shutters on site, and hook-up of contacts for monitoring the building at the windows. As these inputs can be addressed as required, their field of application is not restricted. The control cables between input and push-buttons can be up to 2 m long.

The housing of the DRO 1U is designed to fit into a flush-mounted installation box and can thus be located close to the drive itself. Free load lines permit the separation of earthed and 230 V leads in accordance with VDE 0100, Part 410.

Located on the front of the device, and covered by a blank, is a coding connection and a LED to indicate the status of the present bus signal.

The status of the outputs in the event of a bus fault can be preconfigured and is set at the factory to "UP" ("1"). With the aid of the DHK 1 hand encoder the status can also be configured to "DOWN" ("0") and changed at any time.

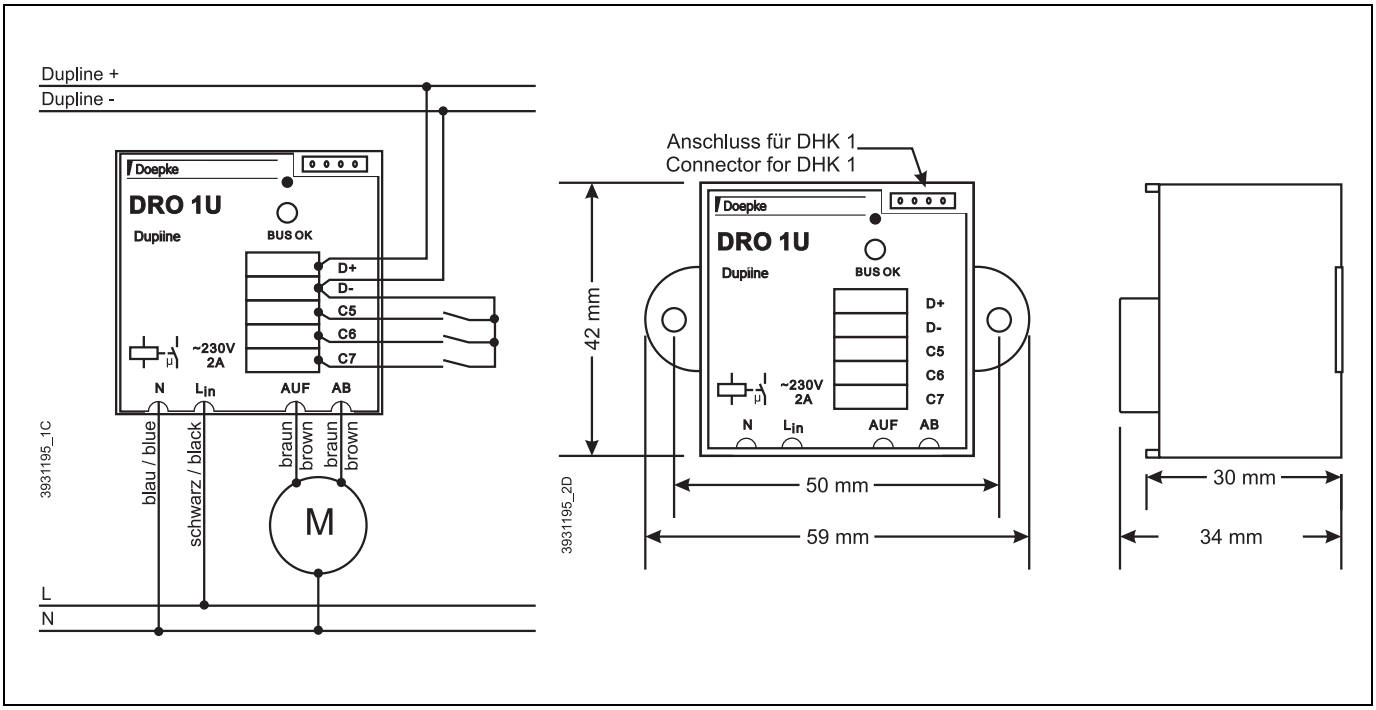
Notes on Applications

Caution! For the control of motors it is absolutely necessary to use the ProLine object „Roller blind“, since otherwise the required reverse delays cannot be kept. This may lead to damages at the relay contacts and motors connected to them.

The encoding of addresses must be carried out so, that the “UP” channel gets an odd address (A1, B5, etc.) and the “DOWN” channel gets the following even address (A2, B6, etc.).

To ensure a trouble-free function, the DRO 1U has to be supplied with a permanently present line voltage (230 VAC).

Wiring Layout and Dimensions



Connections

Terminal	Description	Terminal	Description
C5	Semiconductor input C5	Brown	Switching channel UP
C6	Semiconductor input C6	Brown	Switching channel DOWN
C7	Semiconductor input C7		
D-	Dupline signal conductor - (Dupline-)	Black	Phase (L_{in})
D+	Dupline signal conductor + (Dupline+)	Blue	Neutral (N)

Dupline Channel Allocation

Channel	Description	Channel	Description
1	Relay UP	5	Input C5
2	Relay DOWN	6	Input C6
3	Not assigned	7	Input C7
4	Not assigned	8	Not assigned

Indicators

Indicator	Description
Green “BUS OK” LED	Dupline bus: Off – bus fault / On – bus OK

Technical Data

	Min.	Typ.	Max.
Dupline			
Current input		24 µA	

Technical Data (Continued)

	Min.	Typ.	Max.
Input channels	3 (Semiconductor inputs, C5..C7)		
Output channels	2 control channels (shutter „UP“ and „DOWN“)		
Inputs			
Type	Semiconductor inputs		
Contact load			1 mA
Permissible switch bounce time			10 ms
Permissible int. contact resistance			1 kOhm
Outputs			
Type	Relays		
Voltage		230 VAC	
Rated current / load capacity			2 A
Power factor	cos φ = 0.6 - 1		
Operating voltage			
Rated operating voltage	210 VAC	230 VAC	250 VAC
Current input	8 mA	10 mA	12 mA
Terminals			
Control terminals			
Type	2- and 3-pole plug terminals (fitted)		
Contact area	0.4 mm ∅		0.8 mm ∅
Mains terminals			
Type	4 leads LiY with wire end ferrules		
Contact area		0.75 mm²	
Housing			
Type	Strap-type enclosure		
Dimensions	42 x 42 x 34 (W x H x D in mm)		
Material	Polyamide PA6		
General technical data			
Ambient temperature	-10°C		+35°C
Atm. humidity			85%
Encl. protection type / standards	IP20, DIN EN 50428, DIN EN 60669-1, DIN EN 60669-2-1		
Order number, description	09 501 138, Shutter control unit DRO 1U		

5.4.6 DSM 1U: Flush-Mounted, 1-Way Binary Relay Module

- 1-way relay module for local installation, e.g. in flush-mounted installation boxes
- 1 relay output (NOC) for 250 VAC / 13 A
- Power supply by the Dupline bus

Product Description

The DSM 1U was designed for applications in local installations for controlling loads with voltages of up to 250 VAC and a current consumption of up to 13 A. Its compact size makes it suitable for fitting into flush-mounted installation boxes and similar limited spaces.

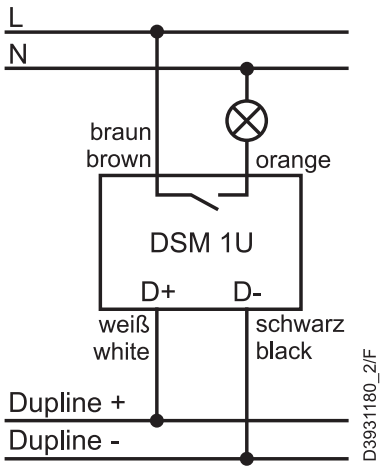
The DSM 1U does not require an external power supply as it is supplied by the Dupline signal line.

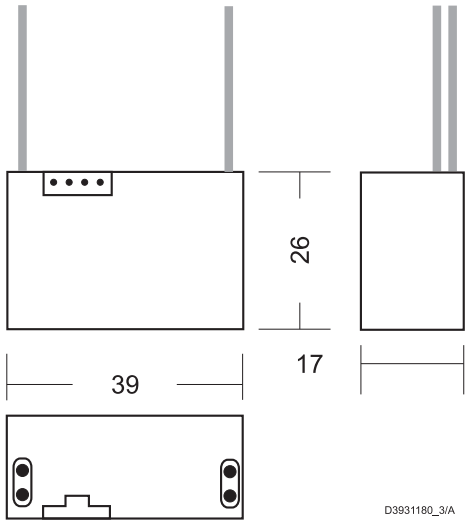
As a safeguard in the event of a bus fault, the status of the output can be preconfigured with the DHK 1 hand encoder. The standard setting is "OFF".

Notes on Applications

Not applicable.

Wiring Layout and Dimensions





Connections

Terminal	Description	Terminal	Description
brown	Switching channel (L_{IN})	black	Dupline signal conductor - (Dupline-)
orange	Switching channel (L_{OUT})	white	Dupline signal conductor + (Dupline+)

Dupline Channel Allocation

Channel	Description	Channel	Description
1	Output signal	2..8	Not assigned

Indicators

none

Technical Data

		Min.	Typ.	Max.
Dupline				
	Current input		1.1 mA	3.1 mA(1)
	Input channels	none		
	Output channels	1 output switching signal		
Outputs				
	Type	All-or-nothing relay		
	Voltage	200 VAC	230 VAC	250 VAC
	Rated current / load capacity			13 A
Lamp loads(2)	Incandescent lamps			3000 W
	HV-halogen lamps			2500 W
	Fluorescent lamps			2400 W
	Fluorescent lamps with el. ballast			600 W
	Gas discharge lamps	max. 1000 W (70µF), 1250 W (100µF, min. 5000 switching cycles)		
	Capacitor for compensation	max. 70 µF (100µF, min. 5000 switching cycles)		
	Energy-saving lamps, conv. ballast			1250 W
	Energy-saving lamps, el. ballast(3)			300 W
Operating voltage				
	Rated operating voltage	From Dupline signal		
Terminals				
	Type	Cable connection: Dupline: 2 x 0.75 mm², 150 mm Output: 2 x 1.5 mm², 150 mm		
Housing				
	Type	Black flush-mounted installation housing		
	Dimensions			
	Material	Noryl GFN 1		
General technical data				
	Ambient temperature	-20°C		+50°C
	Atm. humidity			80%
	Encl. protection type / standards	IEC 60664		
	Order number, description	09 501 114, Relay output DSM 1U		

(1) Peak current at make
(2) The data relate to a minimum service life of 25,000 switching cycles and the connection requirements as per IEC 60069.
(3) These data are largely dependent upon the manufacturer. In case of doubt, please refer!

5.4.7 DSM 4M: 4-Channel Relay Module with manual operation, DIN-Rail

- 4-channel relay module for installation in distribution boards.
- Manual operation available via slide switch on the front.
- Acknowledgement of switching states of the relays
- Switching channels with high leading load capacity of 230 V/16 A each.
- Specially suitable for mercury and gas discharge lamps.

Product Description

The DSM 4M is a relay module with provision for manual operation for switching four independent loads, which may be distributed on different phases. Each load can have a current consumption of up to 16 A.

Each relay of the four switching channels has a mechanical facility for manual operation. This is accessible on the front via an extended lever - e.g. via a screwdriver. The levers also indicate the current switching status of the relay. The current relay status is transmitted back via channels 5...8 to the Dupline system.

The relays, being of extremely high quality, also permit the connection of loads with higher capacitance of up to 140 µF so that the module is particularly suitable for mercury and gas discharge lamps.

The green LED located in the coding and test socket on the front of the device indicates that the Dupline bus signal is functioning properly.

The all-or-nothing relays are designed for retentivity, which results in their status being stored should a power failure occur. In addition - and as a safeguard in the event of a bus fault - the status of the outputs can be preconfigured with the DHK 1 hand encoder. The standard setting is "ON".

Notes on Applications

None.

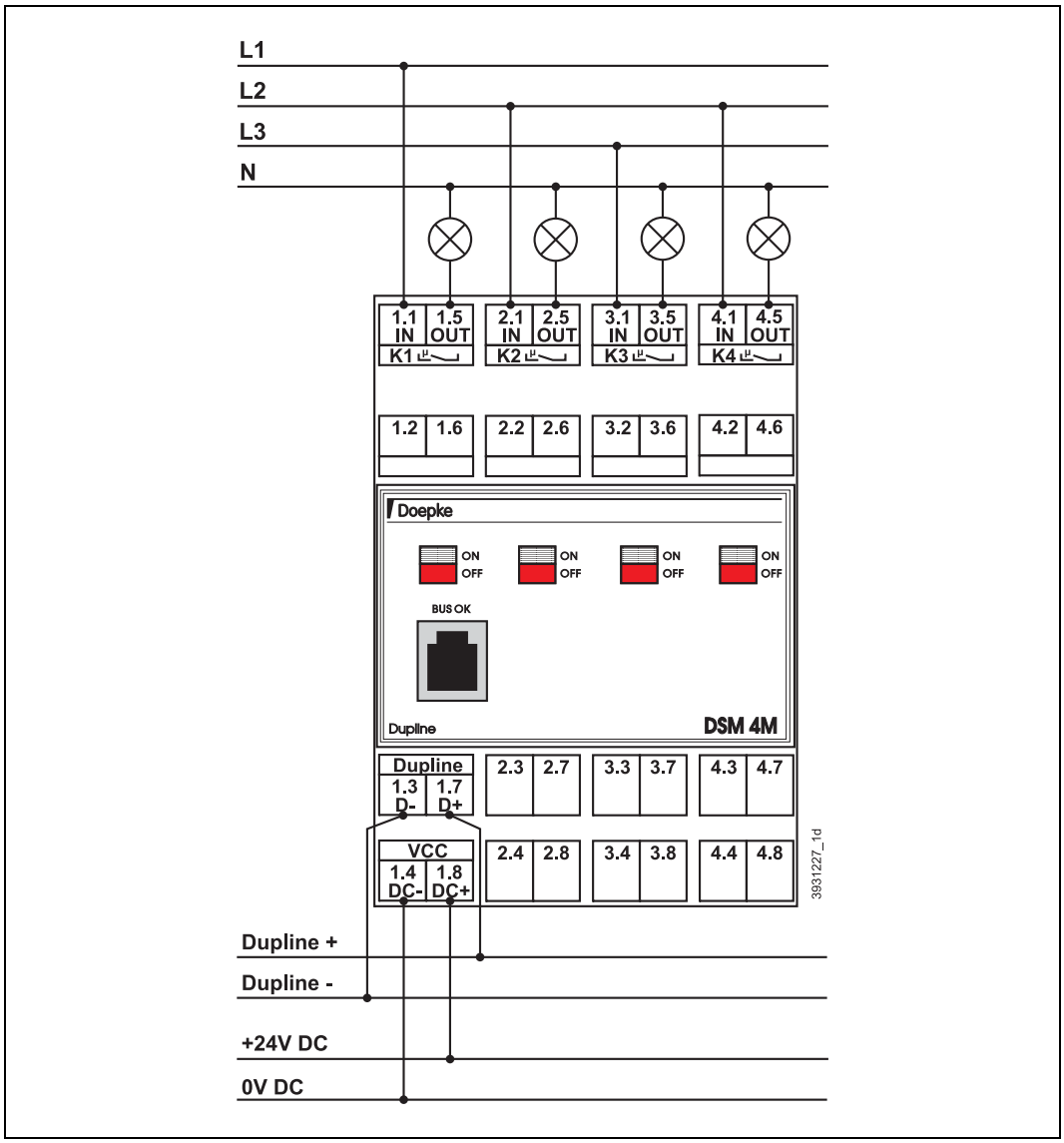
Dupline Channel Allocation

Channel	Description	Channel	Description
1	Relay output signal K1	5	Switching status relay K1
2	Relay output signal K2	6	Switching status relay K2
3	Relay output signal K3	7	Switching status relay K3
4	Relay output signal K4	8	Switching status relay K4

Connections

Terminal	Description	Terminal	Description
1.1	Switching ch. K1 (L_{IN}/L_{OUT})	3.1	Switching ch. K3 (L_{IN}/L_{OUT})
2.1	Switching ch. K2 (L_{IN}/L_{OUT})	4.1	Switching ch. K4 (L_{IN}/L_{OUT})
1.3	Dupline signal conductor - (Dupline-)	1.7	Dupline signal conductor + (Dupline+)
1.4	0 VDC operating voltage	1.8	+24 VDC operating voltage

Wiring Layout and Dimensions



Indicators

Indicator	Description
Green “BUS OK” LED	Dupline bus: Off - bus fault / On - bus OK
Mechanical Operating Lever	All-or-nothing relays K1..K4: Up (red): Relay closed Down (green): Relay open or no N-connection

Technical Data

	Min.	Typ.	Max.
Dupline			
Current input		150 µA	
Input channels	4 acknowledge channels (channels 5..8)		

Technical Data (Continued)

		Min.	Typ.	Max.
	Output channels	4 output switching signals (channels 1..4)		
Operating Voltage				
	Rated operating voltage	21.5 VDC	24 VDC	26.5 VDC
	Current input	30 mA	35 mA	130 mA
	Ripple voltage			100 mV_{pp}
Relay outputs				
	Type	All-or-nothing relay		
AC	Voltage	12 VAC		250 VAC
AC	Load capacity (per output)	100 mA		16 A
DC	Voltage	12 VDC		30 VDC
DC	Load capacity (per output)	100 mA		10 A
Lamp Loads(1)	Figures for no. of switching cycles	30.000		100.000
Lamp Loads(1)	Incandescent lamps	2500 W		1250 W
Lamp Loads(1)	Fluorescent lamps, uncompensated	2500 W		1250 W
Lamp Loads(1)	Fluorescent lamps, parall. compens.	1300 W / 140 µF		650 W / 70 µF
Lamp Loads(1)	Fluorescent lamps, load-lag circuit	2 x 2500 W		2 x 1200 W
Lamp Loads(1)	Halogen lamps, 230 V	2500 W		1200 W
Lamp Loads(1)	LV halogen lamps w. transformer	500 VA		500 VA
Lamp Loads(1)	HQL, uncompensated	2000 W		1000 W
Lamp Loads(1)	HQL, parallel compensated	2000 W / 140 µF		1000 W / 70 µF
Lamp Loads(1)	DULUX lamps, uncompensated	1600 W		800 W
Lamp Loads(1)	DULUX lamps, parall. compensated	1300 W / 140 µF		1300 W / 140 µF
Terminals				
	Type	Strain-relief clamps		
	Contact area	0.4 mm ∅		2.5 mm²
	Torque			0.6 Nm
Housing				
	Type	Distribution installation housing for mounting on rails according to DIN EN 60715:2001-09		
	Dimensions	72 x 85 x 58 (W x H x D in mm) / 4 modules		
	Material	Polycarbonate		
General technical data				
	Ambient temperature	-10°C		+45°C
	Atm. humidity	max. 85% (exposure to dew not permissible)		
	Encl. protection type / standards	IP20, DIN EN 50428, DIN EN 60669-1, DIN EN 60669-2-1		
	Order number, description	09 501 174, 4-way relay module DSM 4M		

(1) These data relate to connection requirements in accordance with EN 60669. Switching cycles for lamp loads not listed here are available upon request.

5.5 Combined Inputs and Outputs

5.5.1 DRM 4: 4-Way Binary Relay Module with 4 Inputs, DIN-Rail

- 4-channel multi-function relay module for 4 switched, electrical loads or 2 drives
- Powerful 230 V / 16 A relays
- 4 potential-free inputs with adjustable switching thresholds
- Compact design with 4 module width for installing in distribution board
- Indication of switching status via LC display with 2 x 16 characters
- Option of manual operation via menu
- Configuration without the need of a hand encoder

Product Description

The DRM 4 is a latest generation multi-function relay module which, thanks to its configurable operating modes, represents the natural successor to the following modules:

1. 2-way shutter control unit:
   In this operating mode you can control up to four drives for e.g. roller blinds, awnings and skylights; whereby the device automatically observes the transit times between the directions of shutter movement. With appropriate configuration of the channel generator it is possible to achieve slat control in steps of seconds.
2. 2-way Venetian blind control unit with step-mode:
   This operating mode is particularly suitable for actuating Venetian and vertical-slatted blinds because the hardware offers a step mode for fine adjustment. This enables stepped pulsing of 100 ms duration.
3. 4-way relay module for switching up to four independent loads:
4. 4-way input module with adjustable switching thresholds:
   The module offers four electrically decoupled inputs for the conversion of voltage signals on the Dupline bus. They offer a broad voltage range of 0 to 230 V AC or DC. The response threshold, at which the applied voltage is recognized as the "1"-signal, can be configured separately in two steps for each input.

With its back-lit display on the front panel and its four navigation buttons, the relay module provides for very simple menu-guided configuration and operation. It supports, among others, the following functions:

- Setting of Dupline addresses and priority switching in the event of bus failure, thereby obviating the need for a DHK 1 hand encoder when commissioning;
- Setting the pulse/pause ratio from 100 ms:900 ms to 800 ms:200 ms when in the Venetian blind control mode;
- Option of manual operation of all channels when off-line, e.g. during commissioning.

In „standard mode“ the display shows the current switching mode of the 16 A relays, which feature large capacity reserves especially for the „Roller blind“ and „Venetian blind modules“. An additional LED gives visual warning of disruptions, e.g. a missing bus signal.

Notes on Applications

General

For the configuration process the device needs a 24 V power supply. However, a bus connection is not required.

Inputs

- When connecting dangerous voltages (e.g. mains voltage) at different phases the connection sequence has to be such that L and N are alternated respectively.
- Input signals with protective low voltage (e.g. 24 V DC) may only be mixed with voltages posing a potential danger to persons (e.g. mains voltage) if, as a minimum, the requirements of the above mentioned standard are met during installation.
- In the case of mixed connections (see above) it is essential that between such connections at least one terminal is left unused. This free terminal has to be permanently protected against use and the installation documentation must include a corresponding notice.
- The inputs are limited suitable for converting dimmed mains voltages, e.g. from dimmer outputs with phase control at On or at Off. The frequency of connected voltages must not exceed 60 Hz.

„Step-Mode“ („Venetian blind module“ operating mode)

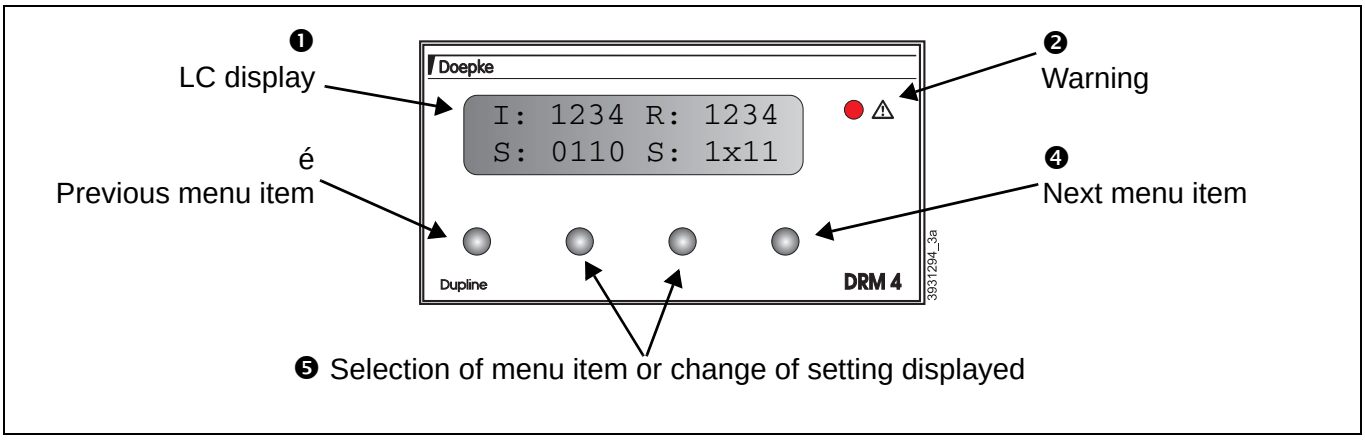
This operating mode facilitates the positional adjustment of Venetian blinds and vertical-slatted hangings. The device will normally adopt the so-called „Step-mode“ when the Up command is activated for no more than 2 seconds followed immediately (max. 2.5 sec. later) by the Down command. In this case the device will start to pulse with the set pulse/pause ratio in the Down direction. And, of course, correspondingly likewise for the opposite direction.

When using the unit as Venetian blind control modules, please observe the following points:

- Not every drive is suitable for the step-mode. Operate the device therefore only with those drives which - according to the manufacturer - will not be damaged by frequent pulsing of 100 ms duration. This specification is met by e.g. the „JA xx Soft“ model range of Messrs. Elero.
- Due to the multitude of different Venetian blinds on the market, an exact slat position adjustment cannot be guaranteed.
  In case of doubt check the interplay between the DRM 4 and the blind beforehand.
- Because slat adjustment with the DRM 4 is carried out by hardware, the „Slat adjustment“ option in ProLine or ProLine^{NG} should be switched off.
- In order to be able to employ the step-mode, select a minimum setting of 500 ms for the transit time when configuring the „Roller blind control“ object in ProLine or ProLine^{NG}.

The timing of the step-mode corresponds to that of DRM 8 as shown on **Page 101**.

Displays and Operation:



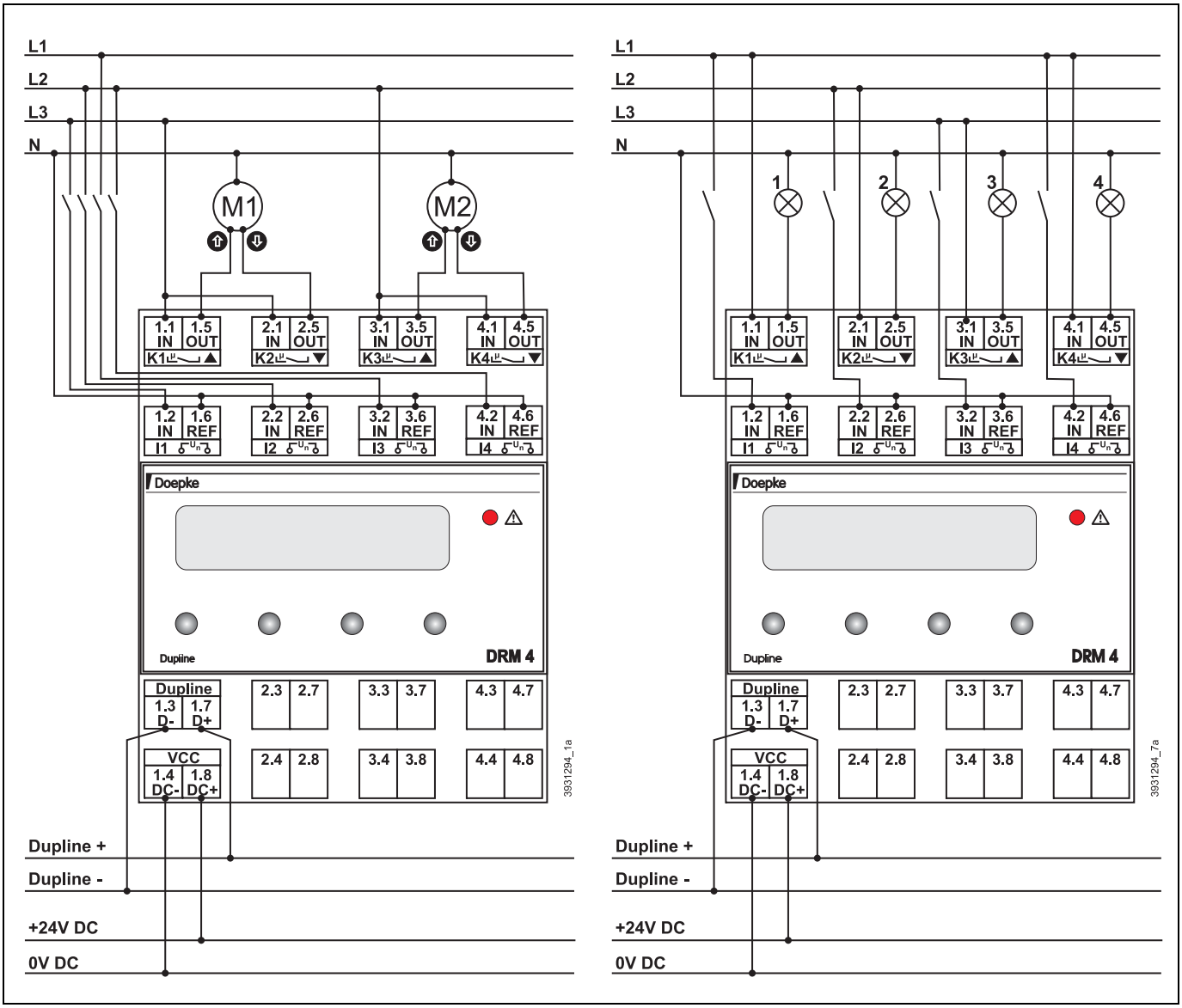
„Warn-“LED

	Message	Description
⚠	Continous On	The DRM 4 is in manual operating mode and is „off-line“; it therefore does **not** react to switching commands
	Flashing 1/s	There is no bus signal. This malfunction will also be indicated when in manual operating mode.

Connections

Terminal	Description	Terminal	Description
1.1	Phase input relay K1	1.5	Output relay K1 / motor 1 **UP**
2.1	Phase input relay K2	2.5	Output relay K2 / motor 1 **DOWN**
3.1	Phase input relay K3	3.5	Output relay K3 / motor 2 **UP**
4.1	Phase input relay K4	4.5	Output relay K4 / motor 2 **DOWN**
1.2/1.6	Input signal 1 (I1)	2.2/2.6	Input signal 2 (I2)
3.2/3.6	Input signal 3 (I3)	4.2/4.6	Input signal 4 (I4)
1.3	Dupline signal conductor - (D-)	1.7	Dupline signal conductor + (D+)
1.4	0 VDC operating voltage	1.8	+24 VDC operating voltage

Wiring Layout



Technical Data

	Min.	Typ.	Max.
Dupline			
Current input	0.7 mA	1.0 mA	1.3 mA
Input channels	4 input channels (channels 5..8)		
Output channels	4 control channels (channels 1..4)		
Display			
Type	Alphanumeric LC display		
Display format	max. 2 lines each with 16 characters		
Display size	43.9 x 10.0 (B x H in mm)		
Background lighting	LED (switch-on time configurable)		
Controls			
Operating/navigation keys	4		

Technical Data (Continued)

		Min.	Typ.	Max.
Inputs				
	Type	4 opto-decoupled semi-conductor inputs		
	Rated input voltage	0 V AC/DC		230 V AC/DC
	Rated input frequency	0 Hz		50 Hz
	Input sensitivity / switching threshold	Adjustable: Low (20 V AC/DC) / High (190 V AC/DC)		
	Current input (24 V DC / 230 V AC)			0.1 / 7.5 mA
Outputs				
	Type	All-or-nothing relay		
AC(1)	Voltage	12 VAC		250 VAC
	Load capacity (per output)	100 mA		16 A
DC	Voltage	12 VDC		30 VDC
	Load capacity (per output)	100 mA		10 A
Lamp Loads(1)	Incandescent lamps			3000 W
	HV-halogen lamps			2500 W
	Fluorescent lamps			2400 W
	Fluorescent lamps with el. ballast			600 W
	Gas discharge lamps	max. 1000 W (70 µF), 1250 W (100 µF(2))		
	Capacitor for compensation	max. 70 µF (100 µF(2))		
	Energy-saving lamps, conv. ballast			1250 W
	Energy-saving lamps, el. ballast(3)			300 W
Operating Voltage				
	Rated operating voltage	21.5 VDC	24 VDC	26.5 VDC
	Current input	15 mA		100 mA(4)
	Ripple voltage			100 mV_{pp}
Terminals				
	Type	Strain-relief clamps		
	Contact area	0.4 mm ∅		2.5 mm²
	Torque			0.6 Nm
Housing				
	Type	Distribution installation housing for mounting on rails according to DIN EN 60715:2001-09		
	Dimensions	72 x 85 x 58 (W x H x D in mm) / 4 modules		
	Material	Polycarbonate		
General technical data				
	Ambient temperature	-10°C		+45°C
	Atm. humidity	max. 85% (exposure to dew not permissible)		
	Encl. protection type / standards	IP20, DIN EN 50428, DIN EN 60669-1, DIN EN 60669-2-1		
	Order number, description	09 501 237, 4-way multi-function relay module DRM 4 with 4 inputs		

(1) The data relate to a minimum service life of 25,000 switching cycles and the connection requirements as per EN 60069.
(2) Min. 5,000 switching cycles.
(3) These data are largely dependent upon the manufacturer. In case of doubt, please refer!
(4) All relays and background lighting switched on.

5.5.2 DSS 4UR: 4-way Input / Output Module 24 V DC, Flush Mounted

- 4, from the bus signal isolated 24 V DC inputs
- 4 24 V DC semi-conductor outputs for acknowledgement with LED or incandescant lights
- Included system cable looms with approx. 200 mm length
- Spring-loaded terminals with double connecting points for looping through the Dupline bus signal
- Very low power consumption
- Fits e.g. into deep socket installation boxes

Product Description

The DSS 4UR-N and DSS 4UR-P are components of the Dupline installation system with four inputs and outputs in semi-conductor design. Amongst others, the devices allows the integration of conventional push-buttons with acknowledge signal to be linked to the system. Because of their compact design they can be fitted behind push-buttons in deep flush-mounted installation boxes.

Conventional push-buttons and potential-free switching contacts can be operated with the DSS 4UR-N/-P via three 4-wire system cables supplied complete with end ferrules. An internal extended operating signal prevents any multiple switching occasioned by possible contact bounce.

The outputs of the DSS 4UR-N/-P are each designed for loads of max. 50 mA. Basically, any desired electrical consumers may be employed; however, the maximum loading capacity may not be exceeded when using incandescent lamps as indicator lights. For this reason - and because of the longer lifespan - we recommend the use of LEDs.

While the electrical consumers are driven at 0 V DC on DSS 4UR-N, they have to be connected to +24 V DC in case of DSS 4UR-P.

Notes on Applications

General

Because of their compact design the input/output modules will fit behind the push-button in standard socket installation boxes.

The clips mounted facilitate the installation and allow the Dupline signal and the 24 V DC voltage to be connected and looped through.

The sensor is equipped with a 4-pole flat plug connection for encoding the addresses with the DHK 1 (coding cable DKP 2). It is not possible to carry out a bus test with the DTG 1 tester via this connection.

Power Supply

The the in- and outputs of the DBA and the modules themselves must be supplied by the same power source.

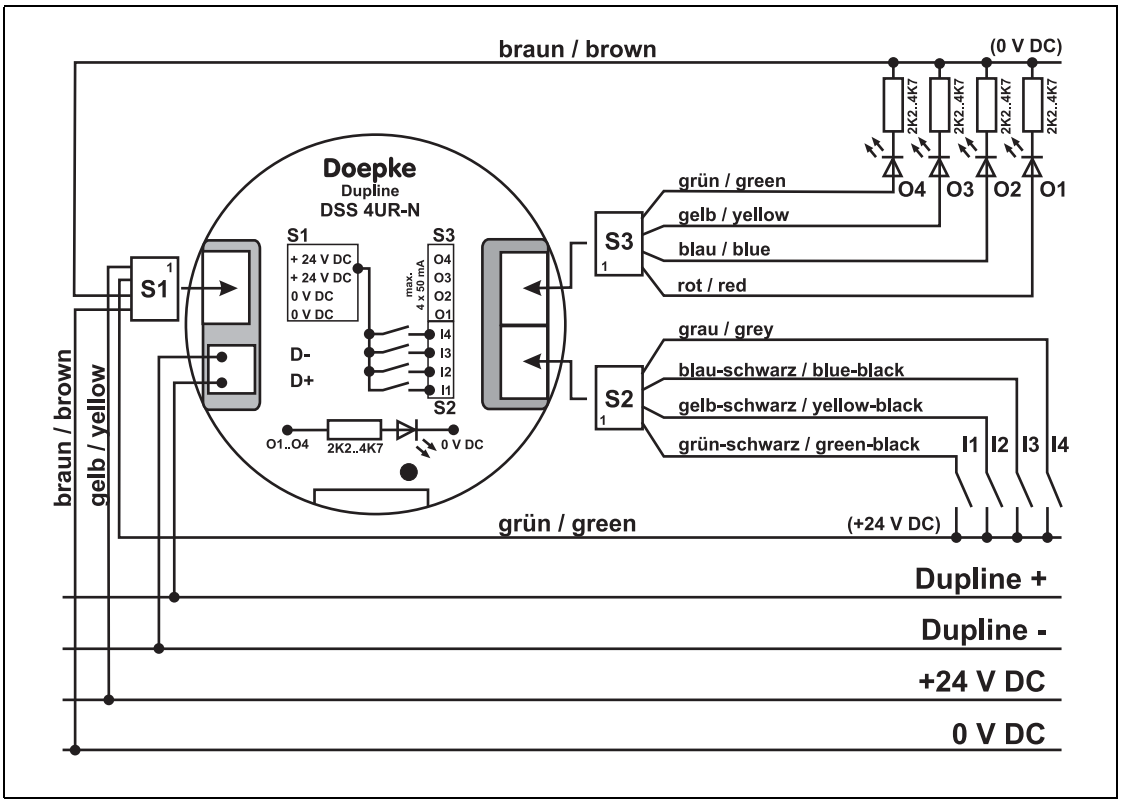
Dupline Channel Allocation

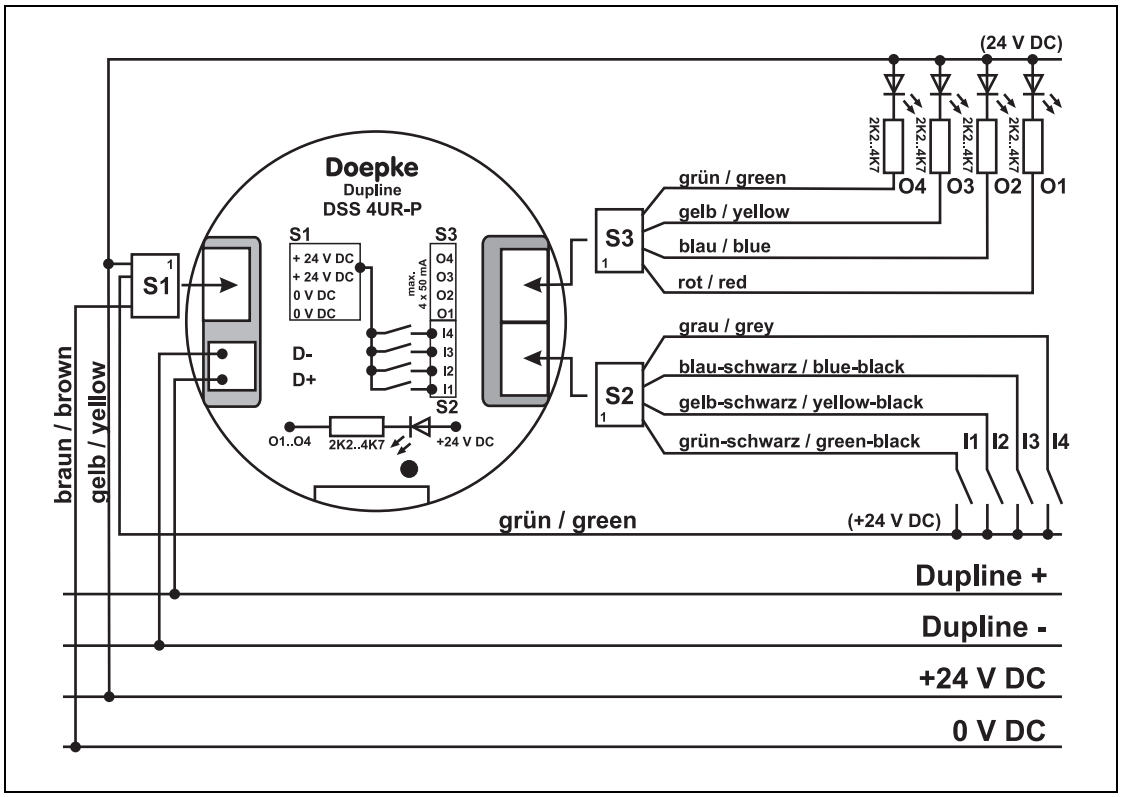
Channel	Description	Channel	Description
1	Input signal 1 (I1)	5	Output signal 1 (O1)
2	Input signal 2 (I2)	6	Output signal 2 (O2)
3	Input signal 3 (I3)	7	Output signal 3 (O3)
4	Input signal 4 (I4)	8	Output signal 4 (O4)

Connections

	Pin	Color	Signal
Cable Loom S1	1	yellow	Operating voltage +24 V DC
	2	green	Operating voltage +24 V DC
	3	brown	Operating voltage 0 V DC
	4	brown	Operating voltage 0 V DC
Cable Loom S2	1	green-black	Input signal signal 1 (I1)
	2	yellow-black	Input signal signal 2 (I2)
	3	blue-black	Input signal signal 3 (I3)
	4	grey	Input signal signal 4 (I4)
Cable Loom S3	5	red	Output signal 1 (O1)
	6	blue	Output signal 2 (O2)
	7	yellow	Output signal 3 (O3)
	8	green	Output signal 4 (O4)

Wiring Layout and Dimensions





Indicators

none

Technical Data

	Min.	Typ.	Max.
Dupline			
Current input		750 µA	
Input channels	4		
Output channels	4		
Inputs			
Type	Bus signal decoupled semi-conductor inputs		
	21.5 VDC	24 VDC	26.5 VDC
Rated voltage	from cable loom (24 V DC)		
Current input per input			1 mA
Length of line			10 m
Outputs			
Type	Semiconductor outputs, 24 VDC open collector		
Rated voltage	from cable loom (0 V DC / 24 V DC)		
Load capacity per output			50 mA
Operating Voltage			
Rated operating voltage	21.5 VDC	24 VDC	26.5 VDC
Own current consumption		5 mA	9 mA

Technical Data (Continued)

		Min.	Typ.	Max.
Terminals				
Terminals	Type	Spring-loaded terminals, 2-pole with double connecting points		
	Contact area	0.4 mm ∅		0.8 mm ∅
Cable Loom	Type	3 x 4 leads LiYv with end ferrules		
	Diameter		0.25 mm²	
Housing				
Type		Flush-mounted socket mounting plate for EIB switch		
Dimensions		∅ 50.5 mm x 13.5 mm (W x H in mm)		
Material		Polyamide, glass fibre reinforced		
General Technical Data				
Operating temperature		-10°C		+45°C
Atm. humidity		Max. 85% (exposure to dew not permissible)		
Encl. protection type		IP20		
Protection class		III		
Order number, description		09 501 241, 4-way input/output module DSS 4UR-N 09 501 242, 4-way input/output module DSS 4UR-P		

5.6 Components for Visual Display

5.6.1 DSC 43-5.7: Touch Screen Panel 5.7“, TFT, 24 V DC

- Touch screen panel incorporating up-to-date 64-bit RISC processor
- High resolution of 320 x 240 Pixel
- Size of screen 115.2 mm x 86.4 mm (5.7" / 144.7 mm diagonal)
- Remote operation by means of apps for iOS and Android
- Configuration via DSCconf EX software, can be run on Microsoft® Windows® 2000, XP, Vista, Windows® 7, Windows® 8 and Windows® 10

Product Description

The DSC 43-5.7 touch panel is an operating and display unit of the newest generation with improved display and revised computer architecture.

The panels features a 5.7" (115.2 mm x 86.4 mm) screen size with a 320 x 240 pixel resolution and thus offers the user the opportunity of a safe and efficient operator screen. A configuration menu is provided for changing the settings of the device such as e. g. contrast.

The device has a number of interfaces, e. g. Ethernet (10BASE-T/100BASE-TX), USB 2.0, two serial COM interfaces and a CF card slot. The generously sized user memory of 16 MB and the powerful processor enable the creation of sophisticated applications.

The DSC 43-5.7 has been designed for rugged use in industrial environments and shipping, which is evidenced by the service life of the background lighting and the protection class (IP65f) of the front end. It is configured via the optionally available Microsoft® Windows®-based software DSCconf EX, which also includes the necessary download cable. It provides for the following functions: generation of menus and operating pages (screens); inserting and configuring operating and visualising elements, e. g. bit switches, indicator lamps, time switches, digital and/or graphic display of analogue data, events and alarms with plain text, trend graphics and sequence programmes, e.g. for controlling heating valves.

With optional paid apps for smartphones and tablets it is also possible to remotely operate the DSC 40 touch panels. Smartphones and tablets display the overall graphical content of the panel and allow the operation as configured on the panel.

Notes on Applications

Connection to Dupline

There are two options for linking the DSC 43-5.7 to a Dupline system:

1. Directly to the 2nd serial port (COM2) of the DKG 20 or DKG 21-GSM:
   For this you will need the **DSA 6** screen adapter which enables a DKK 1 type cable to be connected. The connection is carried out at the COM1 interface of the touch panel.
2. Directly to the Dupline bus via the DSI 1 modbus adapter:
   The optionally available screen adapter **DSA 5** realises the connection between the DSI 1 and the touch. Hence the touch panel can be used at any location on the Dupline bus. The connection is carried out at the COM2 interface of the touch panel.

Compact Flash Card (CF Card)

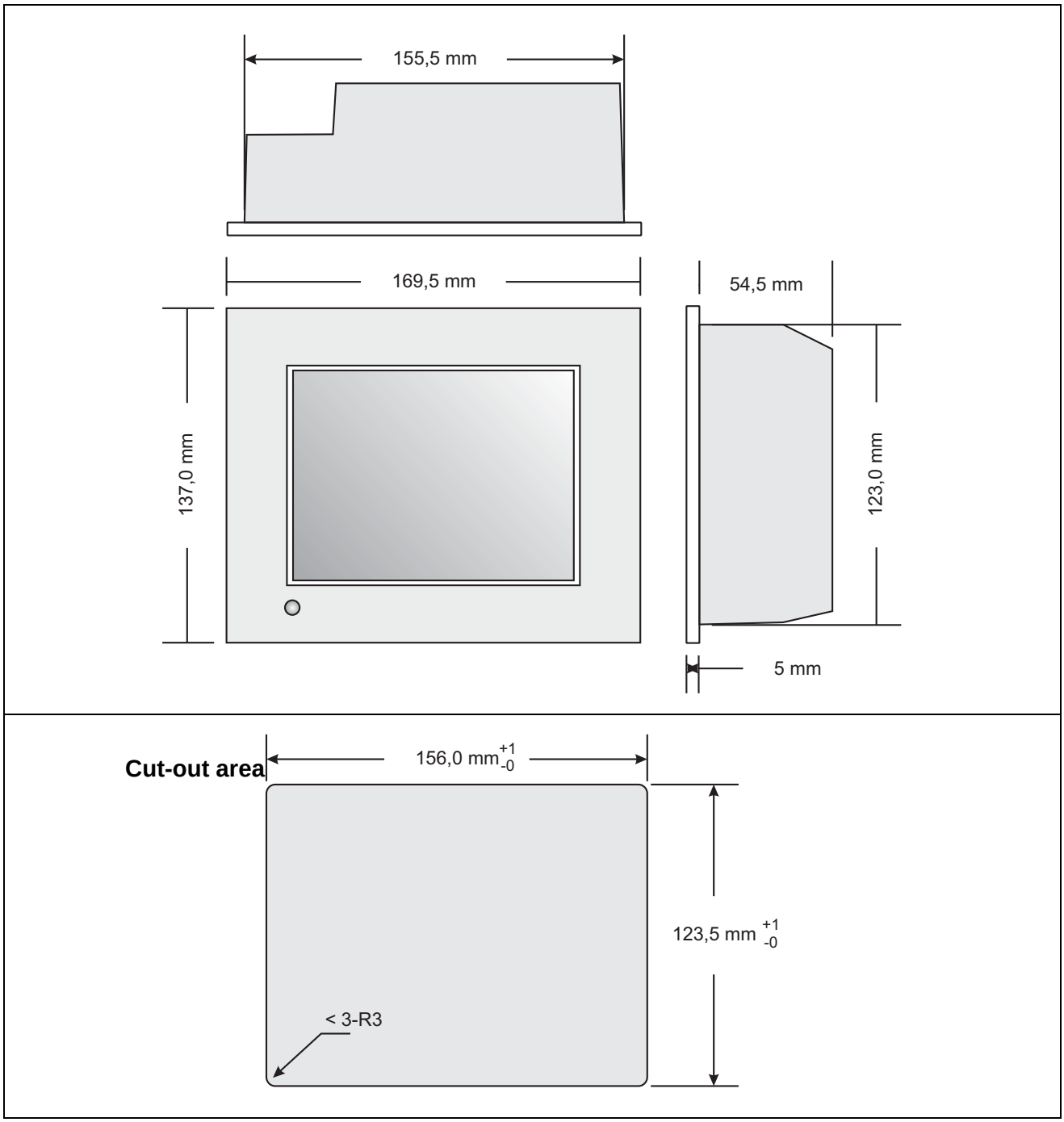
The DSC 43-5.7 is equipped with a slot for standard CF cards, as commonly employed in e. g. photographic technology. Cards with memories of 16 and 32 MB can be used. They permit retrospective exchange of an application, e.g. in order to carry out corrections. The CF card is exchanged on the back of the devices; the cards are not supplied with the units.

Flush-Mounting

As the panel is a unit intended to be semiflush-mounted, and as it is cooled by natural ventilation, a sufficient flow of air must be ensured when installing.

Alternatively the DSC 43-5.7 may also be installed in the Doepke DSC 30-UPG flush-mounted housing (Order no. 09 501 231). This rugged housing makes it easy to install the panel in cavity or solid walls and ensures sufficient dissipation of heat. For further details see **Chapter 5.9.5 "Installation Accessories"** on **Page 158**.

Wiring Layout and Dimensions



Indicators

	Indication	Description
Status LED	Green	On: Normal or offline operation
	Orange	On: Background lighting defective / Flashing: Boot phase
	Red	On: Operating voltage has been supplied / Flashing: Fatal error
	Off	No operating voltage
Ethernet	Green LED	On: Data transfer possible Off: No connection or transmission fault
	Yellow LED	On: Data transfer Off: No data transfer

Technical Data

	DSC 43-5.7
Dupline	
Type of connection	via DSI 1 Modbus adapter to the Dupline bus or directly to the DKG
Display	
Type of screen	TFT colour LCD (QVGA)
Number of colours	65.536
Background lighting	white LED (not exchangeable, life time 50.000 h(1))
Resolution	320 x 240 pixels
Screen diagonal dimension	5.7” / 144.7 mm
Size of display	115.2 x 86.4 (W x H in mm)
Adjustment of brightness/contrast	16 steps each, adjustable via touch front
Character fonts	standard font and loadable character fonts (ASCII code, Chinese, Japanese, Taiwanese and Korean)
Touch surface	analog resistive, 1024 x 1024 touch points
Interfaces	
COM1	RS-232C (male)
COM2	RS-485 (female)
Transmission parameters COM1/COM2	data length: 7/8 bit, stop bits: 1/2, parity: none/even/odd, transmission speed: 2400 bit/s ... 115.2 kBit/s
USB interface	1 x USB 2.0 Type A 1 x USB 2.0 Type mini-B
Ethernet	IEEE802.3u, 10BASE-T/100BASE-TX
CF Card	CF card connector TYP-II (SD/SDHC)
Application data	
User memory	16 MB FPROM
Buffer memory for data backup	320 kB SRAM
Programming Software	
Name	DSCconf EX

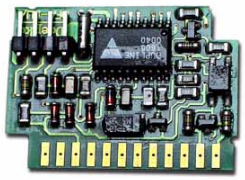
Technical Data (Continued)

	DSC 43-5.7
Languages	German, English
Platforms	Microsoft® Windows® 2000 (SP3), Windows® XP, Vista, 7, 8, 10
Operating voltage	
Rated operating voltage	24 V DC (19.2 V DC .. 28.8 V DC
Power requirement (24 V DC)	max. 0.55 A
Terminals	
Type	plug/screw terminals
Contact area	0.4 mm ∅ to 2.5 mm²
Housing	
Dimensions	see schemes
Material	Polycarbonate (PC)
General technical data	
Ambient temperature	0°C..+50°C
Atm. humidity	10%..90% (not condensing)
Degree of pollution	II
Atmosphere	may not contain aggressive gases
Ventilation	natural air flow
Encl. protection type / standards	IP 65f, NEMA #250 TYP 4X/13
Weight	0.8 kg
Order number, description	09 501 508, DSC 43-5.7, TFT Touch Screen Panel 09 501 229, DSA 5, Adapter DSC 43 to DSI 1 09 501 230, DSA 6, Adapter DSC 43 to DKG 09 501 180, DSC 3-F, CF-Card for DSC 43 09 501 231, Flush-mounted housing DSC 30-UPG 09 501 226, DSCconf EX, Programming software with cable

(1) minimal life time until the background light intensity descreases below 50 %

5.7 Interface Components

5.7.1 DFA-DI: Dupline Remote Actuator Interface



- Enables a DFA remote actuator to be hooked up to Dupline
- Easy-to-install circuit board
- Power supplied by the DFA

Product Description

The DFA-DI serves to hook up a DFA remote actuator for residual current circuit-breakers DFS 2 and DFS 4 to the Dupline bus. The PCB is mounted in a space in the DFA provided for this purpose and makes available the following functions:

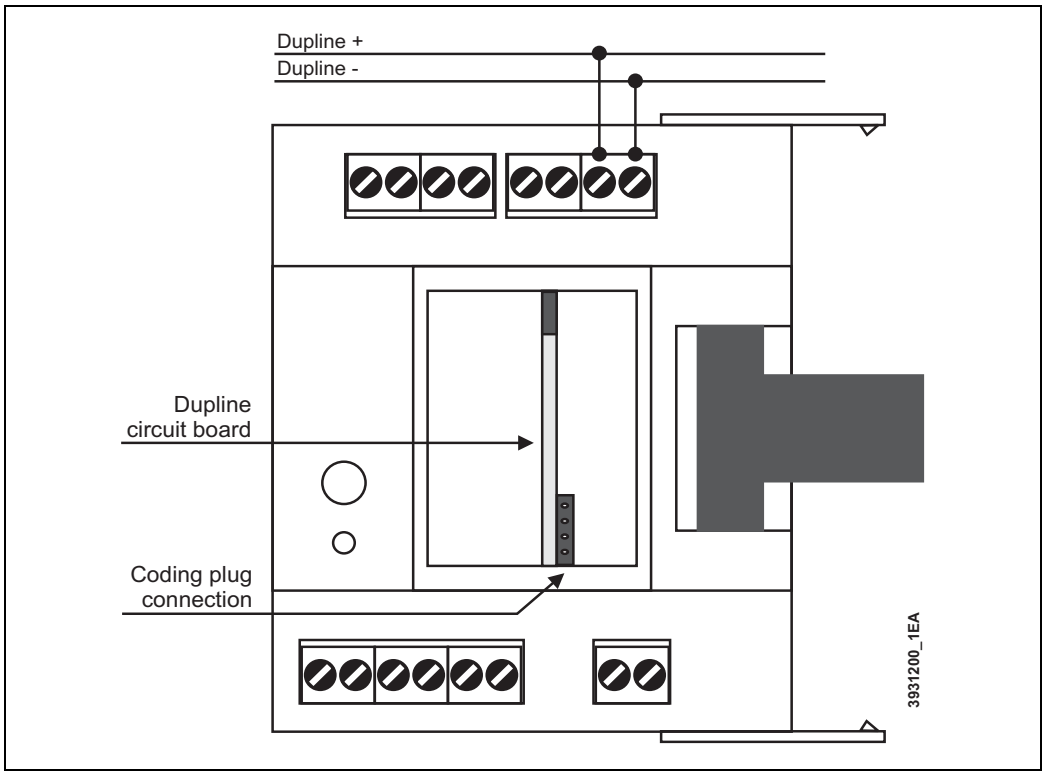
- Connect or disconnect RCCB
- Trip RCCB
- Feedback of the RCCB status
- Feedback of the DFA's operation indicator

All necessary connections (operating voltage, Dupline signal line) between the DFA-DI and the DFA are via a socket board. The signal conductors are connected to the DFA.

Notes on Applications

None.

Wiring Layout and Dimensions



Connections

Connections between DFA and DFA-DI are made via a socket board.

Indicators

none

Dupline Channel Allocation

Channel	Description	Channel	Description
1	Connecting RCCB	5	RCCB switching status: connected
2	Disconnecting RCCB	6	RCCB switching status: disconnected
3	Tripping RCCB	7	RCCB switching status: tripped
4	Not assigned	8	Display DFA control LED

Technical Data

	Min.	Typ.	Max.
Dupline			
Current input		320 µA	350 µA
Input channels	4 status channels		
Output channels	3 control channels		
Operating voltage			
	Supply via DFA remote actuator		
Current input		4.8 mA	5.5 mA
Terminals			
Type	Via socket board, see instructions for DFA remote actuator		
Housing			
Type	Open circuit board		
General technical data			
Encl. protection type / standards	After installation the technical data of the DFA are applicable		
Order number, description	09 100 102, Remote actuator interface DFA-DI		

5.7.2 DCI 2: Serial-to-Ethernet Port Server

- Enables e.g. configuration of channel generators DKG 20 and DKG 21-GSM as well as visualisation of a Dupline net via Ethernet media
- Data transfer from PC to DCI 2 via a virtual COM port
- Power supply by means of a plug power pack

Product Description

The DCI 2 is an interface component with the capability of converting data packets from Ethernet on to a serial line (and vice versa). For this purpose the driver - included in the package - emulates a serial port a serial interface at the PC and diverts data sent to it to an Ethernet network. The re-conversion from Ethernet to serial is then undertaken by the DCI 2 close to the DKG.

By equipping the master in a DKG network with two DCI 2 (at COM1 and COM2 of the DKG), you will be able to remotely configure as well as to visualise from a remote location.

For further information on DKG networks please refer to **Chapter 3** on **Page 16**.

Notes on Applications

General

The configuration of slaves in a DKG network requires - after the initial assigning of slave device numbers - only one DCI 2, which is connected to the master. However, if it is necessary to furnish the slaves remotely with new firmware, then every slave must be connected to a DCI 2.

For ProLine^{NG} the emulated port must be within the range of between COM1 and COM4.

Power Supply

Power is supplied via the plug power pack provided.

Ethernet

In the Ethernet network the DCI 2 requires a free TCP/IP address, which can also be assigned by a DHCP service.

Mounting

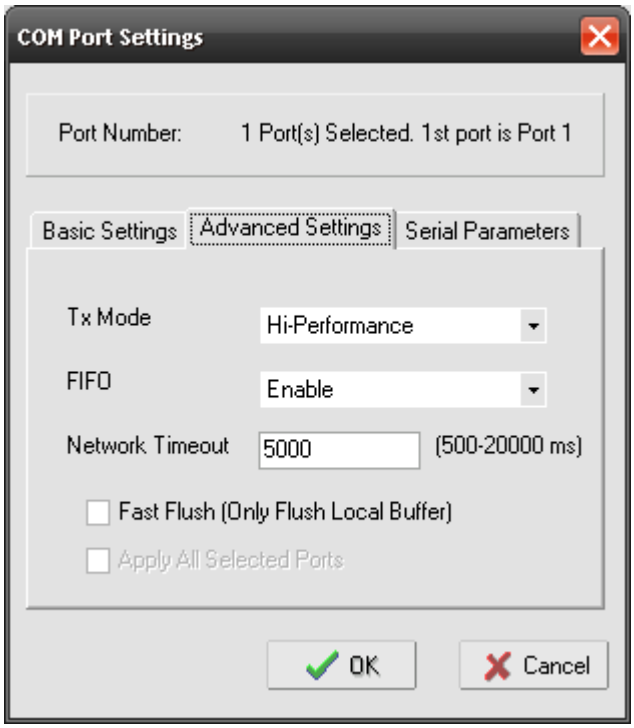
The DCI 2 can be mounted on a DIN-rail using the optionally available bracket.

Interface Configuration

For connection to DKG, the DCI 2 has to be configured to the so-called „Real COM Mode“. This takes place in the „NPORT Administrator“, a programme designed for all popular operating systems. It permits the administration of all DCI 2 present in the network and also allows the setup of the virtual COM port required by ProLine.

The following screen shot illustrates the configuration of the virtual port with the aid of the "Real COM Installer". The baud rate for configuring the DKGs is 115,000, the rate for visualisation may not exceed

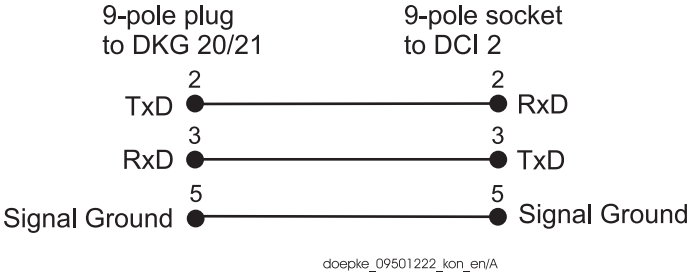
57,600.



Connections SUB-D (9-pole, male)

Pin	Description	Pin	Description
1	DCD	6	DSR
2	RxD	7	RTS
3	TxD	8	CTS
4	DTR	9	-
5	GND		

Wiring Layout and Dimensions



Indicators

Indicator	Colour	Description	
Ready	Red	On:	Power is on and NPort 5110 is booting up.
		Blinking:	Indicates an IP conflict, or DHCP or BootP server did not respond properly.
	Green	On:	Power is on and NPort 5110 is functioning normally.
		Blinking:	The device server has been located by Administrator's Location function.
	Off	Power is off, or power error condition exists.	
Link	Orange	10 Mbps Ethernet connection	
	Green	100 Mbps Ethernet connection	
	Off	Ethernet cable is disconnected, or has a short.	
Tx/Rx	Orange	Serial port is receiving data.	
	Green	Serial port is transmitting data.	
	Off	No data is being transmitted or received through the serial port.	

Technical Data

	Min.	Typ.	Max.
Operating voltage			
Rated operating voltage	12 VDC		48 VDC
Current input			200 mA
Terminals			
Ethernet	RJ45		
Serial	SUB-D, 9-pole		
Interfaces			
Ethernet	10/100 Mbps Ethernet interface Protocols: TCP, UDP, IP, ICMP, DHCP, BootP, Telnet, DNS, SNMP, HTTP, SMTP		
Serial	RS232 port up to 230,4 kBaud		
Housing			
Type	Rugged sheet steel housing		
Dimensions w/o ears	52 x 80 x 22 (W x H x D in mm)		
Dimensions with ears	75.2 x 80 x 22 (W x H x D in mm)		
Software			
Type	NPort Administrator		
Operating systems	Windows 95/98/ME/NT/2000/XP/2003; Linux		
General technical data			
Ambient temperature	0°C		+55°C
Atm. humidity	5%		95%
Encl. protection type / standards	FCC Class A, CE Class A, UL, CUL, TÜV		
Order number, description	09 501 222, DCI 2 Serial-to-Ethernet Port Server		

5.7.3 DCI 3FB: INSTA Funkbus (Radio Bus) Gateway

- Interface for linking 433 MHz *Funkbus* (radio bus) components of Messrs INSTA, Berker, Gira and Jung
- Optimum reception by means of enclosed external antenna with magnetical foot
- Menu guided enrolling and deleting of the radio components by means of 2-row LC display
- Comfortable system settings (e.g. language, background lighting, reset to default settings)

Product Description

The DCI 3FB radio bus gateway is a component of the Dupline bus system for linking 433 MHz *Funkbus* (radio bus) components of Messrs INSTA, Berker, Gira and Jung.

The DCI 3FB consists of a radio bus transmitter, as well as a receiver and is equipped as standard with an external antenna, which ensures optimum reception when the basic unit is installed in a DIN-rail distribution facility.

The control elements (LC display, buttons and enrolling LED) on the front of the DCI 3FB together with menu guidance in plain language enable user-friendly enrolling and deleting of radio components.

The DCI 3FB supports the following radio bus components:

Radio Bus Transmitter	Radio Bus Receiver
Hand transmitter, mini / standard / comfort (see also **Chapter 5.9.3 "DFF Mini / DFF Komfort: instaFunk Hand-held Transmitter"** on **Page 150**)	Switch/Dimmer ZS
Wall / universal / multifunction transmitter	Universal dimmer
Presence detector	Shutter actuator
Controller	Push-button/switch actuator, mini
RX/TX module	Control unit 1-10 V
Repeater	Universal cord-fitted dimmer

Notes on Applications

Important Notes regarding the Radio Bus

- As radio transmission is via a non-exclusively dedicated transmission route, interferences cannot be prevented.
- The radio transmission is not suitable for safety-related applications, e.g. emergency shutdown or emergency calls.
- Linking this radio installation to other communication networks is permissible only within the nationally applicable regulations.
- This radio installation may not be used for communications beyond property boundaries.
- If operated in Germany, the notices from the general distribution specifications published in the official journal Vfg 73/2000 must also be observed.
- When used for its intended purpose this device conforms to the R&TTE directive (1999/5/EU). **This also includes the usage of the antenna enclosed.**
- Basically the radio bus does not enable simultaneous transmission and reception of telegrams. For this reason the DCI 3FB cannot be operated as a repeater, i.e. as a signal amplifier. **That is also why it is not permissible to use one Dupline address for both**

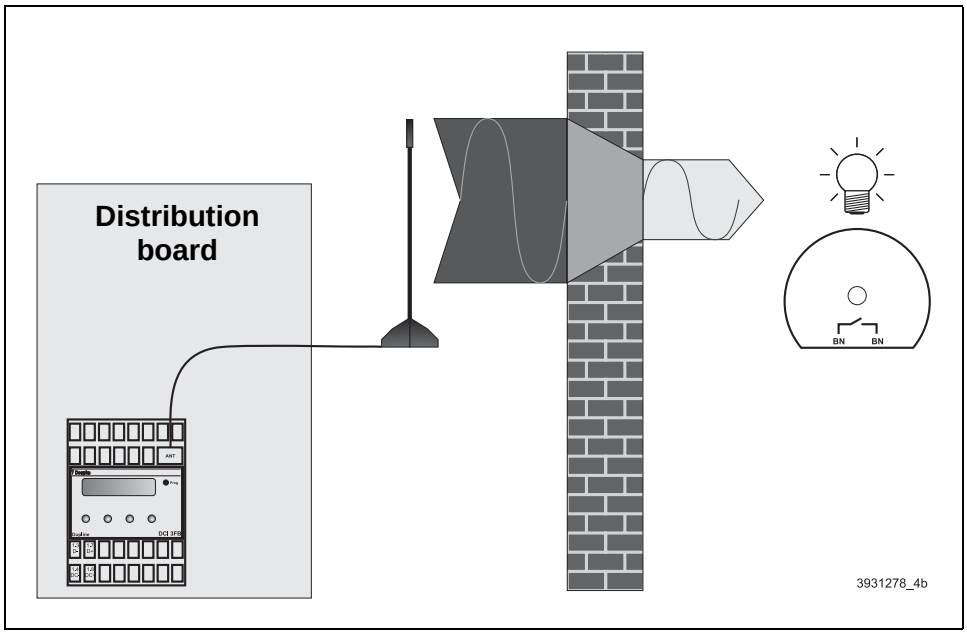
reception and transmission.

Transmission Characteristics

The range of a radio system depends upon the output of the transmitters, the reception characteristics of the receiver, the atmospheric humidity, the mounting height and the structural particulars of the object.

Examples for the penetration of materials:

Dry Materials	Penetration
Timber, plaster of Paris, plasterboard	approx. 90%
Brickwork, MDF	approx. 70%
Reinforced concrete	approx. 30%
Metal, metal latticework, aluminium cladding	approx. 10%
Rain, snow	approx. 0 - 40%



Radio Commands

The radio bus recognizes a total of 57 different radio commands. Among the usual radio bus components only the "Comfort" hand transmitter is able to cope with all commands. Other components are generally restricted to a small section as their functions are also limited. The following table represents the commands:

Number	Command	Meaning
1	1+A	Switch **On** channel **1** - Group **A**
2	1-A	Switch **Off** channel **1** - Group **A**
:	:	:
15	8+A	Switch **On** channel **8** - Group **A**
16	8-A	Switch **Off** channel **8** - Group **A**
17	1+B	Switch **On** channel **1** - Group **B**
18	1-B	Switch **Off** channel **1** - Group **B**
:	:	:

Number	Command	Meaning
31	8+B	Switch **On** channel **8** - Group **B**
32	8-B	Switch **Off** channel **8** - Group **B**
33	1+C	Switch **On** channel **1** - Group **C**
34	1-C	Switch **Off** channel **1** - Group **C**
:	:	:
47	8+C	Switch **On** channel **8** - Group **C**
48	8-C	Switch **Off** channel **8** - Group **C**
49	LS1	Lighting scene **1**
:	:	:
53	LS5	Lighting scene **5**
54	M+	Lighting scene master switch **Up**(1)
55	M-	Lighting scene master switch **Down**(1)
56	Z+	Central command **On**(2)
57	Z-	Central command **Off**(2)

(1) Is automatically memorized together with the lighting scenes (cannot be separately deleted).
(2) Is automatically memorized (can be deleted).

Installing the Antenna

The position of the external antenna has a decisive effect upon the transmission and reception quality of the DCI 3FB. Therefore please note the following points:

- Due to the transmission characteristics (see **"Transmission Characteristics"**) the supplied external antenna should be mounted in as high a position as possible outside the distribution cabinet.
- The connecting line between transmitter and receiver should be selected so that it runs the shortest possible length through brickwork and other materials. In particularly niches in brickwork should be avoided.
- The mounting height of the decentral transmitters or receivers should not be less than 50 cm.
- Computer, audio/video systems, microwaves or electrical transformers and lamp ballast constitute high-frequency sources of interference. A 50 cm minimum distance from such devices should be observed.

In addition, the notes provided in the operating instructions of the transmitters and receivers concerned also apply.

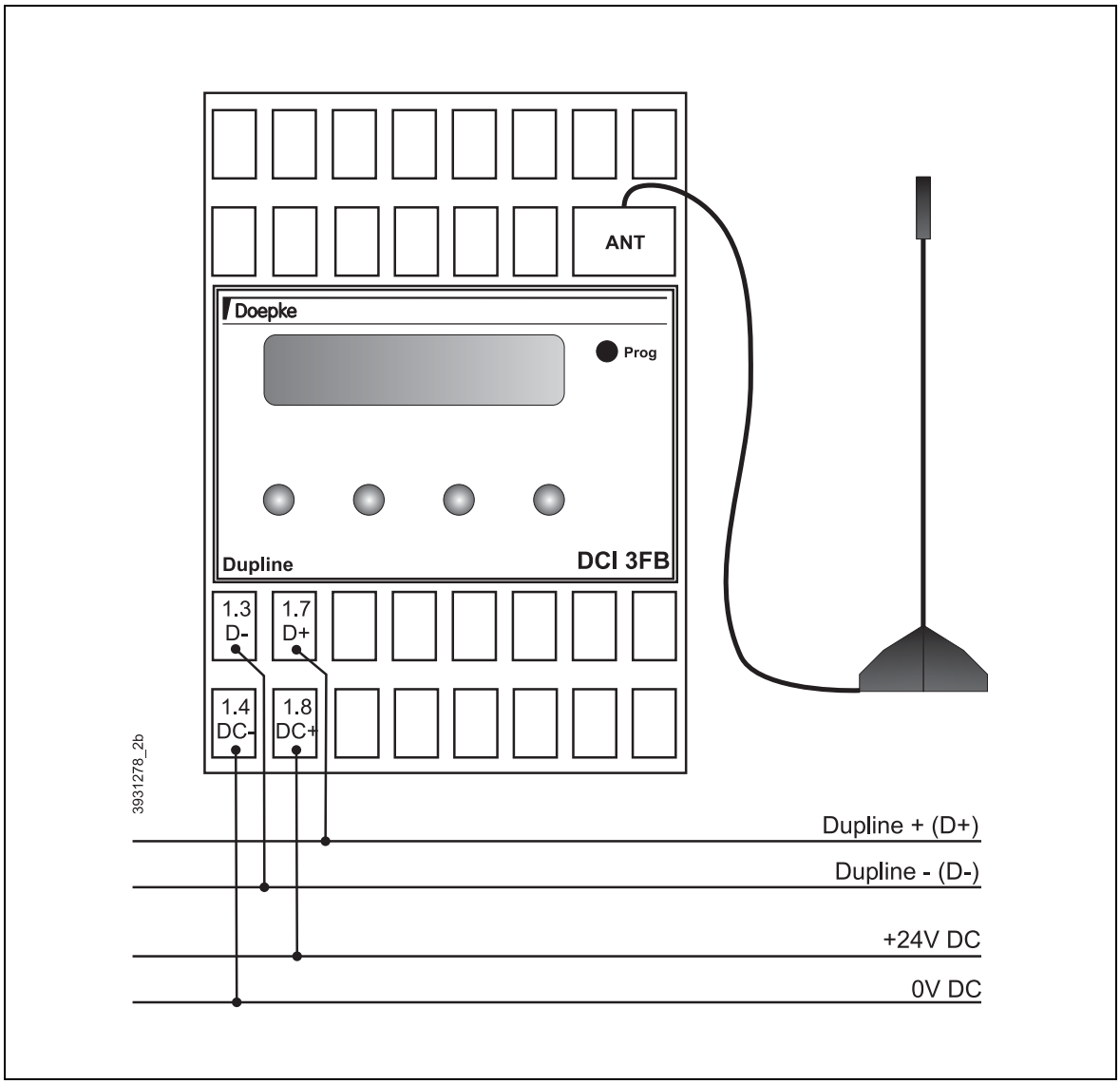
Connections

Terminal	Description	Terminal	Description
1.3	Dupline signal conductor + (D+)	1.7	Dupline signal conductor - (D-)
1.4	Operating voltage 0 VDC	1.8	Operating voltage +24 VDC
ANT	Connection of external antenna		

Indicators

Indicator	Color	Description
„Prog“ LED	Flashing 1/s	Enrolling process: The DCI 3FB is waiting to receive a telegram from a radio transmitter.
	Flashing 4/s	• Receiving a radio command (even if the transmitter had not been enrolled); • Radio transmitter has been deleted ("erased").

Wiring Layout and Dimensions



Technical Data

	Min.	Typ.	Max.
Dupline			
Power consumption	0.8 mA	0.9 mA	1 mA
Display			
Type	Alphanumeric LC display		
Display format	max. 2 lines each with 16 characters		
Display size	43.9 x 10.0 (B x H in mm)		
Background lighting	LED (switch-on time/duration configurable)		
Controls			
Operating/navigation keys	4		
Radio Bus Receiver Unit			
Transmitter frequency/modulation	433.42 MHz / ASK (Amplitude Shift Keying)		
Number of enrollable transmitters			30
Recognized commands per transmitter			57
Max. number of enrollable commands			128
Radio Bus Transmitter Unit			
Transmitter frequency/modulation	433,42 MHz / ASK (Amplitude Shift Keying)		
Number of transmittable commands			57
Range (free field)			100 m
Operating Voltage			
Rated operating voltage	21.5 VDC	24 VDC	26.5 VDC
Power consumption	30 mA		48 mA
Permissible ripple voltag			100 mV_{pp}
Antenna			
Length	17 cm		
Connection	2.70 m, RG 174 cable with SMB connector		
Bending radius	35 cm		
Terminals			
Type	Strain-relief terminals		
Contact area	0.4 mm ∅		2.5 mm²
Tightening torque			0.6 Nm
Housing			
Type	Distribution installation housing for mounting on rails according to DIN EN 60715:2001-09		
Dimensions	72 x 85 x 58 (W x H x D in mm) / 4 modules		
Material	Polycarbonate		
General Technical Data			
Operating temperature	0°C		+45°C
Atmospheric humidity	Max. 85% (exposure to dew not permissible)		
Encl. protection type / standards	IP 20, DIN EN 50428		
Order number, description	09 501 227, Radio Bus Gateway DCI 3FB		

5.7.4 DCI 4 DALI: DALI Gateway

- interface for connecting the DALI (Digital Addressable Lighting Interface) bus
- supports up to 64 DALI units, 16 lighting groups and 16 lighting scenes
- inputs for master on and off commands
- simple, intuitive use by means of two-row LC display and navigation push buttons for configuration and manual operation

Product Description

The standardised DALI bus (Digital Addressable Lighting Interface) allows the control of technical devices for lighting (electronic ballasts, load dimmers, LED, etc.). The DALI bus supports a maximum of 64 devices, which can be grouped into upt to 16 lighting groups. Individually tailored brightness values of all groups can be stored and accessed in up to 16 lighting scenes, where parameters such as minimum and maximum values, dimming and fade speeds are adjustable.

The DALI gateways from Doepke are control units for a maximum of 64 slave devices at one DALI bus. They support the basic functions such as search of participants, formation of lighting groups and lighting scenes. They also supply the DALI bus with voltage so that no external power source is required. The available parameters of the participants (minimum / maximum dimming values, dimming and fade speeds) can be set via the gateway. It is operated via a two-line LCD display completely menu-driven and thus is very easy. It also includes manual control options for controlling all participants, groups and lighting scenes so external wirings for commissioning are not necessary. Configurations are stored permanently, whereby all functions even after a power failure are available again.

The DCI 4 DALI supports the linking of all possible 16 lighting groups and lighting scenes with the addresses of the Dupline bus. Direct control via the central on and off commands can be given via Dupline as well as by the inputs of the gateway. Due to the configuration possibilities of the Dupline bus, the light scenes and Gateway can also be realized across gateways, so that even large rooms with more than 64 units can be controlled via one single keystroke.

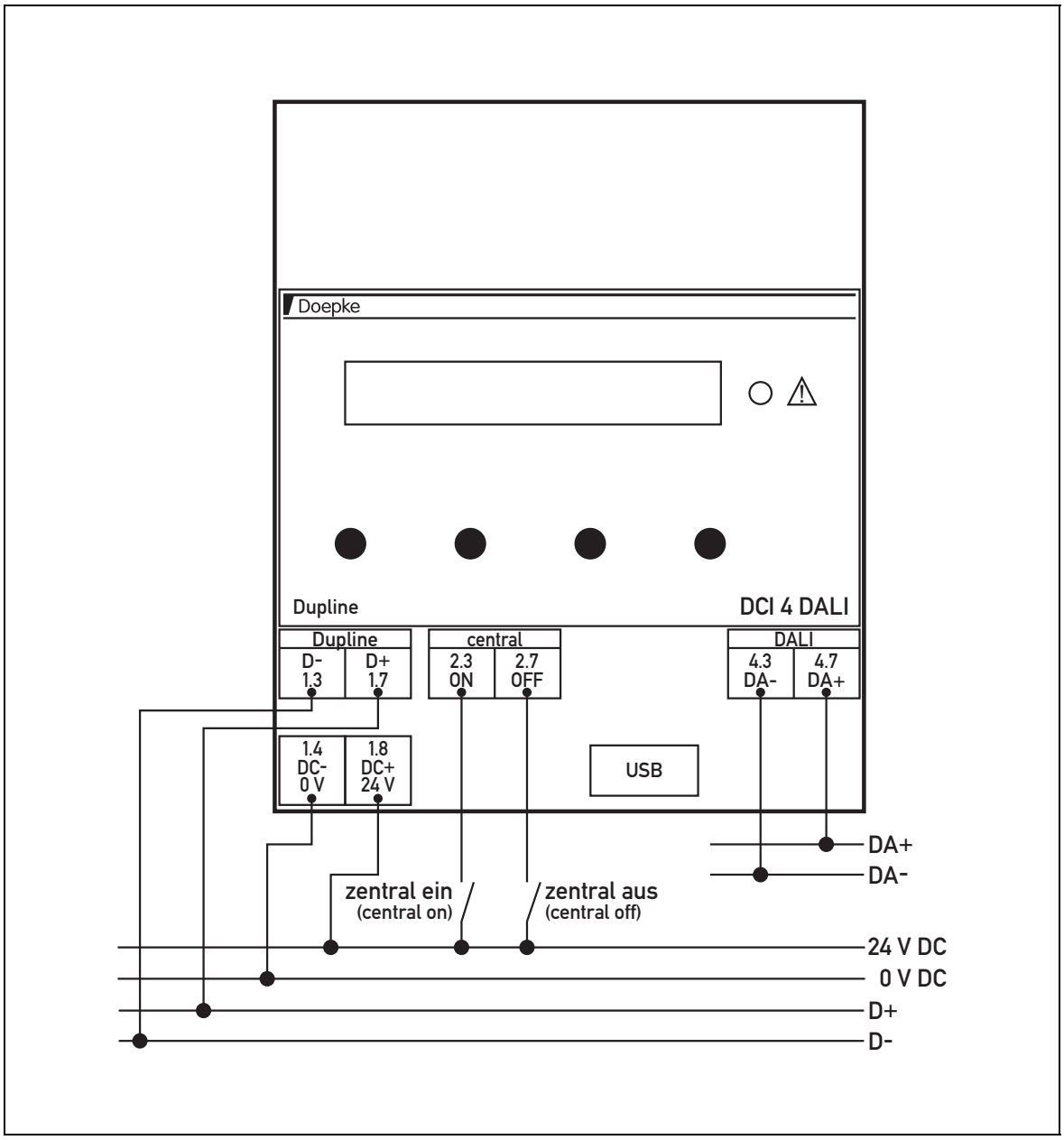
Connections

Terminal	Description	Terminal	Description
1.3	Dupline signal conductor - (D-)	1.7	Dupline signal conductor + (D+)
1.4	0 VDC operating voltage	1.8	+24 VDC operating voltage
2.3	master command „on“ (+24 V DC)	2.7	master command „off“ (+24 V DC)
4.3	DALI- (DA-)	4.7	DALI+ (DA+)

„Warn“ LED

	Message	Description
⚠	continous on	The unit is in manual operation mode and is „off-line“ and thus does not react on switching commands from the bus.
	flashing 1/s	The bus signal is not present. This fault also is displayed in manual operation mode.

Wiring Layout



Technical Data

	Min.	Typ.	Max.
Dupline			
current input	0.8 mA	0.9 mA	1 mA
Display			
type	alphanumeric LC display		
display format	max. 2 lines each with 16 characters		
display size	43.9 x 10.0 (B x H in mm)		
background lighting	LED (switch-on time configurable)		

Technical Data (Continued)

Controls			
operating/navigation keys	4		
DALI interface			
type	interface acc. to EN 60929		
output voltage	11.5 V DC	16.5 V DC	17 V DC
rated current			128 mA
short-circuit disconnection			200 mA
cable lengths 0,5 mm² 0,75 mm² 1,0 mm² 1,5 mm²			100 m 150 m 200 m 300 m
number of devices			64
Inputs			
type	semi-conductor inputs		
rated input voltage	21.5 V DC	24 V DC	26.5 V DC
current per input	4.0 mA	4.6 mA	5.1 mA
Operating Voltage			
rated operating voltage	21.5 V DC	24 V DC	26.5 V DC
current input	24 mA	26 mA	31 mA
rpple voltage			100 mV_{pp}
Terminals			
type	Strain-relief clamps		
contact area	0.4 mm ∅		2.5 mm²
torque			0.6 Nm
Housing			
type	Distribution installation housing for mounting on rails according to DIN EN 60715:2001-09		
dimensions	72 x 85 x 58 (W x H x D in mm) / 4 modules		
material	Polycarbonate		
General technical data			
ambient temperature	-10°C		+45°C
atm. humidity	max. 85% (exposure to dew not permissible)		
encl. protection type / standards	IP20, EN 60669-2-1, EN 50428, EN 50491-3/5-1/5-2, EN 60929, EN 62386-101/-103		
order number, description	09 501 243, DALI Gateway		

5.7.5 DSI 1: Dupline - Modbus - Interface

- Enables the connection of the DSC 43-5.7 touch panel
- Compact design
- Power supply provided by the Modbus connection

Product Description

The DSI 1 enables master control units with Modbus protocol to be linked to the Dupline bus. Recommended master devices are touch screen panels, e.g. the DSC 43-5.7, but it is also possible to connect PCs by means of the DSI 1.

Upon receiving the data requirements of the master, the DSI 1 responds by transmitting the appropriate channel data of the Dupline bus. In so doing it supports the Modbus function codes 3 (Read register) and 16 (Write register). With these functions both binary and analog data can be read and written by the AnaLink method. You'll find a complete Modbus command reference in [6].

Notes on Applications

Communication Parameters

To some extent, the DSI 1 works with fixed parameters (see table). Please observe that the adjustable value of „Time Before Send" in DSCconf EX varies dependent on the version DSI firmware:

Version	Time Before Send
up to 084/06 and ZPR0160-02	5 ms
084/07 and ZPR0160	15 ms

Settings

The device supports the following settings:

Switch	Description	OFF	ON
1	Modbus slave address	1	2
2	Modbus baud rate	9,600	19,200
3	Dupline transmission mode	Read-Only	Read / Write
4	Spare	-	-

Adaptors for touch panels

To simplify the link of the DSI 1 to the touch panels of the DSC series we advise the utilisation of the screen adapter DSA 5 (see **Page 154**). Using it avoids complicated wiring.

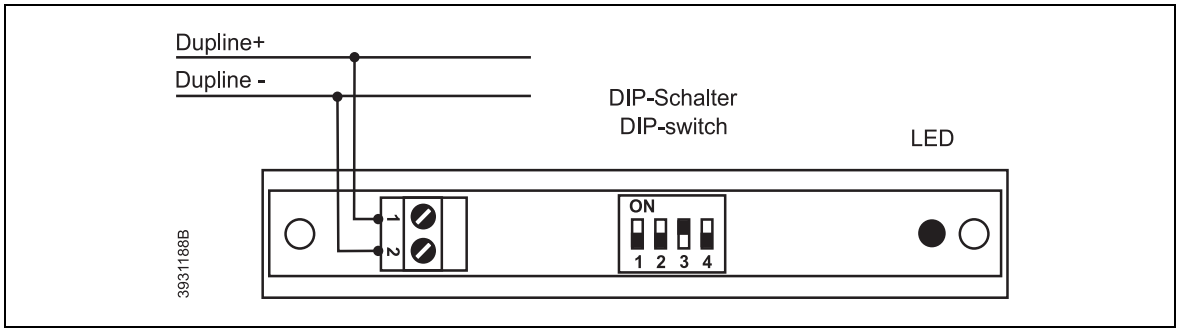
Connections

Terminal	Description	Terminal	Description
1	Dupline signal conductor + (Dupline+)	2	Dupline signal conductor - (Dupline-)

SUB-D (25-pole):

Pin	Description	Pin	Description
7	GND	10	TxRx-
16	+5 VDC	22	TxRx+

Wiring Layout



Indicators

Indicator	Description
Red LED	Flashing in quick succession (2 ms per 132 ms): Communication OK Slower flashing (0.25 s): Dupline bus fault

Technical Data

	Min.	Typ.	Max.
Dupline			
Current input		10 µA	
Input channels	128 read channels		
Output channels	128 write channels		
Operating voltage			
Rated operating voltage	via Modbus connection		
Current input		45 mA	
Terminals			
Type	Strain-relief clamps		
Contact area	0.4 mm ∅		2.5 mm²
Interface			
Type	SUB-D, 25-pin male connector, RS485		
Transmission data	9,600/19,200 baud, no parity bit, 8 data bits, 1 stop bit		
Housing			
Type	Adaptor enclosure, grey		
Dimensions	55 x 70 x 16 (W x H x D in mm)		
Material	Polycarbonate		
General technical data			
Ambient temperature	-20°C		+60°C
Atm. humidity	20%		80%
Encl. protection type / standards	IEC 60664		
Order number, description	09 501 116, DSI 1 Modbus interface		

5.8 Load and Power Supply Units

5.8.1 LT 500 / LT 1200: Remote Dimmer Load Modules, DIN-Rail

- For actuating capacitive or inductive dimmer loads
- For increasing the capacity of e.g. the Dupline DDM 1R*plus* dimmer
- Dimming loads up to 500 VA or 1200 VA resp. (up to 2400 VA with parallel operation)
- Integrated overload- and overvoltage protection with automatic restart
- No-load monitoring for conventional transformers

Product Description

With the LT 500 and LT 1200 dimmer load modules resistive, inductive or capacitive loads can be dimmed. They are ideally suited for use with the Dupline DDM 1R*plus*, DDMU 1R*plus* or the DDMU 2*plus* dimmers.

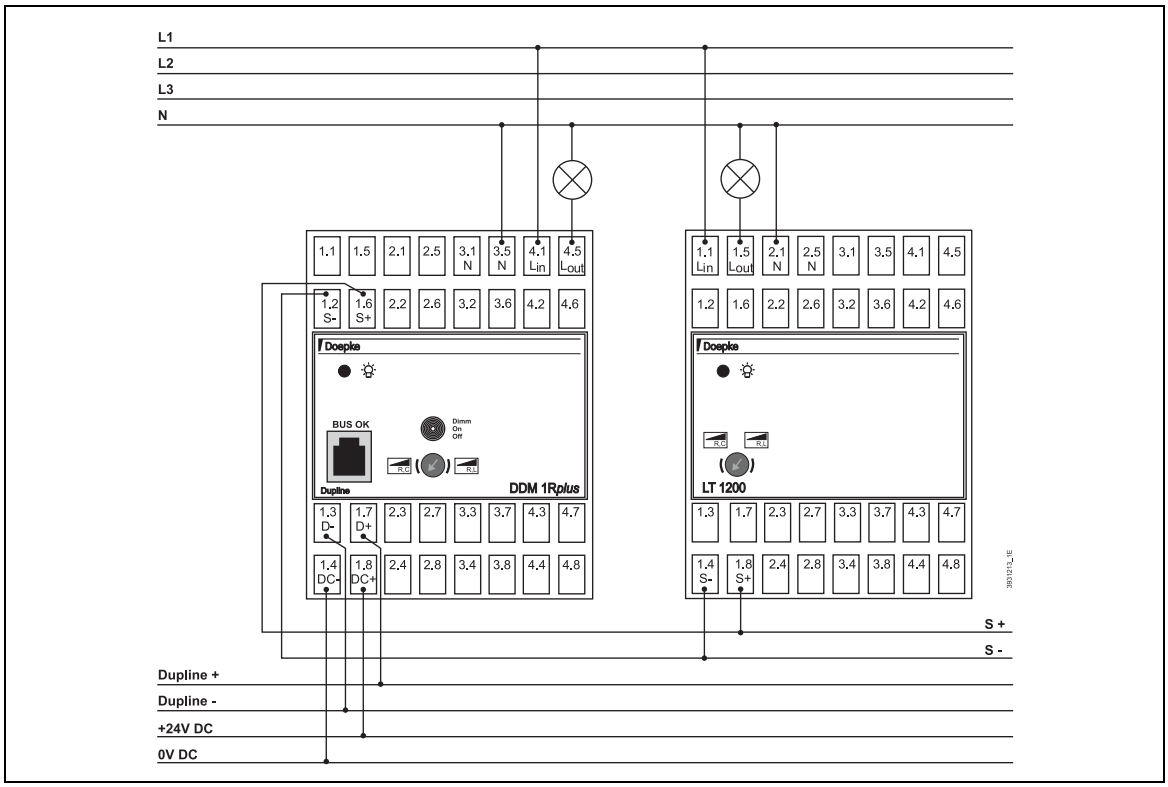
The selection of the loads to be dimmed is carried out with a change-over switch before start-up. Provided the same operating mode and phase are used, two LT 500 or LT 1200 can be connected in parallel.

Both load modules are equipped with thermal overload as well as an overvoltage protection. The devices will automatically restart after a thermal trip as soon as the temperature reaches a normal level again.

Notes on Applications

When installing the load modules it should be insured that there is sufficient ventilation. They may not be mounted in closed, airtight distribution boxes.

Wiring Layout and Dimensions



Connections

Terminal	Description	Terminal	Description
1.1 / 1.5	Dimming channel (L_{IN} / L_{OUT})	2.1 / 2.5	N-conductor input
1.4 / 1.6	Control input (S- / S+)		

Indicators

Indicator	Description
Red LED	Malfunction: Slow sequence flashing (1 Hz): Temperature too high Quick sequence flashing (4 Hz): Short-circuit / incorrect operating mode / no-load monitoring/ overvoltage

Technical Data

	Min.	Typ.	Max.
Inputs			
Type	Control inputs (of e.g. DDM 1R*plus*)		
Length of control cable			100 m
Outputs (LT 500)			
Type	Semiconductor output		
Output voltage		230 VAC / 50 Hz	
Rated load	10 VA (cos φ = 1)		500 VA
Outputs (LT 1200)			
Type	Semiconductor output		
Output voltage		230 VAC / 50 Hz	
Rated load	10 VA (cos φ = 1)		1200 VA
Dimmable Loads	**AC modulation control**		**Phase angle control**
Incandescent lamps	yes		yes
HV-halogen lamps	yes		yes
LV-halogen lamps(1)	With electronic transformers(2)		With conventional transformers(3)
Operating voltage			
Rated operating voltage	210 VAC / 50 Hz	230 VAC / 50 Hz	250 VAC / 50 Hz
Power loss at rated load (LT 500)			4.5 VA
Power loss at rated load (LT 1200)			17 VA
Terminals			
Type	Strain-relief clamps		
Contact area	0.4 mm ∅		2.5 mm²
Housing			
Type	Distribution installation housing for mounting on rails according to DIN EN 60715:2001-09		
Dimensions LT 500	35 x 85 x 58 (W x H x D in mm) / 2 modules		
Dimensions LT 1200	72 x 85 x 58 (W x H x D in mm) / 4 modules		
Material	Polycarbonate		
General technical data			
Ambient temperature	-10°C		+45°C
Atm. humidity			80%

Technical Data (Continued)

	Min.	Typ.	Max.
Encl. protection type / standards	IP20, DIN EN 50428, DIN EN 60669-1, DIN EN 60669-2-1		
Order number, description	09 500 226, remote dimmer load module LT 500 09 500 227, remote dimmer load module LT 1200		

(1) With NV-halogen lamps it is necessary to allow for the transformer's own consumption in addition to the lamps' capacity when calculating the total power loss. With a matched transformer this may be assumed to be approx. 10% of the lamps' capacity.
(2) The actual load must not be lower than the minimum load specified by the manufacturer.
(3) Conventional transformers for LV-halogen lamps should be loaded to at least 20%. If the inductance is too high the dimmer will be switched off (no-load detection).As a genera rule, only those transformers which have been specified by the manufacturer as being suitable for phase angle control dimmers should be used.

5.8.2 NT 24-750 / NT 24-2000: 24 VDC-Power Supply Units, DIN-Rail

- Rugged power packs for DIN-rail mounting
- Outputs of 24 V DC / 750 mA and 24 V DC / 2000 mA respectively
- Integrated overload and overvoltage protection
- Parallel connection of structurally identical devices possible

Product Description

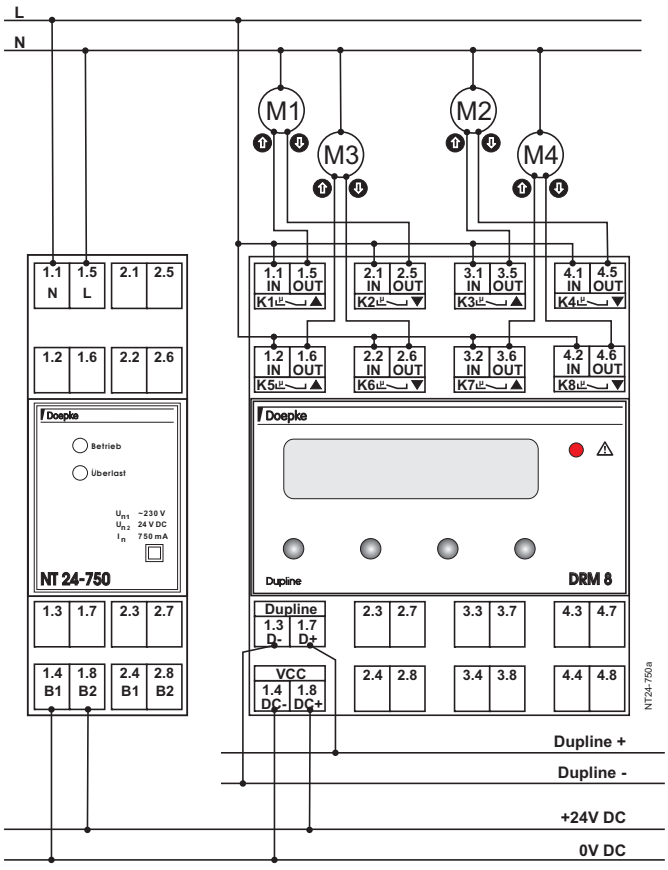
The NT 24-750 / NT 24-2000 power packs are stabilized 24 V DC power supplies and meet the requirement for isolation between the protective low voltage side and the low-voltage side as specified in DIN VDE 0100 Part 410. They feature an overload indicator and are sustained short-circuit proof. The NT 24-750 / NT 24-2000 are primary pulsed, no-load resistant as well as short circuit-proof power packs. Due to their internal voltage control they are also protected against overload.

Notes on Applications

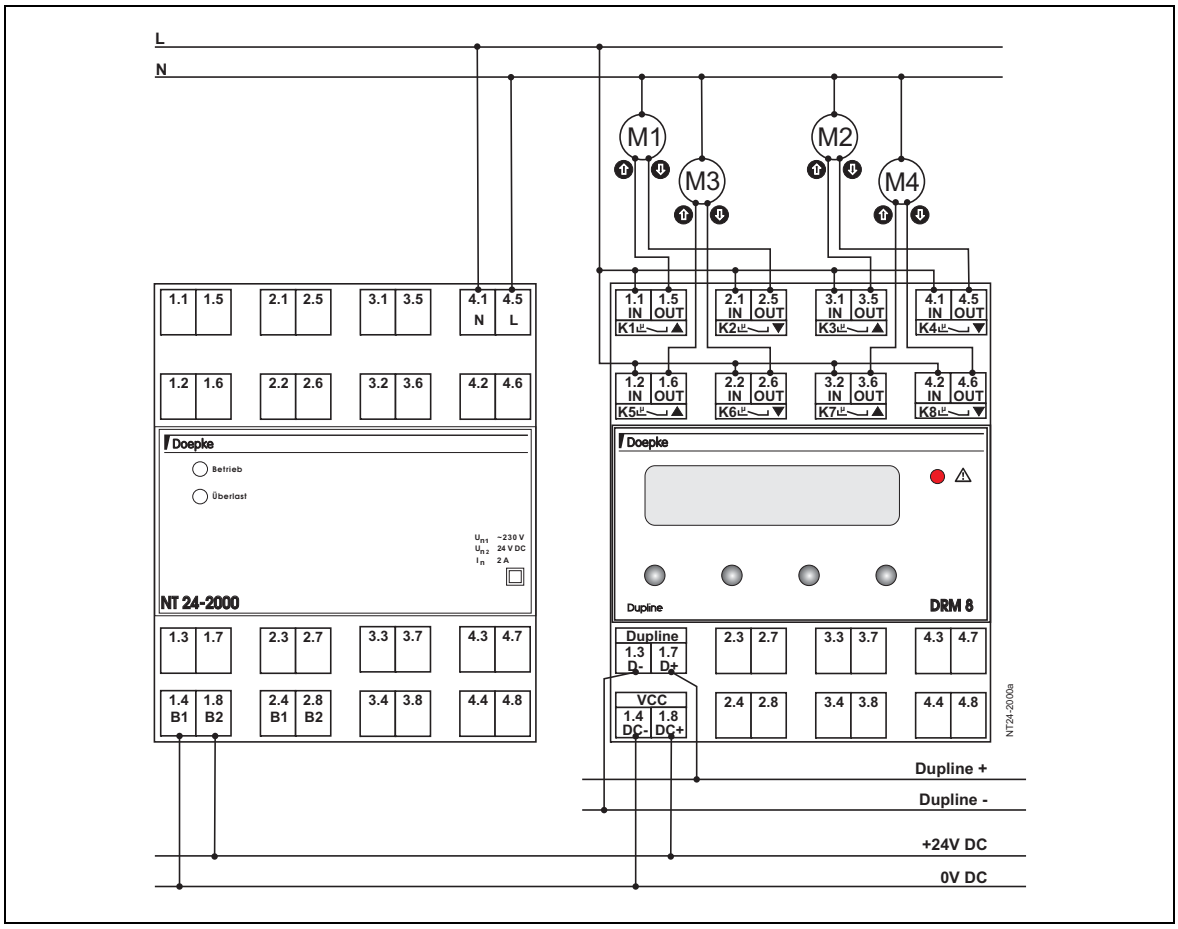
Not applicable.

Wiring Layout (NT 24-750)

The connection principle of the power supply units is illustrated below using the DRM 8 relay module as an example:



Wiring Layout (NT 24-2000)



Connections NT 24-750

Terminal	Description	Terminal	Description
1.1 / 1.5	Voltage supply 230 V AC (L /N)		
1.4 / 1.8	Voltage output (B1/B2)	2.4 / 2.8	Voltage output (B1/B2)

Connections NT 24-2000

Terminal	Description	Terminal	Description
		4.1 / 4.5	Voltage supply 230 V AC (L /N)
1.4 / 1.8	Voltage output (B1/B2)	2.4 / 2.8	Voltage output (B1/B2)

Indicators

Indicator	Description
Betrieb (green)	On when operating power supplied
Überlast (red)	On when short-circuit / overvoltage

Technical Data

	NT 24-750	NT 24-2000
Rated input voltage	230 V AC +10% / -15%	
Frequency range	47 - 63 Hz	
External safeguard, input	miniature circuit breaker 6 A to 16 A, Charakteristic B	
Rated output voltage (SELV)	24 V DC ±5%	
Factory-set output voltage	24,7 V DC ±0.05 V	
Output current	750 mA	2000 mA
Rated capacity	18 W	48 W
Inherent dissipated energy at rated load	2.7 W	7.2 W
Max. residual ripple at rated load	100 mV_{pp}	200 mV_{pp}
Short circuit current	3 A	5 A
Capacitive load	min. 10,000 µF	min. 22,000 µF
Insulation voltage strength input to output	4 kV	
Overvoltage category	III	
Internal fuse, input	2.5 A	
Efficiency	> 84%	
Parallel connectivity, output end(1)	max. 3 devices	max. 2 devices
Terminals		
Type	clevis terminal	
Contact area	0.4 mm to 2.5 mm	
Housing		
Type	Distribution installation housing for mounting on rails according to DIN EN 60715:2001-09	
Dimensions (W x H x D in mm)	36 x 85 x 58 (2 modules)	70 x 85 x 58 (4 modules)
Material	Polycarbonate (PC)	
General technical data		
Ambient temperature	-10°C bis +55°C	
Derating	from 40°C: 2% per 1°C	
Atm. humidity	max. 95% (exposure to dew not permissible)	
Encl. protection type	IP20 (IP40 with installation in distribution board)	
Standards	EN 60950, EN 61558-1, EN 50491-2-1, EN 50491-3, EN 50090-2-2, EN 61000-6-2, EN 61000-6-3, EN 61000-3-2, EN 61204-3,	
Order number	09 500 164	09 500 165

(1) The number of parallel devices can be increased by using decoupling diodes.

5.9 Accessories

5.9.1 DHK 1: Hand Encoder

- Portable address encoder for Dupline components
- Read-out and changing channel addresses of inputs and outputs
- Setting the priority switching direction of output channels in the event of system malfunctions
- LED display and rugged action-point key pad
- Current supplied by standard 9V battery plus power-saving facility

Product Description

The DHK 1 is used for read-out and entering of the channel addresses of inputs and outputs. The encoding of the channels can be carried out in groups or, alternatively, by channels. It is also possible to define the status of the outputs in the event of a bus fault or a device malfunctioning. The programming of the components is permanent, i.e. it needs to be carried out only once for every device.

The DHK 1 also permits the priority switching direction of the outputs to be set which will be activated if a bus fault or other system failures occur.

It is an indispensable tool for every installer, as the channel addresses have always got to be adapted to the relevant installation in any event. This can be undertaken either before installation and with no voltage applied, or when the connection to the Dupline bus has already been established.

With its handy size and dirt-repellent key pad the device is ideally suited for daily use when commissioning systems in rugged environments. The 9V compound battery supplied with the device combined with the power-saving LED and an energy-saving facility ensure a long service life.

The programming cables supplied are suitable for Dupline components with RJ12 plug connection as well as for those with flat connectors.

Notes on Applications

For details regarding the use of the DHK 1 please refer to the operating instructions supplied with every device.

Technical Data

	Min.	Typ.	Max.
Dupline			
Connection	RJ12 socket		
Controls			
Key pad	5 action-point keys		
	On/Off switch		
Indicators			
Type	4 x 8 red LED, Ø 1.8 mm		
Operating voltage			
Rated operating voltage	9V alkaline battery, 400mAh, Type IEC 6F22 Life-span approx. 1 year		
Current input (operation)			22 mA
Current input (stand-by)			25 µA

Technical Data (Continued)

	Min.	Typ.	Max.
Housing			
Type	portable plastic housing		
Dimensions	65 x 120 x 22 (W x H x D in mm)		
Material	Polycarbonate, grey		
General technical data			
Ambient temperature	0°C		+50°C
Atm. humidity	20%		80%
Encl. protection type / standards	IP 40		
Weight	225 g		
Accessories	1 coding cable with 2 modular RJ12 plug connectors (DKP 1) 1 coding cable RJ12 for flat plug connectors (DKP 2)		
Order number, description	09 501 103, Hand encoder DHK 1 09 501 125, DKP 1 09 501 126, DKP 2 09 501 141, DKP 3 (Coding cable, RJ12 for M12, e.g. for DTS)		

5.9.2 DTG 1: Tester

- Portable device for checking and simulating signals on the Dupline bus
- LCD functions display
- Operating voltage supplied by the Dupline bus

Product Description

The DTG 1 is a small, pocket-sized tester for displaying as well as changing the channel status of the Dupline bus.

With its choice of operating modes the DTG 1 can be used to display and change binary data as well as counter and analog data. Its combination of size, LCD display and practical key pad means it is ideally suited for demanding commissioning jobs in rugged environments. Being powered by the Dupline bus it does not require batteries.

It is supplied complete with a connecting cable to connect it to Dupline components (RJ12 connector) and a cable which can be clipped directly on to the Dupline signal conductors. This makes it possible to determine the channel status at any locations of the bus.

Technical Data

	Min.	Typ.	Max.
Dupline			
Connection	3 mm jack bush		
Input current			4.0 mA
Controls and Indicators			
Key pad	12 action-point keys		
Display	2 x 16 alphanumeric characters, LCD, height 5 mm		
Operating voltage			
Rated operating voltage	Via Dupline signal line		
Housing			
Type	Portable plastic housing		
Dimensions	145 x 90 x 28 mm (L x W x H)		
Material	Polycarbonate, grey		
General technical data			
Ambient temperature	0°C		+50°C
Atm. humidity	20%		80%
Encl. protection type / standards	IP 40		
Weight	250 g		
Accessories	1 cable, jack for RJ12 plug (DKT 1) 1 cable, jack for grip testing clips (DKT 2)		
Order number, description	09 501 113, Tester DTG 1 09 501 127, DKT 1 09 501 128, DKT 2		

5.9.3 DFF Mini / DFF Komfort: instaFunk Hand-held Transmitter

	• Handy radio transmitter for up to four commands • Very shapely anthracite housing • Power supplied by one durable coin cell • Key chain included
	• Comfortable, handy radio transmitter in anthracite color • 3 x 16 switching or dimming commands • 5 lighting scene commands • Pushbuttons for central command on/off and up/down • Power supplied by durable Micro-AAA-batteries

Product Description

The instaFunk remote controls DFF represent a comfortable supplement to the DCI 3FB Funkbus (radio bus) gateway - see also **Chapter 5.7.3 "DCI 3FB: INSTA Funkbus (Radio Bus) Gateway"** on **Page 131**. By means of the provided key chain the DFF Mini hand-held transmitter is suited perfectly as a key ring, with which - at the same time - gates can be opened and e.g. a basic illumination can be established.

By contrast the DFF Komfort hand-held transmitter with 48 switching and dimming commands offers comprehensive potential for controlling many electrical loads in a building. Thereby three option pushbuttons („A“, „B“ and „C“) support 16 commands each. Within the Dupline system, the five additional and separated lighting scene commands are usable for calling lighting scenes or other special commands. Finally the master commands for lighting and shutters can also be used within Dupline.

In addition the provided stickers for the identification of the commands facilitate the operability.

Technical Data

	DFF Mini	DFF Komfort
Radio Transmission		
Transmitter frequency/modulation	433,42 MHz, ASK (Amplitude Shift Keying)	
Range (free field)	max. 30 m	max. 100 m
Controls		
Number switched channels	4	3 x 16
Number lighting scene pushbuttons	-	5
Number central command pushbuttons	-	4
Operating voltage		
Rated operating voltage	3 VDC	6 VDC
Batteries	1 x coin cell CR 2032	4 x Micro LR 03
Life-time	approx. 5 years	approx. 3 years
Housing		
Type	Portable plastic housing	
Dimensions (W x L x H in mm)	40 x 73 x 19	53 x 192 x 23
Material	Polycarbonate, anthracite	
General technical data		
Operating temperature	0°C to +55°C	
Atmospheric humidity	max. 80%	
Accessories	Key chain	-

Technical Data (Continued)

	DFF Mini	DFF Komfort
Order number, description	09 501 234, Hand-held transmitter DFF Komfort 09 501 235, Hand-held transmitter DFF Mini	

5.9.4 Adapters, Cables and Special Accessories

5.9.4.1 DDA 1: DCF-Antenna for DKG 20 / DKG 21-GSM

- Spare part for DKG 20/DKG 21-GSM delivered until January 2016.
- Enables reception of the DCF time signal from the transmitter in Rugby (UK)
- Active antenna with outstanding reception characteristics
- For use indoors
- Temperature range of 0ºC to 50ºC.

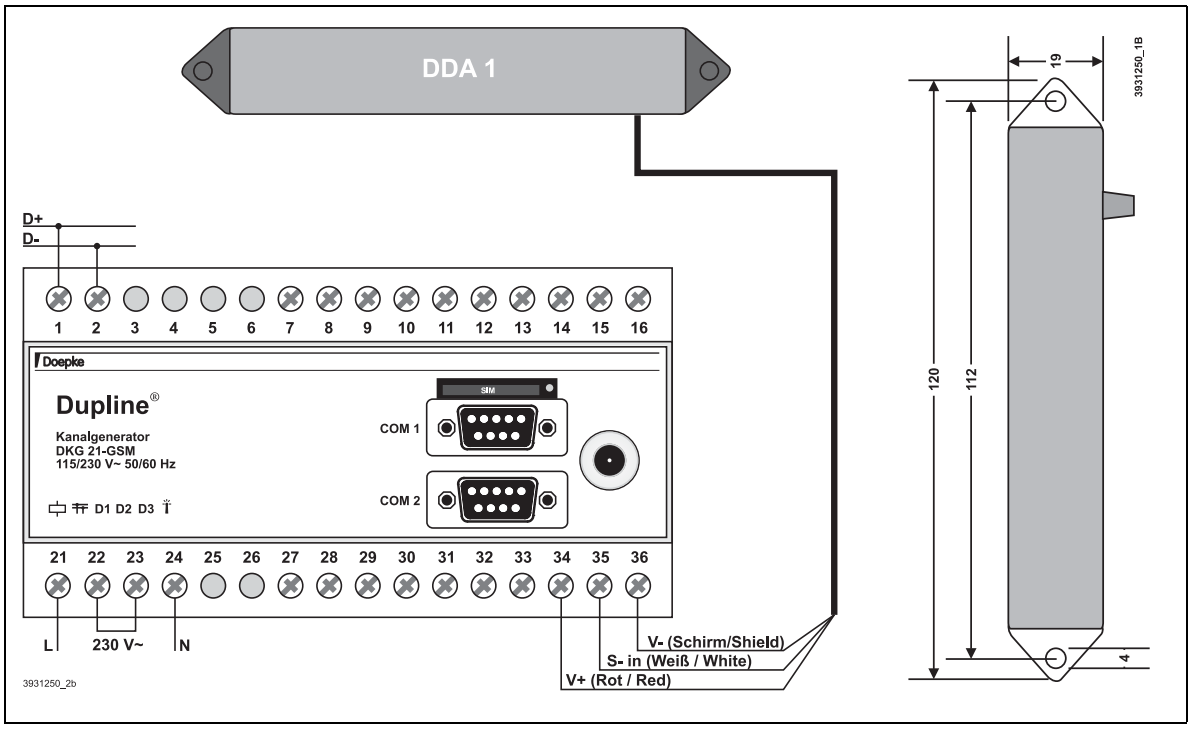
Notes on Applications

Mount the antenna in a location in the interior where interference-free reception of the DCF signal is ensured. It is not recommended to install it in a metal-enclosed distribution box, window-less cellars, basements or rooms surrounded by reinforced concrete.

The antenna should preferably be aligned horizontally across to the local DCF emitter.

Note: DKG 20 and DKG 21-GSM with a production date of February 2016 and later do not support the DCF antenna anymore.

Wiring Layout and Dimensions



	Min.	Typ.	Max.
Antenna			
Incoming frequency		77,5 kHz	
Input sensitivity		30 µV/m	50 µV/m
Output voltage	3 V		30 V

	Min.	Typ.	Max.
Operating voltage			
Rated operating voltage	3 V		12 V
Current input		0.8 mA	
Connections			
	2-wire round cable with screen, length approx. 2.5 m		
Housing			
	Grey plastic housing		
General technical data			
Operating temperature	0°C		+50°C
Order number, description	09 501 191, DCF-active antenna DDA 1		

5.9.4.2 DT 01 Cable Termination Unit

- Prohibits reflections of the bus signal on large distance cable ends;
- Applicable for use in distribution cabinets and as de-central component (external power supply not necessary);

Notes on Applications

When a generator connected to a non-terminated cable emits a square-wave signal, the cable ends will always cause reflections. Depending on distance and frequency, the signal can be distorted to a degree where the information becomes unreliable.

However, these reflections can easily be removed by mounting the correct termination at the cable end. In the case of Dupline the critical distance between the generator and the far cable end is 2 km and above. Consequently, if as a rule of thumb a DT 01 termination unit is mounted at the cable end when the distance to the channel generator exceeds 1.2 km, reflections are avoided.

Note: In case of branches on the cable it is only necessary to mount a second DT 01 if the distance to the nearest DT 01 exceeds 1.2 km. In all other cases a second DT 01 should not be mounted since it increases the capacity of the cable and thereby reduces the transmission distance.

Note: The DT 01 is the only unit which can remove reflections and consequently cannot be replaced by other Dupline® modules.

Technical Data

	Min.	Typ.	Max.
Dupline			
Current input		220 µA	
Input channels	none		
Output channels	none		
Operating voltage			
Rated operating voltage	supplied by Dupline signal line		

Technical Data (Continued)

	Min.	Typ.	Max.
Power consumption			10 mW
Terminals			
	Screw terminals		
Housing			
	Distribution installation housing for mounting on rails according to DIN EN 60715:2001-09		
Maße	18 x 78 x 70 (W x H x D in mm) / 1 module		
General technical data			
Ambient temperature	-20°C		+50°C
Atm. humidity	max. 80% (exposure to dew not permissible)		
Encl. protection type / standards	IP 20		
Order number, description	37 501 006, DT 01 Cable Termination Unit		

5.9.4.3 Adapters and Standard Cables

DKA 1	**Angle Adapter for channel generator DKG 1 / DKG 2**
	• 1-module housing with lateral connector for DKG (male) and connection to PC in front • Allows front-sided connection of ProLine interface cable in distribution installation • Simple mounting by clicking on DIN rail and pushing to the DKG
Technical Data	
Connections	DSUB 9-pole (male) for DSUB 9-pole (female)
Dimensions	17.5 x 85 x 58 (W x H x D in mm) / 1 module
Order number, description	09 501 143, Angle adapter DKA 1

DKK 1	**Interface cable for programming with ProLine**
	• To connect the DKG channel generators resp. DKA 1 to a PC for configuration tasks using the ProLine-software
Technical Data	
Connections	DSUB 9-pole for DSUB 9-pole (or 25-pole with adaptor DKK 3)
Length	2 m
Order number, description	09 501 129, Interface cable DKK 1

DKK 2	**Interface cable for connection of channel generators DKG 1/DKG 2**
	• To connect two DKG 1 or DKG 2 channel generators for data exchange.
Technical Data	
Connections	DSUB 9-pole (male) for DSUB 9-pole (male)
Length	2 m
Order number, description	09 501 137, DKK 2 interface cable for DKG 1/DKG 2

DKM 1	**Interface cable for modules with M12-connector**
	• Connecting cable for system components with M12-connector, such as e.g. DTS 1
Technical Data	
Connections	M12-socket for 3 wires
Length	2 m
Order number, description	09 501 140, M12 interface cable DKM 1

DSA 5	**Adapter for touch panel DSC 43 to DSI 1**
	• Adapter for connecting the touch panel series DSC 30 to the DSI 1 Modbus interface
Technical Data	
Connections	9-pole SUB-D (male) to 25-pole (female)
Type	Encapsulated PCB
Order number, description	09 501 229, DSA 5, Adapter DSC 43 to DSI 1

DSA 6	**Adapter for touch panels DSC 43 to DKG**
	• Adapter for connecting the touch panel series DSC 30 to the DKG 20 and DKG 21-GSM channel generators

DSA 6 (Continued)	Adapter for touch panels DSC 43 to DKG
Technical Data	
Connections	DSUB 9-pole (male) to DSUB 9-pole (female)
Type	Encapsulated PCB
Order number, description	09 501 230, DSA 6, Adapter DSC 43 to DKG 20/21-GSM

5.9.4.4 Cable for Hand Encoder DHK 1 and Tester DTG

DKP 1	Spare cable for hand encoder DHK 1
	• To connect DHK 1 hand encoder to system components with modular plug connector, e.g. DSM 4M.
Technical Data	
Connections	RJ12 for RJ12
Length	0.75 m
Order number, description	09 501 125, RJ12/RJ12 encoder cable DKP 1

DKP 2	Spare cable for hand encoder DHK 1
	• To connect DHK 1 hand encoder to system components with flat plug ports, such as e.g. DSS 4U.
Technical Data	
Connections	RJ12 for flat pack connectors
Length	0.75 m
Special note	When connecting to the component care must be taken to ensure the correct polarity
Order number, description	09 501 126, RJ12/flat encoder cable DKP 2

DKP 3	Spare cable for hand encoder DHK 1
	• To connect DHK 1 hand encoder to system components with M12- connection, such as e.g. DTS 1
Technical Data	
Connections	RJ12 for M12-socket
Length	0.75 m
Order number, description	09 501 141, RJ12/M12 encoder cable DKP 3

DKT 1	**Spare cable for tester DTG 1**
	• To connect DTG tester to system components with RJ12 plug connection, such as e.g. DSM 4M.
Technical Data	
Connections	Jack for RJ12 plug connector
Length	0.95 m
Order number, description	09 501 127, Tester cable DKT 1

DKT 2	**Spare cable for tester DTG 1**
	• To connect DTG tester directly to the Dupline conductors
Technical Data	
Connections	Jack to testing clips
Length	0.6 m
Order number, description	09 501 128, Tester cable DKT 2

5.9.5 Installation Accessories

DSC 30-UPG	Flush mounted housing for DSC 30 touch panels
	• For installing the DSC 43 touch screen in solid walls. • Free space for power supply • Magnetic fixing of the touch panel in the housing.

Technical Data	
Dimensions, flush-mounted section	315 x 132 x 84 (W x H x D in mm)
Housing aperture after sealing in plaster	158 x 132 (W x H in mm)
Material, flush-mounted section	Sheet steel
Order number, description	09 501 231, Flush mounted housing for DSC 43

5.10 Software

5.10.1 ProLine / ProLine^{NG}: Configuration Software for Channel Generators

- Very simple, intuitive operation
- Many predefined installation objects
- Several languages adjustable
- Runs on Microsoft® Windows® 95/98/NT/2000/XP/7/8/8.1/10

Product Description

ProLine resp. ProLine^{NG} are the configuration programmes for the DKG 1 and DKG 2 resp. DKG 20 and DKG 21-GSM channel generators. They offer user-friendly programming of the addresses in the channel generators with the aid of predefined objects.

The options available include all the objects which have already been described for the channel generators in **Chapter 5.2 "Central Units"** on **Page 28**, such as shutter controls or light level sensors.

The latest version of the software can always be accessed via http://www.doepke.de/uk. It requires no other drivers and is very compact. Currently three versions are available with following correlation:

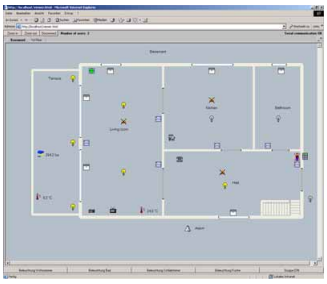
DKG Version	ProLine Version
DGK 1/DKG 2 up to version 1.04	ProLine version 1.03
DGK 1/DKG 2 from version 3.00	ProLine version 3.07 and newer
DGK 20/DKG 21-GSM	ProLine^{NG}

You'll find a detailed description of all functions of ProLine and ProLine^{NG} in the user manuals on http://www.doepke.de/uk.

No licence fees are charged for the configuration software.

Note: For transfer of configuration a PC with a serial RS232 COM interface is required.

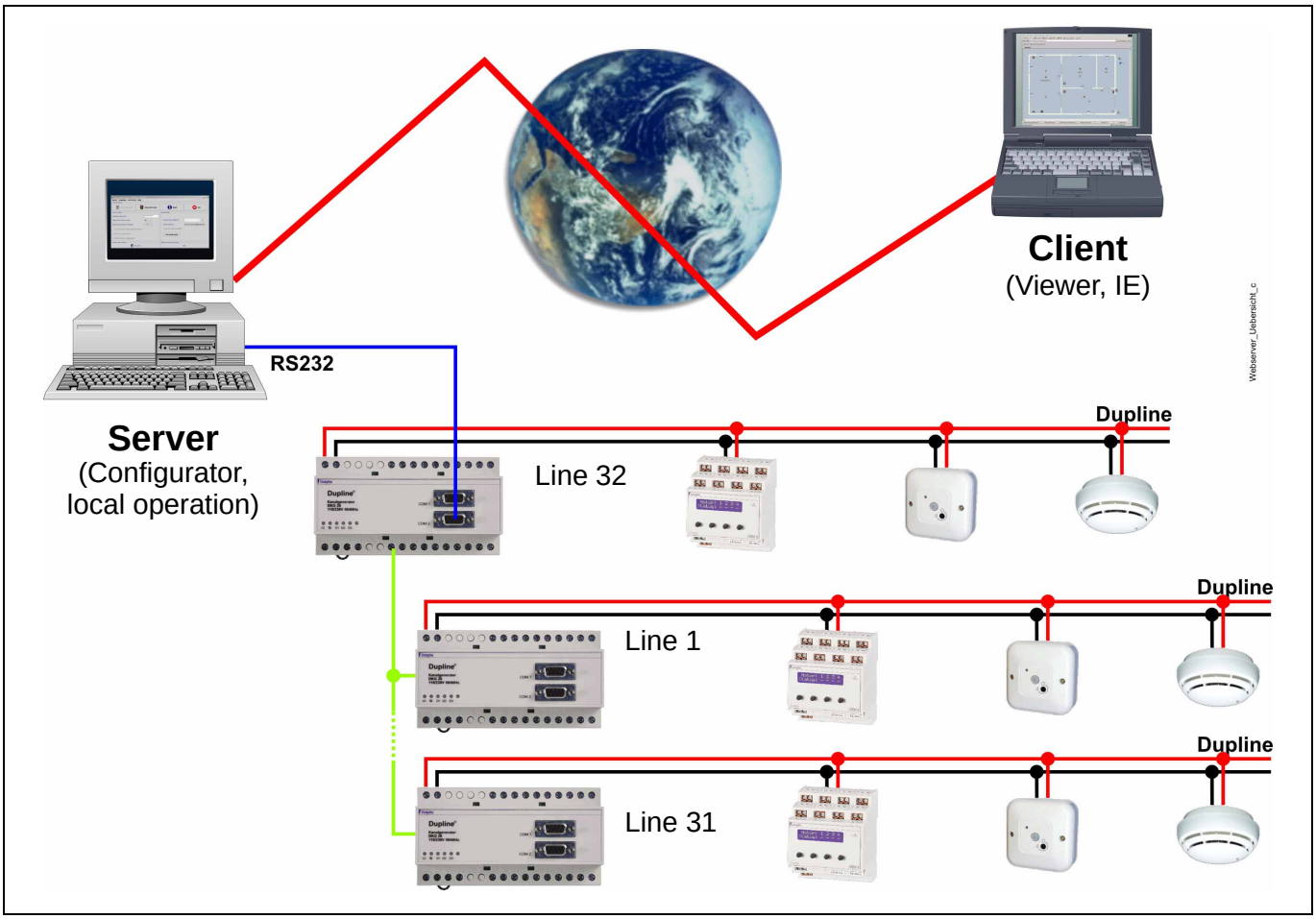
5.10.2 Webserver: Visualisation Software



- Visualisation of all loads and sensors connected to a Dupline system, either locally or via the Internet or network
- Visualisation of networks with DKG 20/DKG 21-GSM also possible
- Extremely simple, intuitive operation
- Many predefined installation items
- Supports languages English and Danish
- Server runs on Microsoft® Windows® 98/ME/NT/2000/XP
- Clients require only an Internet browser for visualisation

Product Description

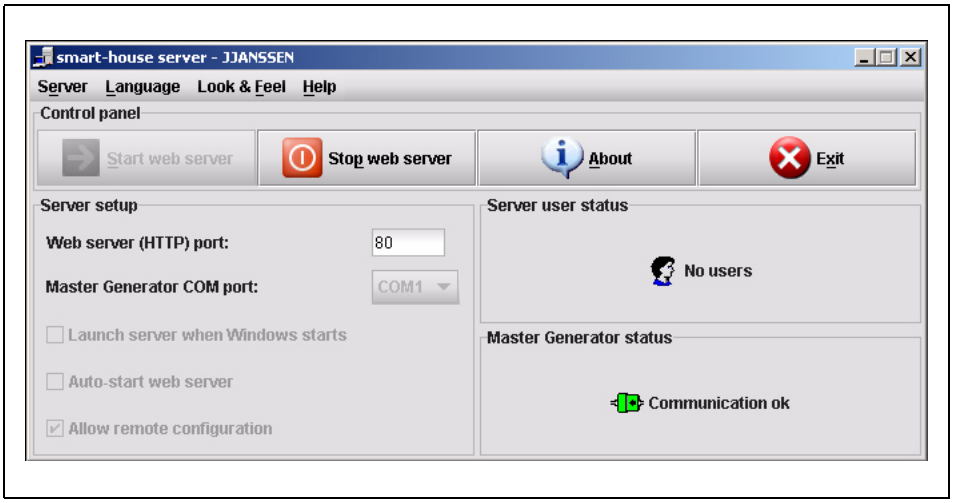
The Dupline Webserver is an inexpensive, PC-based visualisation software which permits a Dupline system to be visualized and remotely controlled. Schematically expressed it looks as follows:



The software consists of three parts:

1. Webserver
   This makes available the HTTP port which can be accessed locally or via the network (e.g. Internet). It contains the images and data, which have already been prepared with the configurator and which the server continuously receives from the Dupline system connected to the PC.

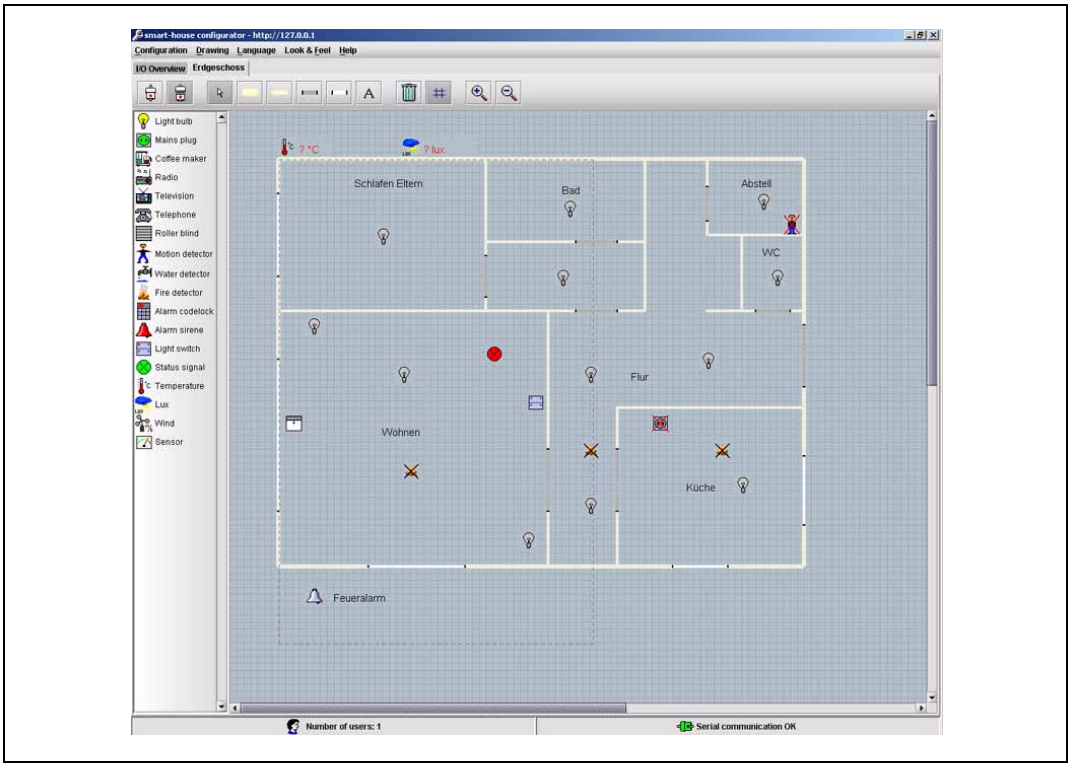
If the Webserver is to be accessed via the Internet, it requires a connection with a TCP/IP address:



2. Configurator

This is used to prepare the visualisation images. First the channel definitions and description are read in by opening the appropriate ProLine file. With a simple and easy-to-use drawing tool ground plans can then be prepared in no time at all. Using the “drag-and-drop” method predefined symbols (icons) can be positioned on the screen with the mouse. Finally, these symbols are assigned a control and display address from the previously read channel descriptions.

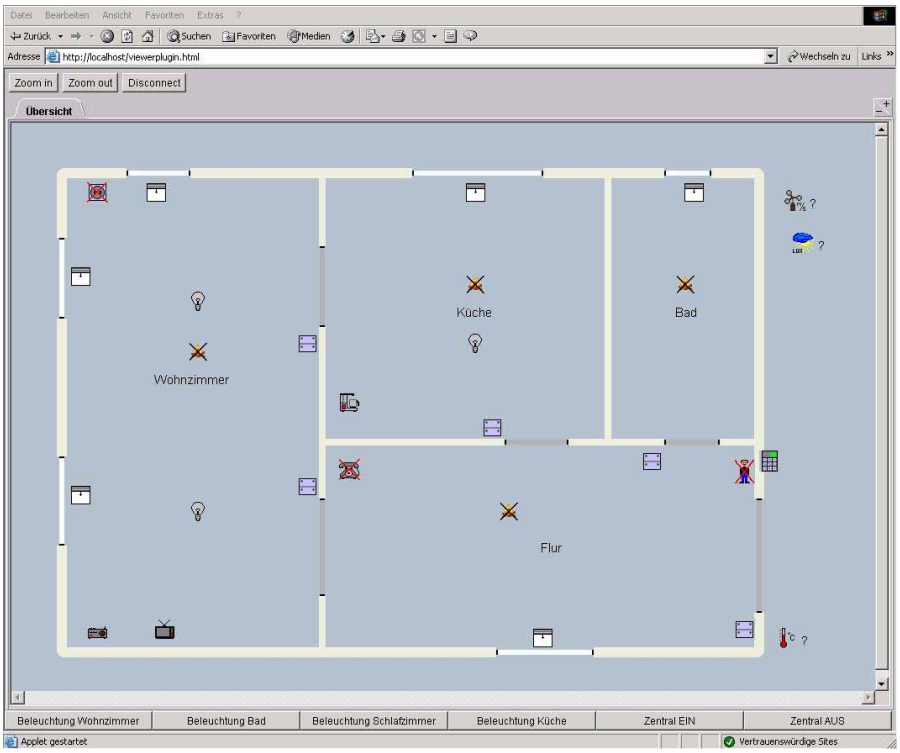
During the creation of an application the configurator already allows the display to be tested.



3. Viewer

The viewer can be used to display the prepared pictures; however, the browsers of the PC operating systems, e.g. the Microsoft® Internet Explorer or Mozilla Firefox, are equally

suitable. The Webserver offers the possibility, particularly from remote locations, of obtaining an overview of the actual status in the building at any time – whether with a Notebook, via PDA, or with a mobile phone.



The Webserver is currently available in English and Danish.

A demo version for 2 digital and one analog value is available for downloading on the Building System CD and on the Internet at http://www.doepke.de/uk. Registration requires a licence number and is carried out online via the Internet.

Technical Data

General technical data	
PC Requirements	Min. P2 with 450 MHz or equivalent, 32 MB RAM Serial connection to channel generator Network card, mouse
Software Requirements	Microsoft® Windows® 98/ME/NT/2000/XP
Languages	English, Danish
Functions	Displaying and controlling Dupline channels of up to 32 inter-connected DKG 20/DKG 21-GSM; Operation even without image creation; Function keys definable; Notification of events by e-mail; Visualisation of WAP-capable handies; Operation via PDA possible; Password protection;
Order number, description	37 501 182, Dupline webserver

5.10.3 DDE-Server: Visualisation in Office Applications

- For visualising and controlling a Dupline network with the aid of DDE/ActiveX-capable applications
- Very easy, intuitive operation
- Compatible with Microsoft® Windows® 95/98/NT/2000/XP

Product Description

This software enables data of a Dupline system to be incorporated in applications which master the Microsoft® DDE protocol or which can handle ActiveX components (e.g. Microsoft® Office programmes such as Word, Excel or Access).

Operating the DDE interface is incredibly easy: the channels to be displayed are simply taken from the server face into the relevant application where they are immediately available. The Dupline channels are simply controlled via Visual Basic programming which is by now supported by all Office programmes.

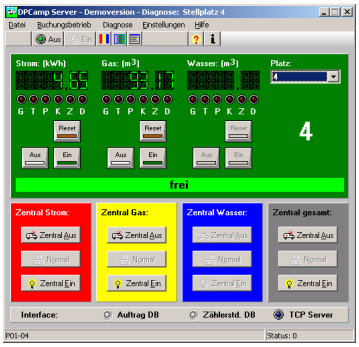
The interface created with the DDE server enables further processing of Dupline data in a very simple way: whether digital or analog data are to be written into a log file or counter readings have to be processed for raising invoices – these functions can be carried out without problems.

A demo version is available at http://www.doepke.de/uk.

Technical Data

General technical data	
PC Requirements	• Min. 2P with 450 MHz or equivalent, 32 MB RAM • Serial connection to channel generator • Network card, mouse
Software Requirements	Microsoft® Windows® 98/ME/NT 4/2000/XP
Languages	English
Functions	Display and control of Dupline channels;
Order number, description	37 501 149, DDE-Server DDS 1

5.10.4 DPCamp: Software for Commissioning and Interfacing in Leisure Facilities



- Software for Commissioning and visualising of leisure facilities with Dupline, e.g. camping sites and marinas
- Immediate display of switching states and counter values of energy supply (electricity, gas, water)
- Integrated interfaces „Databases“ and „TCP/IP Socket“ for connecting billing programmes
- Very easy, intuitive operation
- Compatible with Microsoft® Windows® NT 4/2000/XP Pro

Product Description

DPCamp is a software package for commissioning and visualising of Dupline systems in leisure facilities. Most likely such systems include both, switching of energy supply of electricity, gas and water, as well as the acquisition of consumption values.

The base for this automated control are energy pillars which - preferably - are designed for 4, 8, 12, etc. berths. In this case, each berth can be switched by means of one of the Dupline relay modules, e.g. DRM 4 or DRM 8, and it’s consumption value can be recorded using the counter modules DTZ 4. Thus, following convenient functions may be realised depending on the hardware configuration:

- Automatic switching on and off the energy supply on guests’ registration and checkout;
- Automatic acquisition of consumption values on checkout and further processing by billing programmes;
- Display of working conditions of RCCBs and MCBs (by means of voltage supervision at relay outputs of DRM 4);
- Remote actuating of RCCBs and MCBs (requires the Doepke remote actuator DFA).

For realisation of large facilities the channel generators DKG 20 and DKG 21-GSM offer the possibility of creating networks with up to 32 systems (please see also **Chapter 3.1.3 "Networks with DKG 20 / DKG 21-GSM"** on **Page 16**). The PC executing DPCamp has to feature a serial RS232 communication interface which is to be connected to the master of the Modbus network. Further interfaces are not required.

DPCamp will be delivered with two software modules - „DPCamp Server“ and „DPCamp Client“:

DPCamp Server

Via a serial cable, this module establishes the connection to the central device (channel generators DKG 20 or DKG 21-GSM), reads data and forwards switching commands to the bus.

The configuration of the server is done by means of a Microsoft® Access database holding the definitions for all output and counter modules. On the basis of configuration the server is able to address the hardware devices.

The server makes the status of the actuators and the metered values through an Access-based database, which serves as a data basis for both, the billing as well as the DPCamp Client programme.

There are two basic interfaces for further processing of the values available currently:

1. Data base interface, supports
   - Microsoft® Access 97 - 2003
   - Microsoft® Access 2007
   - Microsoft® SQL Server 2000/2008
   - Pervasive SQL 8.x - 10.x

– Interbase / Firebird

2. The TCP/IP socket connection for direct requests of values from the server

– Provides access by means of text requests via TCP/IP connections

The server also features a diagnosis tool which is able to display all states within the entire bus system. It thus is excellently suited for commissioning and troubleshooting.

DPCamp Client

This module enables you to operate the Dupline system „remotely“. In practice this means that you are able to control your facility from any PC that is connected via network to the DPCamp Server PC. Thereby DPCamp Client uses the TCP interface. Due to this, several PCs may access the central DPCamp Server PC and switch relays respectively request counter values.

Note: Of course it is a pleasure to us to develop visualisation applications and additional software interfaces for billing programmes. Please simply call us!

Technical Data

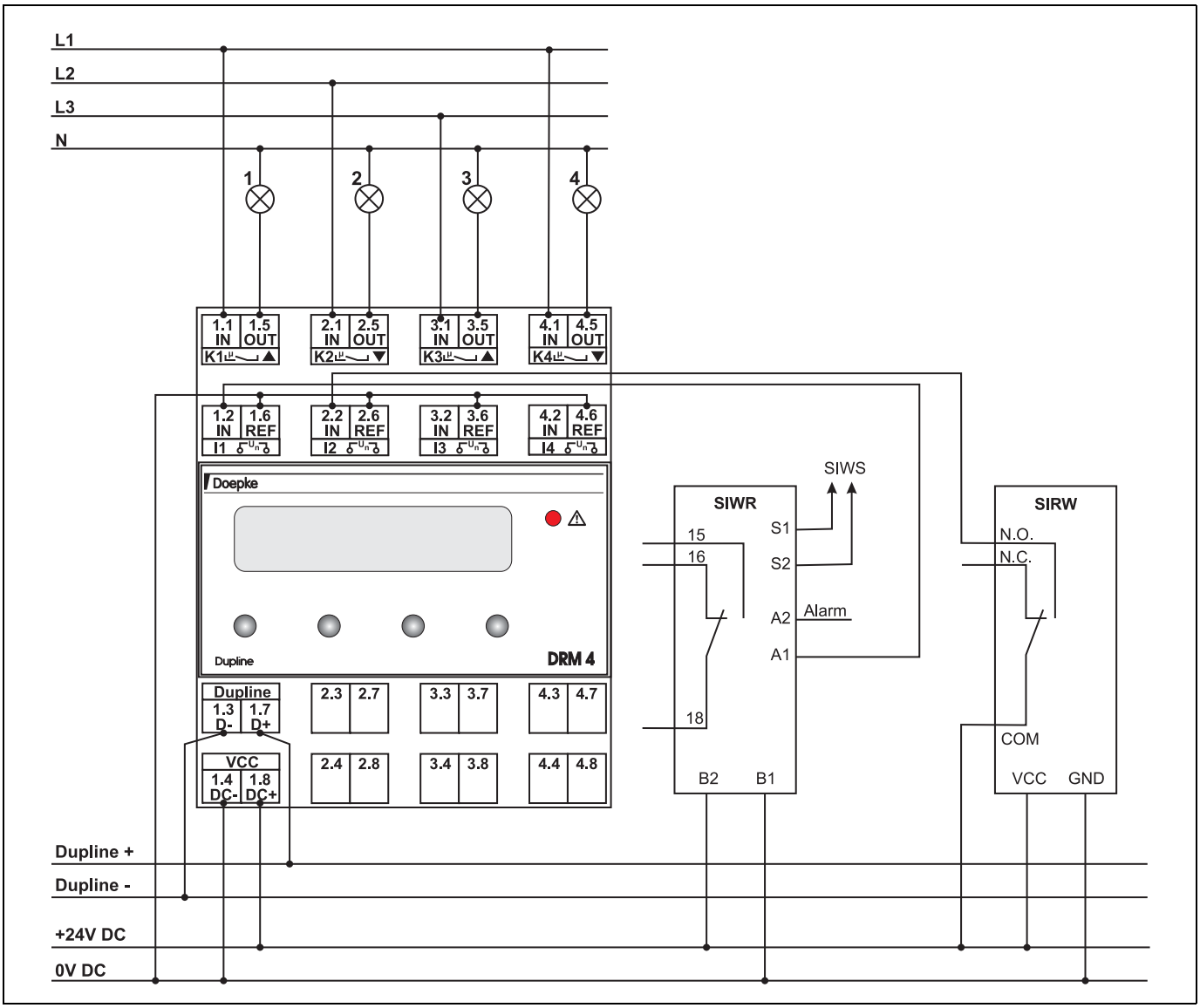
General technical data	
PC Requirements	• Min. P3 with 500 MHz or equivalent, min. 64 MB RAM (128 MB recommended) • Serial RS232 connection (COM interface) to channel generator • Network card, mouse
Software Requirements	Microsoft® Windows® NT 4/2000/XP Pro
Languages	German (English on request)
Functions	Display and control of Dupline channels; counter value acquisition; forward of data to billing programmes
Order number, description	08 501 010, DPCamp-25 (license for 1..25 berths) 08 501 011, DPCamp-50 (license für 26..50 berths) 08 501 012, DPCamp-100 (license für 51..100 berths) 08 501 013, DPCamp-200 (license für 101..200 berths) 08 501 014, DPCamp-200plus (license for 201 berths and more)

Chapter 6 Examples of Circuit Diagrams

6.1 Incorporating SI Components

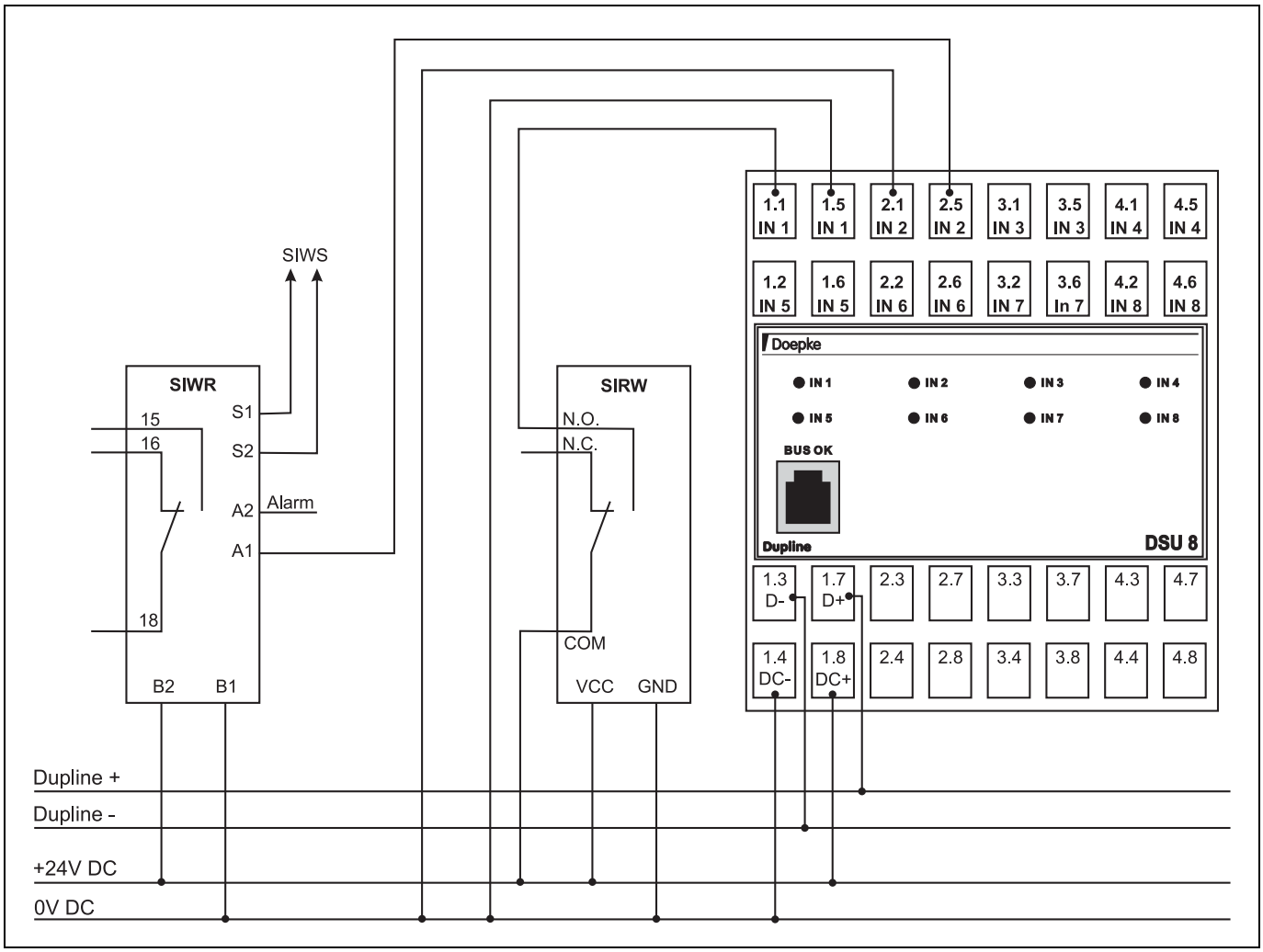
6.1.1 Link-up of Wind / Rain Detectors (SIWR/SIRW) via DRM 4

The following example of a circuit diagram illustrates how the wind detector or the wind relay (SIWS/SIWR) and the rain detector (SIRW) can be linked to the system via the inputs of the DRM 4. Both the signal of the wind relay at the I1 input and the signal of the rain detector at I2 require a coded address and should be configured in ProLine as a "push-button function"..



6.1.2 Link-up of Wind / Rain Detectors (SIWR/SIRW) via DSU 8/DSU 8*plus*

The next circuit example illustrates how the wind detector or the wind relay (SIWS/SIWR) and the rain detector (SIRW) can be linked to the system via the inputs of the DSU 8/DSU 8*plus*. Both the signal of the wind relay at the IN 1 input and the signal of the rain detector at IN 2 require a coded address and should be configured in ProLine as a "push-button function".



6.2 DRM with DC Drives

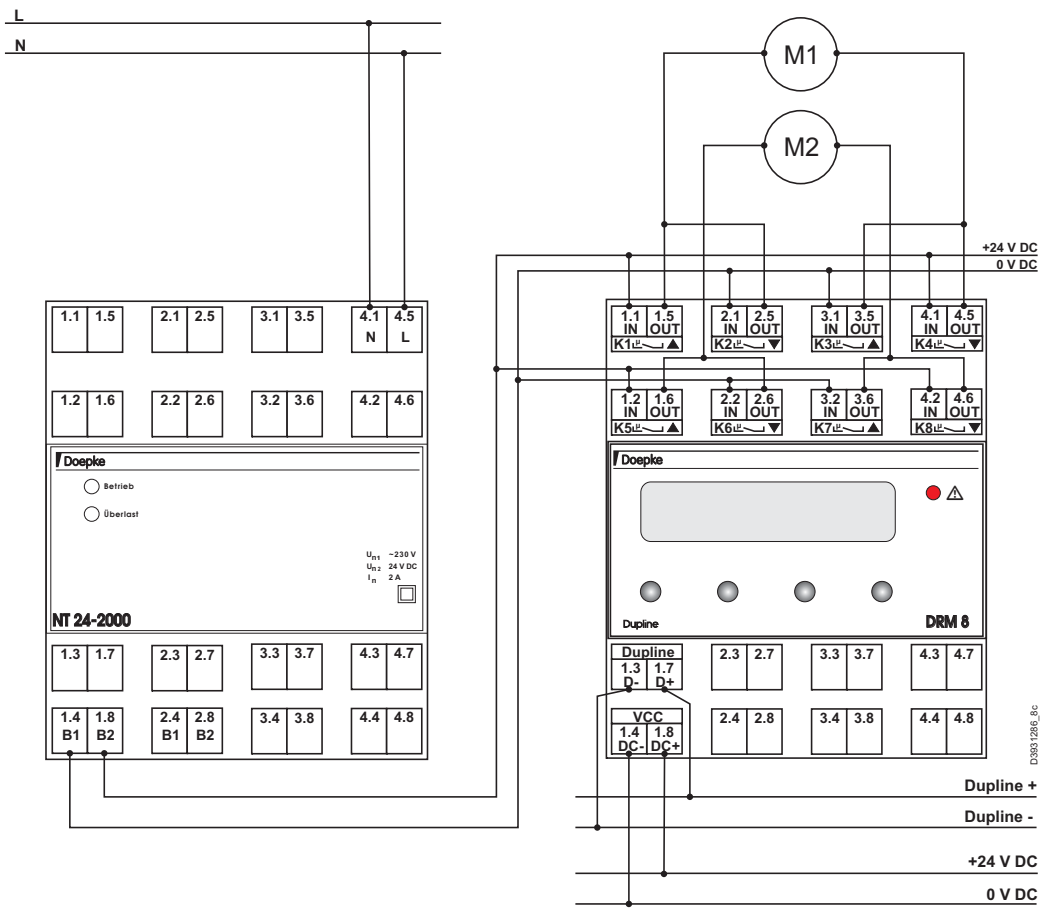
Often skylights are equipped with DC drives with operating voltages of 12 V or 24 V. The DRM 8 allows to control two motors when using one power supply and four motors when using two power supplies.

6.2.1 Feed-in by one Power Supply

Encode the shutter controls resp. configure the channel generator as follows:

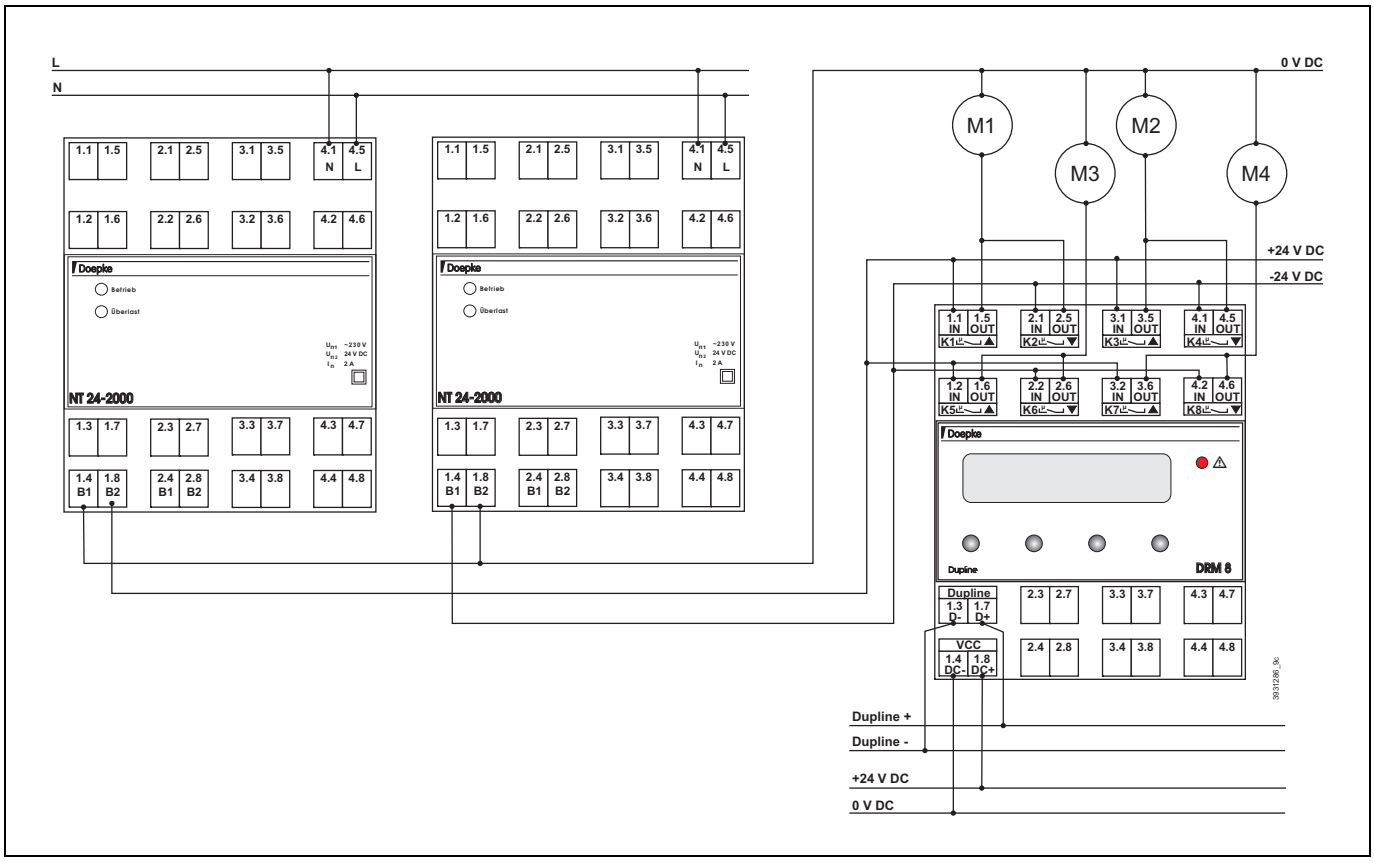
Motor 1		**Motor 2**	
Configuration in ProLine			
Shutter Control on A1 / A2		Shutter Control on A3 / A4	
Encoding of Channels			
K1	A1	K5	A3
K2	A2	K6	A4
K3	A1	K7	A3
K4	A2	K8	A4

Perform the wiring of the DRM 8 according to the following drawing - see **Chapter 5.4.4 "DRM 8: 8-Channel Relay Module / 4-Ch. Shutter Control, DIN-Rail"**):



6.2.2 Feed-in by two Power Supplies

When using two power supplies for the drives, each output can be used for one single shutter:



Chapter 7 Notes on Project Planning

7.1 General

Although the planning and commissioning of Dupline installations is not at all complicated, proceeding in a structured way it will facilitate such planning and commissioning.

This chapter provides a guideline on how to proceed as well as model templates which can be used for planning the project.

7.2 Guideline for Project Planning

1. Preparing the performance specifications
   a. Defining the switch/control points (push-buttons, IR remote controls)
   b. Defining the loads (shutters, lamps)
   c. Defining the functionality (delayed switching on/off)
2. Planning the components
   a. Selecting the components (central or decentral).
   b. Possible provision of more flush-mounted sockets for components
   c. Optimising the operating signals to DSS 2U/4R/4U/8U
   d. Layout of the bus (upgradability, length)
3. Planning the distribution components
   a. Space required for distribution (allow approx. 30% reserve)
   b. Calculating the current requirements of DIN-rail devices / decentral devices with central power supply
      Power supply units should be utilized up to max. 90%.
   c. Calculating the current requirements at the Dupline bus. DKG 1 and DKG 2 supply up to 100 mA, DKG 20 and DKG 21-GSM up to 130 mA.
4. Defining the Dupline addresses
   a. Assigning addresses for the individual channels of components. The form provided in chapter **Chapter 7.3** on **Page 171** (or on the the building management CD) can be used for this purpose.
   b. The maximum number of 128 different addresses may not be exceeded; if necessary extra provision must be made by interconnecting two or more channel generators.
5. Preparing the configuration with ProLine
   a. Configuration of individual addresses and their function using the form provided in chapter **Chapter 7.3** on **Page 171**.
   b. Preparing the list of addresses via ProLine (“Print“ menu).
   c. Encoding and labelling the input and output devices.
   d. Transferring the configuration to the channel generator (this may also be done later during distribution).
6. Installation of the Dupline signal conductors
   a. Installation of the bus signal conductors in accordance with the notes in **Chapter 4 "Notes on Wiring and Installation"** on **Page 20**.
   b. Verification of the proper installation of the wires with **not** connected components by means of an isolation test with at least 500 V.

7. Installation of the components
   a. Connecting the decentral components to the Dupline bus
   b. Mounting the components in the distribution facility:
      Connecting the power supply and the Dupline bus.
   c. Connecting the load cables of the outputs:
      For purposes of clarity the use of terminal blocks and through terminals is recommended.
8. Commissioning and testing the bus
   a. Checking the bus-LED at the components (testing that the Dupline bus is functioning properly).
   b. If necessary, simulate and display the signals with the aid of the tester.
9. Final tasks
   a. Producing the final documentation (address assignment etc.) with the aid of the ProLine software
   b. Saving the channel generator configuration on a storage medium.

7.3 Form for Assigned Addresses

On the following page you'll find a table that shall help you in planning and documentation of address assignment. If you've received this document in A5-size, the cells will be too small. In this case, please use our Microsoft Excel forms in internet under http://www.doepke.de/uk or on our CD.

Doepke — Dupline Address Assignment

Customer: _____
Project: _____
Others:

Prepared by: _____
Date: Version:

Page ____ of ____

Addr.	Unit: Type	Unit: Channel.	Floor / Location / Description	Function: Pb	Ts	Ti	Rt	Mf	Rb	Rm	Md	Ls	Ts	Mod	IA	SA	InA	WA	Cs	Cv	Remarks

4Pb=**P**ush **b**utton; Ts=**T**oggle **s**witch; Ti=**Ti**mer; Rt=**R**eal **t**ime; Mf=**M**aster **f**unction; Rb=**R**ollerblind; Rm=**R**ollerblind **m**aster; Md=**M**easuring **d**evice; Ls=**L**ight **s**ensor; Ts=**T**emperature **s**ensor; Mod=**Mo**tion **d**etector; IA= **I**SA **a**larm; SA=**S**moke **a**larm; InA=**In**truder **a**larm; WA=**W**ater **a**larm; Cs=**C**ommon **s**iren;Cv=**C**ounter **v**alue

Chapter 8 Suggestions, Questions and Problems

8.1 FAQs

This chapter deals with frequently asked questions (FAQs), which will be regularly updated.

8.1.1 General Questions

Can I use an existing telephone line as the signal conductor?

Yes. You simply have to make sure that no strong electromagnetic interference could affect the line.

I have got more than 128 components which I want to connect to the bus. Is this possible?

Most probably. With Dupline the addresses are used as “functions“ not as physical addresses for actuating the inputs and outputs. The deciding factor here is which functions the Dupline bus is intended to fulfil. In this context please read **Chapter 2.3 "The Basic Principle of Dupline"** on **Page 11**.

Is a demo-version of the ProLine configuration programme available?

No. As we are not selling the software, you are actually able to download the original version from our homepage (http://www.doepke.de/uk) without incurring licence fees.

Are texts for tenders available for Dupline components?

Yes. You will find the most up-to-date version on our homepage (http://www.doepke.de/uk).

How much do Dupline components cost?

A complete price list is available from us upon request. Please also take a look at our homepage (http://www.doepke.de).

Is it possible to connect products from third parties to the Dupline bus?

Yes, and this by means of different ways:

- The components DRM 4 (see **Chapter 5.5.1** on **Page 113**), DSU 2U (see **Chapter 5.3.10** on **Page 70**) and DSU 8*plus* (see **Chapter 5.3.11** on **Page 72**) allow converting DC and AC voltages to the Dupline bus.

  The incorporation of such components is illustrated by means of examples in **Chapter 6.1 "Incorporating SI Components"** on **Page 166**.
- Standard switches, also with acknowledgement LEDs, can be connected using the operating signal sensors DSS 2U/4U/8U (**Chapter 5.3.8** on **Page 65**).
- By means of the DBA basic module you may integrate special EIB/KNX push-button programmes from different manufacturers. Therefor please read **Chapter 5.3.7** on **Page 62**.
- The Funkbus gateway DCI 3FB also allows integrating Funkbus components of manufacturers insta, Berker, Gira and Jung. You’ll find details in **Chapter 5.7.3** on **Page 131**.

Can I link the Dupline bus to other systems?

Yes. There is the possibility of connecting Dupline to foreign systems via the Profibus and the Modbus. Simply call us - we willingly advice you.

What happens if the Dupline signal conductors at a component have been transposed?

It may result in the failure of the Dupline bus – transmission on the bus lines is then no longer possible.

What happens in the case of a bus failure, e.g. a break in the signal line?
Provided there is no short-circuit, the components connected to the damaged section of the bus will merely adopt the preconfigured switching status. This means that the outputs emit the priority switching direction („ON“, „OFF“ or „NO ACTION“) previously programmed with the DHK 1 hand encoder or directly set at the module.

8.1.2 Questions Concerning the Products

I require a Dupline component with special functionality. Which options are available to me?
Please contact us! We will be able to tell you whether such a device is already in preparation or on offer from a partner company, or whether we will be developing the device as a one-off especially for you.

I would like to use a different visual display component on the Dupline bus. Is that possible?
This is always possible, provided the visual display component can cope with the Modbus-I-RTU protocol. This protocol is supported by the DSI 1 modbus interface and permits the connection of any control displays. It is thus also possible to use visualising software which can be run on a PC, provided there is a modbus driver.

8.1.3 Dupline and the SI Building Management System

Can I incorporate SI components in a Dupline system?
Yes. Some of the Dupline components (DIN-rail devices such as the DRM 4 or the flush-mounted 4-way input/output modules DSS 4UR) offer control inputs (24 V DC) or outputs, which permit direct connection. Examples of such link-ups are given in **Chapter 6.1 "Incorporating SI Components"** on **Page 166**.

8.1.4 Problems

The system operates unstably - different loads are obviously switched at irregular times for no obvious reason.
Such behaviour can have various causes:

- Check the wiring and cable types: unsuitable wiring or circuit-within-circuit arrangements may result in reflections. These could perhaps be reduced by providing a compensating circuit at the DKG or by providing a terminal resistor. Please refer to **Chapter 4 "Notes on Wiring and Installation"** on **Page 20**.
- Does the system include loads which require high (start-up) currents and which are not switched via Dupline? In such cases it may well be possible that the Dupline signal conductors are subject to interference from load lines and initiate switching operations. This can normally be remedied by shielding the signal conductors.
- "Voltage carry-over": if several, decentral distribution facilities with Dupline components are being used, then equipotential currents may occur. These are only dangerous if they flow via the Dupline signal conductor and can thus interfere with the communication. This can be remedied by interconnecting all 0 V wires of the 24 VDC voltage supply.

Having installed a new component, other loads are also unintentionally being switched. Why?
Check the following:

- Have you "coded out" non-required channels of the , the DSM 4M will generate a signal on the acknowledge channels 5 ...8 whenever the relevant relais have been switched on.
- Are there logic connectives which access previously unused addresses?

Time and again the relay points of my shutter control unit are sticking. Why?

Here, too, there may be several causes:

- The shutter controls may only be operated with the relevant “roller blind Up/Down“ ProLine item so that the switch-over idle time when changing direction from "UP" to "DOWN" and vice versa is maintained.
  Under no circumstances may the shutter control units be operated with other items. Even the use of the tester if incorrectly configured may result in the destruction of the relay points.
- Do not make any changes to the bus system as long as the mains voltage for the shutter controls is switched on. When connecting the bus conductors switching channels could be activated sporadically and the reverse idle time might be disregarded.
- Check the current-at-make and constant current of the shutter. If the figures exceed the relay points' maximum load capacity of 2A (DRO 1U) resp. 16 A (DRM 4/DRM 8), the shutter control unit is being operated outside the limits of its specifications.
- Check which version of the DKG 1 or DKG 2 channel generator is being used (by pressing <Enter>). It should be at least 3.07 as the switch-over idle time of older versions is not maintained under certain conditions. If necessary, replace the channel generator.
- If the motor connections for directions „Up“ and „Down“ have been mixed up, under no circumstances this may be corrected by means of the encoding of the shutter control unit (exchanging of the channel addresses). Here, it is absolutely necessary to adapt the wiring.

8.2 Contact

If you have any questions or suggestions on the subject of Dupline or this document, please contact us by telephone, e-mail, fax or post at:

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