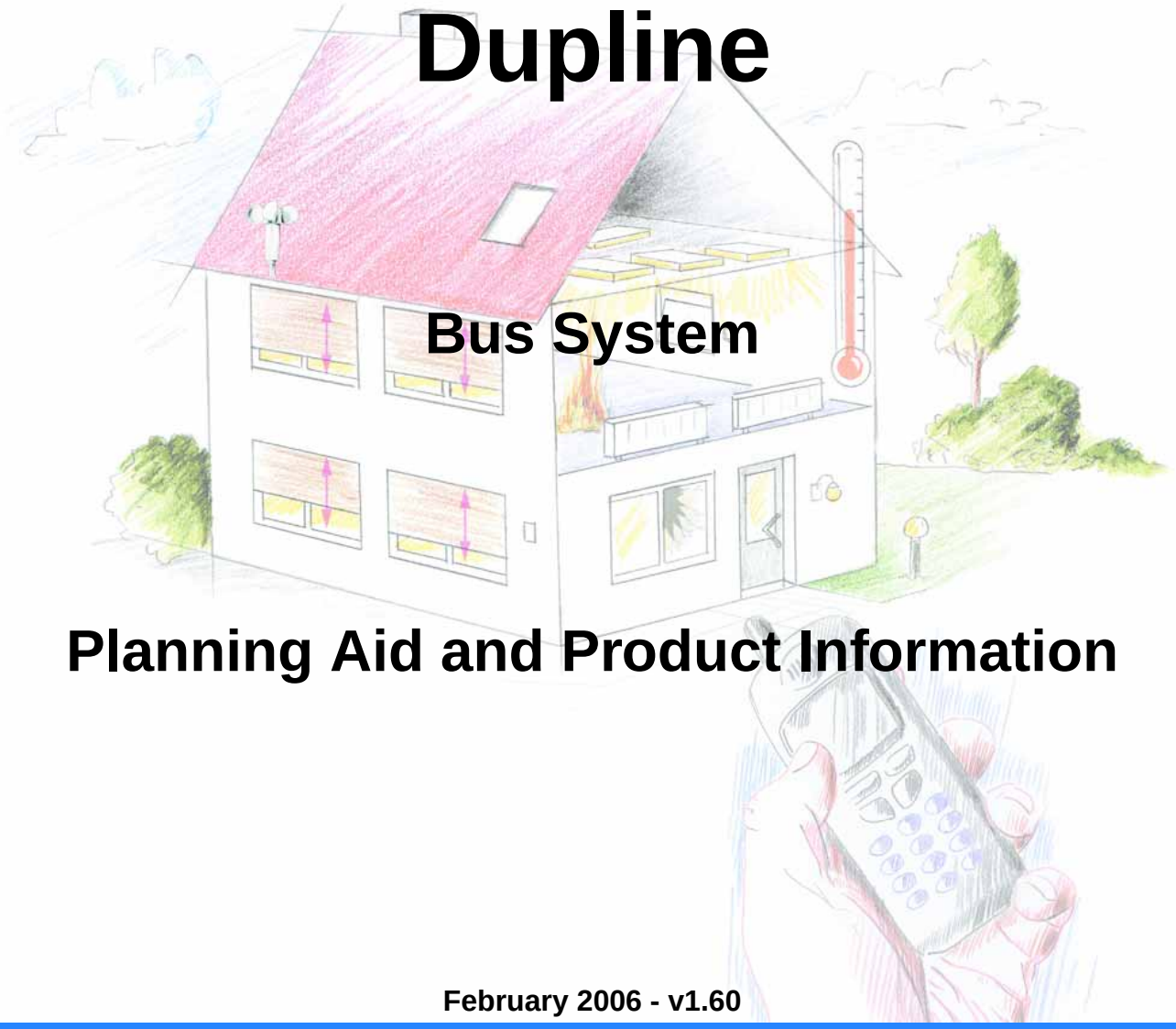
Doepke

Dupline

Bus System



Planning Aid and Product Information

February 2006 - v1.60

Dupline

Bus System

Planning Aid and Product Information

February 2006 - v1.60

Registered Trademarks

IBM and IBM PC are registered trademarks of the International Business Machines Corporation.
Microsoft, MS-DOS and Windows® are registered trademarks, and Windows® NT, Windows® 2000 and Windows® XP are trademarks of the Microsoft Corporation.
Dupline is registered trademark of the Carlo Gavazzi Group.

Liability

All information contained in this document of Doepke Schaltgeräte GmbH & Co. KG is protected by copyright. The reproduction and processing, altering and/or transfer against payment of such information is permissible only with the express written approval of Doepke Schaltgeräte GmbH & Co. KG.
This information is provided solely as customer information and does not constitute a binding guarantee or undertaking. It is subject to changes at any time, be it in technical content or in price/commercial terms. Binding statements can only be given following specific enquiries.
Being non-binding, no liability of any kind can be accepted for the accuracy of the information.
The use of this document is solely at your own discretion. Doepke Schaltgeräte GmbH & Co. KG accepts no liability for any damages arising from the use of this document, in particular breakdown of operations, loss of earnings, loss of information and data or consequential damages, except in cases of compulsory liability, e.g. as provided for by the Product Liability Law, or in cases of premeditation, gross negligence, absence of promised capabilities or because of infringement of fundamental contractual obligations. Compensation for infringement of fundamental contract obligations shall, however, be limited to contract-typical foreseeable damage, provided there is no premeditation or gross negligence.

Table of Contents

Chapter 1 - Introduction

1.1 General 4
1.2 About this Document 4
1.3 Abbreviations and Terms 4
1.4 Related Dokuments 6
1.5 What is Dupline? 7
1.5.1 General 7
1.5.2 The Technology 7
1.5.3 The Quality 7

Chapter 2 - Dupline - The Basics

2.1 System Configuration 8
2.1.1 Overview 8
2.1.2 Transmission Line Structure 9
2.2 Signal Transmission 11
2.2.1 Introduction 11
2.2.2 Carrier Signal and Channel Addresses 11
2.2.3 Addressing 12
2.2.4 Transmission Procedure 12
2.2.4.1 Overview 12
2.2.4.2 Control status 12
2.2.4.3 Analog measurements (AnaLink) 12
2.2.4.4 Counter data (time-division multiplex method) 12
2.3 Inputs and Outputs 14
2.3.1 General 14
2.3.2 Address Assignment 14
2.3.3 Functions 14
2.3.4 Power Supply 14
2.3.4.1 General 14
2.3.4.2 Components with AC power supply 15
2.3.4.3 Components with internal DC power supply 15
2.3.4.4 Components with external DC power supply 15
2.4 Standards and Enclosure Protection 17
2.4.1 Standards 17
2.4.2 Enclosure Protection Type 17

Chapter 3 - Notes on Wiring and Installation

3.1 General Notes 18
3.2 Cable Recommendations 19
3.3 Cable Length and Resistance 20
3.4 Line Termination 20
3.5 Lightning Protection 21

Chapter 4 - Networks and Visualisation

4.1 Networks 22

4.1.1 Overview 22
4.1.2 Installation of RS485-Networks 22
4.1.3 Networks with DKG 20 / DKG 21-GSM 22
4.2 Visualisation 24
4.2.1 Overview 24
4.2.2 Visualising at the Channel Generator 24
4.2.2.1 DKG 1 / DKG 2 24
4.2.2.2 DKG 20 / DKG 21-GSM 24
4.2.3 Visualising with the DSI 1 Modbus Interface 25

Chapter 5 - System Components

5.1 General Information 26
5.1.1 Overview 26
5.1.2 Notes on Product Descriptions 26
5.2 Central Units 28
5.2.1 DKG 1/DKG 2: Channel Generators 24 VDC and 115/230 VAC resp. 28
5.2.2 DKG 20 / DKG 21-GSM: Channel Generators 33
5.3 Inputs 41
5.3.1 DBM 1: Surface-Mounted Proximity Detector 41
5.3.2 DIR 2: Infrared Remote Control 44
5.3.3 DLUX: Surface-Mounted Light Level Sensor 47
5.3.4 DNP 8E: 8-Way Binary Input Board (24 VDC) 49
5.3.5 DPM 1: Presence Detector 52
5.3.6 DRD 3: Smoke and Fire Detector 56
5.3.7 DRT 1: Room Thermostat in Installation Housing 59
5.3.8 DRT 2: Room Thermostat with 2-line Display, 24 VDC 61
5.3.9 DSS 4R/DSS 4R-EIB: Operating Signal Sensors with Acknowledgement 67
5.3.10 DSS 2U/DSS 4U/DSS 8U: Flush-Mounted Operating Signal Inputs 70
5.3.11 DSU 1U: Flush-mounted 1-Channel Binary Signal Converter 73
5.3.12 DSU 2U: Flush-mounted 2-Channel Binary Signal Converter 75
5.3.13 DSU 8: 8-Channel Binary Signal Converter 77
5.3.14 DTS 1: Surface-mounted Temperature Sensor 80
5.3.15 DTS 2: Temperature Sensor in Installation Housing 82
5.3.16 DTZ 4: Rail Mounted 4-Channel Pulse Counter/Hours-Run Meter 84
5.3.17 DWS 1: Water Stop Sensor 87
5.4 Outputs 89
5.4.1 DDM 1Rplus: 1-Way Light Scene Dimmer, DIN-Rail Mounted 89
5.4.2 DDMU 1Rplus: 1-Way Light Scene Dimmer 1..10V, DIN-Rail Mounted 93
5.4.3 DDM 2/DDM 2*plus*/DDMU 2/DDMU 2*plus*: 2-way Dimmer, DIN-Rail mounted 97
5.4.4 DNP 8A/DPN 8A: 8-Way Binary Output Board (24 VDC) 104
5.4.5 DRO 1U: Flush-Mounted 1-Channel Shutter Control Unit 107
5.4.6 DRO 2: Rail Mounted 2-Channel Shutter Control Unit 110
5.4.7 DRO 4b/DRO 4c: Rail Mounted 4-Channel Shutter Control Units 113
5.4.8 DSM 1U: Flush-Mounted, 1-Way Binary Relay Output 117
5.4.9 DSM 2: 2-Way Relay Output with 4 Semiconductor Outputs, DIN-Rail Mounted 119
5.4.10 DSM 4M: 4-Channel Relay Output with manual operation, DIN-Rail Mounted 122
5.4.11 DSM 4R: 4-Way Relay Output with Acknowledge Feature, DIN-Rail Mounted 125
5.4.12 DSM 8: 8-Way Binary Relay Output (230VAC), DIN-Rail Mounted 128
5.5 Combined Inputs and Outputs 131

5.5.1 DNP 4 / DPN 4: 4-Way binary Input and Output Board (24 VDC) 131
5.5.2 DSM 4E: 4-Way Binary Relay Output with 4 Semicond. Inputs, DIN-Rail 134
5.6 Components for Visual Display 137
5.6.1 DDI 2: 2-Row Text Display, 24 VDC 137
5.6.2 DSC 10: Touch Screen Panel 3.8“, 24 VDC 142
5.6.3 DSC 3: Touch Screen Panel, 24 VDC 145
5.7 Interface Components 149
5.7.1 DFA-DI: Dupline Remote Actuator Interface 149
5.7.2 DCI 1: Serial-to-Ethernet Port Server 151
5.7.3 DSI 1: Dupline - Modbus - Interface 155
5.8 Load and Power Supply Units 157
5.8.1 LT 500 / LT 1200: Remote Dimmer Load Modules, DIN-Rail Mounted 157
5.8.2 NT 24-250 / NT 24-1300: 24 VDC – Power Supply Units, DIN-Rail Mounted 160
5.9 Accessories 163
5.9.1 DHK 1: Hand Encoder 163
5.9.2 DTG 1: Tester 165
5.9.3 Adapters, Cables and Special Accessories 166
5.9.3.1 DDA 1: DCF-Antenna for DKG 20 / DKG 21-GSM 166
5.9.3.2 Adapters and Standard Cables 167
5.9.3.3 Cable for Hand Encoder DHK 1 and Tester DTG 170
5.9.4 Installation Accessories 172
5.10 Software 174
5.10.1 ProLine / ProLineNG: Configuration Software for Channel Generators 174
5.10.2 Webserver: Visualisation Software 175
5.10.3 DDE-Server: Visualisation in Office Applications 178
5.10.4 DPCamp: Software for Commissioning and Interfacing in Leisure Facilities 179

Chapter 6 - Notes on Project Planning

6.1 General 181
6.2 Guideline for Project Planning 181
6.3 Form for Assigned Addresses 182

Chapter 7 - Examples of Circuit Diagrams

7.1 Incorporating SI Components 184
7.1.1 Link-up of Wind / Rain Detectors (SIWR/SIRW) via DSM 4E 184
7.1.2 Link-up of Wind / Rain Detectors (SIWR/SIRW) via DSU 8 185
7.2 DRO with DC Drives 186
7.2.1 Feed-in by one Power Supply 186
7.2.2 Feed-in by two Power Supplies 187

Chapter 8 - Suggestions, Questions and Problems

8.1 FAQs 188
8.1.1 General Questions 188
8.1.2 Questions Concerning the Products 189
8.1.3 Dupline and the SI Building Management System 189
8.1.4 Problems 189
8.2 Contact 190

Index I

Chapter 1 Introduction

1.1 General

Building installation technology is in a state of change; no more rigid wiring systems, but a flexible central and decentral intelligence which makes it easier for the electrical fitter to fulfil his customer's requirements at sensible prices.

Doepke is following this positive trend with its new product range: Dupline. This bus system combines easy handling with the flexibility of a bus system. Due to its interference immunity and the wide range of products it is not only suitable for inside areas but also eminently for use in outside applications such as camping sites and yachting marinas. But also in inside applications, Dupline can show strength: easy-to-handle shutter controls, temperature supervision or also fire alarms allow an uncomplicated solution for 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. It is provided in loose-leaf form to allow for the growing product range and possible technical improvements.

In order to ensure that this planning aid is always up to date, Doepke will be supporting you with advice and service: make use of our telephone support line, our e-mail update service, or the information prepared for you on our website http://www.doepke.de/uk to keep yourself fully up to date.

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.

Abbreviation	Description
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
PNP-Transistor	Semiconductor component with pn-junction for switching currents: This design permits the switching/controlling of loads which are connected to neutral.
Profibus	Abbreviation for „Process Field Bus“: This is a bus system that originally has been used in industry for cross-linking input and output devices - also on system level. Today, this bus system is used in various applications.
Profibus-DP	Abbreviation for „Process Field Bus - Decentralized Periphery“: This is a special version of Profibus, tuned in reaction time on signal level.
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)
SCADA	Supervisory Control And Data Acquisition: Software or device that offers the possibility to display and/or to modify process signals.
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

Referenz	Beschreibung	
[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

1.5 What is Dupline?

1.5.1 General

Dupline is not a new bus system. This product from Messrs. Carlo Gavazzi Industri A/S (Denmark) 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.

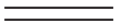
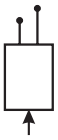
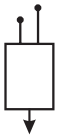
But we also know that quality can not only be described by guidelines. Therefore, many proposals and suggestions for improvements from planners, electrical fitters and end users flow into the design and the handling of our components.

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.

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

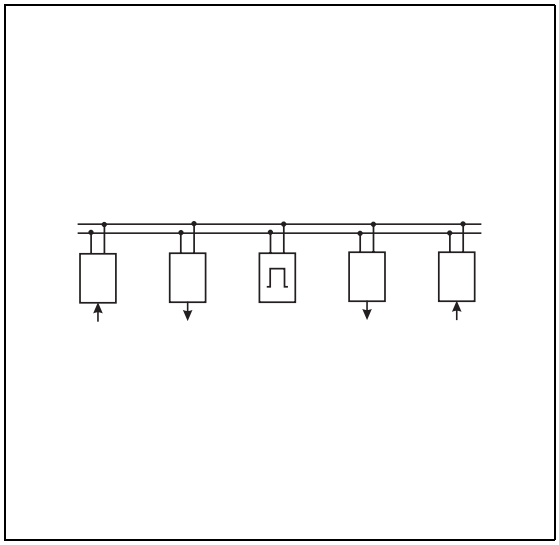
This chapter deals with the structure of single Dupline systems; networks consisting of single systems are described in **Chapter 4 "Networks and Visualisation"** on **Page 22**.

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.

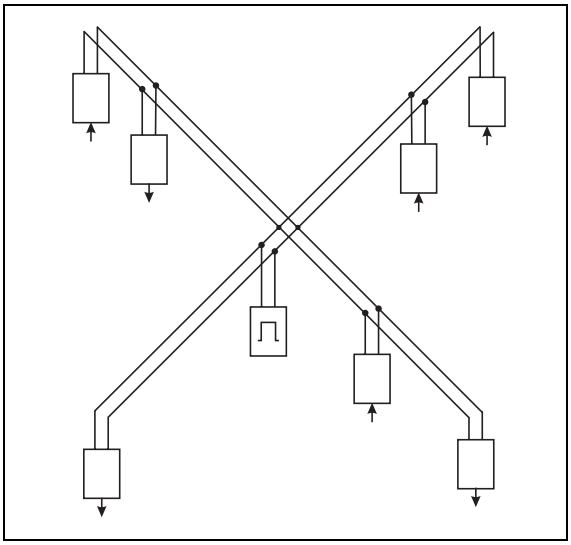
The following diagrams illustrate the possibilities:

Linear Installation:



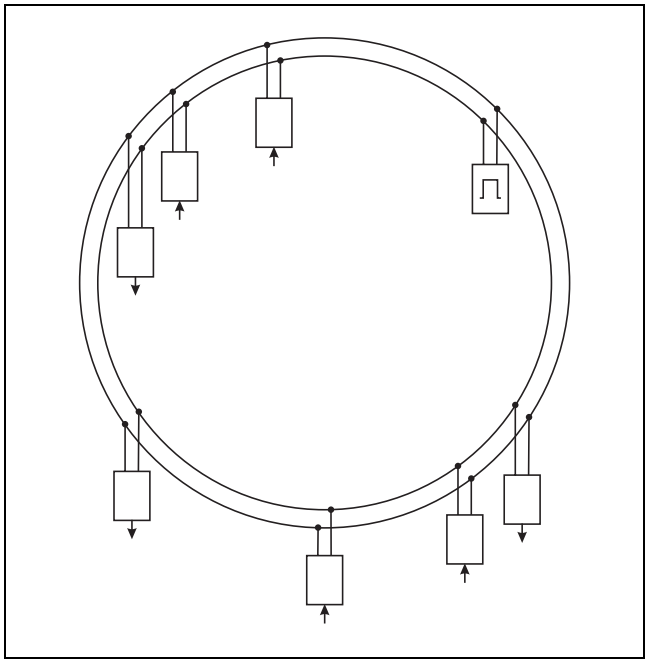
With a total bus line length of approximately 10 km this type of configuration is probably the most frequently used.

Star-type Installation:



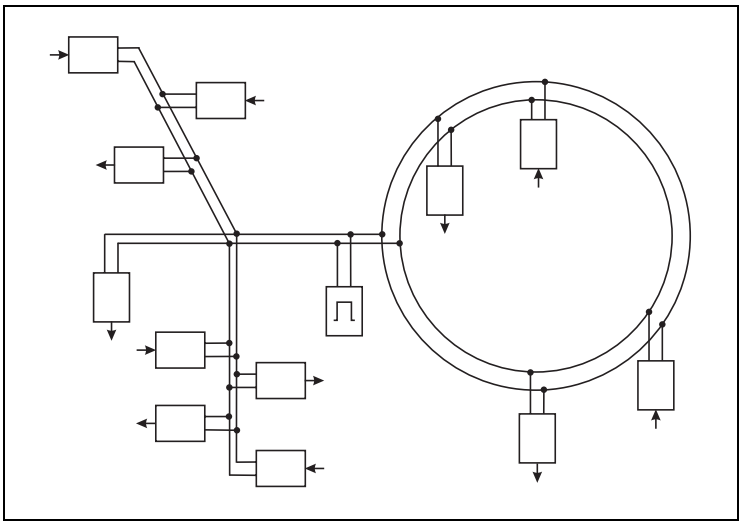
In order to calculate the total bus line length of this type of installation it is only necessary to add the lengths of the two lanes.

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 Signal Transmission

2.2.1 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“.

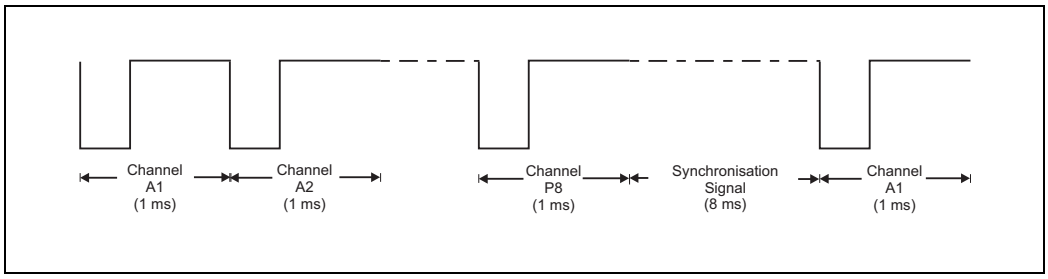
Contrary to other bus systems these addresses, or channels, do not serve as a physical response to inputs or outputs but represent a function, e.g. input and output signals. Such a function could be - to quote the simplest example – the switching of a lamp. This function is then carried out simply by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

2.2.2 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 1).

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

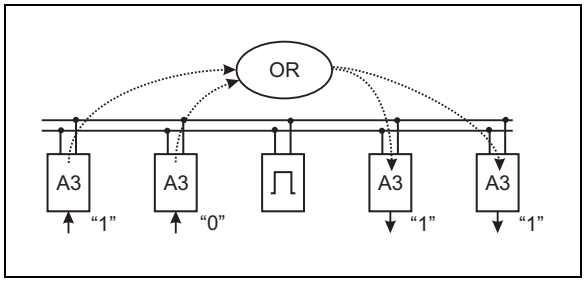
For further information on the channel generator and its functions see **Chapter 5.2.1 "DKG 1/DKG 2: Channel Generators 24 VDC and 115/230 VAC resp."** on **Page 28**.

2.2.3 Addressing

As already mentioned, the addressing does not serve to physically activate input or output devices so that it is possible – and even desirable – to assign identical addresses to input and output devices.

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:



2.2.4 Transmission Procedure

2.2.4.1 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.

2.2.4.2 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“.

2.2.4.3 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.

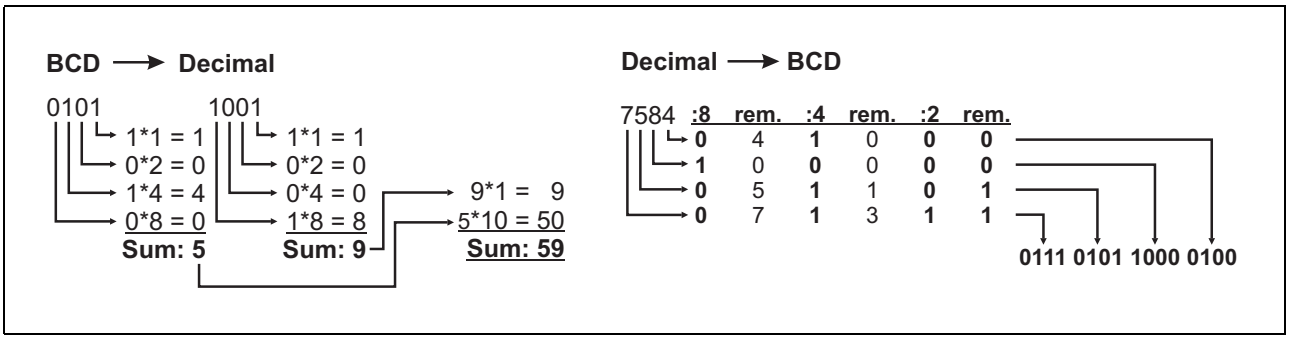
Because of the serial transfer this procedure is primarily suitable for the transfer of slowly graduating measurements.

2.2.4.4 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 5.3.16 "DTZ 4: Rail Mounted 4-Channel Pulse Counter/Hours-Run Meter"** on **Page 84**) 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 current firmware (up to version 1.03) of the channel generators supports 16 of these multiplex channels (addressed via channels A1 to A4). Generators from version 3.0 on will have addressing via channels B2 to B8 implemented and will thus be able to serve up to 128 device channels.

2.3 Inputs and Outputs

2.3.1 General

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; in a commercial or business environment such as e.g. an office block, the distance at the input side can be up to 12 m. But in an industrial environment the length of a cable at the input end may not exceed 3 m.

2.3.2 Address Assignment

A Dupline component may have one or more channels depending upon its equipment. Thus it is possible e.g. for an output also to have input channels for return communication (DSM 4R).

The channel addresses must be allocated to the devices with the aid of the hand encoder (DHK 1); the addresses themselves can be freely selected. Unused channels should always remain uncoded, e.g. they should not be assigned an address and any previously assigned addresses should be deleted.

In the case of outputs with digital signals the hand encoder also generally permits configuration of the output status if a system defect occurs (e.g. cable break).

For information about the hand encoder, see **Chapter 5.9.1 "DHK 1: Hand Encoder"** on **Page 163**.

2.3.3 Functions

The function range of inputs and outputs depends only partly upon their hardware equipment. It is the implementation of the relevant item in the channel generator, or in the ProLine configuration software, which is the decisive factor.

The simplest example for different functions are the items “push-button function“ and “touch contact function“ both of which are based on input signals from simple buttons. In the case of the push-button function the relevant channel is only active for as long as the button is pressed – in the case of the touch contact function the signal remains permanently set upon one actuation of the button.

It is also possible, for example, to assign certain types of operational behaviour to a shutter control when the button is pressed (Start – Stop – Reverse).

It is for this reason that the description of the Dupline components goes into very few, if any, details in respect of their „logic“ function.

2.3.4 Power Supply

2.3.4.1 General

Dupline signal conductors are always operated free of potential, i.e. without connection to earth potential or to the potential of external power supply sources.

The types of connections for different module types are explained below.

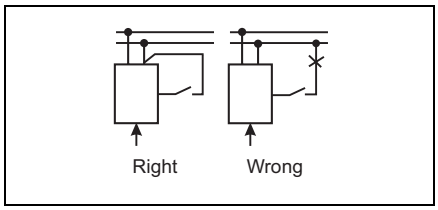
2.3.4.2 Components with AC power supply

Components which operate with AC voltage always have their own separate connections for their supply. It must, of course, be ensured that the correct operating voltage is applied.

2.3.4.3 Components with internal DC power supply

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:



Caution! **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.

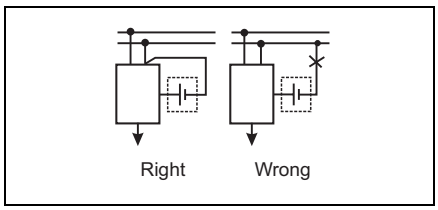
2.3.4.4 Components with external DC power supply

As Dupline is a bus system which is separated from potential, there should basically be no connection established between external power supplies and the bus conductors.

An exception to this rule is the wiring of the input and output boards DNP 8A, DNP 4, etc. In order to prevent equalising currents from occurring, the neutral conductor of the power supply must in these cases be connected to the Dupline signal conductor (-).

Connecting the supply voltage

If the device has been provided with a separate neutral input connection for the power supply, then this must be used. If no neutral input is provided, the negative pole of the supply voltage must be connected **directly** to the terminal of the Dupline signal conductor (-).

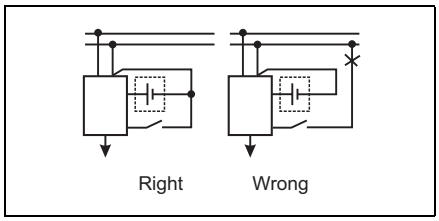


Note: The power supply for such a component has to be installed direct neighbourhood of the component. Several components which are locally distributed, e.g. in sub-ordinate distribution cabinets, must not be supplied by the same power supply.

Connecting switching contacts

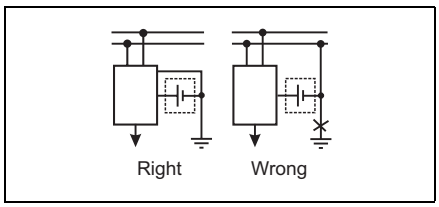
If the switching inputs and outputs of the components need to be connected to 0 VDC, then only the neu-

tral conductor of the external power supply may be used for this purpose.



Hidden connection to earth

When establishing the power supply care must be taken that no hidden connections are created between the Dupline neutral and the earth potential.



2.4 Standards and Enclosure Protection

2.4.1 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.

2.4.2 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

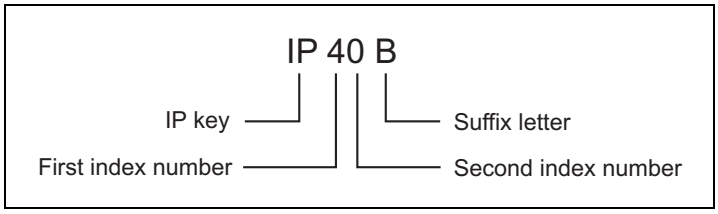
6: Protected against strong water jet

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 3 Notes on Wiring and Installation

3.1 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:

- The longer the lines and the expected interferences are, the higher the wire quality must be.
- On large line lengths (from 3 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 below.

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.

	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.	Yes.
	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 3.2** on **Page 19**. Reference figures and calculation examples can be found in **Chapter 3.3 "Cable Length and Resistance"** on **Page 20**.	
		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).	Insulation resistance: at least 100,000 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).
Cable branching and terminals	The resistance of the clamp terminals should be as low as possible - pay special attention to the clamp contact’ being properly tightened.	

	Domestic buildings	Industrial buildings
Positioning of modules	On line lengths of more than 3 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 3 km. See **Chapter 3.4** on **Page 20**.	
Lightning protection	Has to be provided always on outdoor applications; see **Chapter 3.5** on **Page 21**.	
Signal inputs and outputs	Put sensors as close as possible to the input modules (the length of lines must not exceed the length specified in the data sheet). Generally, the same parasitic induction and thus also same the rules as for the bus conductors apply. Notes on power supply for local components can be found in **Chapter 2.3.4 "Power Supply"** on **Page 14**.	

(1) Measured with a test voltage of at least 500 V. If the resistance of existing installations is less than 1000 kOhm, all junction boxes and terminal points of cables must be tested.

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	**RE-2x(ST)Ymb**	60	flexible
	A-2Y(L)2Y	55	flexible
	A-2YF(L)2Y	55	flexible
	NYY-O		

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 50 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).

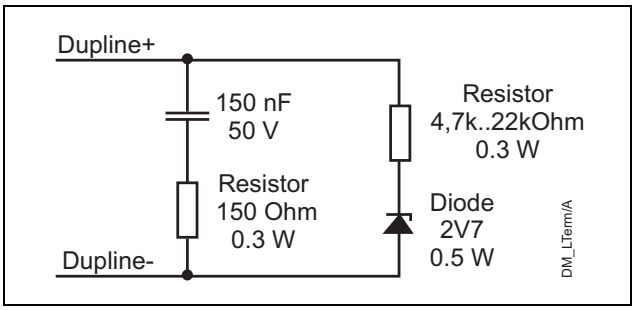
Assuming that all components are located at the outermost end of the bus conductor, the maximum line length can be calculated as follows (where „S" is the value for the loop resistance):

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

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

3.4 Line Termination

With longer distances (> 1.5 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).

3.5 Lightning Protection

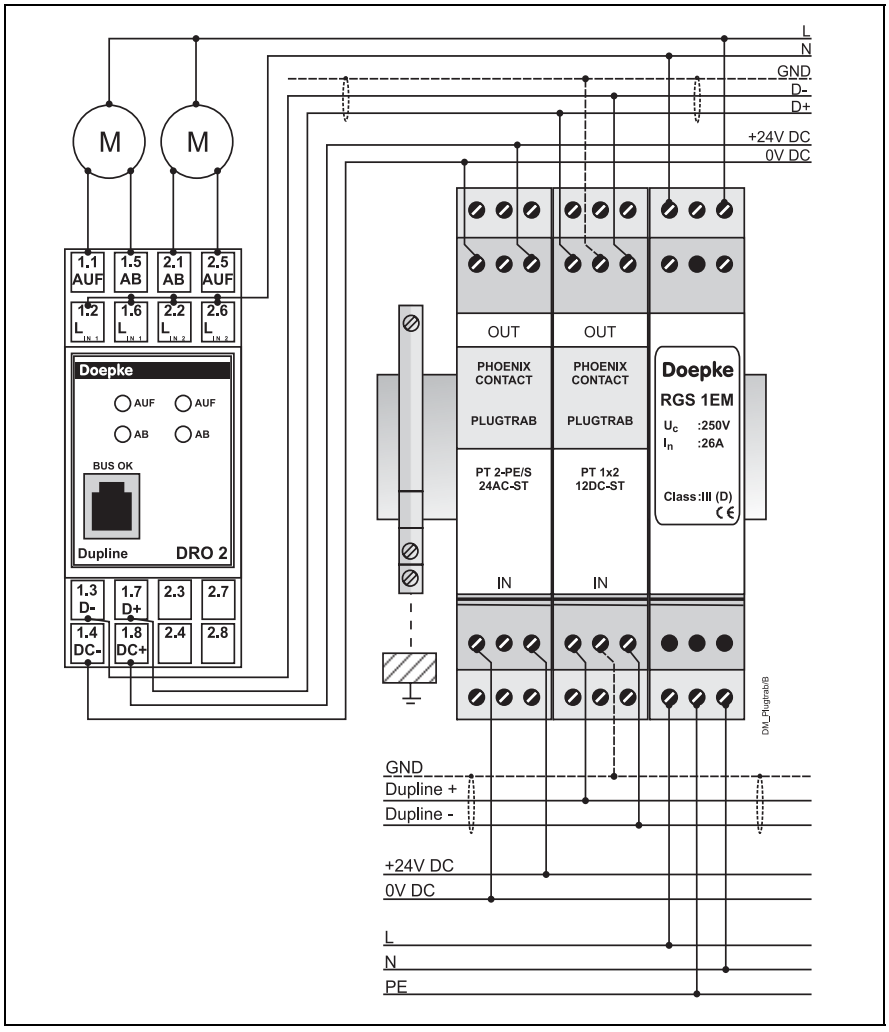
Dupline systems which could be exposed to lightning strikes should be provided with suitable lightning protection. This applies especially to aerial lines and lines installed outside of buildings.

For an entire protection it is to observe, that not only the Dupline bus is protected, but also the distribution voltage lines. Following devices then are necessary:

Component / Description	Manufacturer	Module	Socket
Protection of the Dupline bus	Phoenix Contact	PT 1x2 12DC-ST	PT 2x1-BE(1) PT 2x1-BE-F(2)
Protection of 24 VDC supply inputs	Phoenix Contact	PT 2-PE/S-24AC-ST	PT-BE/FM
Protection of 230 VAC supply inputs	Doepke	RGS 1 EM	RGS BE

(1) Use this socket to apply an available shielding grounded at one end.
(2) Use this socket to apply an available shielding without grounding.

Following figure shows a connection example using the shutter control unit DRO 2 (see also **Chapter 5.4.6 "DRO 2: Rail Mounted 2-Channel Shutter Control Unit"** on **Page 110**):



Chapter 4 Networks and Visualisation

4.1 Networks

4.1.1 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.

4.1.2 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 or, with DKG 1/DKG 2, by inserting terminating resistors).
- 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.

4.1.3 Networks with DKG 20 / DKG 21-GSM

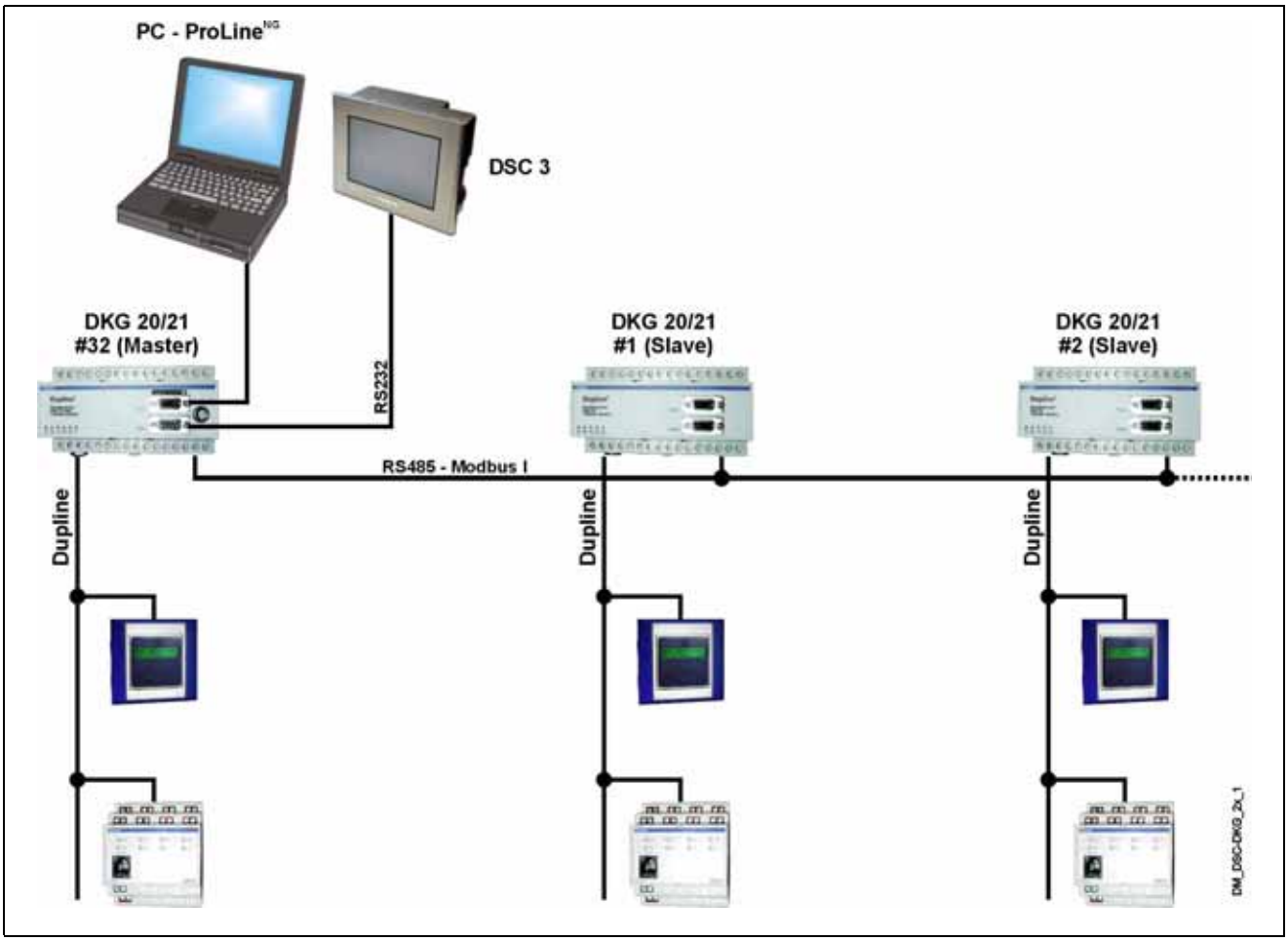
The new generation of channel generators (DKG 20 / DKG 21-GSM) have been equipped with an enhanced modbus interface offering the following advantages:

- 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 151**);
- 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 4.2 "Visualisation"** on **Page 24**);
- Synchronisation of clocks of all DKGs via the master in the network.

When setting up such a network please note - in addition to the points in **Chapter 4.1.2 "Installation of RS485-Networks"** on **Page 22** - 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"** 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.

4.2 Visualisation

4.2.1 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 4.1 "Networks"** on **Page 22** 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.

4.2.2 Visualising at the Channel Generator

4.2.2.1 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 the DSC 3 touch screen, or via scripts or HLLs in software components.

4.2.2.2 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.

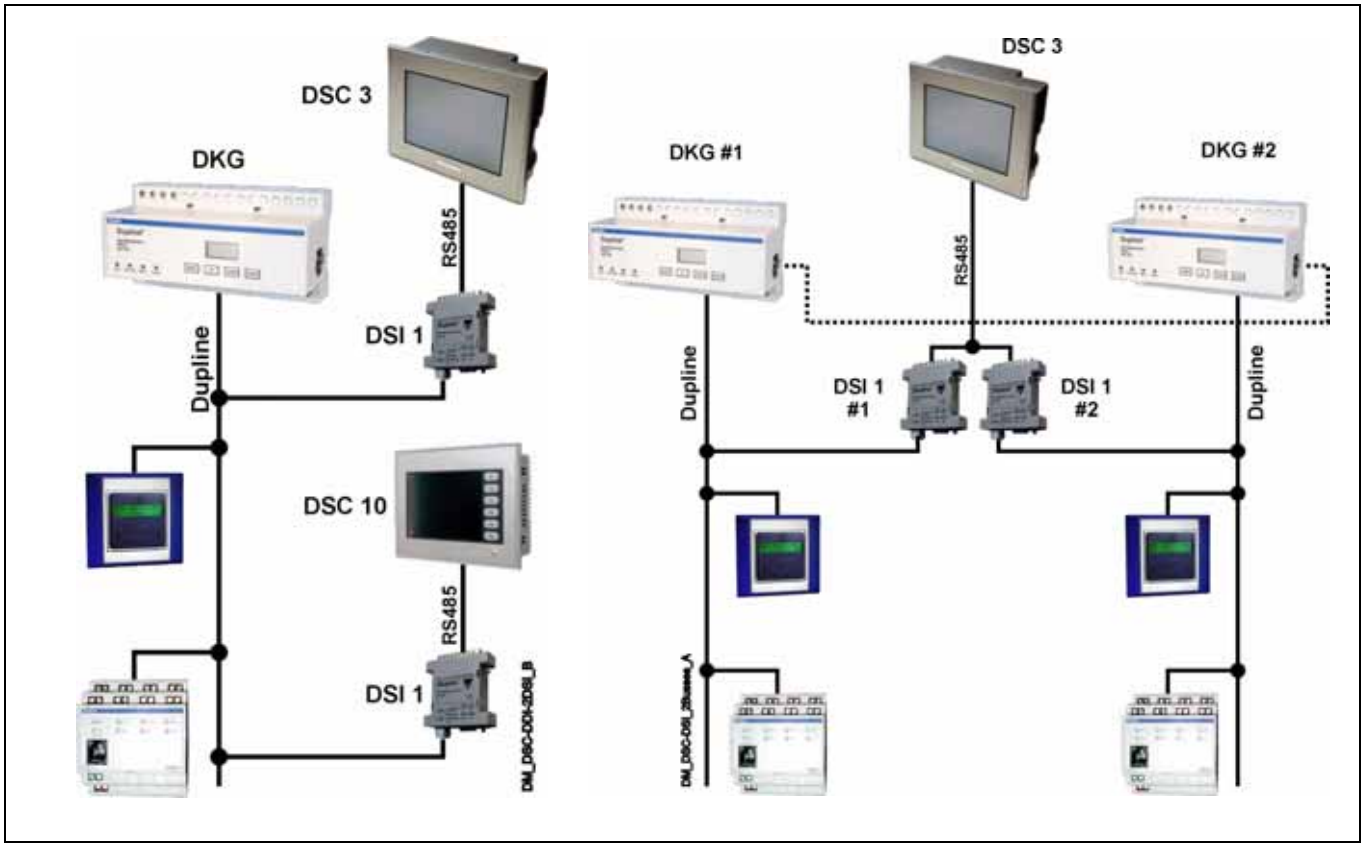
If the visualising component is connected to one of the slaves, the data of the other network members can

normally be read but not written. Both options are illustrated in the diagram on **Page 22** in **Chapter 4.1.3 "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.

4.2.3 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 complete visualisation in a network consisting of connected DKG 1 and/or DKG 2. Because the serial ports are already in use here, visualisation can be via the DSI 1s, whereby the latter must be assigned different slave addresses. This has the advantage that the data exchange between DKGs takes place automatically.

For detailed information on the DSI 1 please refer to **Chapter 5.7.2 "DSI 1: Dupline - Modbus - Schnittstelle"** on **Page 148**.

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:

Central Units ..... Chapter 5.2 ..... Page 28
These are channel generators which constitute the necessary component of any Dupline system.

Inputs ..... Chapter 5.3 ..... Page 41
This group encompasses all devices which capture data and transmit them to the Dupline bus for processing. These also include e.g. sensors.

Outputs ..... Chapter 5.4 ..... Page 89
These components output the data, e.g. 24 VDC or 230 VAC switching signals. Also included are special devices such as shutter controls and dimmers.

Combined Inputs and Outputs ..... Chapter 5.5 ..... Page 131
Components which both input and output signals can be found in this chapter. This also includes, for example, the DSM 4E.

Components for Visual Display ..... Chapter 5.6 ..... Page 137
Here you will find modules which assist in displaying the data and status of a system. This includes e.g. the DDI 2 text display.

Interface Components ..... Chapter 5.7 ..... Page 149
This chapter contains a list of those devices which can be used for communication with other systems, such as e.g. the DSI 1.

Load and Power Supply Units ..... Chapter 5.8 ..... Page 157

Accessories ..... Chapter 5.9 ..... Page 163
Here you will find encoding and test equipment, cables and other accessories.

Software ..... Chapter 5.10 ..... Page 174
Here you will find the “ProLine“ configuration software and further visualisation software.

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/DKG 2: Channel Generators 24 VDC and 115/230 VAC resp.

- 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 VDC (DKG 1) and 115/230 VAC (DKG 2) resp.

Product Description

The DKG 1 and DKG 2 channel generators are intelligent, configurable central units which generate the Dupline carrier signal for 128 channels and are therefore the necessary central units for every system. They differ only in their supply voltage: the DKG 1 requires a 24 VDC voltage, while the DKG 2 can be connected directly to the AC supply net (115/230 VAC).

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

The channel generators offer a multitude of functions, some of which are listed below:

Different channel types

The channel generators support 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 generators permit 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 generators are 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

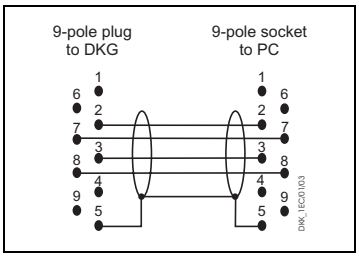
For detailed information on applications refer to the operating instructions of the channel generator and the “ProLine“ configuration software. The latter offers complete menu-guided operation for ease of use.

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 2.2 "Signal Transmission"** on **Page 11**).

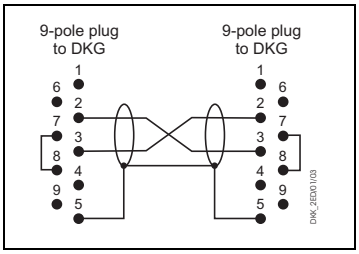
Connection between DKG and PC

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 4.2 "Visualisation"** on **Page 24**.

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:

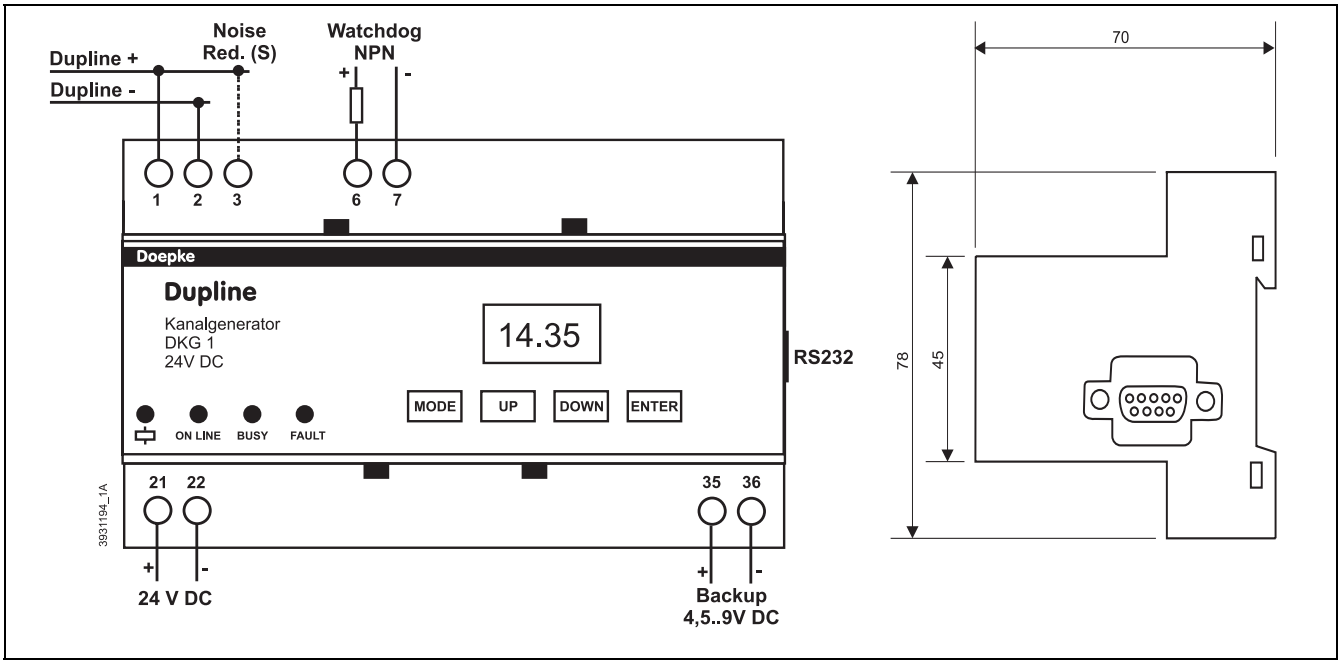
- channel addresses
- time switch channels
- logic connectives
- central/master channels.

Installation in distribution cabinets

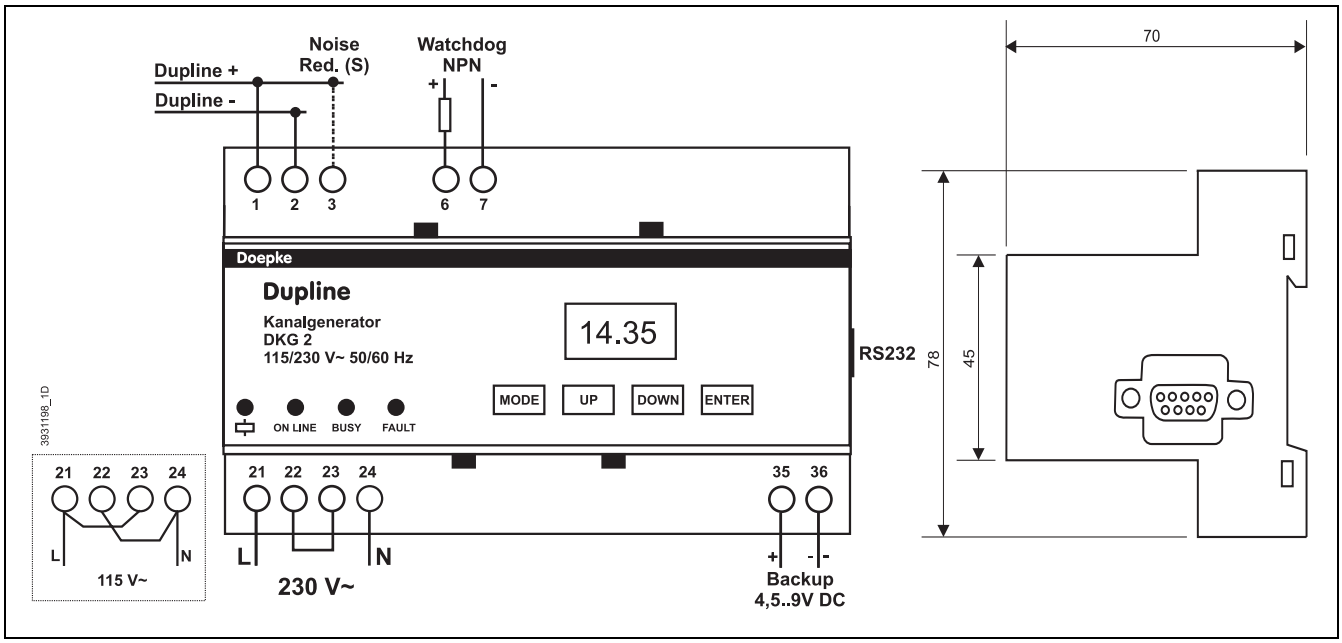
When installing the channel generators in distribution cabinets, it should be noted that the serial connection has to be arranged from the right hand side. This means that a free space of approximately 3 module widths needs to be provided here in order to allow the programming plug to be inserted.

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 5.9.3 "Adapters, Cables and Special Accessories"** on **Page 166**).

Wiring Layout and Dimensions DKG 1



Wiring Layout and Dimensions DKG 2



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
DKG 1 only:			
21	Operating voltage 24 VDC	22	Operating voltage 0 VDC
DKG 2 only:			
21	Operating voltage 115/230 VAC	24	Operating voltage N

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

	Min.	Typ.	Max.
Dupline			
Output voltage			8.2 V, pulsed
Output current			100 mA
Frequency	approx. 1 kHz		

	Min.	Typ.	Max.
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
Operating Voltage DKG 1			
Rated operating voltage	10 VDC	24 VDC	30 VDC
Power consumption		approx. 7 W	
Operating Voltage DKG 2			
Rated operating voltage (50/60 Hz)		115/230 VAC	
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
Housing			
Type	Distribution installation housing for rail-mounting to DIN EN 50022		
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	IEC60669, EN55022 / EN61000-6-3 and EN55024 / EN61000-6-1		
Order number, description	09 501 122, channel generator 24 VDC DKG 1 09 501 104, channel generator 115/230 VAC DKG 2 09 501 129, interface cable DKK 1, PC - DKG 09 501 137, interface cable DKK 2, DKG - DKG 09 501 142, 25-pole adapter DKK 3, DKK 1 - PC 09 501 143, angled adapter DKA 1		

(1) Without backup power supply.

5.2.2 DKG 20 / DKG 21-GSM: Channel Generators

- 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
- DCF radio clock synchronization with optional DCF active antenna
- Remote control and remote monitoring via mobile phone (SMS) if connected to optional GSM antenna (DKG 21-GSM only)
- Operating voltage 115/230 VAC

Produktbeschreibung

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.

Configuration

These channel generators are to be configured with ProLine^{NG} (see **Chapter 5.10.1** on **Page 174**). The remote configuration is possible by means of the DCI 2 (see **Chapter 5.7.2** on **Page 151**).

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 4096 channels. The RS485 Modbus I communication is via a shielded standard cable (e.g. ISDY 2 x 0.8mm), which may be up to 1000 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 4.1 "Networks"** on **Page 22**.

The transfer rate is selectable between 2400 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 3) or visualising programmes on PCs can be employed, there being the option of setting a transfer rate between 2400 and 115,200 baud.

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 4.2 "Visualisation"** on **Page 24**.

Internal real-time clock and DCF radio signal synchronisation

Like their predecessors the DKG 2x are also equipped with an internal, back-up battery supported real-time clock. You can improve its accuracy in two stages:

1. By configuring in ProLine^{NG} a calibration with the mains frequency;
2. By connecting the optimal DDA 1 active antenna so that the clock is synchronised with the time signal from an atomic clock. The pulse is sent via the transmitter in Rugby (UK) and has a reception radius of approx. 1000 km.

For details on the DCF antenna please refer to **Chapter 5.9.3.1 "DDA 1: DCF-Antenna for DKG 20 / DKG 21-GSM"** on **Page 166**.

Note: If a network is used, the master will always update the clocks of the connected slaves. It is therefore advisable to connect the active antenna to the master.

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 VDC. 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
13..16	semiconductor outputs Out1..Out4	Q5..Q8

Saving the status upon power failure

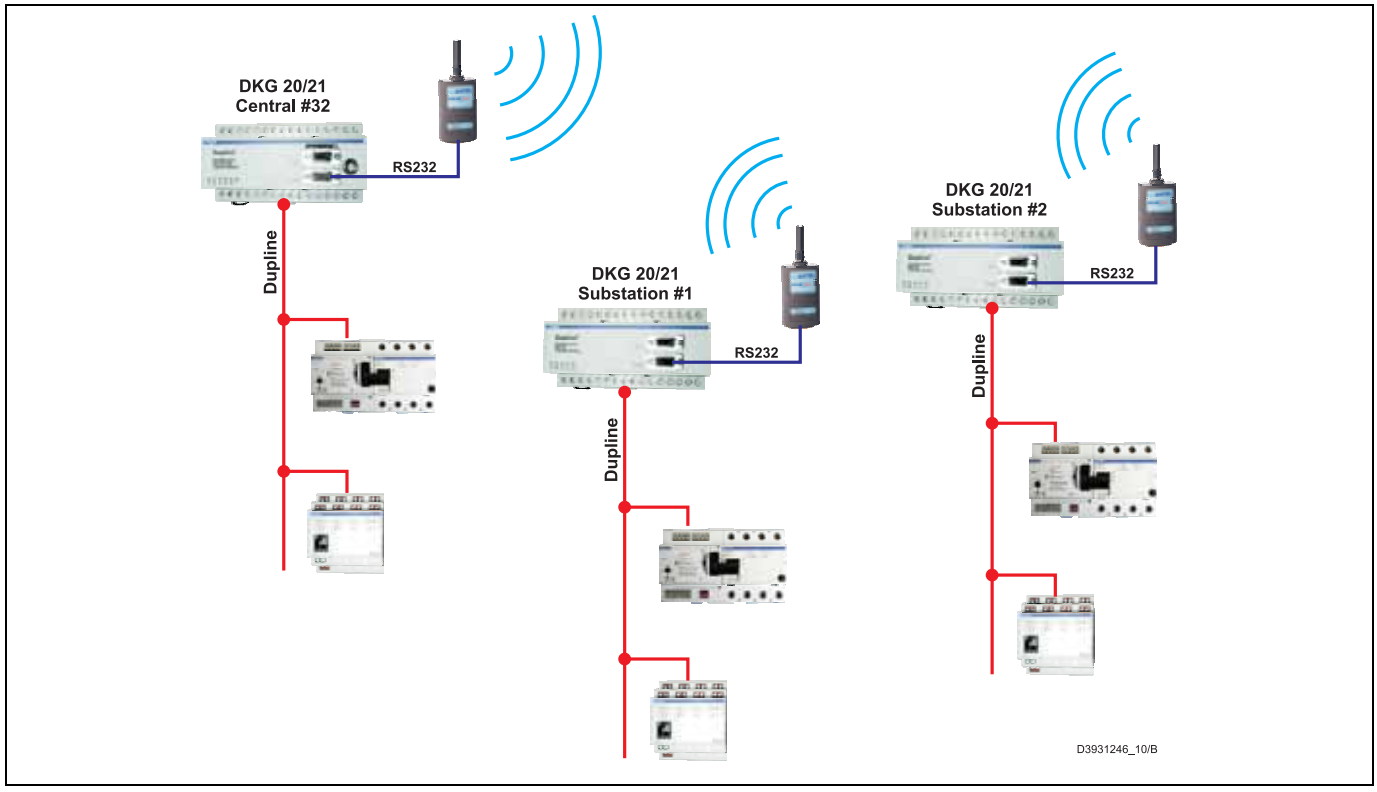
The built-in EEPROM memory now makes it possible permanently to save the status of all channels in the event of a new start or a power failure. This means that the switching status of e.g. toggle-switch functions and real-time switches are restored when restarting, provided this option is activated in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

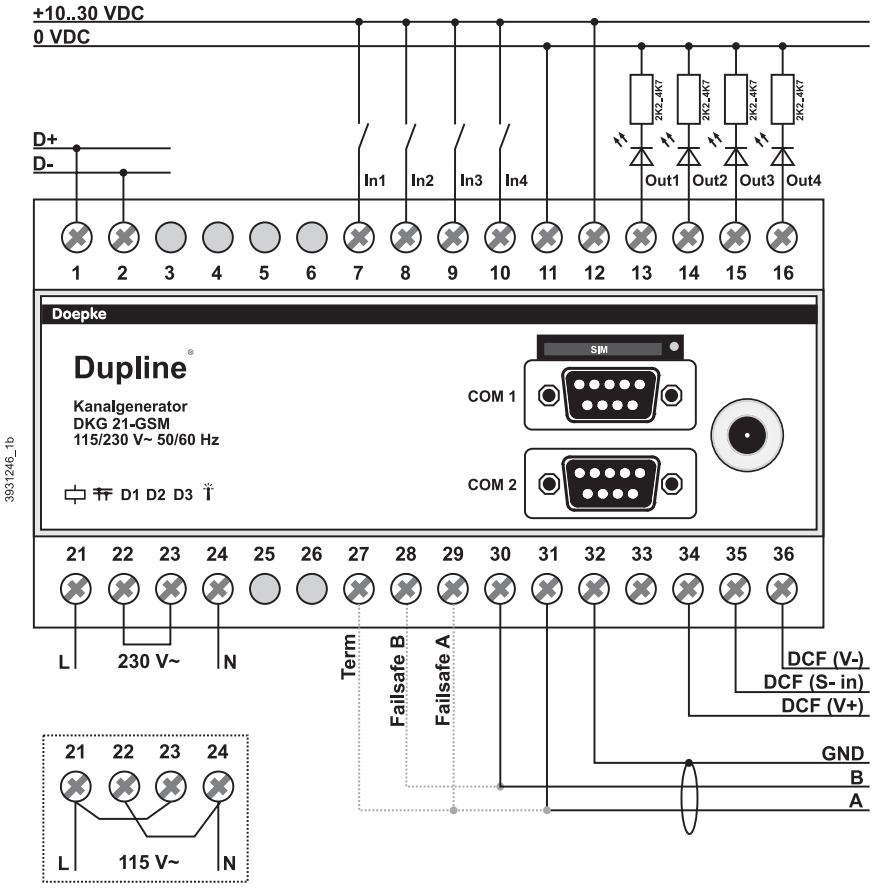
The range of functions of the GSM modem is the same as that of the - now no longer available - GSM 8:

- 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.

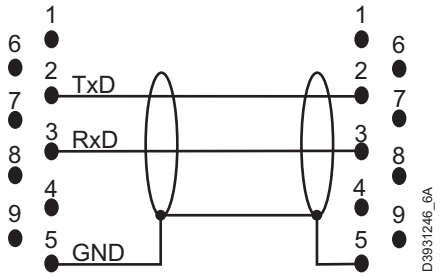
Wiring Layout and Dimensions

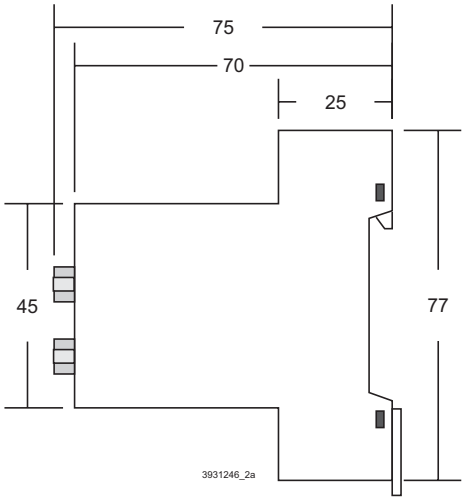


Note: The wiring layout of the DKG 20 corresponds to that of the DKG 21-GSM with the exception of there being no GSM antenna socket.

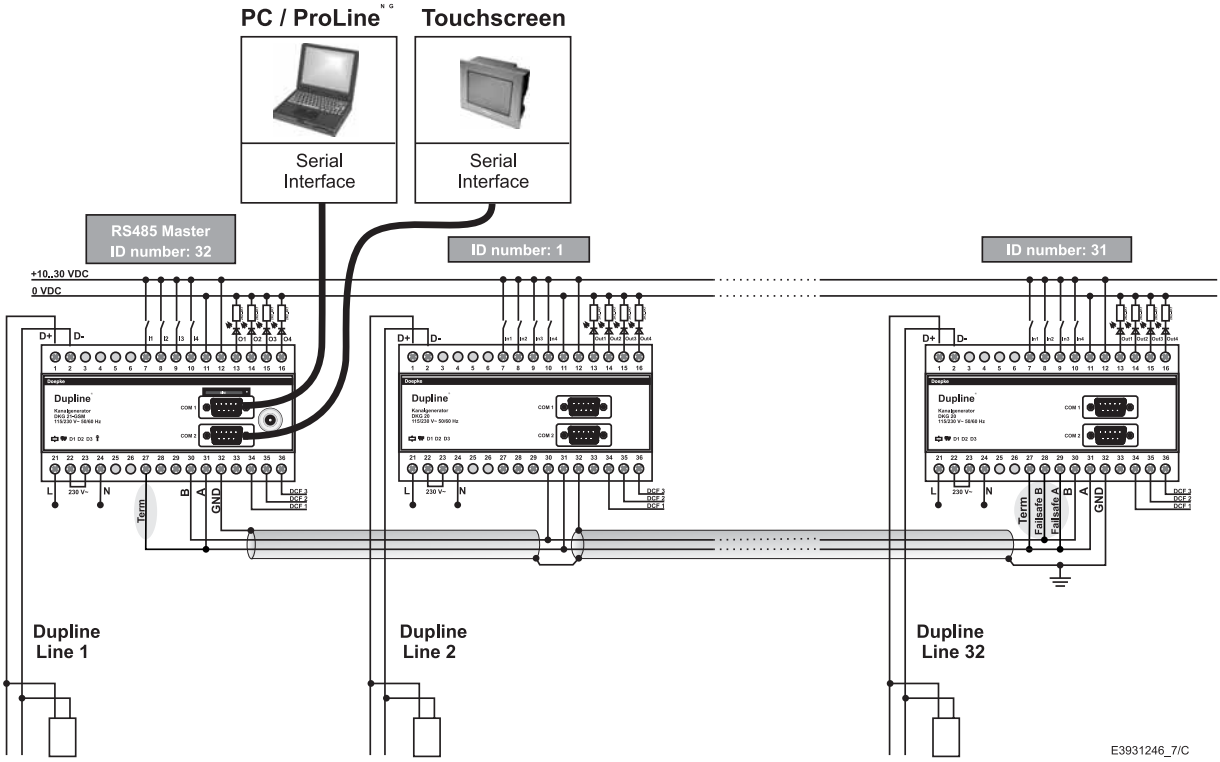
DKG 20/DKG 21-GSM
9-pole DSUB plug

PC
9-pole DSUB jack





Wiring in an RS485 Network



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)	34	DCF signal V+
35	DCF signal S- in	36	DCF signal V-

(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

	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 VAC ±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 VDC
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)		

	Min.	Typ.	Max.
Terminals			
Type	Screw terminals		
Contact area	0.4 mm ∅		2.5 mm²
Housing			
Type	Distribution installation housing acc. to DIN43880 for rail-mounting to DIN EN 50022		
Dimensions	144 x 78 x 65 (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	IEC60664, IP 20		
Order numbers, description	09 501 191, Active DCF antenna DDA 1 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 12 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 burglar alarm and lighting control purposes.

The DBM 1 has a range of 12 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 operation check 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

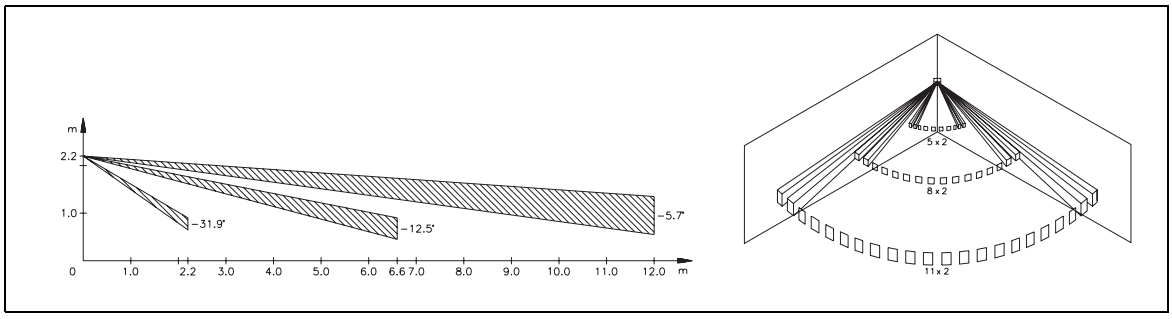
The DBM 1 should not be mounted in the following locations:

- 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.

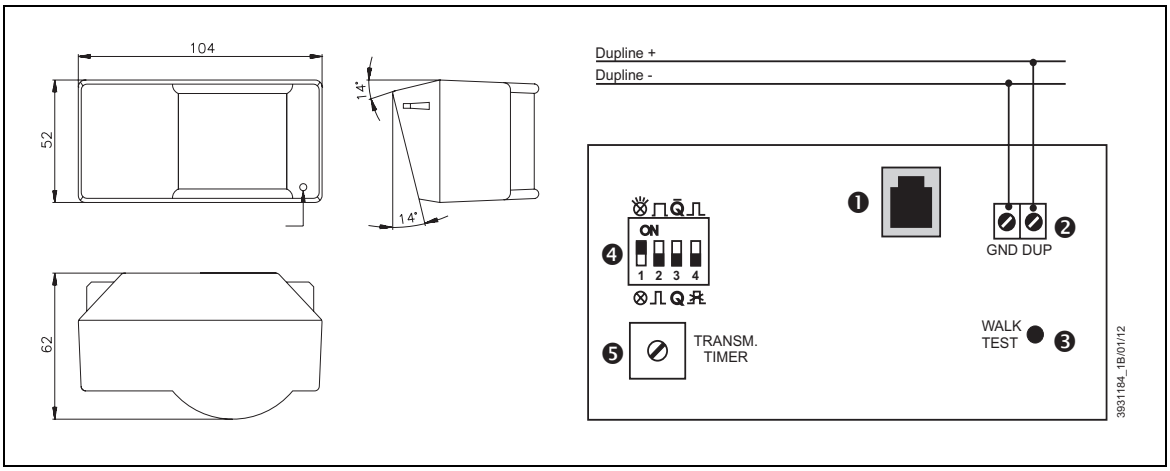
Maximum capacity

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.

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
DUP	Dupline signal conductor + (Dupline+)	COM	Dupline signal conductor - (Dupline-)

Dupline Channel Allocation

Channel	Description	Channel	Description
1	Switching signal (NCC or NOC)	2..8	Not assigned

Indicators

Indicator	Description
Red LED	Indicator for movement test (disconnectable)

DIP Switches

Switch	Description	OFF	ON
1	Indicator for movement test	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

	Min.	Typ.	Max.
Dupline			
Current input		2 mA	
Input channels	none		
Output channels	1 alarm-/switching signal (NCC or NOC)		

	Min.	Typ.	Max.
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			12 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	Lens: polyethylene		
General technical data			
Ambient temperature	-10°C		+50°C
Atm. humidity			85%
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
- Transmitter powered by standard batteries

Product Description

The Dupline infrared remote control consists of two components: a receiver (DIR 2) and a hand transmitter (DIR 2T).

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.

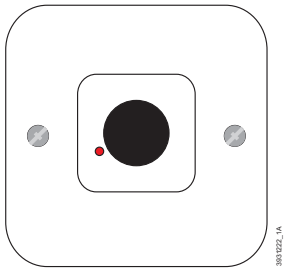
By grouping it is thus possible to configure up to 64 switching commands with 8 receivers and one or more hand transmitters and to remotely operate within one room. Provision for labelling on the back of the transmitter facilitates the operation.

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.

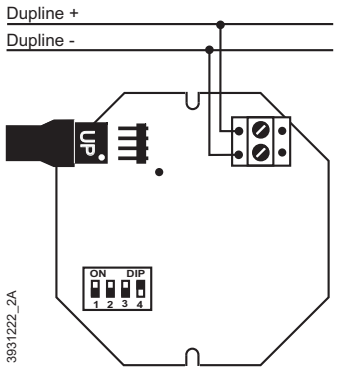
The following diagram shows the recommended mounting of the receivers on the wall:

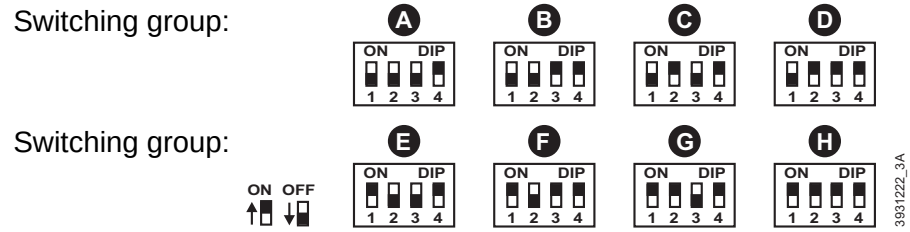


2. Transmitter

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

	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
Housing			
Type	Neutral, polar-white housing		

Technical Data (Continued)

	Min.	Typ.	Max.
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	EN55022 / EN61000-6-3 and EN55024 / EN61000-6-1		
Order number, description	09 501 169, IR-receiver DIR 2		

	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	-		
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 can be transmitted on 8 independently encodable channels and can thus be compared in the channel generator with 8 different threshold values in order to control 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

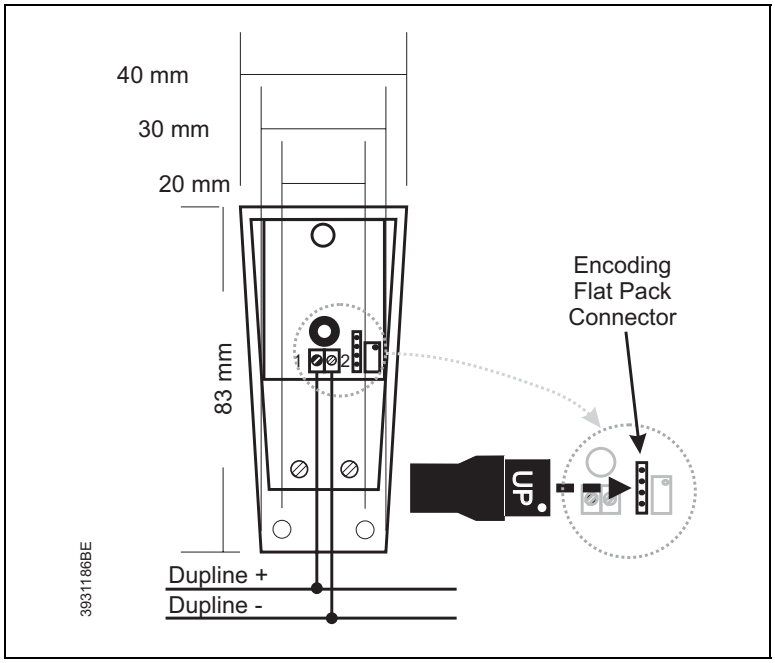
Installation

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 and Dimensions



Connections

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

Dupline Channel Allocation

Channel	Description	Channel	Description
1..4	Light intensity value	5..8	Light intensity value

Indicators

none

	Min.	Typ.	Max.
Dupline			
Current input	350 µA	400 µA	450 µA
Input channels	none		
Output channels	8 light intensity outputs, 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 ∅		2.5 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		
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 DNP 8E: 8-Way Binary Input Board (24 VDC)

- Predestined for use in control boards
- 8 binary inputs
- LED indicator for operating voltage and bus signal
- Support for mounting on DIN-rail available

Product Description

The DNP 8E input board offers 8 binary inputs. Because of its size and connection data it is particularly suitable for fitting in control and indicator boards where open circuit boards can be installed.

The DNP 8E permits contacts and switches to be connected towards the 0 V-signal of the power supply.

The board is equipped with a LED to indicate that the bus signal is correct and a LED to show that operating voltage is applied. Each input operates with pulse stretching respectively delay, so that even extremely short changes in the input signal are registered and transmitted by the system.

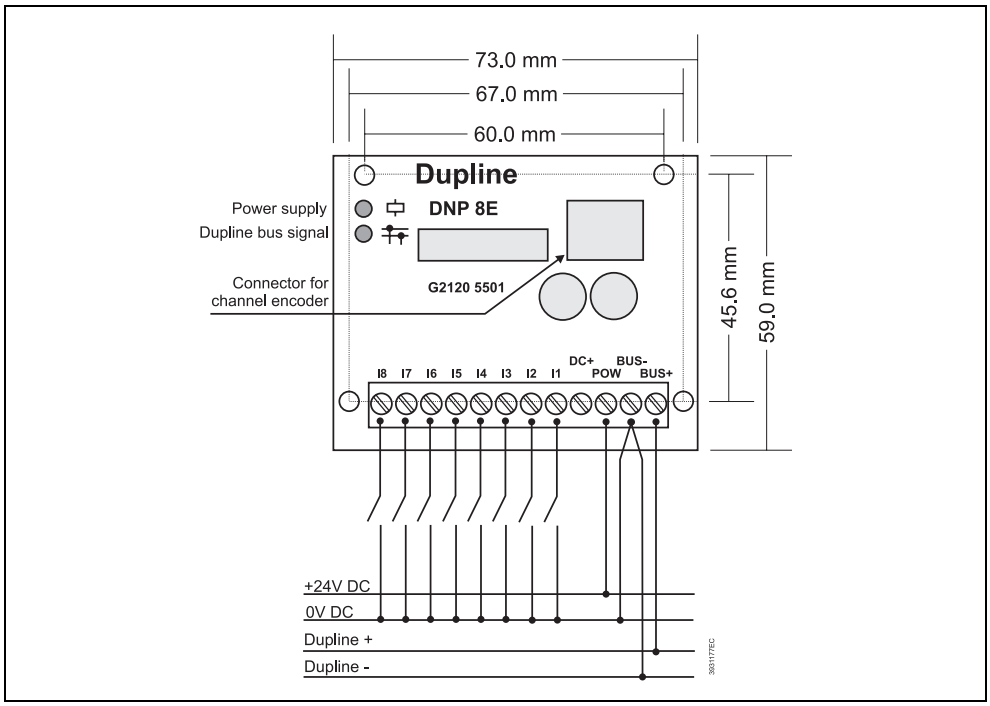
Notes on Applications

When connecting the board it should be noted that - contrary to other inputs and outputs - the 0 V lead as well as the Dupline signal conductor (-) must be connected to the “GND“ terminal.

Moreover, any push-buttons or switches which when operated connect with 0 V may not be directly connected to the Dupline signal conductor (-). For further details please refer to **Chapter 2.3.4.4 "Components with external DC power supply"** on **Page 15**.

Note: This input board is not suited for dimming of lamps with the dimmers DDM 1R***plus***, DDMU 1R***plus***, DDM 2 und DDMU 2. Please use the operating signal sensors of DSS series or the signal converters of DSU series instead.

Wiring Layout and Dimensions



Connections

Terminal	Description	Terminal	Description
I1..I4	Inputs 1..4	I5..I8	Inputs 5..8
DUP	Dupline signal conductor+ (Dupline+)	GND	Dupline signal conductor - (Dupline -) and 0 V operating voltage
POW	24 VDC operating voltage	DC+	not connected

Dupline Channel Allocation

Channel	Description	Channel	Description
1..4	Inputs 1..4	5..8	Inputs 5..8

Indicators

Indicator	Description
Green LED	Operating voltage: Off – no supply / On – operating voltage OK
Yellow LED	Dupline bus: Off – bus fault / On – bus OK

	Min.	Typ.	Max.
Dupline			
Current input		100 µA	
Input channels	8 semiconductor inputs (channels 1..8)		
Output channels	none		
Inputs			
Type	8 contacts (via NPN transistors)		
No-load voltage		8.0 VDC	
Contact load			17 mA
Peak current at make			20 mA
Transition resistance			100 Ohm
Length of line			3 m
Operating Voltage			
Rated operating voltage	10 VDC	24 VDC	30 VDC
Current input		20 mA	
Current at make			1 A
Terminals			
Type	Screw terminal		
Contact area	0.4 mm ∅		2.5 mm²
Housing			
Type	Open circuit board		
Dimensions	approx. 73 x 59 (W x H in mm)		
General technical data			
Ambient temperature	-20°C		+50°C
Atm. humidity	20%		80%

	Min.	Typ.	Max.
Encl. protection type / standards	-		
Accessories	4 retaining clips for mounting the assembly. Optional: Support bracket for mounting on DIN-rail		
Order number, description	09 501 139, 8-way input DNP 8E 09 501 130, DIN-rail support bracket DPH 1 09 501 152, DIN-rail support bracket DPH 2		

5.3.5 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 typical power consumption is only 560 µA. 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 an 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.

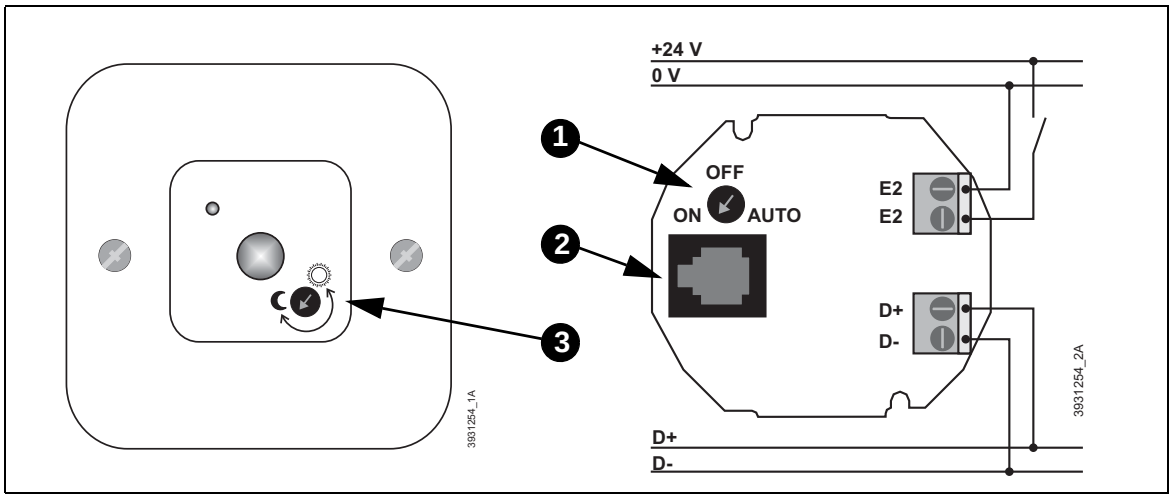
These controls enable you to influence the function of the twilight sensor in relation to the presence detector. Thus different applications are possible:

- 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 DPM 1s:
  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 and Dimensions



1: Operating mode rotary switch

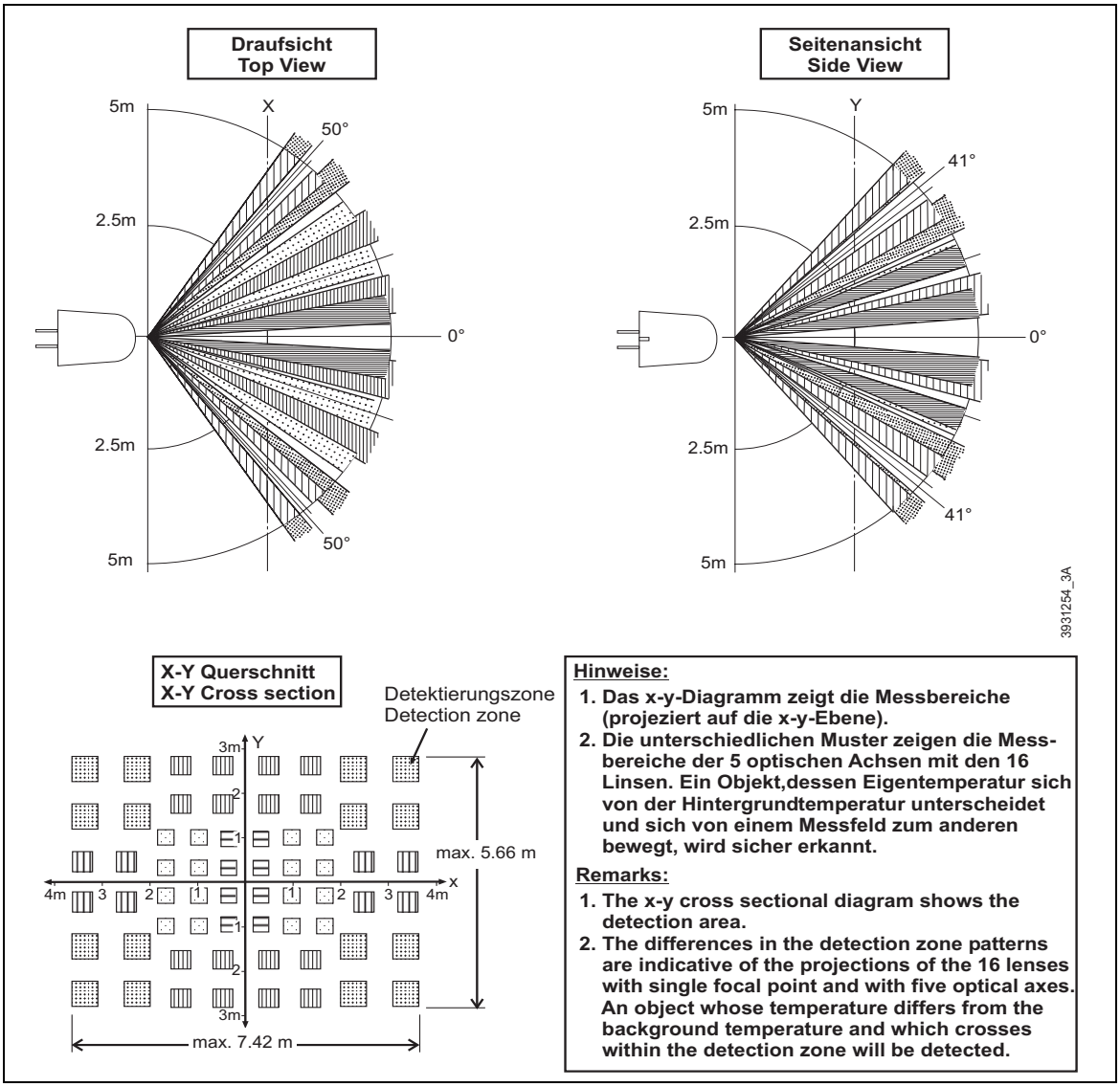
2: RJ12 jack for address encoding.

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

	Min.	Typ.	Max.
Dupline			
Current input	280 µA	560 µA	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
Inputs			
Type	Opto-decoupled semiconductor inputs 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, EN55022 / EN61000-6-3 and EN55024 / EN61000-6-1		
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.

5.3.6 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:

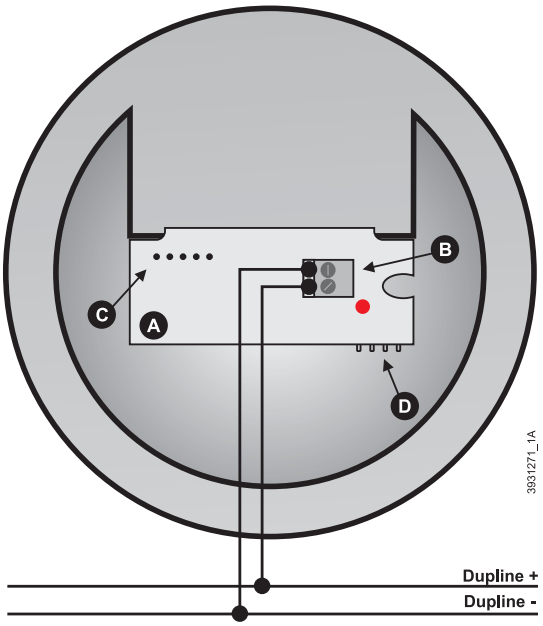
- Rooms may have a floor area of up to 60 m² and a height of up to 6 m;
- Hallways and narrow corridors may have a width of 3 m and a length of 15 m;
- The mounting location shall be as near as possible in the centre of the room;
- A gap of at least 0.5 m must be maintained from walls and furniture.

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

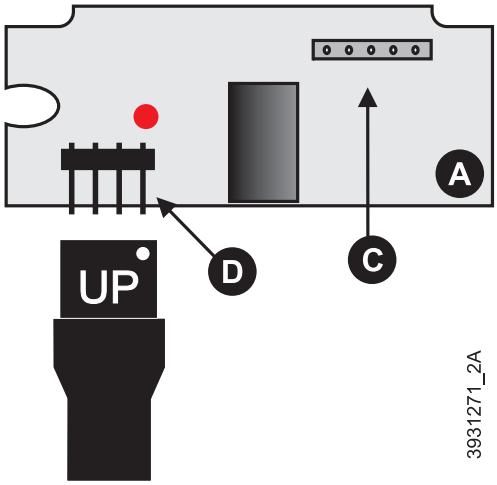
- near to ventilation ducts or strong draughts;
- directly in the apex of pitched roofs (a minimum distance of 30 cm from the apex must be kept);
- in rooms where - under normal conditions - a lot of steam, dust or smoke is present (for example in workshops, bathrooms and laundry rooms);
- in rooms where 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!

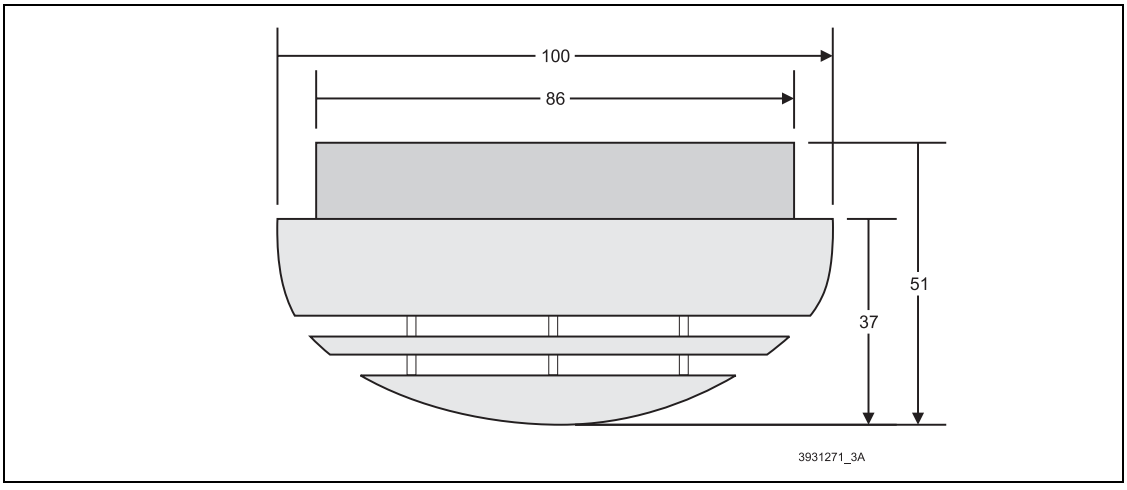
Wiring Layout and Dimensions



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 wholes of the base PCB.



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

	Min.	Typ.	Max.
Dupline			
Current input		200 µA	650 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, 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		

5.3.7 DRT 1: Room Thermostat in Installation Housing

- Thermostat with selectable temperature range of +14°C to +28°C
- For the temperature-dependent regulation of any heating units
- Night-time reduction by 4°C selectable via input channel
- Easiest possible address encoding via rotary switch
- Neutral white coloured combined surface or flush-mounted installation housing
- Power supplied by Dupline bus

Product Description

The DRT 1 is a manually settable room thermostat which transmits to the Dupline bus one switching channel for regulating units such as e.g. radiator control valves.

The desired temperature can be preselected with the setting valve within a range of +14°C to +28°C and is then compared to the room temperature; if the set temperature is below the room temperature, the switching channel will be activated or, conversely, the channel will be deactivated. The hysteresis is ±0.25°C.

An input channel permits the night-time reduction to be pre-programmed: if this is set the DRT 1 will lower the room temperature by 4°C in relation to the preselected temperature.

Notes on Applications

The address, to which the switching channel is to be transmitted, can be freely selected with rotary switches within an address range between A1 to P8.

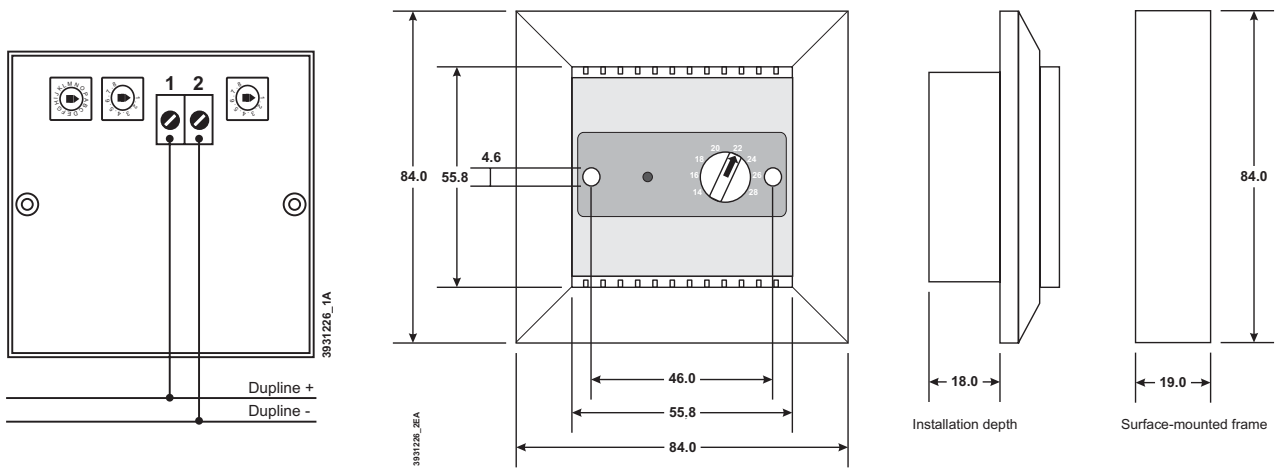
The channel for the night-time reduction can be preset via a rotary switch within an address range of B1 to B8, but cannot be switched off. When not using the night-time reduction, it should be ensured that other input channels do not energize the set channel.

The DRT 1 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 DRT 1 requires no external power supply as it is supplied by the Dupline signal line.

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	Input: Switching channel (heating command)	2	Output: night-time reduction

Indicators

Indicator	Description
Red LED	Switching channel (heating command): Off: Room temperature exceeds set temperature (switched off) On: Room temperature lower than set temperature (switched on)

	Min.	Typ.	Max.
Dupline			
Current input			2.5 mA
Input channels	1 switching channel for e.g. control valves		
Output channels	1 control channel for night-time reduction		
Temperature sensor			
Measuring range	+14°C		+28°C
Hysteresis	-0.25°C		+0.25°C
Night-time reduction	-4°C (at address group „B“)		
Operating Voltage			
Rated operating voltage	Not required (supplied by Dupline signal line)		
Terminals			
Type	Clevis terminal		
Contact area	0.4 mm ∅		2.5 mm²
Housing			
Type	Housing for flush- and surface-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	IP20		
Order number, description	09 501 171, Room thermostat DRT 1		

5.3.8 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 and XP
- 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 light-green 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

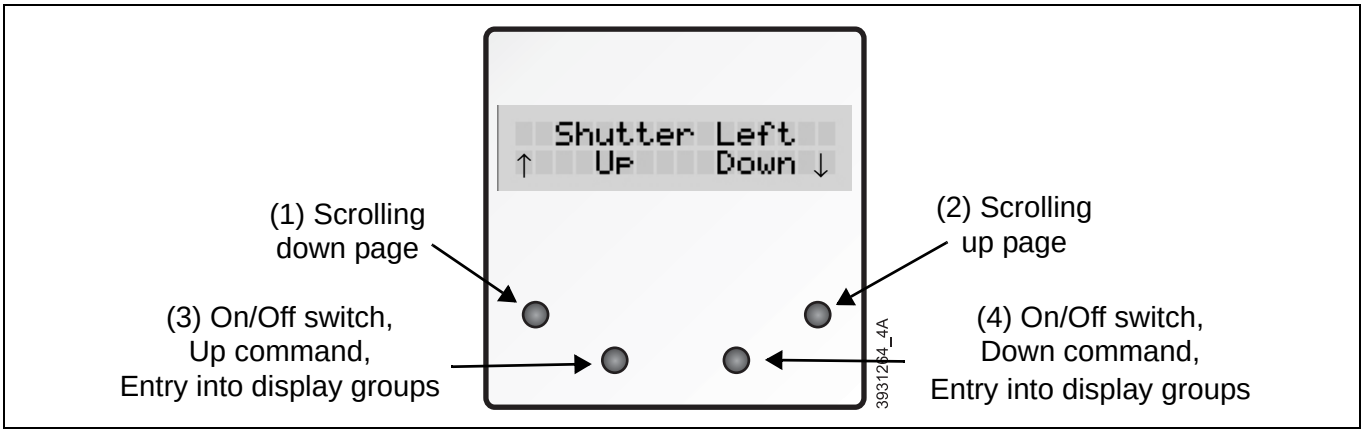
The DRT 2 is designed for fitting into deep flush-mounted installation boxes (dia. 68 mm). The DRT 2 can be integrated here as the cover enables you to use the adapting frames of most standard switch programmes. Please check beforehand that the DRT can be fitted into the individual switch programme.

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 NT24-250 and NT24-1300 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 Menü

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:

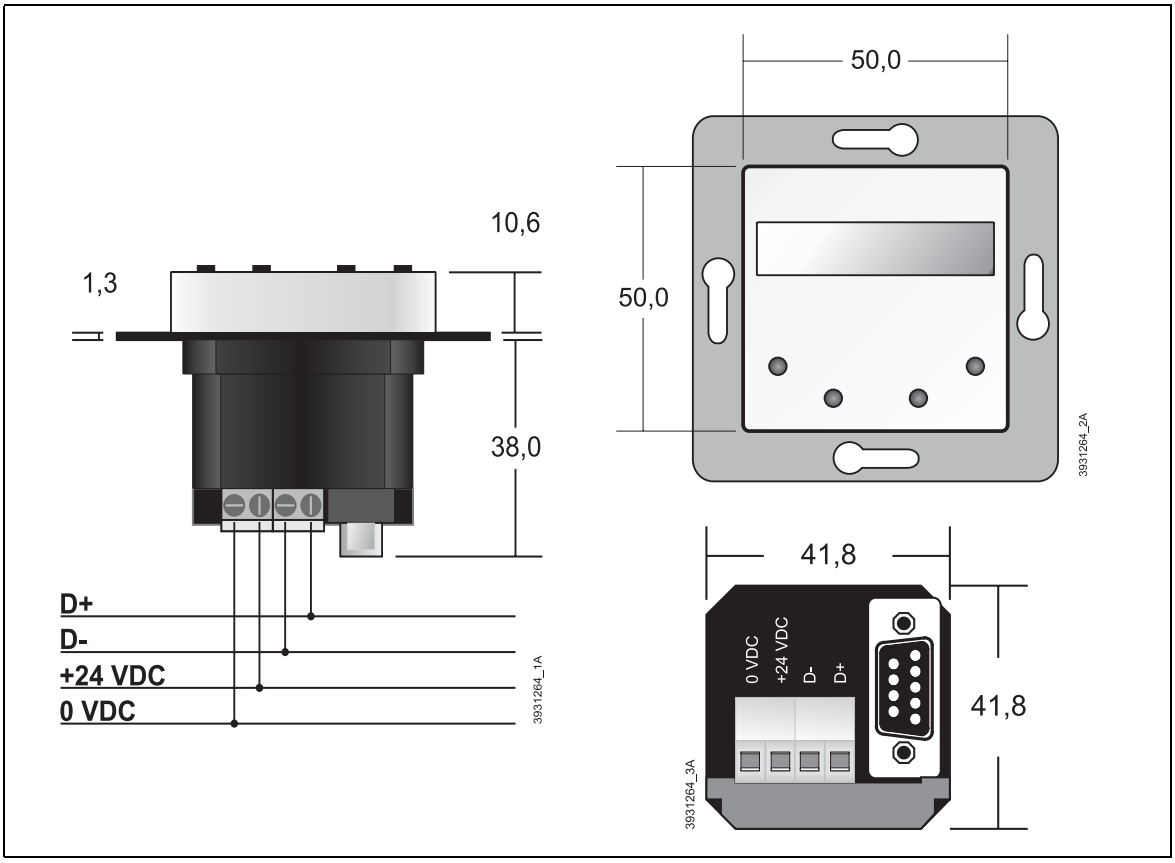
Menu Item	Selection	Description
Language:	German	Displays the current menu language(1)
Lighting:	Off	The back lighting will not be switched on.
	On	The back lighting will always be switched on.
	Key	By pressing a button the back lighting will be switched on for the length of time defined in DRTconf.
	Address	The back lighting is controlled by the Dupline channel configured via DRTconf (e.g. light-level sensor DLUX).
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		

Technical Data (Continued)

		Min.	Typ.	Max.
Sensor	Measuring range	0 °C		45 °C
	Resolution		0.25 K (°C)	
	Measuring error	-1 K (°C)		+1 K (°C)
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		
Platforms		Microsoft® Windows® 2000, Windows® XP		
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 grey; 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, EN55022 / EN61000-6-3 and EN55024 / EN61000-6-1		
Order number, Description		09 501 220, Room thermostat DRT 2		

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

5.3.9 DSS 4R/DSS 4R-EIB: Operating Signal Sensors with Acknowledgement

- DSS 4R: Connection for standard 4-way switches and contacts
- DSS 4R-EIB: Connection for 2-way EIB-switches
- 2-way acknowledgement each with 80 mA output current
- Option of connecting a LED for indicating bus status
- Easy, decentralized installation behind the push-button
- 24 VDC power supply

Product Description

The DSS 4R and DSS 4R-EIB operating signal sensors enable conventional and EIB push-buttons to be linked to the system. They are provided with 4 input and 2 acknowledge channels and, in addition, offer the possibility of indicating the bus status (BUS-OK LED). Because of their compact design the operating signal sensors can be fitted behind a push-button in a standard flush-mounted installation box.

Conventional push-buttons and potential-free switching contacts can be operated with the DSS 4R via the two 4-wire system cables supplied complete with end ferrules. An internal extended operating signal prevents any multiple switching as a result of possible contact bounce.

The 24 V acknowledgement outputs of the DSS 4R are each designed for loads of max. 80 mA (2 W). Basically, any desired lights may be employed; however, the maximum current-on-making may not be exceeded when using incandescent lamps. For this reason – and because of their longer lifespan – we recommend the use of LEDs.

EIB-enabled 2-way switches of Messrs. Berker, Gira, Peha and Siemens can be linked to the Dupline bus with the aid of the DSS 4R-EIB. Connection is made easy with the flexible circuit-board, supplied complete with system plug connectors. The switch can subsequently be fitted on the mounting board provided.

Notes on Applications

Because of their compact design the operating signal sensors will fit behind the push-button in a normal socket installation box. If the switches are locally distributed, the line between the switches and the sensors may be up to 1 m long.

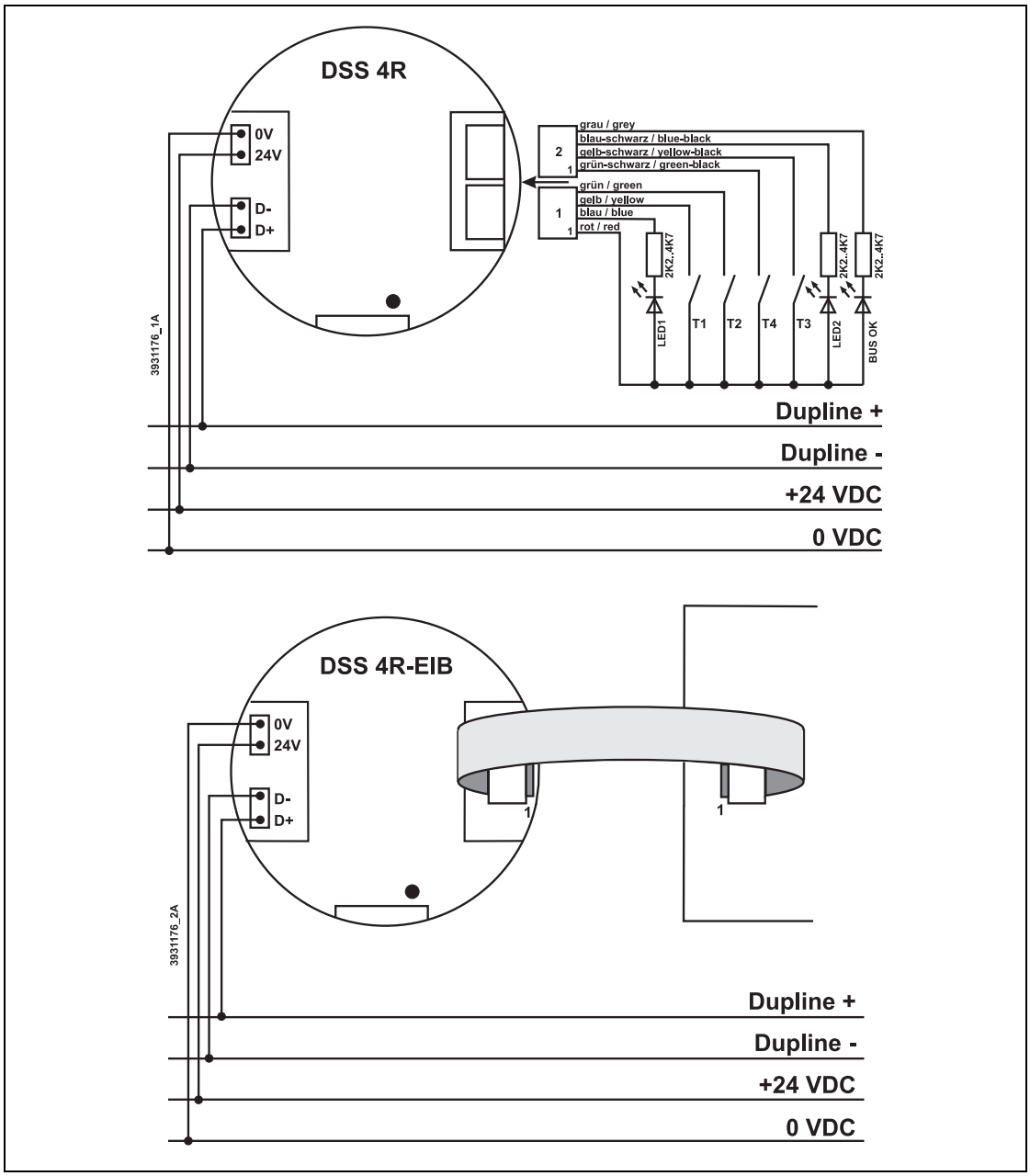
The clips provided facilitate the installation and allow the Dupline signal and the 24 VDC voltage to be connected and looped through.

Both sensors are 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.

Connections DSS 4R

	Pin	Color	Signal
Cable Loom 1	1	red	+24 VDC
	2	blue	Cathode LED1
	3	yellow	Operating signal input T1
	4	green	Operating signal input T2
Cable Loom 2	1	green-black	Operating signal input T4
	2	yellow-black	Operating signal input T3
	7	blue-black	Cathode LED2
	8	grey	Cathode BUS-OK-LED

Wiring Layout and Dimensions



Connections DSS 4R and DSS 4R-EIB

Terminal	Description	Terminal	Description
D-	Dupline signal conductor -	D+	Dupline signal conductor +
0 VDC	Operating Voltage 0 V (DC-)	24 VDC	Operating Voltage 24 VDC (DC+)

Dupline Channel Allocation

Channel	Description	Channel	Description
1	Input operating signal 1 (T1)	5	Acknowledge signal 1 (LED 1)
2	Input operating signal 2 (T2)	6	Acknowledge signal 2 (LED 2)
3	Input operating signal 3 (T3)	7	Not assigned

Dupline Channel Allocation (Continued)

Channel	Description	Channel	Description
4	Input operating signal 4 (T4)	8	Not assigned

Indicators

none

		Min.	Typ.	Max.
Dupline				
Current input			750 µA	
Input channels		4 operating signal inputs		
Output channels		2 acknowledgement outputs		
Inputs				
Type		Semiconductor inputs		
Voltage		21.5 VDC	24 VDC	26.5 VDC
Power supply		not applicable		
Contact load				1 mA
Permissible inh. contact resistance				1 kOhm
Length of line				1 m
Outputs (Acknowledgement)				
Type		Semiconductor outputs, 24 VDC open collector		
Load capacity / output				2 W (80 mA)
Operating Voltage				
Rated operating voltage		21.5 VDC	24 VDC	26.5 VDC
Own current consumption				9.8 mA
Terminals				
Terminals (mounted)	Type	Spring-loaded terminals, 2-pole with double connecting points		
	Contact area	0.4 mm ∅		0.8 mm ∅
Terminals (enclosed)	Type	Screw terminals with wire guard		
	Contact area	0.4 mm ∅		1.5 mm²
Cable Loom (DSS 4R)	Type	10 leads LiYv with end ferrules		
	Contact area		0.25 mm²	
Cable Loom (DSS 4R-EIB)	Type	Flexible circuit board, 10-pole with system plugs		
	Contact area		-	
Housing				
Type		Flush-mounted socket mounting plate for EIB switch		
Dimensions		∅ 50 x 10 (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		IEC60669, EN55022 / EN61000-6-3 and EN55024 / EN61000-6-1		
Accessories (DSS 4R-EIB)		Flush-mounted socket mounting plate for EIB switch		
Order number, description		09 501 154, Operating Signal Sensor DSS 4R 09 501 124, Operating Signal Sensor DSS 4R-EIB		

5.3.10 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. Any extensions of the leads between push-buttons and sensors must be kept as short as possible and may not exceed 1 m. In case of an extension please observe that both signal conductors must have the same length.

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.

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

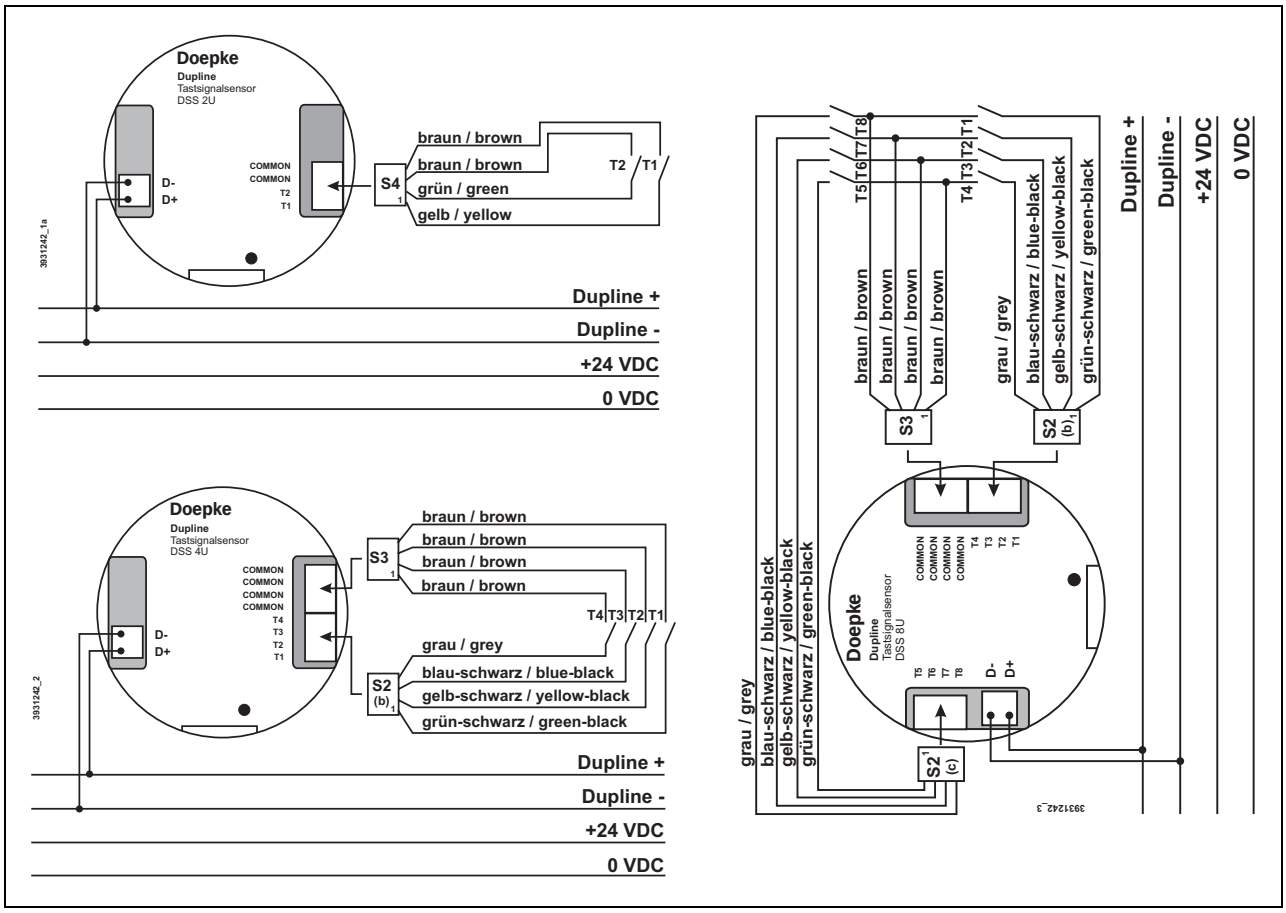
DSS ...			Channel	Description	Channel	Description
8U	4U	2U	1	Input operating signal 1	2	Input operating signal 2
			3	Input operating signal 3	4	Input operating signal 4
			5	Input operating signal 5	6	Input operating signal 6
			7	Input operating signal 7	8	Input operating signal 8

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

Indicators

none

Wiring Layout and Dimensions



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)

		Min.	Typ.	Max.
Dupline				
Current input		100 µA	100 µA	380 µA
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				1 m
Operating Voltage				
		not required (from Dupline signal)		
Terminals				
Spring-loaded terminals (mounted)	Type	Spring loaded terminals, 2-pole with double connection points for bus signal		
	Contact area	0.4 mm ∅		0.8 mm ∅
Screw term. (enclosed)	Type	Screw terminals with wire guard		
	Contact area	0.4 mm ∅		1.5 mm²
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		∅ 50 x 10 (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		IEC60669, EN55022 / EN61000-6-3 and EN55024 / EN61000-6-1		
Accessories		2-pole srew terminal (see above)		
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		

5.3.11 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.

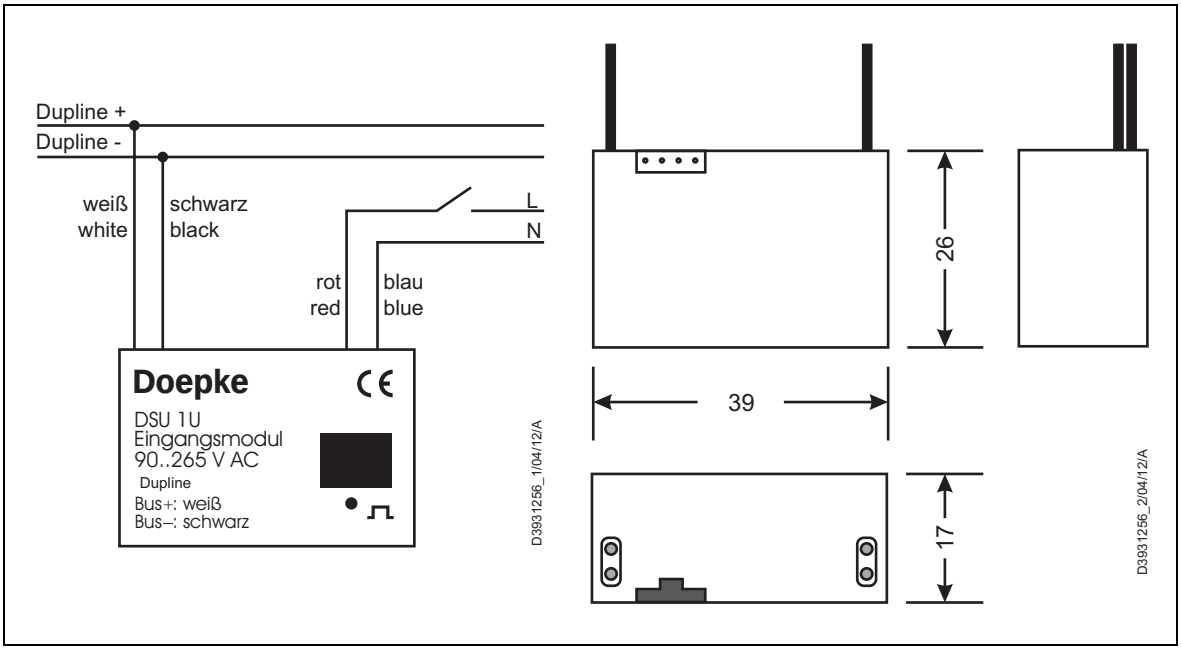
The input is suitable for AC voltages from 90 V to 265 V. There is no need to observe a specific polarity. The signal converter activates the encoded channel when exceeding a voltage difference of 90 VAC and disables the channel when the voltages drops below 60 VAC.

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

	Min.	Typ.	Max.
Dupline			
Current input			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, IEC60664		
Order number, description	09 501 206, Signal converter DSU 1U		

5.3.12 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.

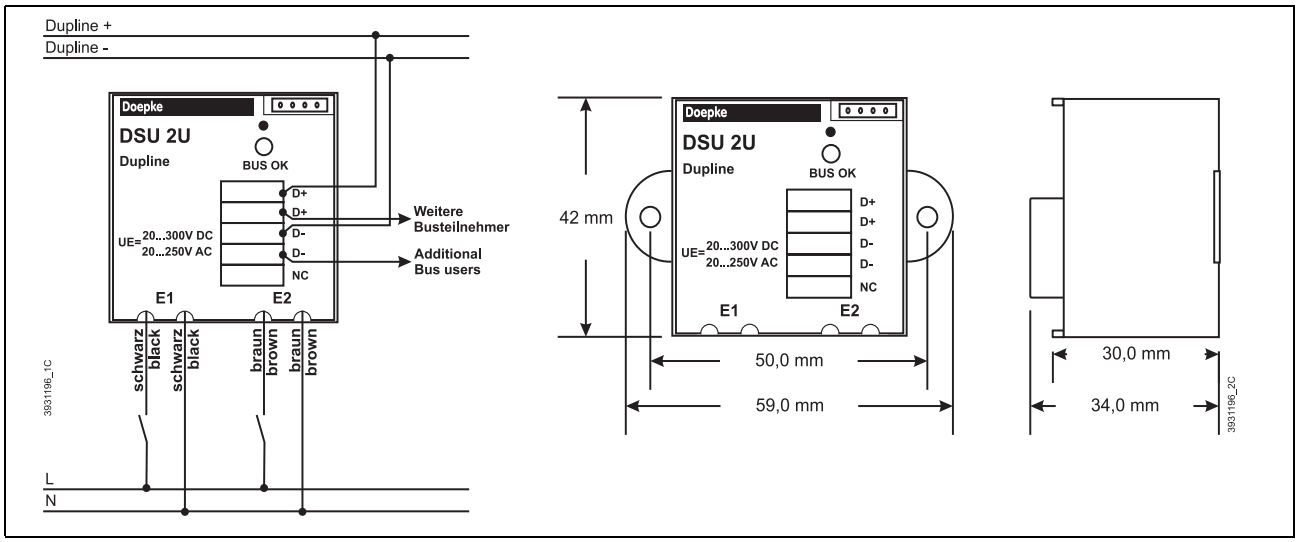
Notes on Applications

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

		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	IEC60669, EN55022 / EN61000-6-3 and EN55024 / EN61000-6-1		
	Order number, description	09 501 136, Signal converter DSU 2U		

5.3.13 DSU 8: 8-Channel Binary Signal Converter

- Converts 8 input signals
- DC voltage from 20 VDC to 300 VDC
- AC voltage from 20 VAC to 250 VAC
- Easily fitted into installation box
- Power supply 24 VDC

Product Description

The DSU 8 signal converter is an input device for up to eight signal voltages whose data are converted for transmission on the Dupline bus.

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

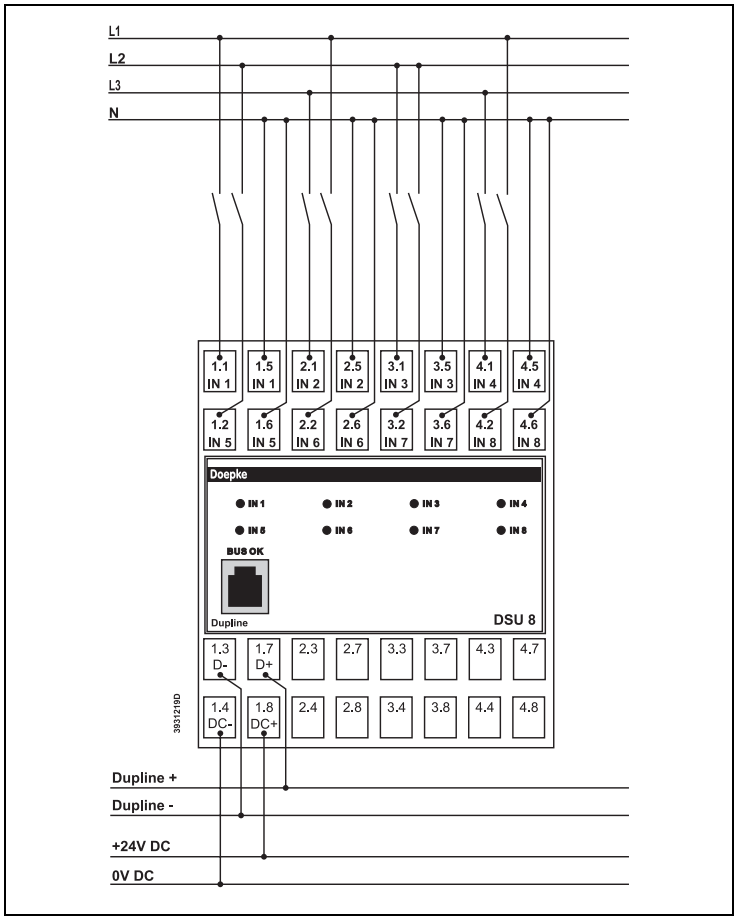
A green LED located in the coding and test socket on the front panel indicates that the Dupline bus signal is functioning properly.

The DSU 8 has a width of 4 modules and is supplied by the 24 VDC operating voltage.

Notes on Applications

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

Wiring Layout and Dimensions



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+)

Dupline Channel Allocation

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

Indicators

Indicator	Description
Green “BUS OK” LED	Dupline bus: Off - bus fault / On - bus OK
8 red LED „EIN“	Input signals 1..8: Off - no input signal detected On - input signal detected

		Min.	Typ.	Max.
Dupline				
	Current input		10 µA	
	Input channels	8 input signals (IN 1..IN 8)		
	Output channels	None		
Inputs				
	Type	electrically isolated, with rectification		
DC	Voltage	20 V		300 V
	Current input	65 µA		4 mA
	Line length			100 m
AC	Voltage	20 V		250 V
	Current input	15 mA		18 mA
	Line length			50 m
Operating Voltage				
	Rated operating voltage	21.5 VDC	24 VDC	26.5 VDC
	Current input	3 mA		40 mA
Terminals				
	Type	Screw terminal		
	Contact area	0.4 mm ∅		2.5 mm²
	Torque			0.6 Nm
Housing				
	Type	Distribution installation housing to DIN 43880 for rail-mounting to DIN EN50022		

	Min.	Typ.	Max.
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	IEC60669, EN55022 / EN61000-6-3 and EN55024 / EN61000-6-1		
Order number, description	09 501 155, Signal Converter DSU 8		

5.3.14 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.

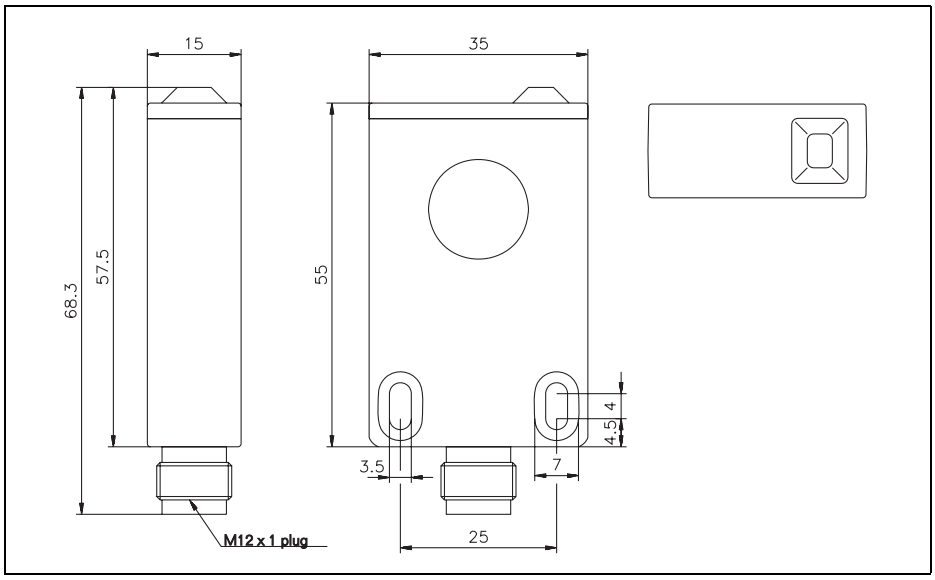
The DTS 1 is suitable for applications in both indoor and outdoor areas and can be mounted unobtrusively because of its compact design.

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 and Dimensions



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

	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. 450s (air flow = 0 m/s), 350s (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)		

5.3.15 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

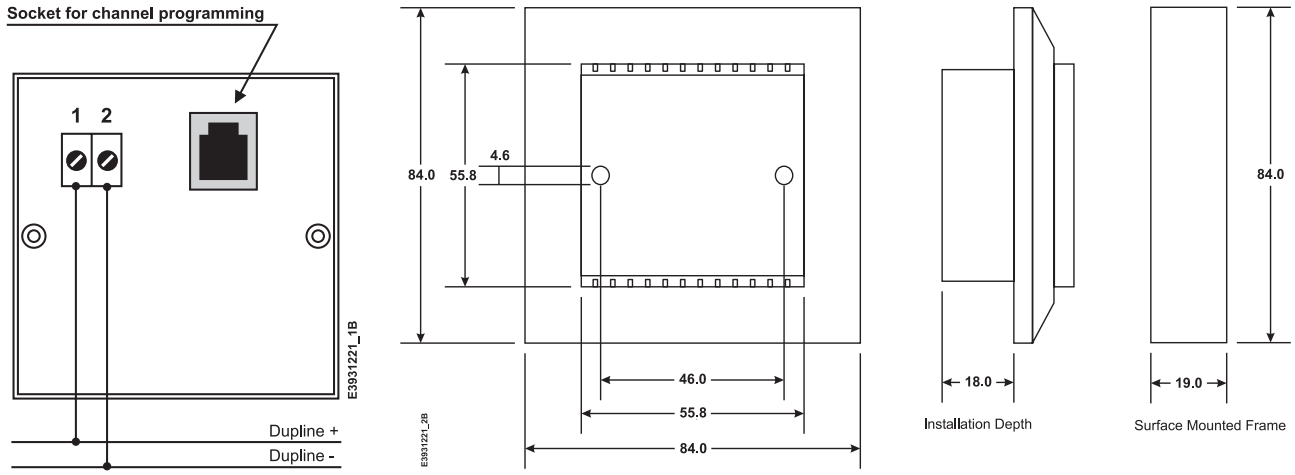
The DTS 2 is designed for use in internal areas and should be so mounted that the air vents are not obstructed by items such as e.g. curtains.

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 2P) 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

	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
Resolution	8 Bit (approx. 0.35°C/Bit)		
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	IP20		
Order number, description	09 501 168, Temperature sensor DTS 2 09 501 172, Temperature sensor circuit-board DTS 2-P		

5.3.16 DTZ 4: Rail Mounted 4-Channel Pulse Counter/Hours-Run Meter

- 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 ms respectively
- Enclosure protection type IP 40 (with installation in distribution board)
- 24 VDC power supply

Product Description

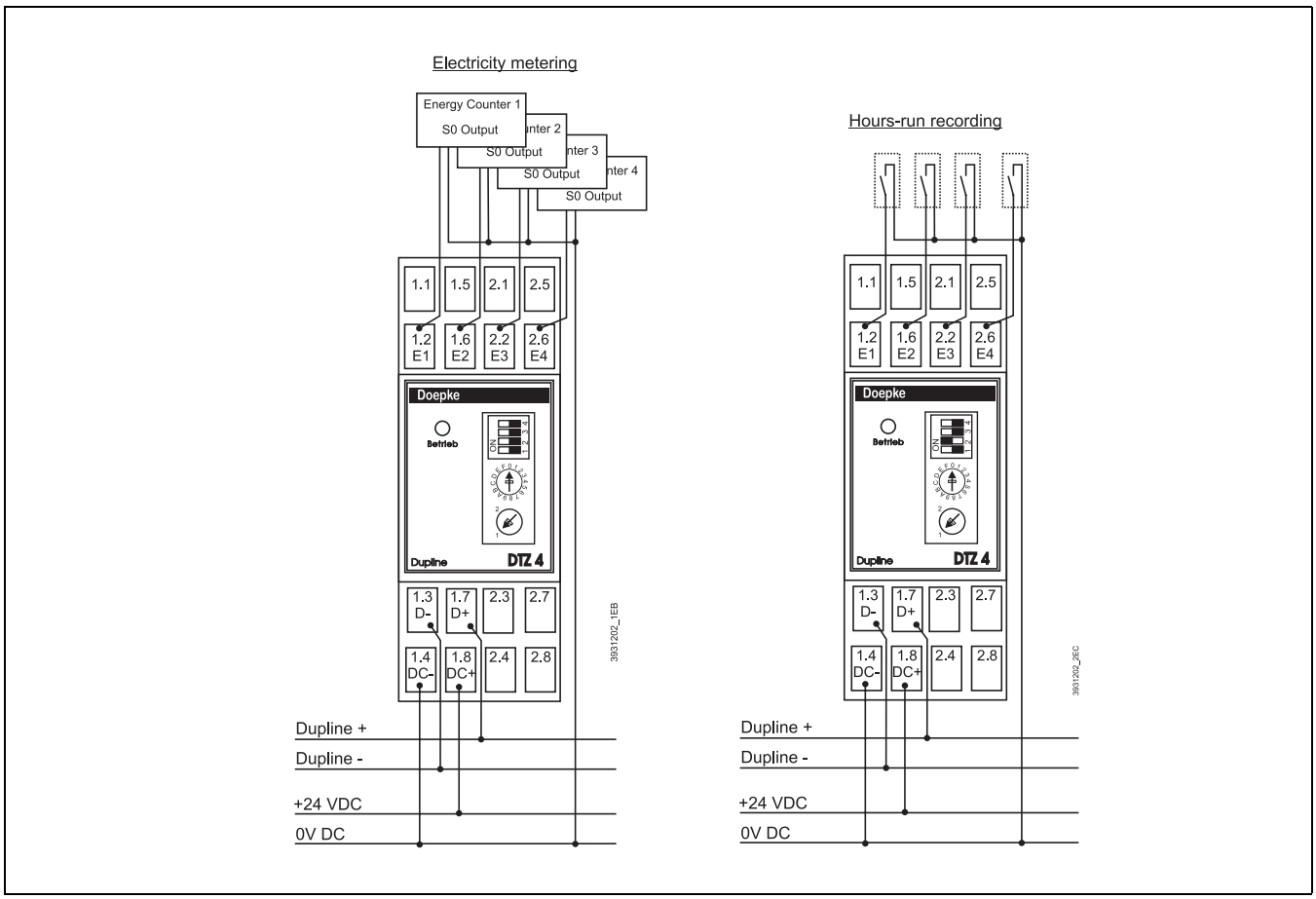
With the DTZ 4 pulse counter running times can be recorded or pulses counted at four inputs. Measured data can always be read, and reset, via the Dupline bus making the DTZ eminently suitable for recording energy consumption on camping sites and yachting marinas.

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 2.2.4.4 "Counter data (time-division multiplex method)"** on **Page 12**.

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 and Dimensions



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

Switch	Description	OFF	ON
1	Reset via Dupline bus	enabled	disabled
2	Operating mode	pulse counter	Hours-run meter
3 / 4	Selection of measuring range	-	-

Rotary Switch

Switch	Description
1 / 2	Setting the device's address

Indicators

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

	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 ms		
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	

	Min.	Typ.	Max.
Terminals			
Type	Strain-relief clamps		
Contact area	0.4 mm ∅		2.5 mm²
Housing			
Type	Distribution installation housing to DIN 43880 for rail-mounting to DIN EN50022		
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	IP 40 (when mounted in cabinets), IEC60669, EN55022 / EN61000-6-3 and EN55024 / EN61000-6-1		
Order number, description	09 501 145, Pulse Counter DTZ 4		

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

5.3.17 DWS 1: Water Stop Sensor

- Detection of water leakage
- Unobtrusive installation at baseboards
- Transmission of a life signal
- Decentralised module with low current consumption (800 µA)
- 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.

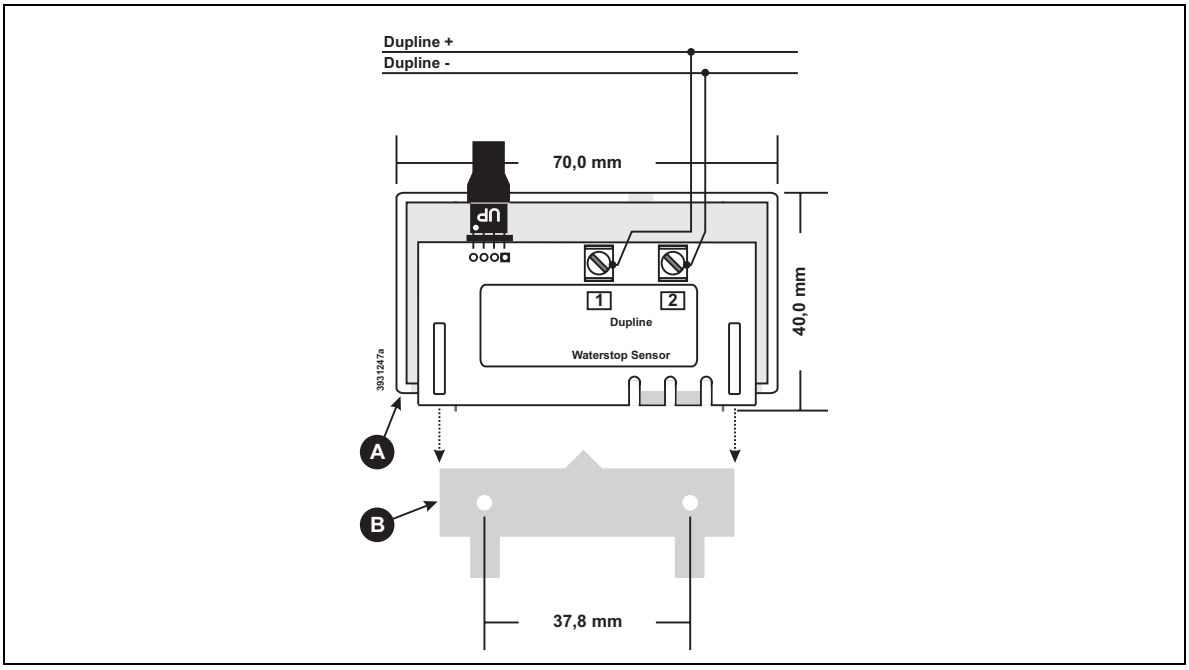
Notes on Applications

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	Dupline signal conductor + (D+)	2	Dupline signal conductor - (D-)

	Min.	Typ.	Max.
Dupline			
Current input		800 µA	
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 Light Scene Dimmer, DIN-Rail Mounted

- 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
- Automatically controlled dimming up and dimming down according to memory setting
- 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.

For a detailed description of the configuration and operation refer to the operating instructions on the Building System CD (Order no. 09 501 001) or the Internet at http://www.doepke.de/uk.

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.

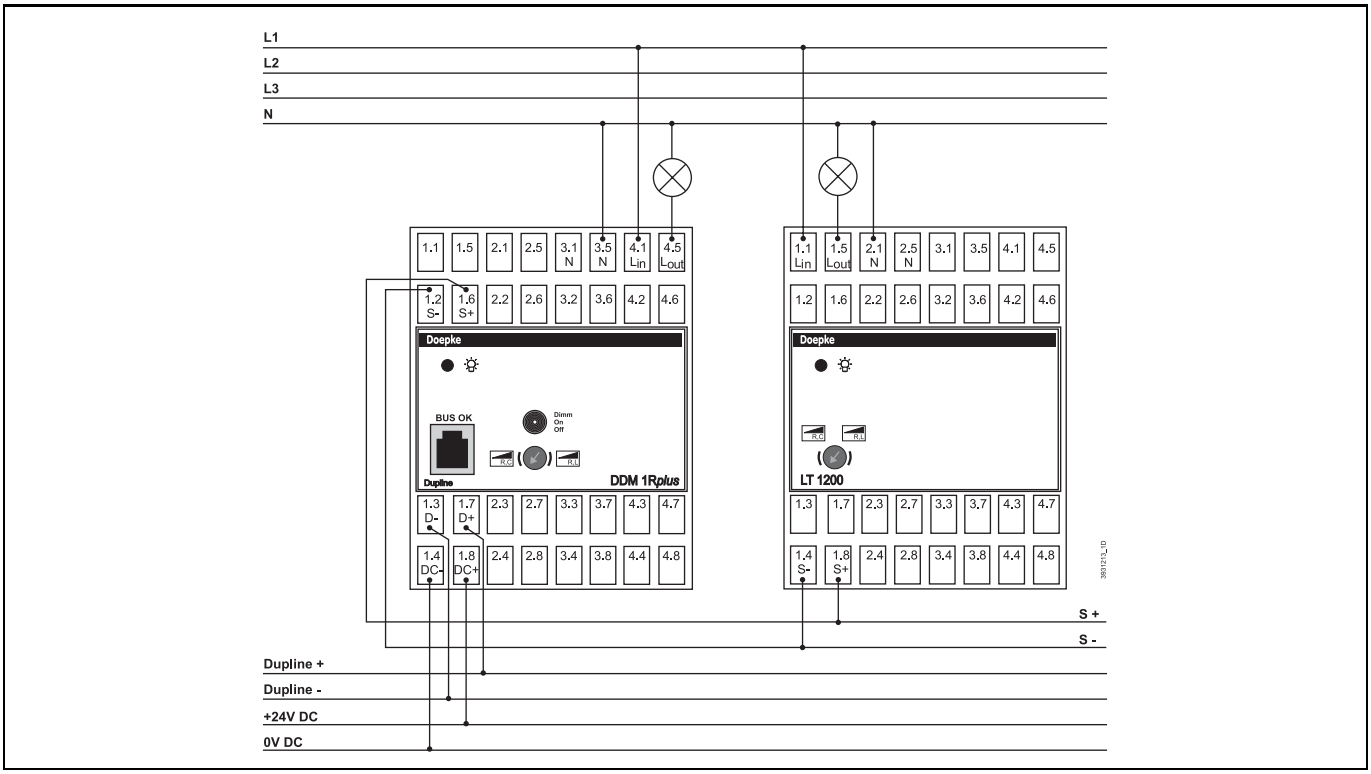
(1) Overload at output: cycling slowly - short-circuit at output: permanently on.

Indicators

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



	Min.	Typ.	Max.
Dupline			
Current input		10 µA	
Input channels	None / 2 acknowledge signals		
Output channels	4 control channels (channels 1..4)		
Outputs			
Type	Dimming output		
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		

	Min.	Typ.	Max.
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 to DIN 43880 for rail-mounting to DIN EN50022		
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	IEC60669, EN55022 / EN61000-6-3 and EN55024 / EN61000-6-1		
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 24V supply. One LT 500 or LT 1200 typically requires 1 mA.

5.4.2 DDMU 1Rplus: 1-Way Light Scene Dimmer 1..10V, DIN-Rail Mounted

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

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...10V 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...10V 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 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.

For a detailed description of the configuration and operation refer to the operating instructions on the Building System CD (Order no. 09 501 001) or the Internet at http://www.doepke.de/uk.

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 VDC (DC+)

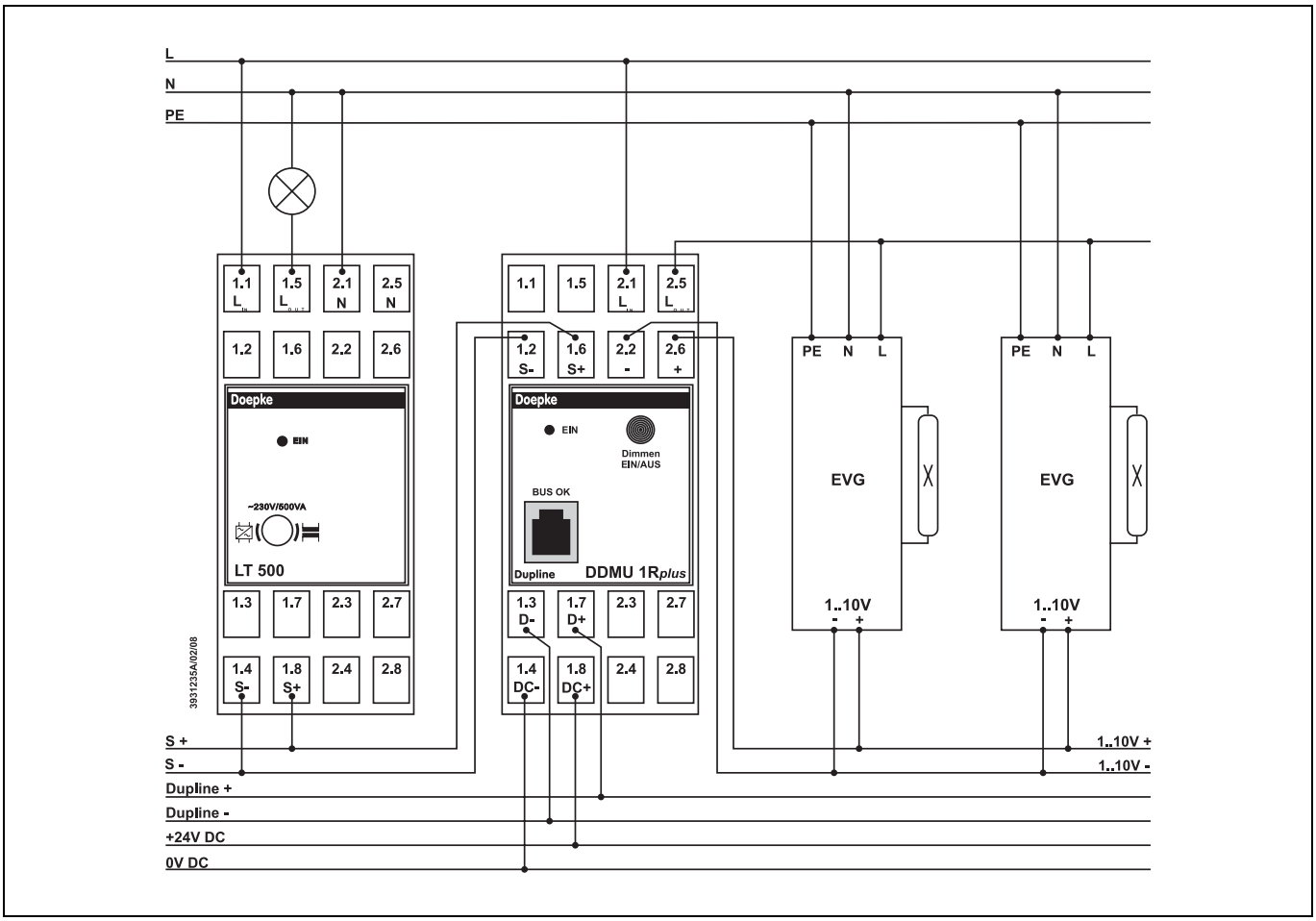
Dupline Channel Allocation

Channel	Description	Channel	Description
1	Central Off / Lighting scenes 3/4/6	5	Ackn. signal dimming output
2	Dimming / On / Off	6	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..10V resp. PWM control output are switched off On: 1..10V resp. PWM control output are switched on

Wiring Layout and Dimensions



	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			
Type	PWM(3) control output, approx. 70 Hz		
Rated voltage	20 V	24 V	26 V

	Min.	Typ.	Max.
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 to DIN 43880 for rail-mounting to DIN EN50022		
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	IEC60669, EN55022/EN61000-6-3 and EN55024/EN61000-6-1		
Order number, description	09 501 181, Lighting scene dimmer DDMU 1***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 24V supply. One LT 500 or LT 1200 typically requires 1 mA.

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

- DDM 2/DDM 2*plus*:
  - 2 outputs each of 200 W, protected against overload, short-circuit, overvoltage, outage
- DDMU 2 und DDMU 2*plus*:
  - 2 outputs 1...10 V for up to 25 el. chokes à 58 W
- *plus* series: 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. Models with the suffix "*plus*" offer in addition the possibility of individually storing, and recalling via Dupline, up to six lighting scenes per channel.

All 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 of the "*plus*" series 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.

Dimmers equipped with load outputs (DDM 2/DDMU 2*plus*) are provided with comprehensive protective mechanisms to safeguard against overloads, overvoltage and short-circuits. If the dimmers 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 this will attempt 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.

Dimmers of the DDMU series are provided with 1..10 V outputs for connecting el. ballast and also incorporate a special feature: a rotary switch on the front panel of the devices which is used for selecting one of two dimming characteristics for these outputs. The dimmers can thus be adapted to the sensitivity of the electronic ballast.

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 all dimmers are equipped with a LED on the front panel, as well as with acknowledge outputs which, in the case of DDM 2 devices, also display the error code. These outputs are electrically isolated and can be routed e.g. to inputs of a DSM 4E or DSU 8. An example of a connection layout is provided under **Wiring Layout and Dimensions**.

The following table illustrates the functions of the dimmers:

	DDM 2	DDM 2*plus*	DDMU 2	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)	(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
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 200 W each	■	■			Load outputs, individually dimmable
2 outputs 1..10 V			■	■	1..10 V outputs, individually dimmable
2 outputs PWM			■	■	PWM outputs, individually dimmable
Detection of overload, overvoltage, short-circuit, of load outage	■	■			Automatic disconnection of outputs

(1) Indicates only operational status.

Notes on Applications

The wiring 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:

	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 %
Light. scene 3	■		■		■		■		25 %
Light. scene 4	■			■	■			■	40 %

	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 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.

For a detailed description of the configuration and operation refer to the operating instructions on the Building System CD (Order no. 09 501 001) or the Internet at http://www.doepke.de/uk.

Dupline Channel Allocation

Type	Channel	Dimming Ch.	Description	Channel	Dimming Ch.	Description
DDM 2 DDMU 2	1	A	Central-Off	5	B	Central-Off
	2		Dimming/On/Off	6		Dimming/On/Off
	3		100% Soft-On	7		100% Soft-On
	4		-	8		-
DDM 2*plus* DDMU 2*plus*	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 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 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**
	3.4/4.4	Pulse width mod. output **S-** channel **A**/channel **B**	3.8/4.8	Pulse width mod. output **S+** 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)

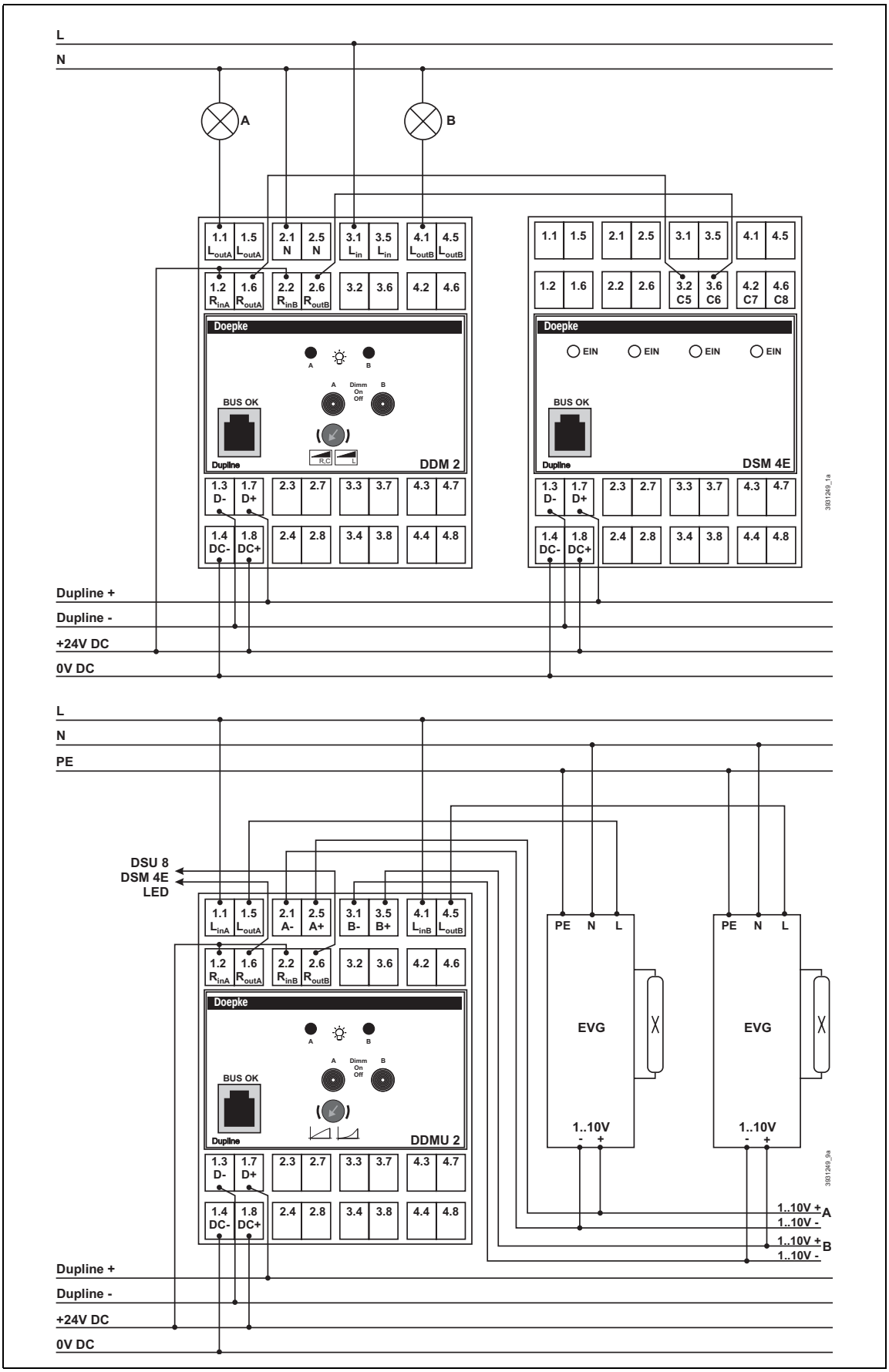
(1) The potentials between individual acknowledgement channels and between the acknowledgement channels and the operating voltage are isolated.

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 a coded channel or pressing the dimmer button) / load outage of both outputs
	Slow single flashing(1) (A oder B)	Overload (excess temperature): Switch-on after cooling down / load outage

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

Wiring Layout and Dimensions



		Min.	Typ.	Max.
Dupline				
Current input			10 µA	
Input channels		None		
Output channels		8 control channels (Output A: 1..4, Output B: 5..8)		
Outputs (DDM 2/DDM 2*plus*)				
Type		2 MOS-FET dimmer outputs		
Rated voltage		215 VAC	230 VAC	250 VAC
Rated current/load capacity(1)				200 W
Dimming speed(2)			4.5 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/DDMU 2*plus* only)				
Type		PWM control output, approx. 110 Hz		
Rated voltage		15 V	21 V	26 V
Rated current/load capacity(4)				30 mA
Outputs El. Ballast (DDMU 2/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)			4.5 s	
Relay output for El. Ballast (DDMU 2/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, all 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 ...		12 mA		14 mA
Current input DDMU ...		12 mA		34 mA
Terminals				
Type		Strain-relief clamps		
Contact area		0.4 mm ∅		2.5 mm²
Housing				
Type		Distribution installation housing to DIN 43880 for rail-mounting to DIN EN 50022		
Dimensions		72 x 85 x 58 (W x H x D in mm) / 4 modules		

	Min.	Typ.	Max.
Material	Polycarbonate		
General technical data			
Ambient temperature	-10°C		+50°C
Atm. humidity	max. 85% (exposure to dew not permissible)		
Encl. protection type / standards	IEC60669, EN55022 / EN61000-6-3 and EN55024 / EN61000-6-2		
Order number, description	09 501 173, DDM 2 dimmer 09 501 187, DDM 2*plus* lighting scene dimmer 09 501 176, DDMU 2 1..10 V 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 24V supply. One LT 500 or LT 1200 typically requires 1 mA.

5.4.4 DNP 8A/DPN 8A: 8-Way Binary Output Board (24 VDC)

- Predestined for use in control boards
- 8 binary, pole-reversal proof outputs which are switched towards 0 VDC or 24 VDC
- LED indicator lamp for operating voltage and bus signal
- Support for mounting on Din-rail available

Product Description

The DNP 8A and DPN 8A output boards offer 8 outputs each. Because of their design and connection data they are mainly suitable for installation in control and display panels, where open circuit boards can be used.

The DNP 8A permits small loads to be connected to a DC voltage of 24 V, which is made available by the board.

With the DPN 8A the loads can be jointly connected to neutral of the DC power supply.

Both boards are equipped with a LED to indicate a correct bus signal as well as with a LED to indicate that operating voltage is applied.

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 "OFF".

Notes on Applications

When connecting the boards it should be noted that – contrary to other inputs and outputs – the 0V-lead as well as the Dupline signal conductor (-) must be connected to the „GND“ terminal.

Moreover, any small loads or switches which when operated connect with 0V may not be connected directly to the Dupline signal conductor (-). For further details please refer to **Chapter 2.3.4.4 "Components with external DC power supply"** on **Page 15**.

Connections

Terminal	Description	Terminal	Description
O1..O4	Output 1 ... Output 4	O5..O8	Output 5 ... Output 8
DUP	Dupline signal conductor + (Dupline+)	GND	Dupline signal conductor - (Dupline -) and 0 VDC operating voltage
POW	24 VDC operating voltage	DC+	Voltage for output load

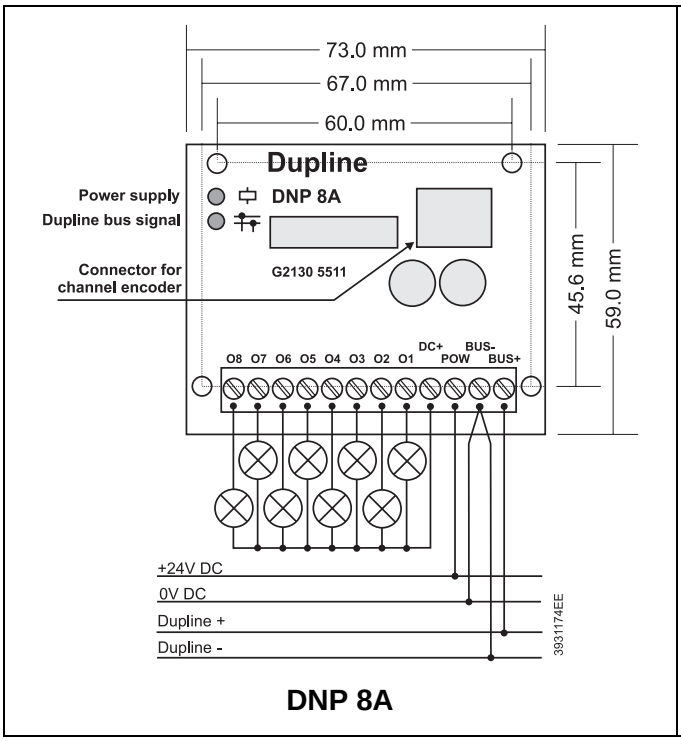
Dupline Channel Allocation

Channel	Description	Channel	Description
1..4	Output 1 ... Output 4	5..8	Output 5 ... Output 8

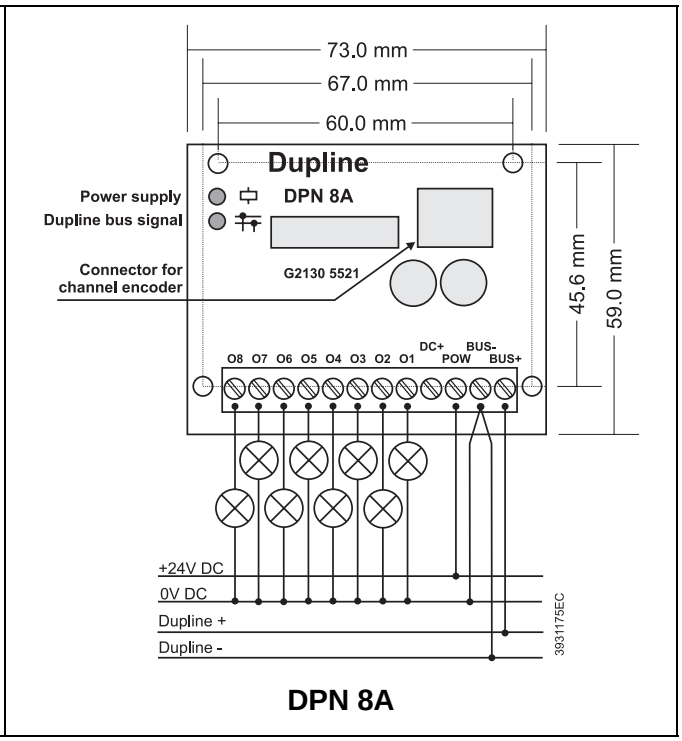
Indicators

Indicator	Description
Green LED	Operating voltage: Off – no supply / On – operating voltage OK
Yellow LED	Dupline bus: Off – bus fault / On – bus OK

Wiring Layout and Dimensions



DNP 8A



DPN 8A

	Min.	Typ.	Max.
Dupline			
Current input		100 µA	
Input channels	none		
Output channels	8 semiconductor outputs (channels 1..8)		
Outputs (DNP 8A)			
Type	8 NPN-transistors, not short-circuit-proof		
Voltage drop			1.2 V
Breaking capacity			200 mA
Rated current (per channel)			50 mA
Leakage current in Off-status		100 µA	
Outputs (DPN 8A)			
Type	8 PNP-transistors, not short-circuit-proof		
Voltage drop		-2.0 V	-2.8 V
Breaking capacity			200 mA
Rated current (per channel)			50 mA
Leakage current in Off-status		200 µA	
Operating Voltage			
Rated operating voltage	10 VDC	24 VDC	30 VDC
Current input		45 mA	
Current at make			1 A
Terminals			
Type	Screw terminal		
Contact area	0.4 mm ∅		2.5 mm²

	Min.	Typ.	Max.
Housing			
Type	Open circuit board		
Dimensions	approx. 73 x 59 (W x H in mm)		
General technical data			
Ambient temperature	-20°C		+50°C
Atm. humidity	20%		80%
Encl. protection type / standards	-		
Accessories	4 retaining clips for mounting the assembly. Optional: Support bracket for mounting on DIN-rail		
Order number, description	09 501 117, 8-way output DNP 8A 09 501 133, 8-way output DPN 8A 09 501 130, DIN-rail support bracket DPH 1 09 501 152, DIN-rail support bracket DPH 2		

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

- Controls one shutter actuator - 230 VAC / 2A
- 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 230V 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 15 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

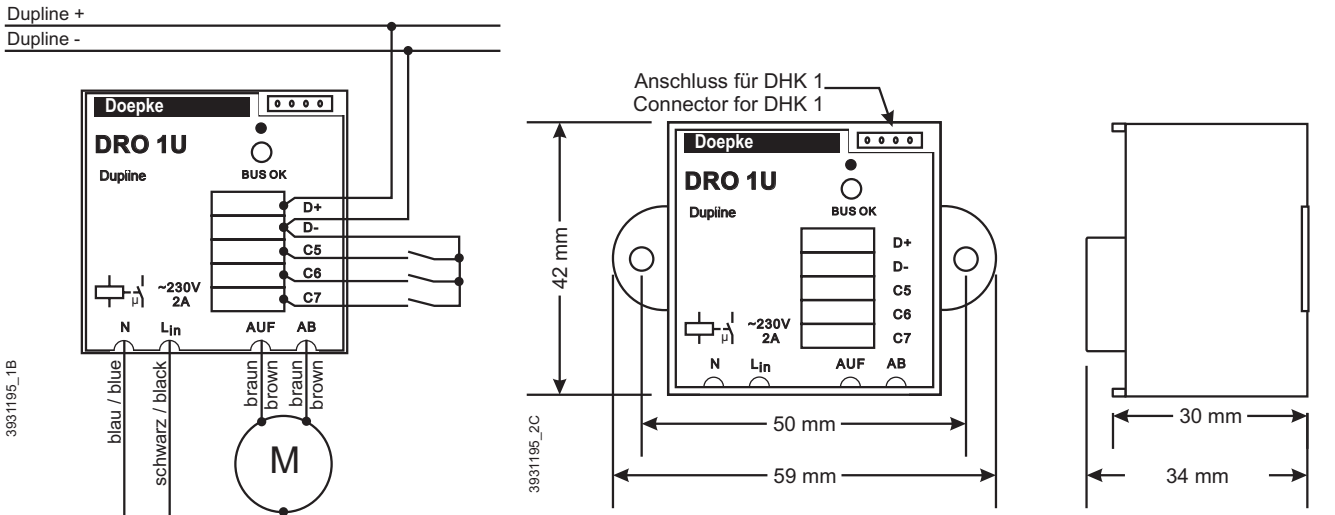
Caution! For the control of motors it is absolutely necessary to use the ProLine object „Roller blind“, since otherwise the required reverse delays cannot be kept. This may lead to damages at the relay contacts and motors connected to them.

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.).

Due to the software’s locking the direction of control in the channel generator, both signals will be transmitted following a DOWN instruction. This also has the effect that both signals are indicated by the tester, this is therefore not a fault indication.

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

	Min.	Typ.	Max.
Dupline			
Current input			10 µA
Input channels	3 (Semiconductor inputs, C5..C7)		

	Min.	Typ.	Max.
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	0.6 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	IEC60669, EN55022 / EN61000-6-3 and EN55024 / EN61000-6-1		
Order number, description	09 501 138, Shutter control unit DRO 1U		

5.4.6 DRO 2: Rail Mounted 2-Channel Shutter Control Unit

- Control of 2 shutters - 230 VAC to max. 2 A
- Electronic and mechanical latching of the direction of shutter movement

Product Description

With the DRO 2 shutter control unit two independent shutter motors, or drives of blinds and skylights, can be controlled. Drives with a current rating of up to 2 A can be controlled at 230 VAC per relay; provided that they are part of the same circuit.

The DRO 2 is equipped with a safety circuit which locks the control direction electronically as well as via the software; furthermore, any incorrect operation is prevented by the channel generator's logic facility.

The green LED situated in the coding and test socket indicates that the Dupline bus signal is functioning properly. Two further LEDs per output, "UP" and "DOWN", indicate the current control direction of the output.

The status of outputs in the event of a bus fault can be preconfigured and is adjusted to „UP" („1") by factory; by means of the hand encoder DHK 1 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.).

Note: If the motor runs in the wrong direction despite a correct address configuration, then the relevant connecting wires of the motor have been interchanged. In such a case reconnect the wires correctly - under no circumstances may the address be exchanged.

Due to the software's locking the direction of control in the channel generator, both signals will be transmitted following a DOWN instruction up to channel generator version 3.06. This also has the effect that both signals are indicated by the tester, this is therefore not a fault indication.

Usage of DC drives

With the newer design of DRO 2 (with separated L_{IN} terminals for the motors) you can also control DC drives. You'll find details about this in **Chapter 7.2 "DRO with DC Drives"** on **Page 186**.

Dupline Channel Allocation

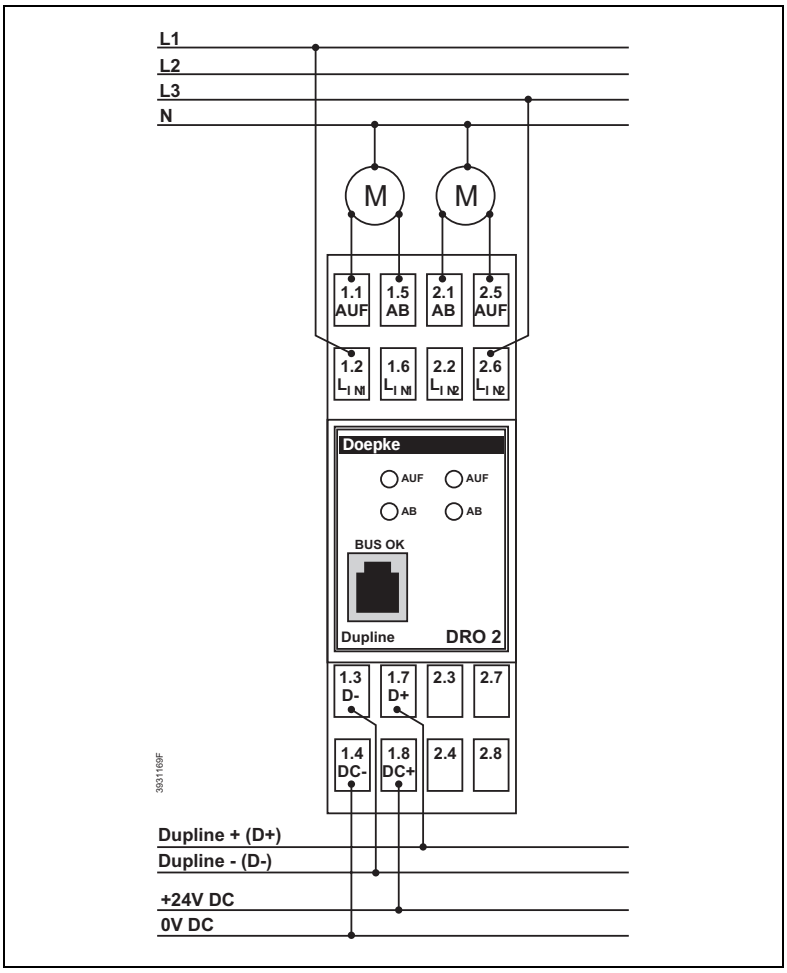
Channel	Description	Channel	Description
1	Motor 1 UP	5	Not assigned
2	Motor 1 DOWN	6	Not assigned
3	Motor 2 UP	7	Not assigned
4	Motor 2 DOWN	8	Not assigned

Connections

Terminal	Description	Terminal	Description
1.1/1.5	Motor 1 output (UP/**DOWN**)	1.2 / 1.6	Motor 1 phase input L_{IN} (1)
2.1/2.5	Motor 2 output (**DOWN**/UP)	2.2 / 2.6	Motor 2 phase input L_{IN}
1.3	Dupline signal conductor - (Dupline-)	1.7	Dupline signal conductor + (Dupline+)
1.4	0 VDC operating voltage (DC-)	1.8	24 VDC operating voltage (DC+)

(1) CAUTION: At the former design of DRO 2 terminals 1.2/1.6 were used for common phase input of motors 1 and 2; terminals 2.2/2.6 were not connected internally.

Wiring Layout and Dimensions



Indicators

Indicator	Description
Green “BUS OK” LED	Dupline bus: Off - bus fault / On - bus OK
2 red LED „AUF“	All-or-nothing relay 1 / 2: Off - no upward movement / On - upward movement
2 red LED „AB“	All-or-nothing relay 1 / 2: Off - no downward movement / On - downward movement

	Min.	Typ.	Max.
Dupline			
Current input		10 µA	
Input channels	none		
Output channels	4 control channels (shutters 1/2, each „UP“ and „DOWN“)		
Outputs			
Type	All-or-nothing relay		
Voltage		230 VAC	
Rated current / load capacity			2 A
Power factor	cos φ = 0.6 - 1		
Operating Voltage			
Rated operating voltage	21.5 VDC	24 VDC	26.5 VDC
Current input	3 mA		25 mA
Ripple voltage			$100mV_{pp}$
Terminals			
Type	Strain-relief clamps		
Contact area	0.4 mm ∅		2.5 mm²
Torque			0.6 Nm
Housing			
Type	Distribution installation housing to DIN43880 for rail-mounting to DIN EN50022		
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			85%
Encl. protection type / standards	IEC60669, EN55022 / EN61000-6-3 and EN55024 / EN61000-6-1		
Order number, description	09 501 108, Shutter control unit DRO 2		

5.4.7 DRO 4b/DRO 4c: Rail Mounted 4-Channel Shutter Control Units

- Control of 4 shutters - 230 VAC to max. 2 A
- Electronic latching of the direction of shutter movement
- Priority drive directions „Off“, „Up“ and „Down“ free selectable
- DRO 4c with „Step Mode“ for adjusting louvered blinds

Product Description

With the DRO 4b and DRO 4c shutter control units four independent shutter motors, or drives of blinds and skylights, can be controlled. Drives with a current rating of up to 2 A can be controlled at 230 VAC per channel.

These second-generation shutter control units (identified by the Up and Down arrows printed on the front panel) are equipped with a micro-controller which ensures that even with an incorrect channel generator configuration the required reverse idle time of 500 ms is maintained.

While the DRO 4b is designed for the 'classic' control of shutters and skylights, the DRO 4c offers a 'Step-Mode' feature for adjusting louvered blinds or shutters with slats. When using the latter model the option "Tilting Blinds" in the ProLine object "Roller blind" should therefore not be activated.

The green LED situated in the coding and test socket indicates that the Dupline bus signal is functioning properly. Two further LEDs per output, “UP“ and “DOWN“, indicate the current control direction of the output.

The status of outputs in the event of a bus fault can be preconfigured and is adjusted to „UP“ („1“) by factory; by means of the hand encoder DHK 1 the status can also be configured to „DOWN“ („0“) and changed at any time.

Notes on Applications

Address Assignment

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.).

Note: If the motor runs in the wrong direction despite a correct address configuration, then the relevant connecting wires of the motor have been interchanged. In such a case reconnect the wires correctly - under no circumstances may the address be exchanged.

„Step Mode“ (DRO 4c only)

The DRO 4c is provided with an automatic feature which facilitates the slat adjustment of blinds and shutters. The unit will generally switch to the so-called "Step-Mode" if the UP command is activated for no more than 1 second and the DOWN command is given immediately afterwards (within max. 2s). The DRO 4c then starts to pulse in the DOWN direction with a pulse-pause ratio of 100 ms:900 ms. And the same applies correspondingly for the opposite direction of course.

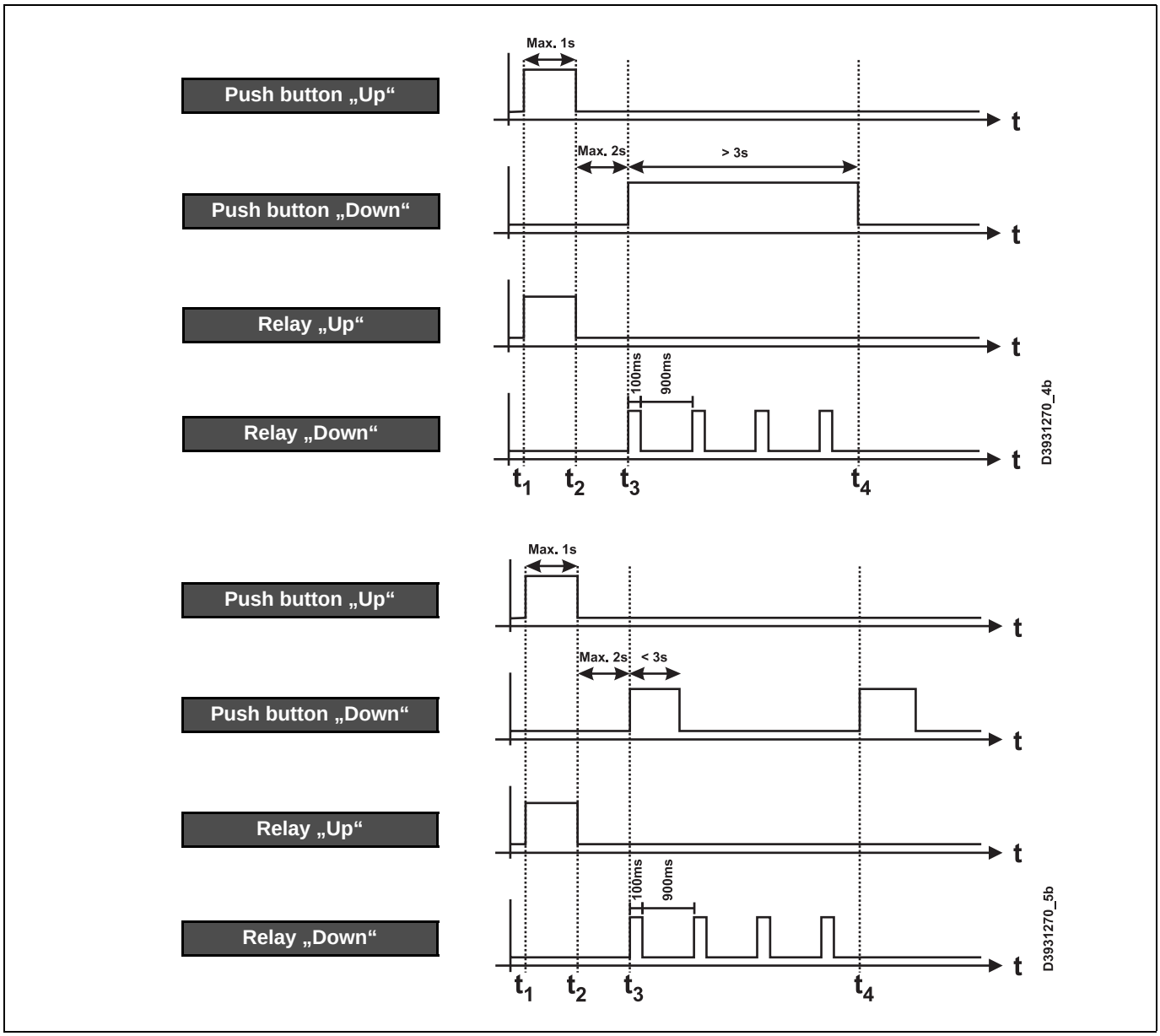
Note: Please be sure to observe the following points when using the DRO 4c:

- Not every drive is suitable for the step-mode. Therefore, operate the DRO 4c only with those drives which - according to their manufacturer - will not be damaged by frequent pulsing of 100 ms duration.
- Due to the wide range of different shutters and blinds perfect slat adjustment cannot be guaranteed in every case. If in doubt check the interaction between DRO 4c and blinds beforehand.
- As the actual slat adjustment with the DRO 4c is carried out by hardware, the "Tilting Blinds"

option should be deselected in ProLine or ProLine^{NG}.

- To use the step-mode, please adjust the „Reverse Delay“ in the configuration of the object „Shutter Control“ in ProLine or ProLine^{NG} to the minimum value of 500 ms. By increasing the reverse delay to 2000 ms, you may disable the step mode for single outputs of the DRO 4c.

The timing of the Step Mode looks like following:



Priority drive direction in the event of a bus fault

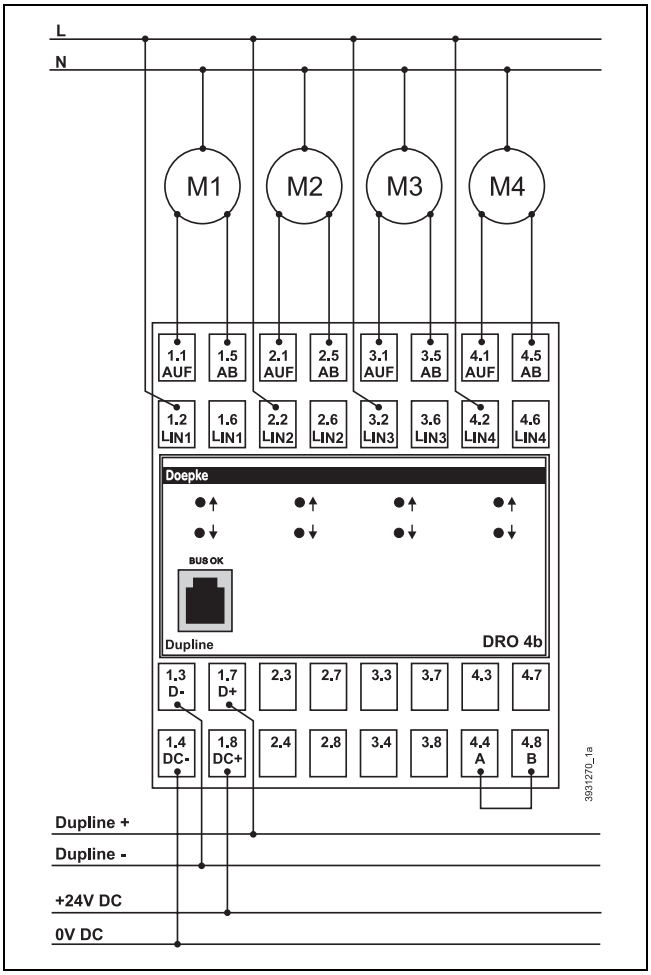
The priority drive direction in the event of a bus fault ("UP", "DOWN" or no movement) can be preset for all relays with the hand encoder depending upon the A-B bridge. Normally this bridge is inserted and the priority direction is "UP" (channel setting "1"). If "0" is set, the DRO 4 will - in the event of a bus fault - activate the drive direction "DOWN" provided the bridge is in place.

If the A-B bridge is removed, the DRO 4 will not activate the motors when a bus fault occurs.

Usage of DC drives

You can find examples of circuit diagrams with DC applications in **Chapter 7.2 "DRO with DC Drives"** on **Page 186**.

Wiring Layout and Dimensions



Connections

Terminal	Description	Terminal	Description
1.1/1.5	Motor 1 output (UP/DOWN)	1.2 / 1.6	Phase input motor 1
2.1/2.5	Motor 2 output (UP/DOWN)	2.2 / 2.6	Phase input motor 2
3.1/3.5	Motor 3 output (UP/DOWN)	3.2 / 3.6	Phase input motor 3
4.1/4.5	Motor 4 output (UP/DOWN)	4.2 / 4.6	Phase input motor 4
A-B 4.4/4.8	Jumper fitted: Pref. direction(1) „Up“ or „Down“, Not fitted: No movement	1.3	Dupline signal conductor - (Dupline-)
		1.7	Dupline signal conductor + (Dupline+)
1.4	0 VDC operating voltage (DC-)	1.8	24 VDC operating voltage (DC+)

(1) On bus fault.

Dupline Channel Allocation

Channel	Description	Channel	Description
1	Motor 1 UP	5	Motor 3 UP
2	Motor 1 DOWN	6	Motor 3 DOWN
3	Motor 2 UP	7	Motor 4 UP
4	Motor 2 DOWN	8	Motor 4 DOWN

Indicators

Indicator	Description
Green “BUS OK” LED	Dupline bus: Off - bus fault / On - bus OK
4 red LED „↑“	All-or-nothing relay 1 / 2 / 3 / 4: Off - no upward movement / On - upward movement
4 red LED „↓“	All-or-nothing relay 1 / 2 / 3 / 4: Off - no downward movement / On - downward movement

	Min.	Typ.	Max.
Dupline			
Current input		10 µA	
Input channels	none		
Output channels	8 control channels (shutters 1/2/3/4, each „UP“ and „Down“)		
Outputs			
Type	All-or-nothing relay		
Voltage		230 VAC	
Rated current / load capacity			2 A
Power factor	cos φ = 0.6 - 1		
Step Mode (DRO 4c only)			
Timing	Pulse: 100 ms; Pause: 900 ms		
Operating Voltage			
Rated operating voltage	21.5 VDC	24 VDC	26.5 VDC
Current input	6 mA		56 mA
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 to DIN43880 for rail-mounting to DIN EN50022		
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			85%
Encl. protection type / standards	IEC60669, EN55022 / EN61000-6-3 and EN55024 / EN61000-6-1		
Order number, description	09 501 214, Shutter control unit DRO 4b 09 501 215, Shutter control unit DRO 4c		

5.4.8 DSM 1U: Flush-Mounted, 1-Way Binary Relay Output

- 1-way relay output 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.

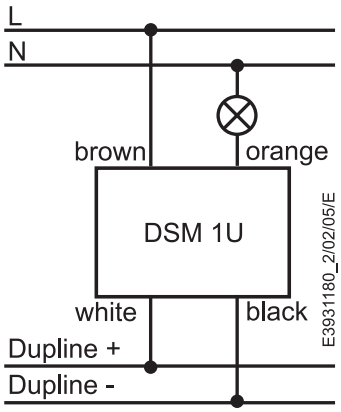
The DSM 1U does not require an external power supply as it is supplied by the Dupline signal line.

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

		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!

5.4.9 DSM 2: 2-Way Relay Output with 4 Semiconductor Outputs, DIN-Rail Mounted

- 2 binary 230 VAC / 16 A relay outputs
- 4 binary 24 VDC / 50 mA semiconductor outputs
- Switching status indicated by LEDs
- Compact DIN-rail mounted device

Product Description

The DSM 2 is a relay output for switching two independent loads, which can be operated on different phases with up to 16 A. The switching status of these outputs is indicated by two LEDs located on the front panel of the device.

It also permits the connection of four additional loads with a 24 VDC power supply and a current consumption of up to 50 mA per channel, e.g. control inputs from devices in the SI Building Management range. These loads have to be connected to the OV-conductor of the power supply.

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 to 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

When using the semiconductor outputs C5 to C8 it should be noted that the outputs are not short-circuit-proof and could be destroyed if a short-circuit occurs.

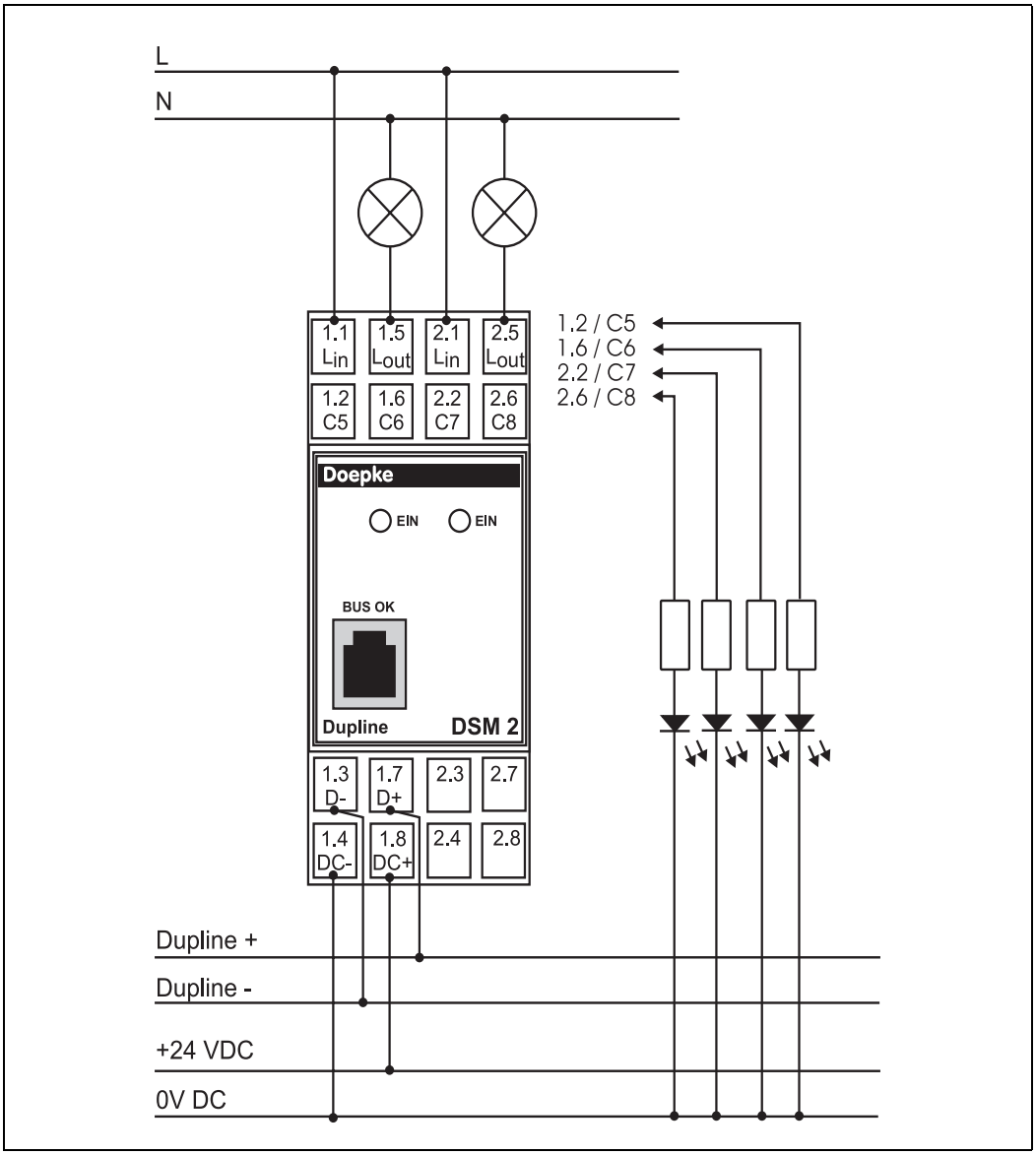
Dupline Channel Allocation

Channel	Description	Channel	Description
1	Relay output signal 1	5	Semiconductor output signal C5
2	Relay output signal 2	6	Semiconductor output signal C6
3	Not assigned	7	Semiconductor output signal C7
4	Not assigned	8	Semiconductor output signal C8

Connections

Terminal	Description	Terminal	Description
1.1 / 1.5	Relay switching channel 1 (L_{IN} / L_{OUT})	1.2 / C5	Semiconductor switching channel C5
2.1 / 2.5	Relay switching channel 2 (L_{IN} / L_{OUT})	1.6 / C6	Semiconductor switching channel C6
		2.2 / C7	Semiconductor switching channel C7
		2.6 / C8	Semiconductor switching channel C5
1.3	Dupline signal conductor - (Dupline-)	1.7	Dupline signal conductor + (Dupline+)
1.4	0 VDC operating voltage (DC-)	1.8	24 VDC operating voltage (DC+)

Wiring Layout and Dimensions



Indicators

Indicator	Description
Green “BUS OK” LED	Dupline bus: Off – bus fault / On – bus OK
Red LED	All-or-nothing relay 1 / 2: Off – relay open / On – relay closed

	Min.	Typ.	Max.
Dupline			
Current input		10 µA	
Input channels	None		
Output channels	6 control channels (2 relay / 4 semiconductor outputs)		
Semiconductor outputs			
Type	PNP transistors, switching to 0 V		
Output voltage	21.5 VDC	24 VDC	26.5 VDC
Load capacity (per output)			50 mA

		Min.	Typ.	Max.
Relay outputs				
Type		All-or-nothing relay		
AC	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 (70µF), 1250 W (100µF(2))		
	Capacitor for compensation	max. 70 µF (100µF(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		3 mA	5 mA	8 mA
Ripple voltage				$100mV_{pp}$
Terminals				
Type		Strain-relief clamps		
Contact area		0.4 mm ∅		2.5 mm²
Torque				0.6 Nm
Housing				
Type		Distribution installation housing to DIN 43880 for rail-mounting to DIN EN50022		
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		IEC60669, EN55022/EN61000-6-3 and EN55024/EN61000-6-1		
Order number, description		09 501 105, Two-way relay output DSM 2		

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

5.4.10 DSM 4M: 4-Channel Relay Output with manual operation, DIN-Rail Mounted

- 4-channel relay output 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 output 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.

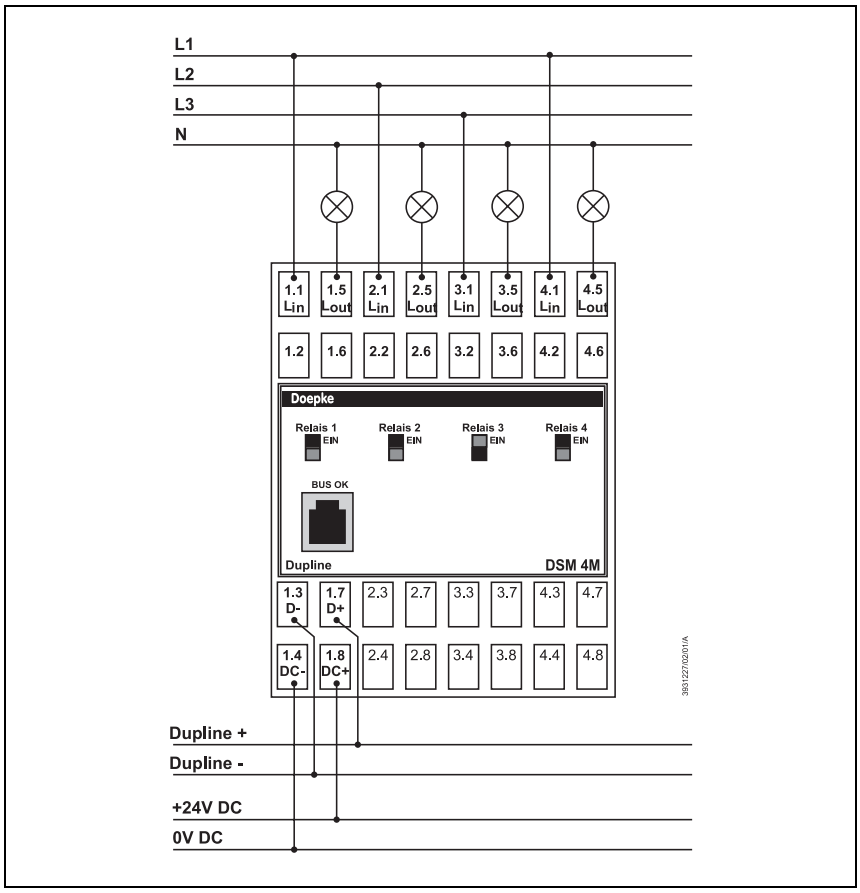
Dupline Channel Allocation

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

Connections

Terminal	Description	Terminal	Description
1.1	Switching ch. 1 (L_{IN})	3.1	Switching ch. 3 (L_{IN})
1.5	Switching ch. 1 (L_{OUT})	3.5	Switching ch. 3 (L_{OUT})
2.1	Switching ch. 2 (L_{IN})	4.1	Switching ch. 4 (L_{IN})
2.5	Switching ch. 2 (L_{OUT})	4.5	Switching ch. 4 (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
	All-or-nothing relays 1..4: Down - Relay open or no N-connection / UP - Relay closed

		Min.	Typ.	Max.
Dupline				
	Current input		10 µA	
	Input channels	4 acknowledge channels (channels 5..8)		
	Output channels	4 output switching signals (channels 1..4)		
Operating Voltage				
	Rated operating voltage	21.5 VDC	24 VDC	26.5 VDC
	Current input	8 mA	10 mA	12 mA
	Ripple voltage			100 mV_{pp}
Relay outputs				
	Type	All-or-nothing relay		
AC	Voltage	12 VAC		250 VAC
	Load capacity (per output)	100 mA		16 A

		Min.	Typ.	Max.
DC	Voltage	12 VDC		30 VDC
	Load capacity (per output)	100 mA		10 A
Lamp Loads(1)	Figures for no. of switching cycles	30.000		100.000
	Incandescent lamps	2500 W		1250 W
	Fluorescent lamps, uncompensated	2500 W		1250 W
	Fluorescent lamps, parall. compens.	1300 W / 140 µF		650 W / 70 µF
	Fluorescent lamps, load-lag circuit	2 x 2500 W		2 x 1200 W
	Halogen lamps, 230 V	2500 W		1200 W
	LV halogen lamps w. transformer	500 VA		500 VA
	HQL, uncompensated	2000 W		1000 W
	HQL, parallel compensated	2000 W / 140 µF		1000 W / 70 µF
	DULUX lamps, uncompensated	1600 W		800 W
	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 to DIN 43880 for rail-mounting to DIN EN50022		
	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	IEC60669, EN55022 / EN61000-6-3 and EN55024 / EN61000-6-1		
	Order number, description	09 501 174, 4-channel relay output DSM 4M		

(1) These data relate to connection requirements in accordance with IEC60669. Switching cycles for lamp loads not listed here are available upon request.

5.4.11 DSM 4R: 4-Way Relay Output with Acknowledge Feature, DIN-Rail Mounted

- 4-way binary relay output for installation in distribution panels
- Switching channels each with a capacity of 230 VAC / 16 A
- Physical acknowledgement of switching status via Dupline bus and LED

Product Description

The DSM 4R is a relay output with acknowledge function designed for controlling four independent loads which may be allocated to different phases. Each load can have a current consumption of up to 16 A.

Each switching channel is provided with an acknowledge feature to indicate the output voltage which is actually present. This acknowledgement can be given on the one hand by the LED and, on the other hand, by transmission via the Dupline bus.

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 to 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

The DSM 4R is suitable for usage in distribution cabinets in outside applications and thus can be used on camping sites and yachting marinas.

In order to utilize the physical acknowledgement of the module, each channel to be acknowledged has to be wired to the relevant N-terminal. The N-connections should not be used as a feed-through for the N-conductors of several loads. In the case of circuits involving differing RCCBs, care should be taken that N is correctly assigned.

The LED of a switching channel will not be lit if there is no N-connection. The right connection of L_{IN} and L_{OUT} has to be observed.

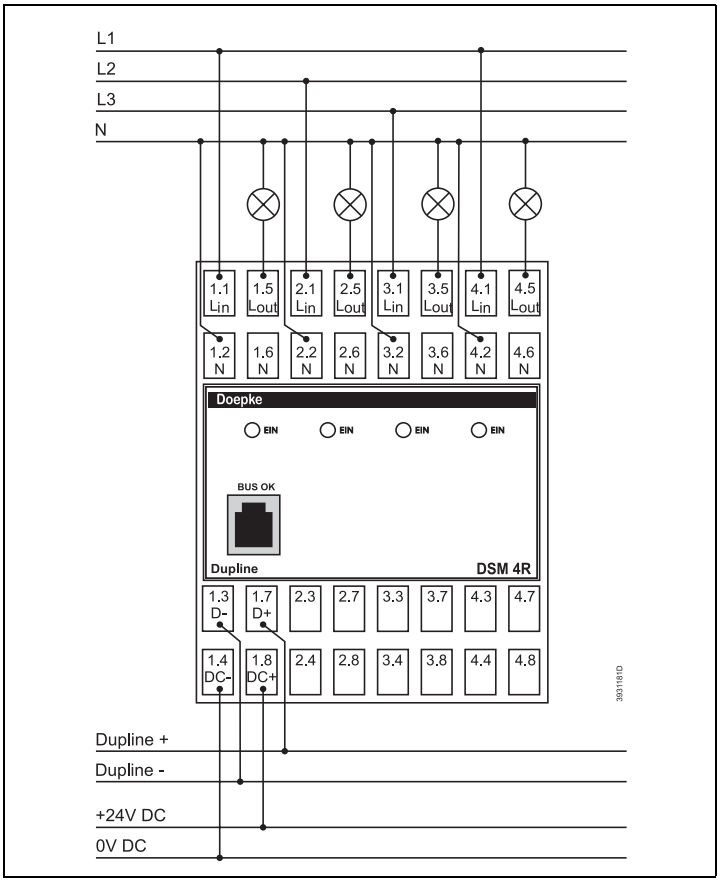
Dupline Channel Allocation

Channel	Description	Channel	Description
1..4	Relay output signals 1..4	5..8	Acknowledge signals 1..4

Connections

Terminal	Description	Terminal	Description
1.1 / 1.5	Relay switching channel 1 (L_{IN} / L_{OUT})	1.2 / 1.6	N-conductor input (acknowl. signal 1)
2.1 / 2.5	Relay switching channel 2 (L_{IN} / L_{OUT})	2.2 / 2.6	N-conductor input (acknowl. signal 2)
3.1 / 3.5	Relay switching channel 3 (L_{IN} / L_{OUT})	3.2 / 3.6	N-conductor input (acknowl. signal 3)
4.1 / 4.5	Relay switching channel 4 (L_{IN} / L_{OUT})	4.2 / 4.6	N-conductor input (acknowl. signal 4)
1.3	Dupline signal conductor - (Dupline-)	1.7	Dupline signal conductor + (Dupline+)
1.4	0 VDC operating voltage (DC-)	1.8	+24 VDC operating voltage (DC+)

Wiring Layout and Dimensions



Indicators

Indicator	Description
Green "BUS OK" LED	Dupline bus: Off – bus fault / On – bus OK
Red LED	All-or-nothing relays 1..4: Off – relay open or no N-connection / On – relay closed

		Min.	Typ.	Max.
Dupline				
	Current input		10 µA	
	Input channels	4 acknowledge signals (channels 5..8)		
	Output channels	4 output switching signals (channels 1..4)		
Acknowledgement				
	Type	using N-Potential		
	Necessary output voltage	100 V AC/DC		
Relay outputs				
	Type	All-or-nothing relay		
AC	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

		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 (70µF), 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		6 mA	8 mA	12 mA
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 to DIN 43880 for rail-mounting to DIN EN50022		
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		IEC60669, EN55022 / EN61000-6-3 and EN55024 / EN61000-6-1		
Order number, description		09 501 100, Four-way relay output DSM 4R		

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

5.4.12 DSM 8: 8-Way Binary Relay Output (230VAC), DIN-Rail Mounted

- 8-way binary relay output for installation in distribution panels
- 8 switching channels each with a capacity of 230 VAC / 16 A
- Switching status indicated by LEDs

Product Description

The DSM 8 is a relay output for switching eight independent loads, which can be operated on different phases with up to 16 A. However, the maximum total load of 80 A may not be exceeded.

The switching status of each output is indicated by its LED on the front panel of the device.

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.

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

As described above, each relay allows a maximum load of 16 A. The total load of 80 A must not be reached.

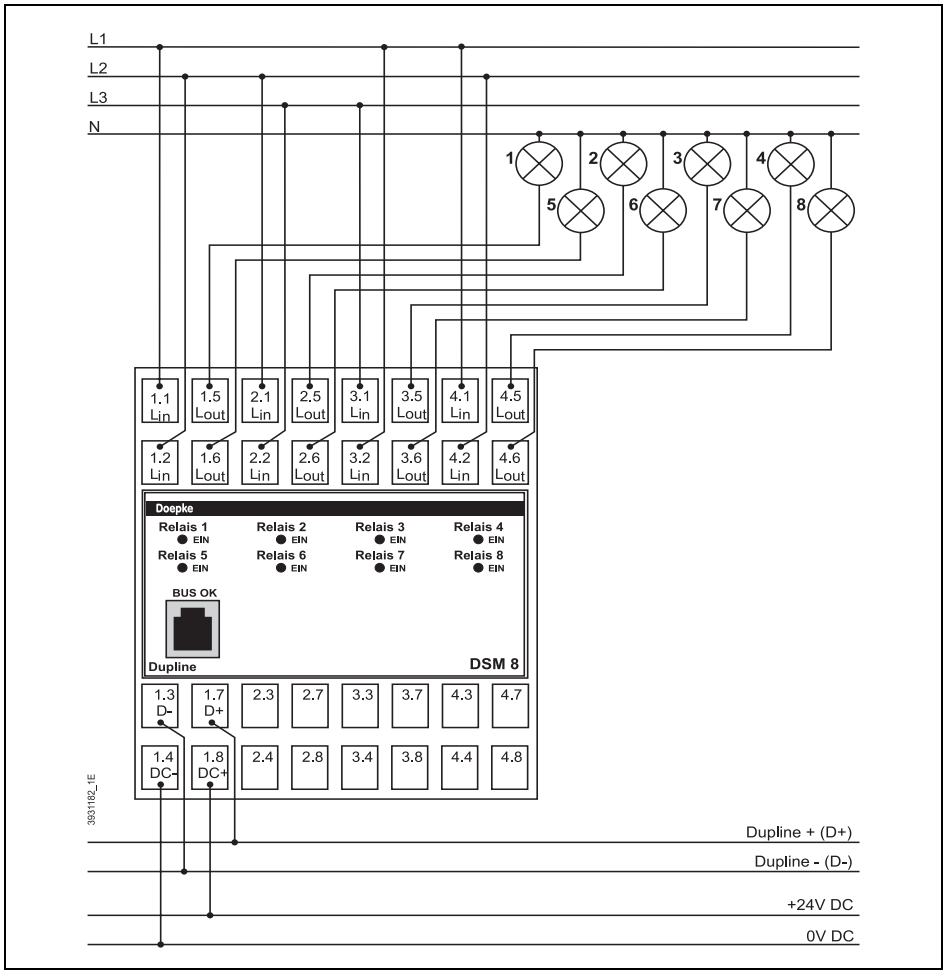
Dupline Channel Allocation

Channel	Description	Channel	Description
1..4	Relay output signals 1..4	5..8	Relay output signals 5..8

Connections

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

Wiring Layout and Dimensions



Indicators

Indicator	Description
Green “BUS OK” LED	Dupline bus: Off – bus fault / On – bus OK
Red LED	Switching relays 1..8: Off – relay open or no N-connection On – relay closed

		Min.	Typ.	Max.
Dupline				
	Current input		10 µA	
	Input channels	None		
	Output channels	8 control channels (Switching relay outputs 1..8)		
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
	Total load			80 A

		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		135 mA	
	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 to DIN 43880 for rail-mounting to DIN EN50022		
	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	IEC60669, EN55022 / EN61000-6-3 and EN55024 / EN61000-6-1		
	Order number, description	09 501 121, 8-Way Relay Output DSM 8		

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

5.5 Combined Inputs and Outputs

5.5.1 DNP 4 / DPN 4: 4-Way binary Input and Output Board (24 VDC)

- Predestined for use in control boards
- 4 binary inputs
- 4 binary, pole-reversal proof outputs to 0 V or 24 VDC
- LED indicators for operating voltage and bus signal
- Support for mounting on DIN-rail available

Product Description

The DNP 4 and DPN 4 input/output boards provide 4 inputs and 4 outputs each. Because of their size and connection data they are particularly suitable for installation in control and display panels, where open circuit boards can be used.

The DNP 4 permits small loads to be connected to a DC voltage of 24 V, which is made available by the board.

However, with the DPN 4 the loads are jointly connected to the 0 V signal of the power supply.

Both boards are equipped with a LED each to indicate a correct bus signal as well as a LED to indicate that operating voltage is applied.

Each input operates with pulse stretching and delay in order to ensure that even extremely short changes in the input signal are detected and transmitted by the system.

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 "OFF".

Notes on Applications

When connecting the boards it should be noted that – contrary to other inputs and outputs – the 0 V-lead as well as the Dupline signal conductor (-) must be connected to the “GND“ terminal.

Moreover, any small loads or switches which when operated connect to 0 V, may not be wired directly to the Dupline signal conductor (-).

The corresponding power supply has to be installed very close to the board. For further details please refer to **Chapter 2.3.4.4 "Components with external DC power supply"** on **Page 15**.

Dupline Channel Allocation

Channel	Description	Channel	Description
1..4	Inputs 1..4	5..8	Outputs 1..4

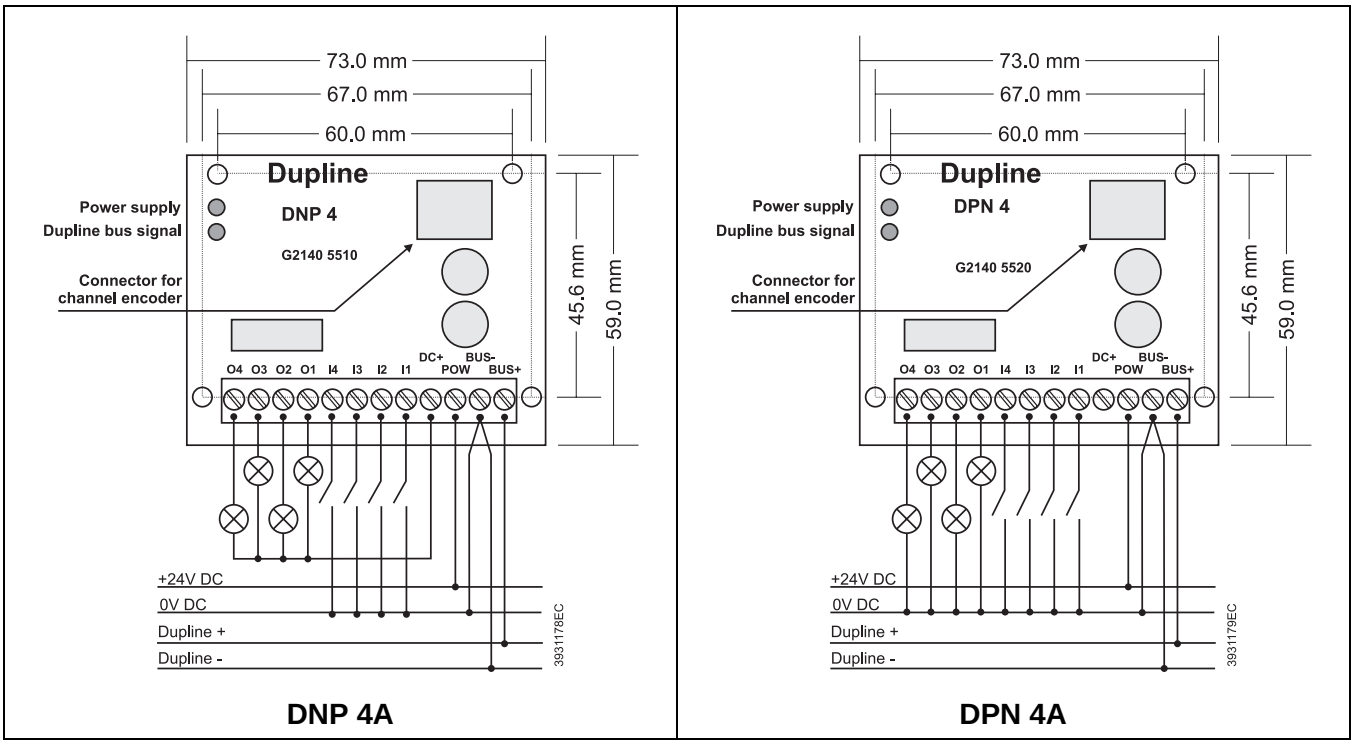
Connections

Terminal	Description	Terminal	Description
I1..I4	Input 1..4	O1..O4	Output 1..4
DUP	Dupline signal conductor + (Dupline+)	GND	Dupline signal conductor - (Dupline -) and 0 V operating voltage
+24 IN	24 VDC operating voltage	+24 OUT	Voltage for output load

Indicators

Indicator	Description
Green LED	Operating voltage: Off – no supply / On – operating voltage OK
Yellow LED	Dupline bus: Off – bus fault / On – bus OK

Wiring Layout and Dimensions



	Min.	Typ.	Max.
Dupline			
Current input		100 µA	
Input channels	4 semiconductor inputs (channels 1..4)		
Output channels	4 semiconductor outputs (channels 5..8)		
Inputs			
Type	4 contacts (via NPN-transistors)		
No-load voltage		8.0 VDC	
Contact load			180 µA
Peak current at make			7 mA
Transition resistance			100 Ohm
Length of line			3 m
Outputs (DNP 4)			
Type	4 NPN-transistors, not short-circuit-proof		
Voltage drop			1.2 V
Breaking capacity			200 mA
Rated current (per channel)			50 mA

	Min.	Typ.	Max.
Leakage current in Off-status		100 µA	
Outputs (DPN 4)			
Type	4 PNP-transistors, not short-circuit-proof		
Voltage drop		-2.0 V	-2.8 V
Breaking capacity			200 mA
Rated current (per channel)			50 mA
Leakage current in Off-status		200 µA	
Operating Voltage			
Rated operating voltage	10 VDC	24 VDC	30 VDC
Current input		45 mA	
Current at make			1 A
Terminals			
Type	Screw terminal		
Contact area	0.4 mm ∅		2.5 mm²
Housing			
Type	Open circuit board		
Dimensions	approx. 73 x 59 (W x H in mm)		
General technical data			
Ambient temperature	-20°C		+50°C
Atm. humidity	20%		80%
Encl. protection type / standards	-		
Accessories	4 retaining clips for mounting the assembly. Optional: Support bracket for mounting on DIN-rail		
Order number, description	09 501 131, 4-way input/output DNP 4 09 501 132, 4-way input/output DPN 4 09 501 130, DIN-rail support bracket DPH 1 09 501 152, DIN-rail support bracket DPH 2		

5.5.2 DSM 4E: 4-Way Binary Relay Output with 4 Semicond. Inputs, DIN-Rail

- 4-way binary relay output with semiconductor input for installation in distribution boards
- Switching channels each with a capacity of 230 VAC / 16 A
- Switch status indicated by LEDs

Product Description

The DSM 4E is a relay output for switching four independent loads, which may be operated on different phases. Each load can have a current consumption of up to 16 A. The switching status indicators – one LED each per switching channel – are located on the front panel of the device.

Four semiconductor inputs permit the connection of e.g. components of the SI Building Management system or any other 10..30 V DC signals. 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 the status being stored should a power failure occur. In addition – and to 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

As shown in the wiring layout below, the 0 V potential of the input control voltage has to have a connection to the 0 V potential of the DSM 4E power supply to keep potential differences as low as possible.

In addition, the inputs do neither have a prevention for contact bounce nor a signal prolongation, as they are implemented for example in DSS 4U. This means that the input signal has to be present for at least two bus cycles, thus 256 ms.

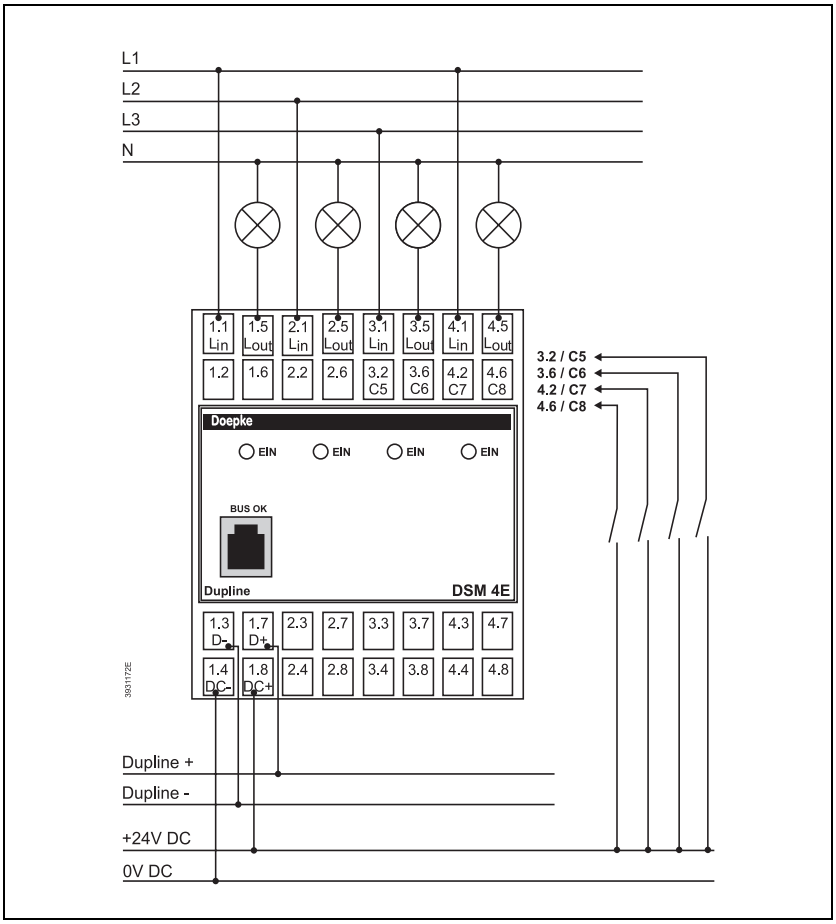
Dupline Channel Allocation

Channel	Description	Channel	Description
1..4	Relay output signal 1..4	5..8	Input signal C5..C8

Connections

Terminal	Description	Terminal	Description
1.1 / 1.5	Relay switching channel 1 (L_{IN} / L_{OUT})	1.2 / C5	Input 1 (24 VDC = ON)
2.1 / 2.5	Relay switching channel 2 (L_{IN} / L_{OUT})	2.2 / C6	Input 2 (24 VDC = ON)
3.1 / 3.5	Relay switching channel 3 (L_{IN} / L_{OUT})	3.2 / C7	Input 3 (24 VDC = ON)
4.1 / 4.5	Relay switching channel 4 (L_{IN} / L_{OUT})	4.2 / C8	Input 4 (24 VDC = ON)
1.3	Dupline signal conductor - (Dupline-)	1.7	Dupline signal conductor + (Dupline+)
1.4	0 VDC operating voltage (DC-)	1.8	+24 VDC operating voltage (DC+)

Wiring Layout and Dimensions



Indicators

Indicator	Description
Green “BUS OK” LED	Dupline bus: Off – bus fault / On – bus OK
Red LED	All-or-nothing relay 1 / 2: Off – relay open / On – relay closed

		Min.	Typ.	Max.
Dupline				
	Current input		10 µA	
	Input channels	4 (semiconductor inputs, channels 5..8)		
	Output channels	4 (relay output, channels 1..4)		
Inputs				
	Type	Semiconductors		
	Input voltage	10 VDC		30 VDC
	Internal resistance		22 kOhm	
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

		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 (all relays on)	15 mA	18 mA	20 mA
	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 to DIN 43880 for rail-mounting to DIN EN50022		
	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	IEC60669, EN55022 / EN61000-6-3 and EN55024 / EN61000-6-1		
	Order number, description	09 501 106, Four-way relay output DSM 4E		

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

5.6 Components for Visual Display

5.6.1 DDI 2: 2-Row Text Display, 24 VDC

- Comfortable, monochrome text display
- 2-line display with 16 alphanumeric characters each on a visible display area of 43.9 x 10.0 mm (W x H)
- Configuration via DDIconf software, can be run on Microsoft® Windows® 2000 and XP
- Direct connection to the Dupline bus
- 24 VDC power supply

Product Description

The DDI 2 text display is a value-for-money visualising component of the Dupline bus system and enables up to 128 channels to be displayed and operated within one system.

Display and Operation

The greenish LC display shows every Dupline function on one page by means of two lines each with 16 characters. The navigation buttons located on the outside can be used to move back and forth between the displayed pages. With the two inner buttons the relevant channel status (On/Off resp. Up/Down) may be changed, provided the keypad is operational and can be altered.

Data Types

The DDI 2 can present switching channels (on/off) as well as analogue data (AnaLink® channels). These include e.g. toggle-switch functions, real-time switch channels, but also straightforward output channels such as an alarm siren. Furthermore, analogue data as used with the DLUX or DTS can be scaled and displayed together with their physical units.

The display also permits the switch status to be changed, provided that this is possible with the channel generator's configuration. There is thus the option in the case of e.g. toggle-switch functions to switch lights and other loads on or off. Shutter control objects, which tie up both channels (Up/Down), are displayed on one page so that it is possible to switch in both directions without having to turn to another page.

Events

The DDI 2 provides the option of defining up to 16 event channels. As soon as any such channel is activated the configured message (e.g. fire alarm) will be displayed. All event messages have a freely-selectable priority rating so that a higher priority message can be shown if a message with a lower priority is already pending. By means of acknowledging it is possible - even while an event channel is still active - to recall a previous display, or to access the next event message.

Background Lighting

The DDI 2 features background lighting whose function can be programmed. With this energy-saving illumination the display can be used in locations with limited light. You may configure the lighting in the way that it

- does not switch on or
- switches on for an adjustable time or
- is activated by a Dupline channel (e.g. set by the light level sensor DLUX).

Configuration

The display is configured with the „DDIconf“ software which can be downloaded free-of-charge from our homepage at http://www.doepke.de. With the aid of this programme you can

- ...configure which channels are to be displayed,
- ...specify the text to go with the displayed channels,
- ...determine which of the displayed channels may be changed,
- ...scale analogue (AnaLink®) channels,
- ...define up to 16 event channels,
- ...specify the order in which the pages will be displayed,
- ...configure the LED background lighting,
- ...select the language of the DDI system menu.

The configuration can be transferred to the DDI 2 - and retrieved - at any time. As it is saved on Flash-PROM, it will be retained even in the event of power failure.

Configuration is carried out via the rear-mounted 9-pole SUB-D socket; for this purpose you can use the DKK 1 interface cable which also serves for the channel generator configuration.

Connections

In addition to a 24 VDC power supply the DDI 2 only requires a Dupline bus system.

Notes on Applications

Design and Mounting

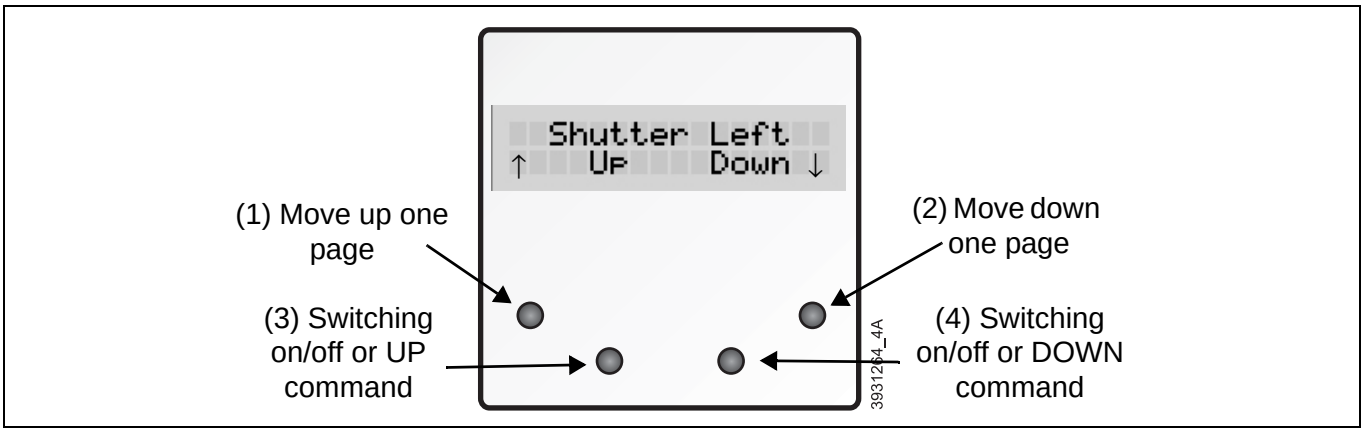
The DDI 2 is designed to be fitted into deep flush-mounted installation boxes (dia. 68 mm). The cover plate permits the use of adapter frames available in most of the standard switch product ranges so that the DDI 2 can be neatly integrated.

In order to ensure the full functionality of the DDI 2 please observe the following points:

- The DDI 2 should be positioned at eye level. Selecting too low a location reduces the visible display section of the device and impairs its legibility.
- When using NT24-250 or NR24-1300 power supply units the maximum length of the leads for the power supply is limited to 50 m.

Controls

The DDI 2 is provided with the following controls:



In addition to the key functions described in the illustration the following combinations provide extra functions:

Combination	Description
(1) and (2)	Displaying the system menu (see next chapter)

Combination	Description
(2) and (4)	Overriding the keypad lock: If the keypad lock has been activated while configuring in DDIconf or in the system menu, operation of the DDI 2 can be temporarily enabled (for approx. 25 s) by pressing this combination.
	Resetting DDI 2 events: If events configured in DDIconf occur, the DDI 2 will display the configured event text and lock the navigation of buttons (1) and (2). In order to enable operation again, press buttons (2) and (4). If further events have occurred in the interim, then these should also be acknowledged.
	Resetting after a bus fault.

System Menu

You can change some basic settings at the device itself even after the DDI 2 has been installed and configured with DDIconf:

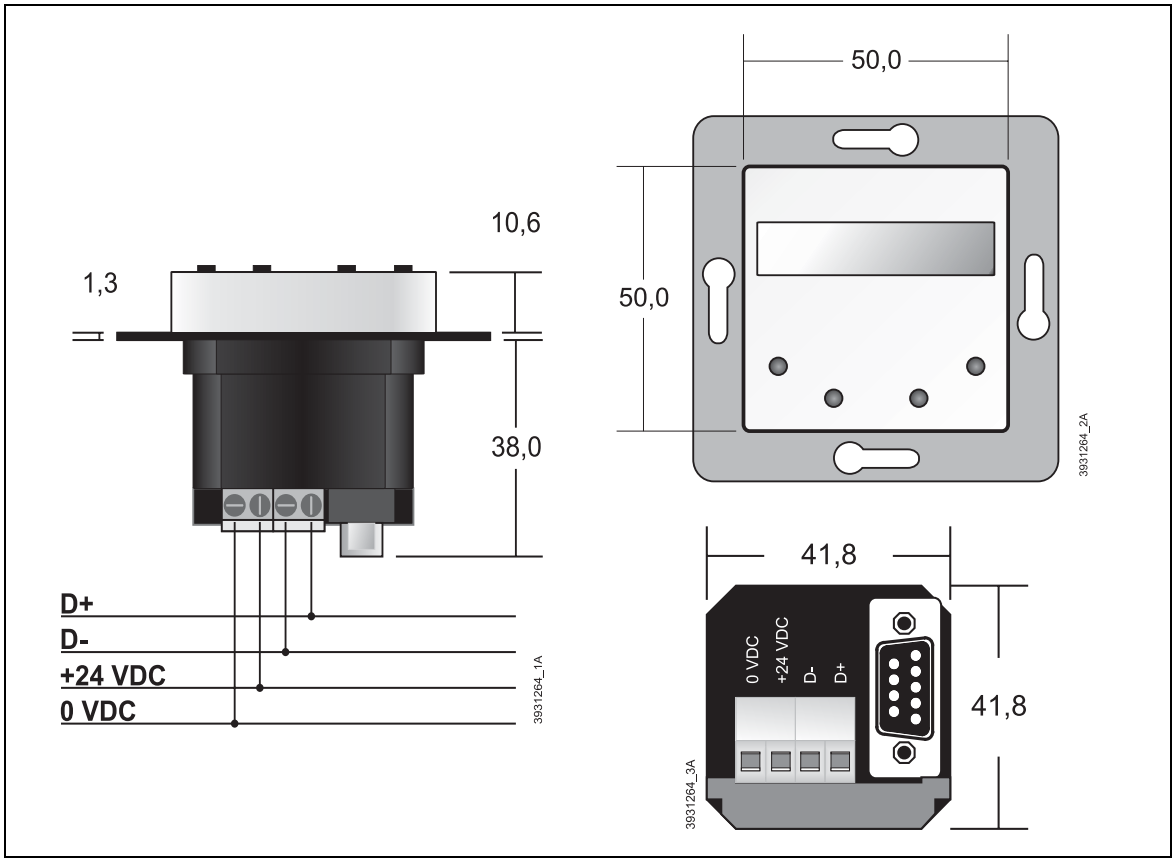
- The language,
- The settings for the background lighting, and
- The keypad lock.

To access the system menu press buttons (1) and (2) simultaneously. You can navigate within the menu using button (1) - moving up - and (2) - moving down. The settings can be changed with buttons (3) and (4). The menu has the following structure:

Menu Item	Option	Description
Language:	Syst.English(1)	Menu language set to „English“
	English(2)	Menu language set to „German“
Mode Bg-Light:	Off	Background lighting always is off.
	On	Background lighting always is on.
	Push	The background lighting will be switched on for the duration set in DDIconf.
	Addr	The background lighting is controlled via a Dupline channel (e.g. light level sensor DLUX).
Keypad Lock:	Off	Operation is not protected by the keypad lock.
	On	To operate the DDI 2 the keypad lock must be cancelled.
System Version	wx.yz	Displays the DDI 2 software version in use.
Exit Menu?	Yes	If you want to exit from the menu press buttons (3) or (4). By pressing buttons (1) or (2) the menu items will be repeated.
Store Data?	Yes	Select this to save the settings and to exit from the menu.
	No	Select this to exit from the menu without saving any changes.

(1) The basic language with which the DDI 2 is equipped ex-factory, always is English.
(2) The second language is dependent upon the language setting when configuring.

Wiring Layout and Dimensions



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

a

	Min.	Typ.	Max.
Dupline			
Power consumption	0.8 mA	0.9 mA	1 mA
Channels	Max. 128 inputs and outputs, free configuration		
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			
Navigation keys	2, outer located		
Operating keys	2, inner located		
Application-related Data			
Number of pages			128
Channels per page			1(1)

	Min.	Typ.	Max.
Number of events			16
Data formats	Digital, analogue (AnaLink®)		
Initialization time(2)			20 s
Programming Software			
Name	DDIconf		
Languages	German, English, Polish, Netherlands		
Platforms	Microsoft® Windows® 2000, Windows® XP		
Operating Voltage			
Rated operating voltage	22 VDC	24 VDC	27 VDC
Power requirement	22.5 mA	28 mA	33 mA
Terminals			
Type	Screw terminals		
Contact area	0.4 mm ∅		2.5 mm²
Housing			
Type	Front cover brilliant white, 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
Atmospheric humidity	Max. 85% (exposure to dew not permissible)		
Encl. protection type / standards	IP20, EN55022 / EN61000-6-3 and EN55024 / EN61000-6-1		
Order number, description	09 501 199, Text display DDI 2		

(1) 2 in the case of shutter controls and shutter master controls.
(2) After operating voltage is applied.

5.6.2 DSC 10: Touch Screen Panel 3.8“, 24 VDC

- Touch panel incorporating a 100 MHz RISC processor
- Monochrome, amber-coloured LCD, 8 grey tones, 320 x 240 Pixel
- Size of screen 79 mm x 60 mm (3.8")
- 24 VDC power supply
- Configuration via DSC 3-P software (version 6.30e or subsequent), operates in Microsoft® Windows® 95/98/NT 4/2000/XP

Product Description

The low-cost DSC 10 is a programmable touch screen panel for changing and displaying switching status and alarm messages within the Dupline bus system.

With a resolution of 320 x 240 pixel this fully graphics-capable panel offers up to 48 freely assignable touch fields. The background lighting is supplied by high-performance LEDs which give the monochrome LC display its characteristic amber colouring and provide a high-contrast picture. Furthermore, they are designed to be completely maintenance-free and subject to virtually no wear.

There are two options for linking the DSC 10 to a Dupline system:

1. Directly to the COM port of the DKG 1 or DKG 2 or to the 2nd serial port (COM2) of the DKG 20 or DKG 21-GSM:
   For this you will require the DSA 3 screen adapter - supplied with the DSC 10-232 - which enables a DKK 1 type cable to be connected.
2. Directly to the Dupline bus via the DSI 1 modbus adapter:

Here you can use the DSC 10-485 which already includes the touch panel, the DSI 1 and the DSA 4 screen adapter. The panel then only needs a power supply and the Dupline signal conductors to be connected.

Because the DSC 10 incorporates over 300 different communication drivers it can also be employed independent of the Dupline system, e.g. in conjunction with many PLCs.

The projects of the DSC 10 are generated with the optionally available editing software DSC 3-P from version 6.30e onwards. The software can be used on any IBM-compatible computer with Microsoft® Windows® 95/98/NT 4/2000/XP. With the aid of the editor the pictures are generated for the subsequent user interface. More than 1,800 predefined objects are available for this task, such as e.g. switches, lamps, bar and trend graphics, as well as indicating and measuring instruments. The calendar function serves to switch Dupline channels on and off, accurately to the minute. The finished objects are transferred to the unit via a download interface specially provided for this purpose. A flash EPROM in the unit serves as a power-failure-secure memory. When operated on-line with Dupline the current process variables, such as alarm messages, will be shown in real-time.

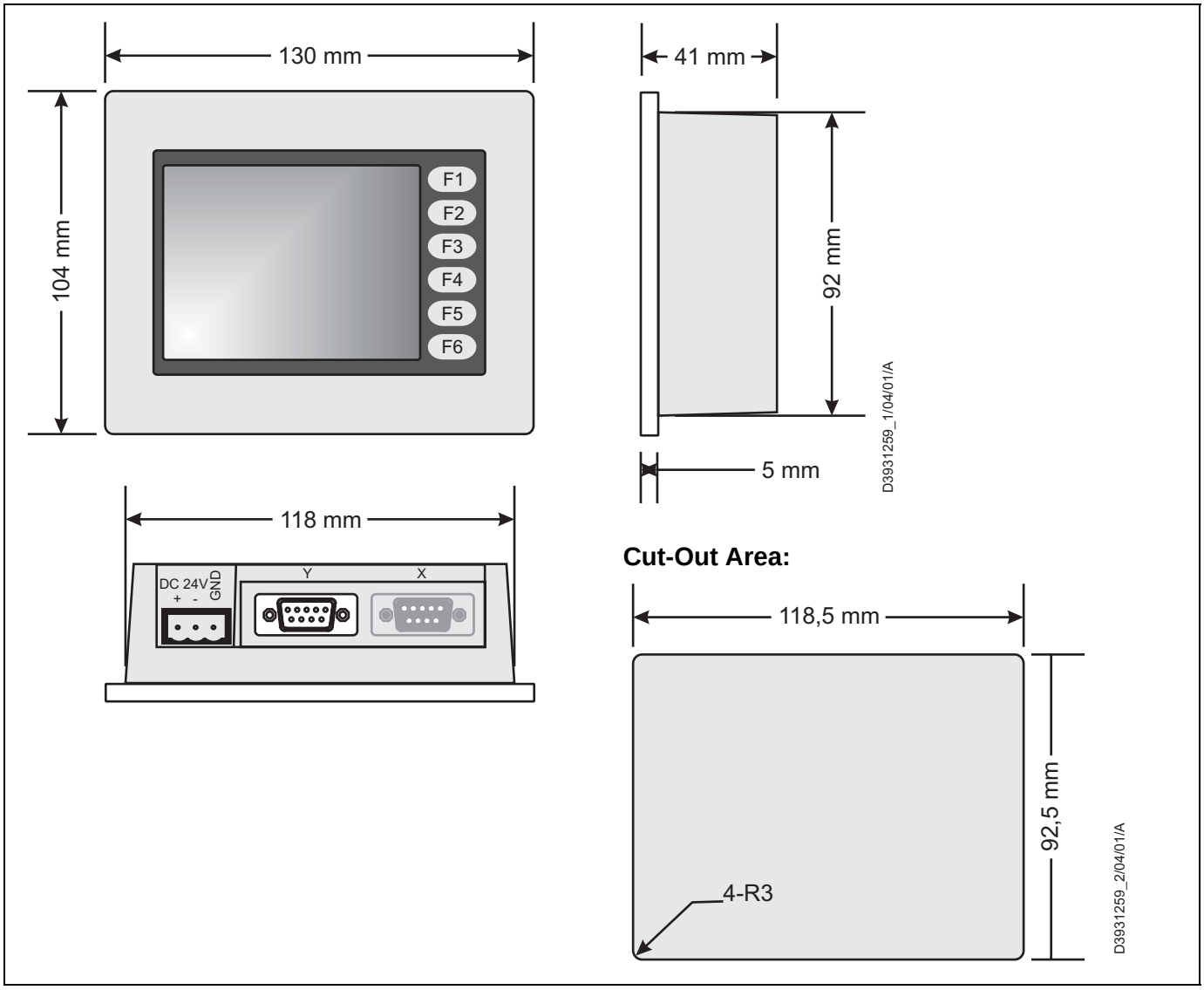
Notes on Applications

Flush-mounting

As the DSC 10 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 10 may also be installed in the Doepke DSC 10-UPG flush-mounted housing (Order no. 09 501 213). This rugged housing makes it easy to install the unit in cavity or solid walls and ensures sufficient heat dissipation. For further details see **Chapter 5.9.4 "Installation Accessories"** on **Page 172**.

Wiring Layout and Dimensions



	Min.	Typ.	Max.
Dupline			
Type of connection	• Via DSA 3 directly to DKG • Via DSA 4 and modbus adapter DSI 1 to Dupline bus		
Display			
Type	Monochrome LC display, amber coloured, 8 grey tones		
Screen diagonal dimension	3.8” / 96,5 mm		
Display size	79 x 60 (W x H in mm) or 3,8”		
Resolution	320 x 240 Pixel		
Touch surface	Resistive (8 x 6 keys, 1- or 2-point touch operation)		
Brightness adjustment	2 settings via the unit's configuration menu		
Contrast adjustment	8 settings via the unit's configuration menu		
Function keys	8 soft keys, programmable		
Background lighting	LED (service life: 50,000 hours)		

		Min.	Typ.	Max.
Chars.	Character sets	ASCII code, Chinese, Japanese, Taiwanese and Korean		
	Font size	8 x 8, 8 x 16, 16, x 16 and 32 x 32 dots		
Text	8 x 8 dots	40 characters x 30 lines		
	8 x 16 dots	40 characters x 15 lines		
	16 x 16 dots	20 characters x 15 lines		
	32 x 32 dots	10 characters x 7 lines		
Memory				
User memory		640 kB (approx. 200 pages each of 3.2 kB)		
Back-up memory		96 kB, back-up by lithium battery(1)		
Interfaces		**Y**		**X**
DSC 10-232		DSUB-9 (male), RS232(2)		not applicable
DSC 10-485		DSUB-9 (male), RS422(2)		DSUB-9 (female), RS485(2)
DSC 10-DUP		DSUB-9 (male), RS422(2)		DSI 1 connected via DSA 3; Connection of Dupline signal lines via screw terminals; slave addresses 1 or 2
All types		Interface for download cable		
Operating Voltage				
Rated operating voltage		19.2 VDC	24 VDC	28.8 VDC
Power consumption				7 W
Housing				
Art		Plastic housing		
External dimensions		130 x 104 x 41 mm (W x H x D)		
Installation depth		36 mm		
General Technical Data				
Operating temperature		0°C		+50°C
Atm. humidity		10% ... 90% (exposure to dew not permissible)		
Protection type / Standards		CE, EN55011 Class A, EN50082-2, UL/c-UL1950, CNS Standard		
Protection type, front enclosure		IP65f, NEMA #250 Type 4x/12		
Weight		400 g		
Order number, description		09 501 203, DSC 10-232, Touch panel 3.8“ with RS232 interface 09 501 204, DSC 10-485, Touch panel 3.8“ with RS4xx interface 09 501 205, DSC 10-DUP, Touch panel 3.8“ with DSI 1 interface 09 501 210, DSA 3, Adapter DSC 10-485 to DSI 1 09 501 211, DSA 4, Adapter DSC 10-232 to DKG 20/21-GSM 09 501 213, DSC 10-UPG, Flush-mounted housing for DSC 10 09 501 148, Programming software DSC 3-P		

(1) The service life of a lithium battery is approx. 10 years at an ambient temperature of 25ºC or below.
(2) Data length: 7/8 bits; stop bits: ½; parity: none/even/uneven; transfer rate: 2.4 ... 115.2 kBit/sec.

5.6.3 DSC 3: Touch Screen Panel, 24 VDC

- Touch screen panel incorporating 100 MHz RISC processor
- 64 colours, 320 x 240 Pixel
- Size of screen 115.2 mm x 86.4 mm (5.7")
- 24 VDC supply voltage
- Configuration via DSC 3-P software, can be run on Microsoft® Windows® 95/98/NT 4/2000/XP

Product Description

The DSC 3 is a programmable touch screen panel for changing and displaying switching status and alarm messages within the Dupline bus system.

At the heart of the DSC 3 is an extremely fast processor, which on the one hand permits the design of a complex but user-friendly screen layout and on the other efficient programming.

The 5.7"-screen (115.2 mm x 86.4 mm) with 64 colours and a resolution of 320 x 240 pixel provides the user with a safe and efficient work surface. The setup of the unit, such as e.g. the contrast, can be adjusted via the configuration menu.

The housing was designed for use in rugged industrial environments - as is evidenced by the service life of the background lighting and the IP65 1f protection type of the front end.

The DSC 3 is linked to the two-line bus of the Dupline system via the DSI 1 modbus adapter, which can be connected at any desired location of the bus, or via the DKG channel generators. The Modbus I-RTU-protocol is always used for the actual data transfer.

The DSC 3 is configured via an optionally available Windows®-based software (Microsoft® Windows® 95/98/NT 4/2000/XP) which also includes the downloading cable. This provides for the following functions:

Displaying and Changing Switching Signals of the Dupline System

Switching signals can be incorporated in texts and output as text. There is, of course the write-option for this type of data, i.e. to change their value in the Dupline bus system.

Events

Certain events in buildings, which have been transmitted by sensors, can be processed so that the DSC 3 displays either plain text or alarm messages.

Alarms

Alarms can be managed via the DSC 3 either by confirming or by resetting. It is also possible to keep alarm lists specifying dates and times.

AnaLink Data

The DSC 3 permits representation of analog values, which are transferred to the bus by the AnaLink procedure, numerically as well as graphically (e.g. as bar charts).

Freely Programmable Functions

The DSC 3 can be programmed extremely freely by means of scripts; typical applications being temperature and sequence control.

Notes on Applications

Compact Flash Card (CF Card)

The DSC 3 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

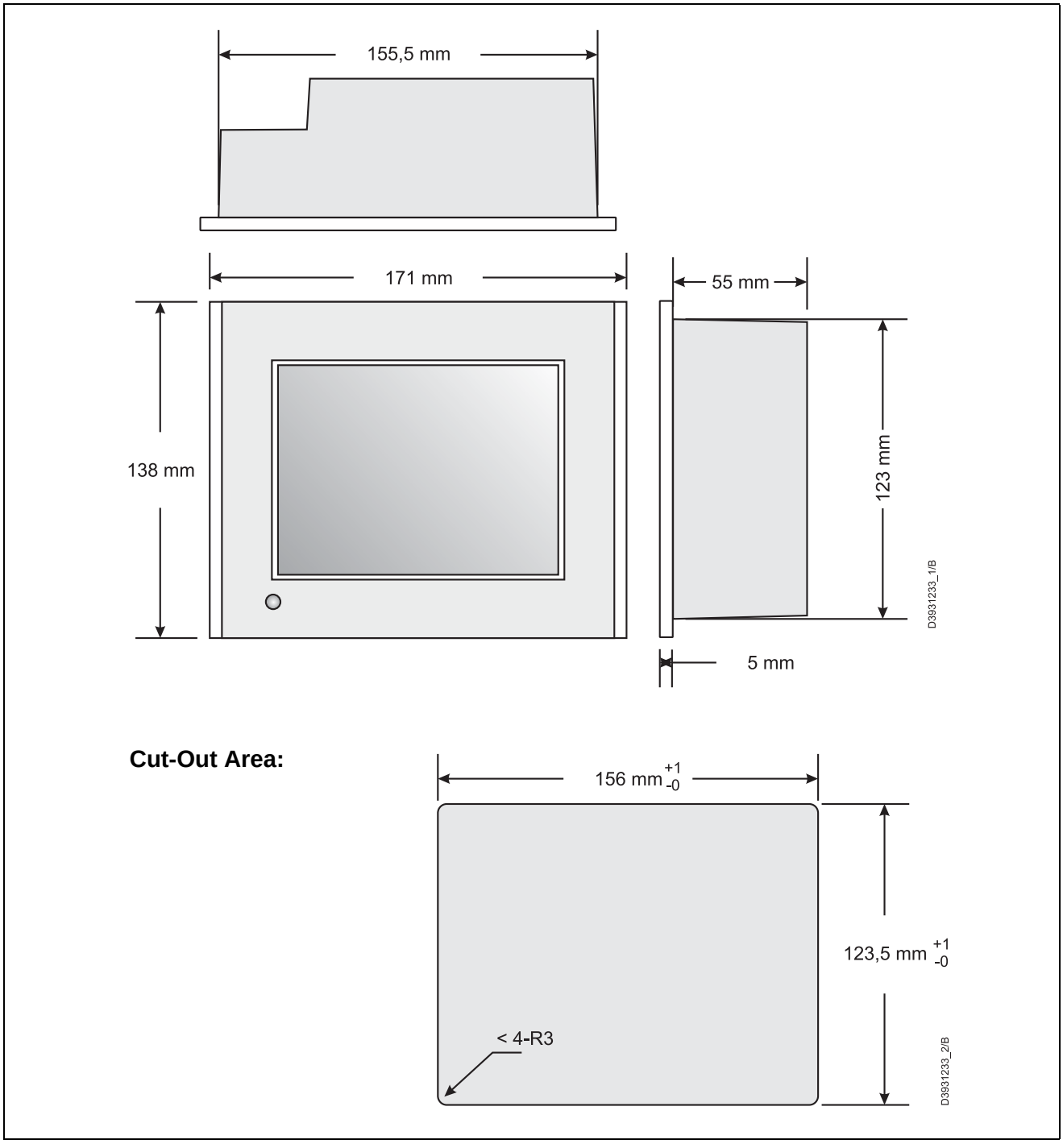
an application, e.g. in order to carry out corrections. The CF card is exchanged on the back of the DSC 3; the cards are not supplied with the unit.

Flush-Mounting

As the DSC 3 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 3 may also be installed in the Doepke DSC 3-UPG2 flush-mounted housing (Order no. 09 501 202). This rugged housing makes it easy to install the DSC 3 in cavity or solid walls and ensures sufficient dissipation of heat. For further details see **Chapter 5.9.4 "Installation Accessories"** on **Page 172**.

Wiring Layout and Dimensions



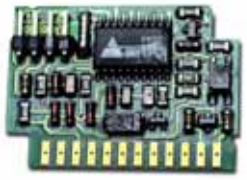
	Min.	Typ.	Max.
Dupline			
Type of connection	Via DSI 1 Modbus adapter to the Dupline bus or directly to the DKG		
Display			
Type	STN colour LCD-display		
Display format	320 x 240 Pixel		
Display size	115.2 x 86.4 (W x H in mm) resp. 5.7”		
Number of character display	Font size 8 x 8 Pixel: 30 lines each with 40 characters ... Font size 64 x 128 Pixel: 2 lines each with 5 characters		
Font size	Character size: Height and width can be expanded 1, 2, 4, or 8 times		
Touch panel	16 x 12 keys per screen		
Adjustment of brightness	4 settings via configuration menu inst. in unit		
Adjustment of contrast	8 settings via configuration menu inst. in unit		
Background lighting	CFL (service life: 50,000 hours)(1)		
Interface			
Serial interface	SUB-D, 25-pole, RS232/RS422		
Transmission parameters	Data length: 7/8 bits, stop bits: 1/2, Parity: None/Even/Odd, Transmission rate: 2400 bit/s .. 115.2 Kbit/s		
Application data			
User memory	1 MB (FEPROM or CF Card resp.)		
Data formats	Freely programmable		
Number of programmable screens	max. 640 at 3.2 kB / screen		
Accuracy of internal real time clock	deviation max. 65 s / month		
Terminals			
Type	Strain-relief clamps		
Contact area	0.4 mm ∅		2.5 mm²
Operating Voltage			
Rated operating voltage	19.2 VDC	24 VDC	28.8 VDC
Power requirement		13 W	22 W
Housing			
Type	Flush-mounted metal enclosure		
Outside dimensions	171 x 138 x 60 (W x H x D in mm)		
Inside dimensions	156 x 124 x 55 (W x H x D in mm)		
Ventilation	Natural air flow		
General technical data			
Ambient temperature	0°C		+50°C
Atm. humidity	10%		90%
Ambient conditions	Not to be used if corrosive gases are present.		
Encl. protection type / standards	IP 65f (front), CE		
Weight	1.2 kg		

	Min.	Typ.	Max.
Order number, description	09 501 179, Touch Screen Panel DSC 3 09 501 180, CF card for DSC 3 09 501 202, Flush-mounted housing DSC 3-UPG2 09 501 148, Programming software DSC 3-P 09 501 207, Programming software DSC 3-P (USB)		

(1) At 25ºC ambient temperature and normal atm. humidity. The luminous substance can be replaced by the user.

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 or miniature circuit-breakers DLS 5 to the Dupline bus. The PCB is mounted in a space in the DFA provided for this purpose and makes available the following functions:

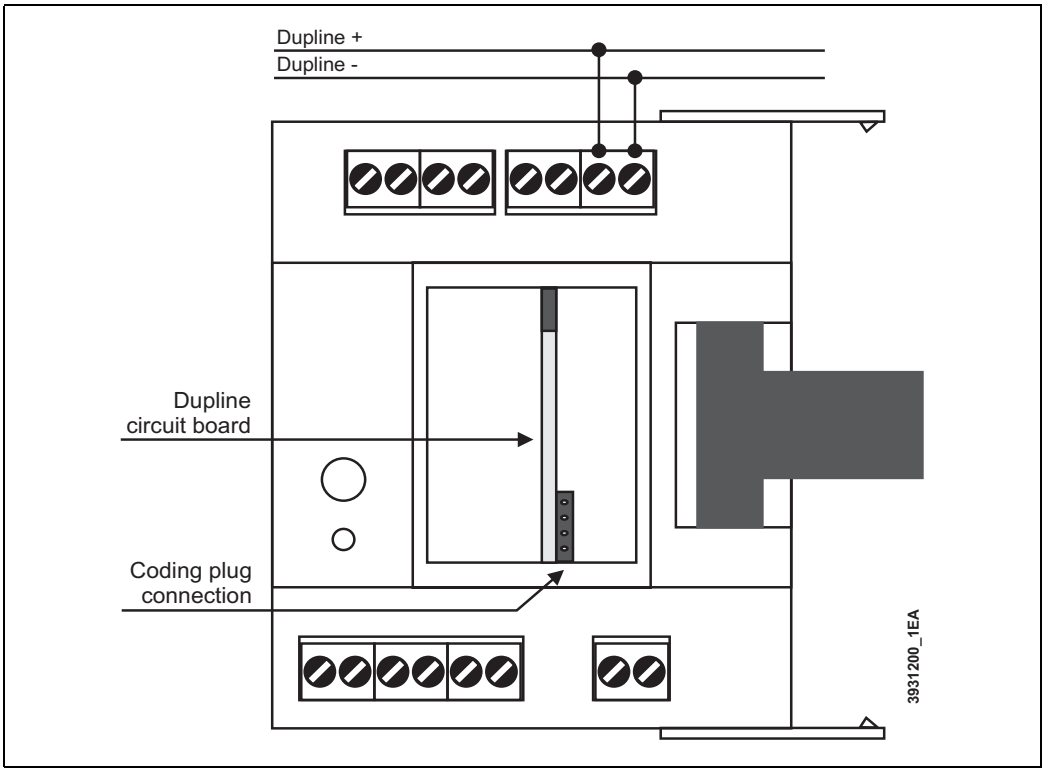
- Connect or disconnect RCCB/MCB
- Trip RCCB
- Feedback of the RCCB/MCB's status
- Feedback of the DFA's operation indicator

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/MCB	5	RCCB/MCB switching status: connected
2	Disconnecting RCCB/MCB	6	RCCB/MCB switching status: disconnected
3	Tripping RCCB/MCB	7	RCCB/MCB switching status: tripped
4	Not assigned	8	Display DFA control LED

	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	09 500 102, Remote actuator interface DFA-DI		

5.7.2 DCI 1: 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 either by means of a plug power pack or via the serial connection

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 4** on **Page 22**.

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 can be supplied either via the supplied plug power pack or by (unregulated) 12...30 VDC, e.g. with the NT 24-250/NT 24-1300 system power supply units (see **Chapter 5.8.2** on **Page 160**).

Ethernet

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

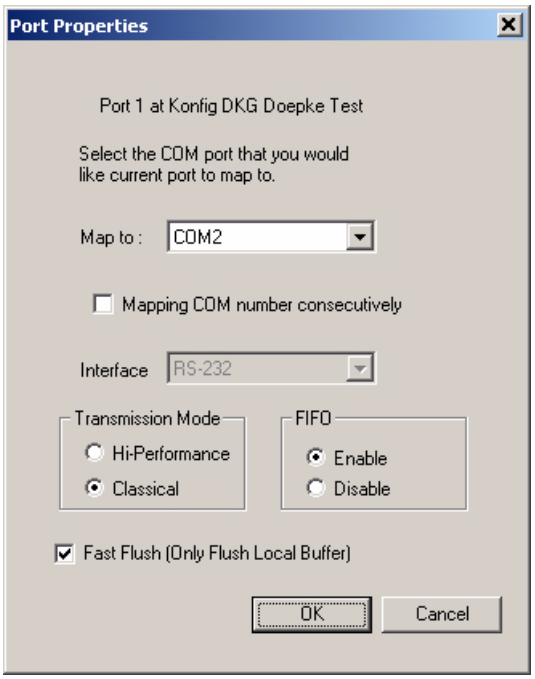
Mounting

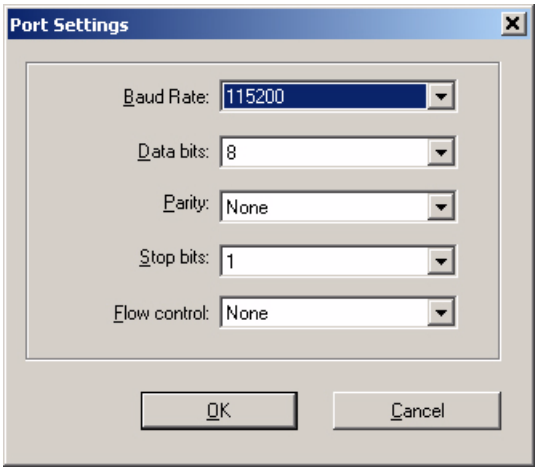
The DCI 2 can be mounted on a DIN-rail using the supplied bracket.

Interface Configuration

The following screen shots illustrate 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 (25-pole)

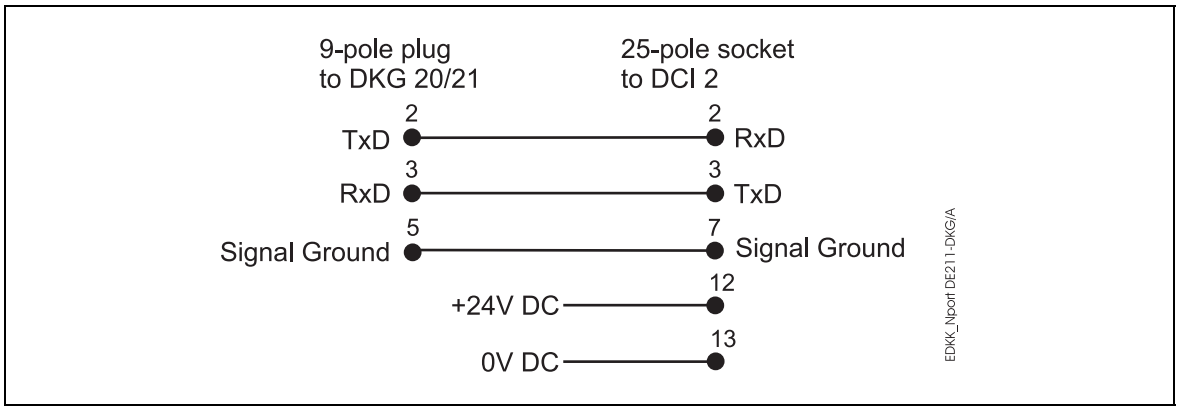
Pin	Description	Pin	Description
2	RxD (in)	10	GND (for +5 VDC)
3	TxD (out)	12	+12 VDC...+30 VDC (in, unregulated)
4	CTS	13	GND (for +12 VDC...+30 VDC)
5	RTS	14	TxD (B, -)
6	DTR	15	TxD (A, +)
7	GND	20	DSR
8	DCD	21	RxD (B, +) / Data B
9	+5 VDC (out, regulated)	22	RxD (A, -) / Data A

DIP-Switches

SW1	SW2	SW3	SW4	Note
OFF				RS232 console (setting for communication to DKG)
ON				Terminal console
	OFF	**OFF**	**OFF**	RS232 (setting for communication to DKG)
	OFF	ON	OFF	RS422
	ON	OFF	ON	RS485 (4-wire with RTS)
	ON	ON	ON	RS485 (4-wire with ADDC(1))
	ON	OFF	OFF	RS485 (2-wire with RTS)
	ON	ON	OFF	RS485 (2-wire with ADDC(1))

(1) Automatic Data Direction Control

Wiring Layout and Dimensions



Indicators

Indicator	Colour	Description
PWR	red	Power is on
	off	Power is off, or power error condition exists
Link	orange	Ethernet connection established
	off	No Ethernet connection of short cut
Ready	green	DCI 2 is ready
	off	DCI 2 has malfunction(configuration?)
Serial Tx	green	Serial data is being transmitted
	off	No transmission of serial data
Serial Rx	orange	Serial data is being received
	off	No reception of serial data

Technical Data

	Min.	Typ.	Max.
Operating Voltage			
Rated operating voltage	12 VDC		30 VDC
Current input			260 mA
Terminals			
Ethernet	RJ45		
Serial	SUB-D, 25-pole		
Interfaces			
Ethernet	10 Mbps Ethernet interface Protocols: TCP, UDP, IP, ICMP, ARP, DHCP, BootP, Telnet		
Serial	RS-232/422/485-Port up to 230,4 kBaud		
Housing			
Type	Rugged sheet steel housing		
Dimensions	90.2 x 22 x 100.4 (W x H x D in mm)		

Technical Data (Continued)

	Min.	Typ.	Max.
Software			
Type	NPort Management Suite		
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 B, CE Class B, UL, CUL, TÜV		
Order number, description	09 501 222, DCI 2 Serial-to-Ethernet Port Server		

5.7.3 DSI 1: Dupline - Modbus - Interface

- Enables the connection of the DSC 10/DSC 3 touch panels
- 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 e.g. the DSC 10 resp. DSC 3 touch screen panels, 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 following modbus function codes:

- Function code 3: Read register
- Function code 16: Write register

With these functions both binary and analog data can be read and written by the AnaLink method.

Notes on Applications

Modbus slave address

With the DSI 1 two different Modbus slave addresses - 1 and 2 - can be set up.

Modbus communication parameters

The DSI 1 offers the option of two communication speeds, 9600 or 19200 Baud. For a secure transmission, we recommend 9600 Baud.

Adaptors for touch panels

The touch panels DSC 3 resp. DSC 10-485 are equipped with screen adaptors DSA 1 resp. DSA 3 to adapt the pin assignment to the DSI 1. For operation of other touch screens of the manufacturer Pro-face, these adapters also are available separately.

Connections

Terminal:

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+

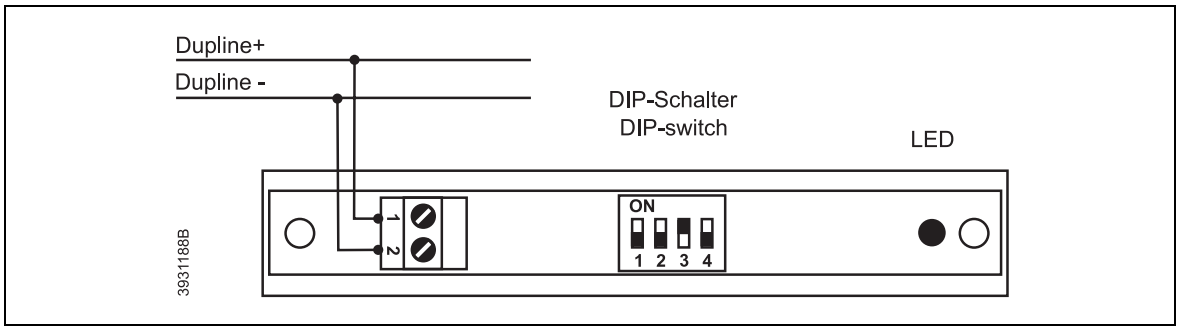
DIP-Switches

Switch	Description	OFF	ON
1	Modbus address	1	2
2	Modbus baud rate	9600	19200
3	Dupline transmission mode	Read-Only	Read / Write

DIP-Switches (Continued)

Switch	Description	OFF	ON
4	Spare	-	-

Wiring Layout and Dimensions



Indicators

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

	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	9600/19200 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	IEC60664		
Order number, description	09 501 116, DSI 1 Modbus interface 09 501 193, DSA 1 Screen adapter for DSC 2/3 09 501 210, DSA 3 Screen adapter for DSC 10-485		

5.8 Load and Power Supply Units

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

- 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 dimmer series.

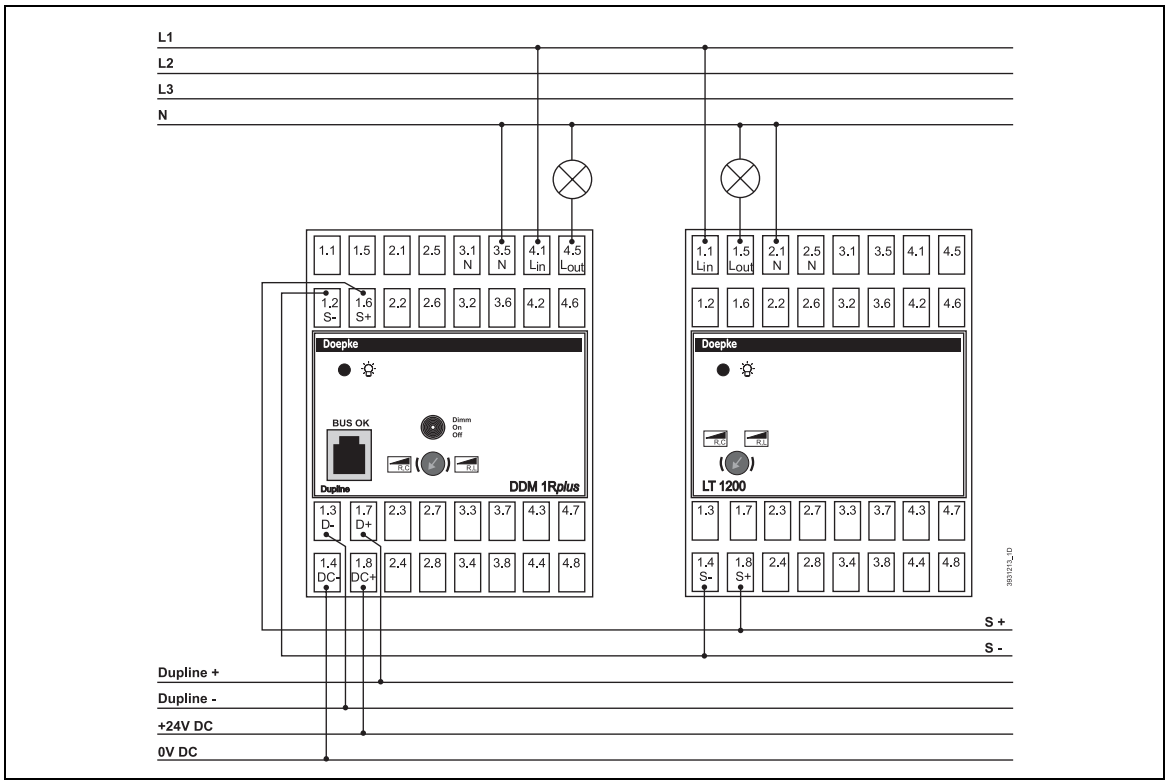
The selection of the loads to be dimmed is carried out with a change-over switch before start-up. Provided the same operating mode and phase are used, two LT 500 or LT 1200 can be connected in parallel.

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

	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 rail-mounting to DIN EN50022		
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%
Encl. protection type / standards	IEC60669		

	Min.	Typ.	Max.
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 24-250 / NT 24-1300: 24 VDC – Power Supply Units, DIN-Rail Mounted

- Rugged power packs for DIN-rail mounting
- Outputs of 24 VDC / 250 mA and 24 VDC / 1300 mA respectively
- Integrated overload and overvoltage protection
- Parallel connection of structurally identical devices possible

Product Description

The NT 24-250 and NT 24-1300 are used to supply the power for Dupline DIN-rail devices. They provide the required 24 VDC and a current of 250 mA or 1300 mA respectively.

The power supply units are equipped with both overload and short-circuit protection.

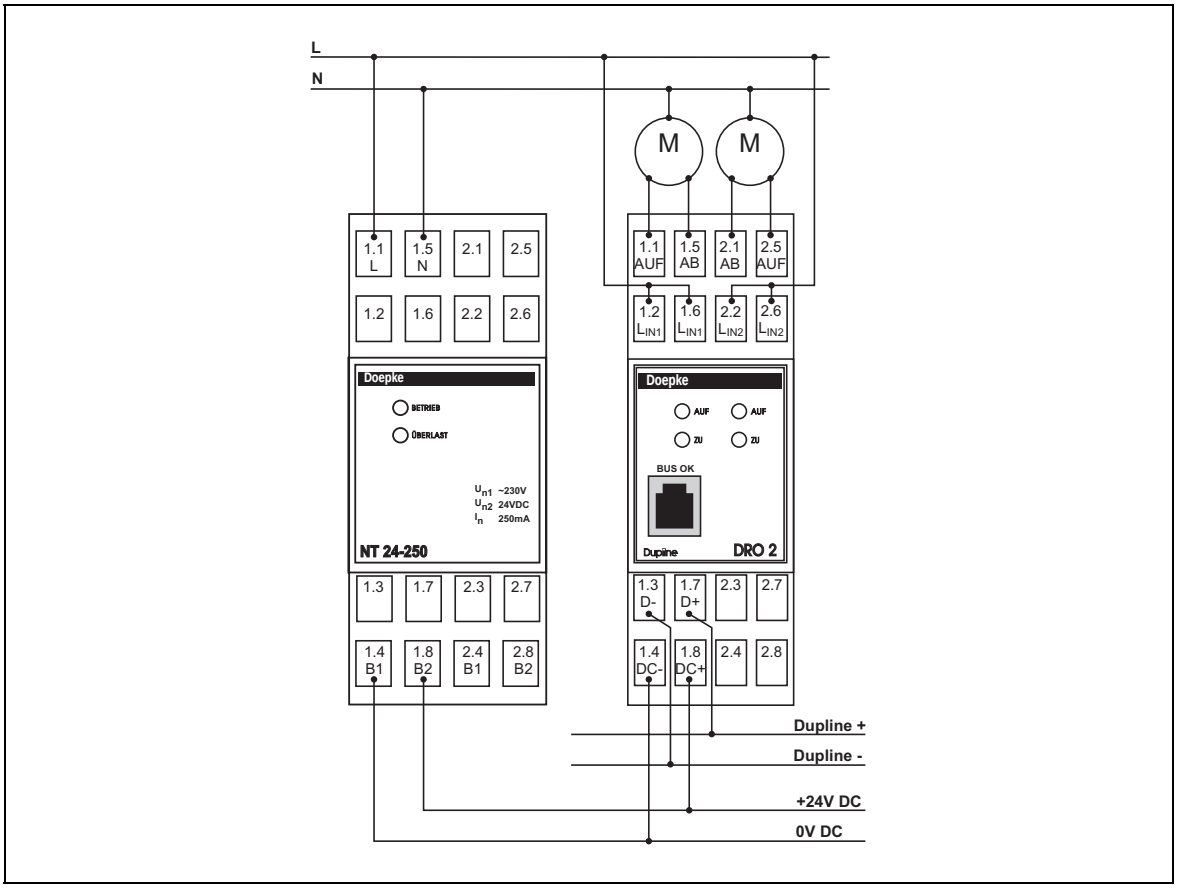
Structurally identical components can be connected in parallel; however, the total load capacity of the power supply units in such cases must be reduced by 10%.

Notes on Applications

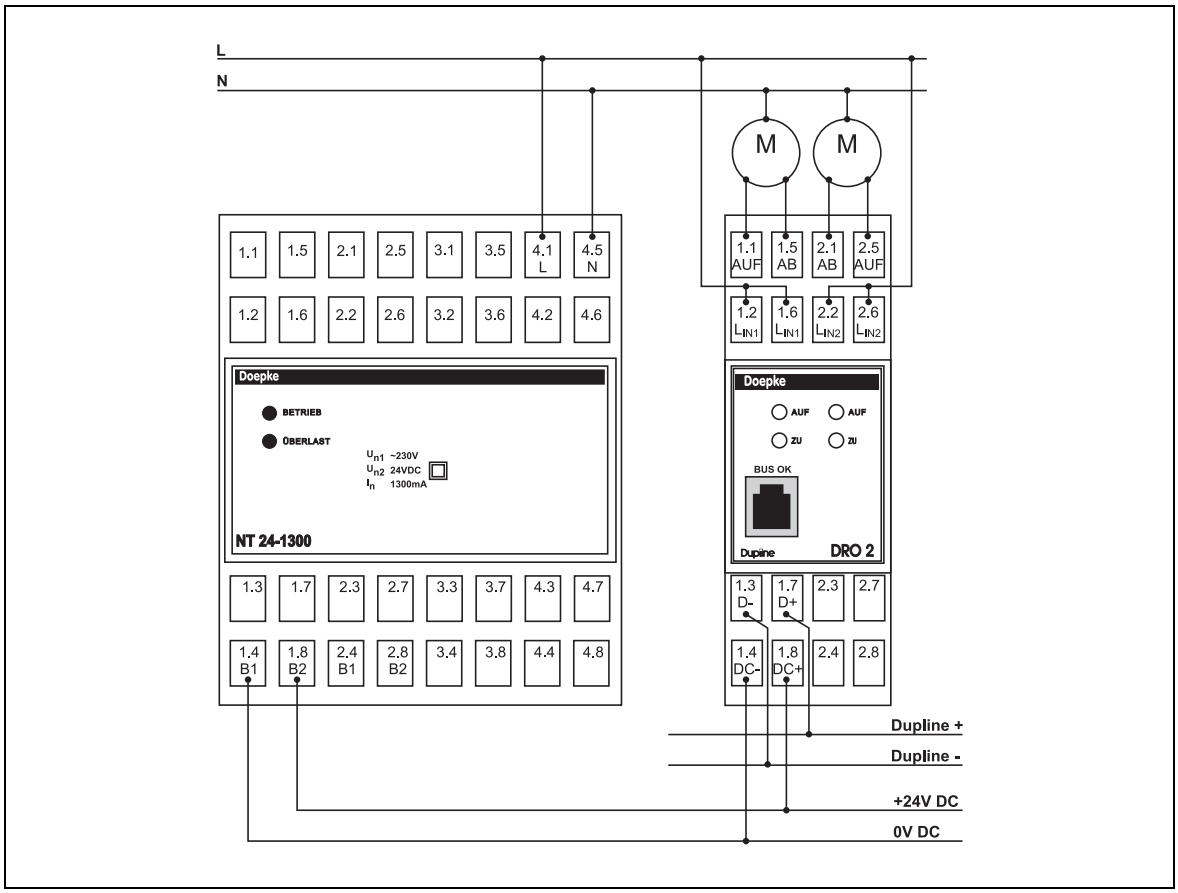
Not applicable.

Wiring Layout and Dimensions

The connection principle of the power supply units is illustrated below using the DRO 2 shutter control as an example:



Wiring Layout and Dimensions (NT 24-1300)



Connections NT 24-250

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

Connections NT 24-1300

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

Indicators

Indicator	Description
Red LED	On when short-circuit / overvoltage / parallel connection

	Min.	Typ.	Max.
Outputs (NT 24-250)			
Output voltage	22 VDC	24 VDC	26 VDC
Output current			250 mA
Rated capacity			6 VA

	Min.	Typ.	Max.
Residual ripple at rated load			250 mV_{pp}
Outputs (NT 24-1300)			
Output voltage	22 VDC	24 VDC	26 VDC
Output current			1300 mA
Rated capacity			31 VA
Residual ripple at rated load			250 mV_{pp}
Operating Voltage			
Rated operating voltage	210 VAC / 50 Hz	230 VAC / 50 Hz	250 VAC / 50 Hz
Terminals			
Type	Strain-relief clamps		
Contact area	0.4 mm ∅		2.5 mm²
Housing			
Type	Distribution installation housing to DIN 43880 for rail-mounting to DIN EN50022		
Dimensions NT 24-250	35 x 85 x 58 (W x H x D in mm) / 2 modules		
Dimensions NT 24-1300	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%
Encl. protection type / standards	IEC60669 / EN60950 / EN60335		
Order number, description	09 500 162, Power supply unit NT 24-250 09 500 163, Power supply unit NT 24-1300		

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 Western 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.

	Min.	Typ.	Max.
Dupline			
Connection	Western digital socket		
Controls			
Key pad	5 action-point keys		
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
Housing			
Type	portable plastic housing		
Dimensions	65 x 120 x 22 (W x H x D in mm)		

	Min.	Typ.	Max.
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 Western plug connectors (DKP 1) 1 coding cable Western 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, Western 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 (Western 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.

	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 Western 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 Adapters, Cables and Special Accessories

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

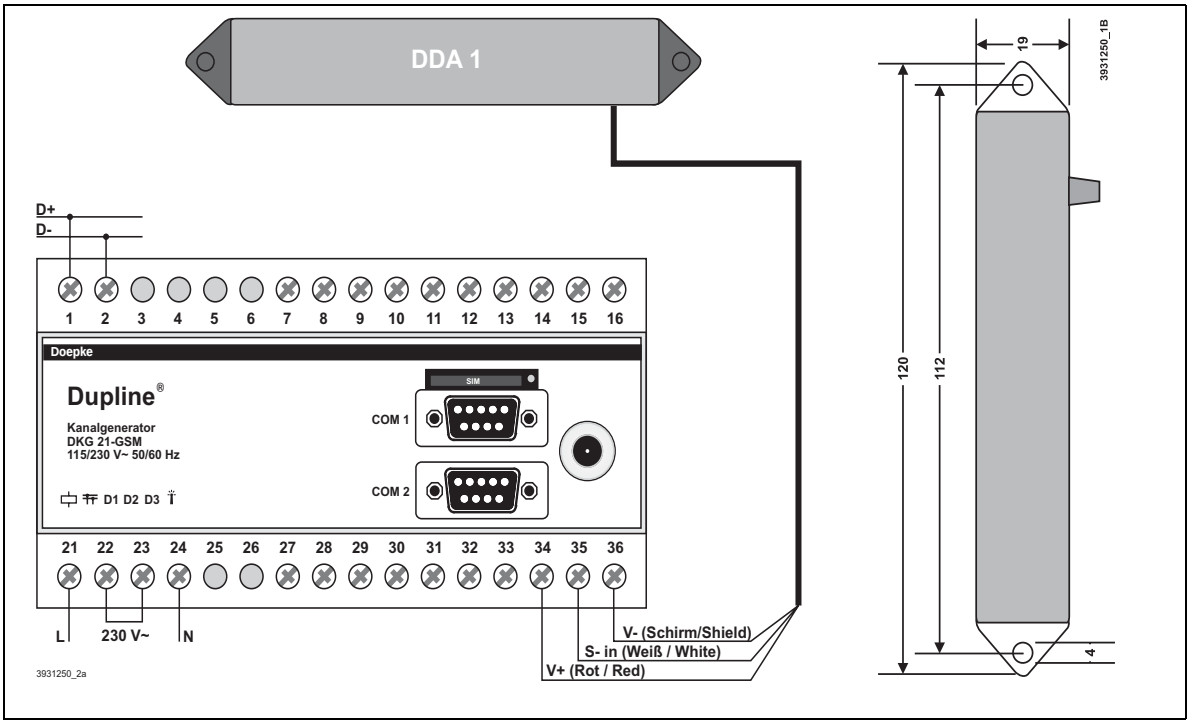
- Enables reception of the DCF time signal from the transmitter in Rugby (UK)
- Active antenna with outstanding reception characteristics
- For use indoors
- Temperature range of 0ºC to 50ºC.

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.

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
Operating voltage			
Rated operating voltage	3 V		12 V
Current input		0.8 mA	

	Min.	Typ.	Max.
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		

5.9.3.2 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.

DKK 2 (Continued)	**Interface cable for connection of channel generators DKG 1/DKG 2**
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

DKK 3	**Adapter for connecting DKK 1 to a 25-pole serial PC port**
	• To convert the DSUB 9-pole to 25-pole for computers with a 25-pole serial connector.
Technical Data	
Connections	DSUB 9-pole for DSUB 25-pole
Order number, description	09 501 142, 25-pole adapter DKK 3

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 1	**Adapter for touch panels DSC 2/DSC 3**
	• Adapter for connecting the touch panels DSC 2, DSC 3 and similar types to the DSI 1 Modbus interface **Note:** Please use the DSA 3 instead of the DSA 1 for connecting the DSC 10 touch panels.
Technical Data	
Connections	DSUB 25-pole (male) to DSUB 25-pole (female)
Type	Encapsulated PCB
Order number, description	09 501 193, DSA 1 Adapter DSC 2/3 to DSI 1

DSA 2	**Adapterfor touch panels DSC 2/DSC 3**
	• Adapter for connecting the touch panels DSC 2, DSC 3 and similar types to the DKG 20 and DKG 21-GSM channel generators **Note:** Please use the DSA 4 instead of the DSA 2 for connecting the DSC 10 touch panel.
Technical Data	
Connections	DSUB 9-pole (male) to DSUB 25-pole (male)
Type	Encapsulated PCB
Order number, description	09 501 200, Adapter DSC 2/3 to DKG 20/DKG 21-GSM

DSA 3	**Adapter for touch panel DSC 10-485 to DSI 1**
	• Adapter for connecting the touch panel DSC 10-485 to the DSI 1 Modbus interface
Technical Data	
Connections	9-pole SUB-D (male) to 25-pole (female)
Type	Encapsulated PCB
Order number, description	09 501 210, DSA 3, Adapter DSC 10-485 to DSI 1

DSA 4	**Adapter for touch panels DSC 10-232 to DKG**
	• Adapter for connecting the touch panels DSC 10-232 to the DKG 20 and DKG 21-GSM channel generators
Technical Data	
Connections	DSUB 9-pole (male) to DSUB 9-pole (female)
Type	Encapsulated PCB
Order number, description	09 501 211, DSA 4, Adapter DSC 10-232 to DKG 20/21-GSM

5.9.3.3 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 2.
Technical Data	
Connections	Western for Western
Length	0.75 m
Order number, description	09 501 125, 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	Western 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, 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	Western for M12-socket
Length	0.75 m
Order number, description	09 501 141, M12 encoder cable DKP 3

DKT 1	Spare cable for tester DTG 1
	• To connect DTG tester to system components with Western plug connection, such as e.g. DSM 2.

DKT 1 (Continued)	Spare cable for tester DTG 1
Technical Data	
Connections	Jack for Western 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

5.9.4 Installation Accessories

DPH 1	**Mounting unit for type DNP xx / DPN xx input and output boards**
	• For mounting input and output boards, such as e.g. DNP 4, on DIN-rail. • This mounting unit might not be used in standard-sized distribution housings.
Technical Data	
Dimensions	26.7 x 59.2 x 80.6 (W x H x D in mm)
Order number, description	09 501 130, DNP/DPN mounting unit DPH 1

DPH 2	**Mounting unit for type DNP xx / DPN xx input and output boards**
	• For mounting input and output boards, such as e.g. DNP 4, on DIN-rail. • Consists of one base mounting unit and two side parts. • This mounting unit can be used in standard-sized distribution housings.
Technical Data	
Dimensions	67 x 87 x 39 (W x H x D in mm, mounted)
Order number, description	09 501 152, DNP/DPN mounting unit DPH 2

DSC 10-UPG	**Flush mounted housing for DSC 10 touch panels**
	• For installing DSC 10 touch screens in cavity or solid walls. • Very simple installation due to the plaster guard as supplied. • Magnetic fixing of the touch panel in the housing. • Elegant design with black-anodised frontplate
Technical Data	
Dimensions, flush-mounted section	127 x 106 x 54 (W x H x Din mm)
Dimensions frame	158 x 132 (W x H in mm)
Adjustable plastering thickness	0 to 35 mm
Material, flush-mounted section	electro-galvanized metal, 1.0 mm
Material frame	Aluminium, 1.0 mm, black-anodised
Order number, description	09 501 213, Flush mounted housing for DSC 10

DSC 3-UPG2	**Flush mounted housing for DSC 2/3 touch panels**
	• For installing DSC 2/DSC 3 touch screens in cavity or solid walls. • Very simple installation due to the plaster guard as supplied. • Magnetic fixing of the touch panel in the housing.
Technical Data	
Dimensions, flush-mounted section	169 x 127 x 77 (W x H x D in mm)
Housing aperture after sealing in plaster	217 x 176 (W x H in mm)
Adjustable plastering thickness	0 to 30 mm
Material, flush-mounted section	electro-galvanized metal, 0.8 mm
Order number, description	09 501 202, Flush mounted housing for DSC 2/DSC 3

5.10 Software

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

- Very simple, intuitive operation
- Many predefined installation objects
- Several languages available
- Runs on Microsoft® Windows® 95/98/NT/2000/XP

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 software is continuously being updated so that any new components on the Dupline bus are available immediately after their development. The latest version 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.

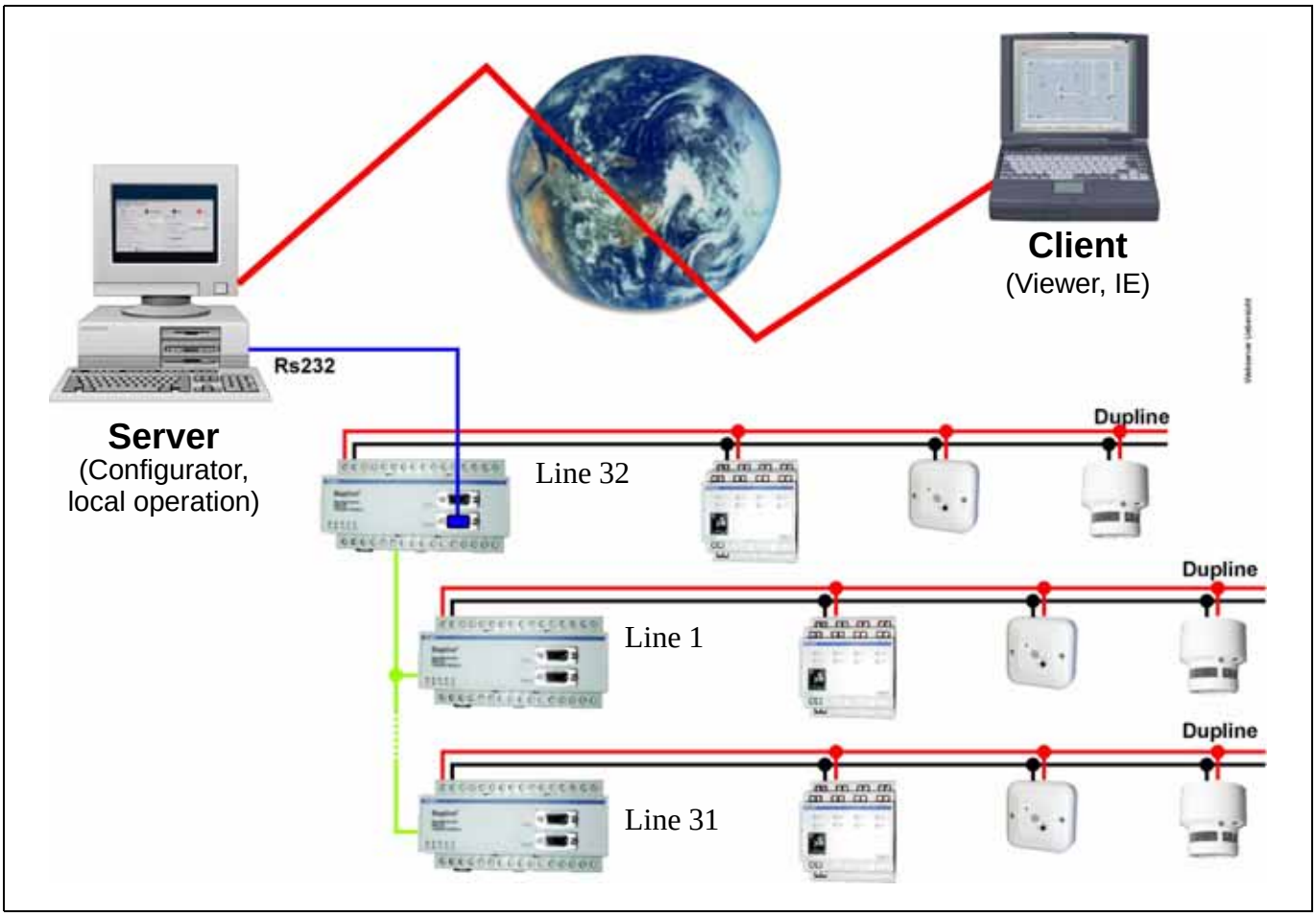
General technical data	
Contents	• Documentation about SI Building Management System and Dupline (this document as PDF) • Other documents • Calculation aid • Prepared texts for the tendering phase • Data file for tenders according to GAEB • Latest version of ProLine
Order number, description	09 501 001, Building Management Documentation CD 59 00 126, ProLine User Manual (via internet) 59 00 142, ProLine^{NG} User Manual (via internet)

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

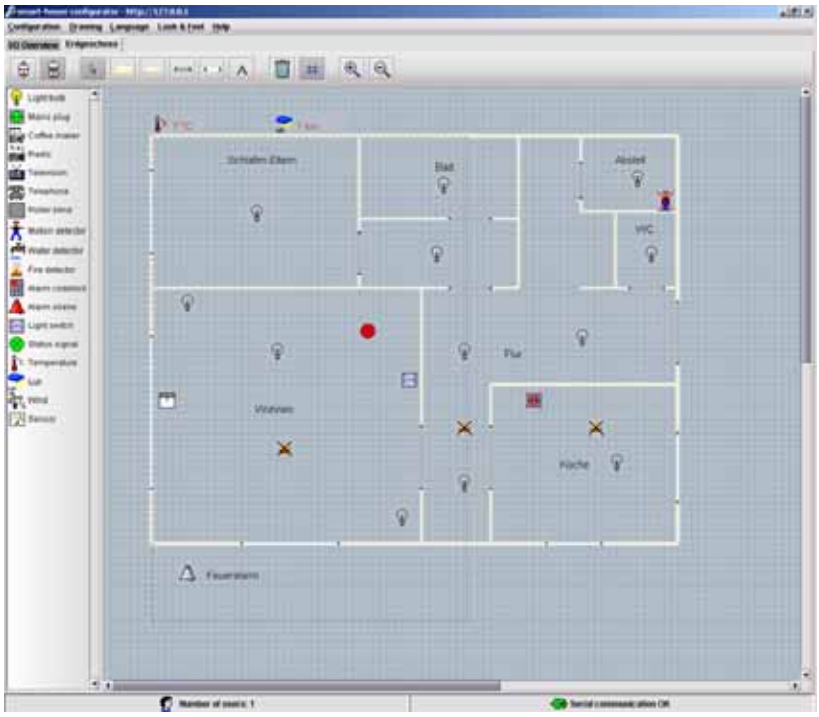
   This makes available the HTTP port which can be accessed locally or via the network (e.g. Internet). It contains the images and data, which have already been prepared with the configurator and which the server continuously receives from the Dupline system connected to the PC.

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.

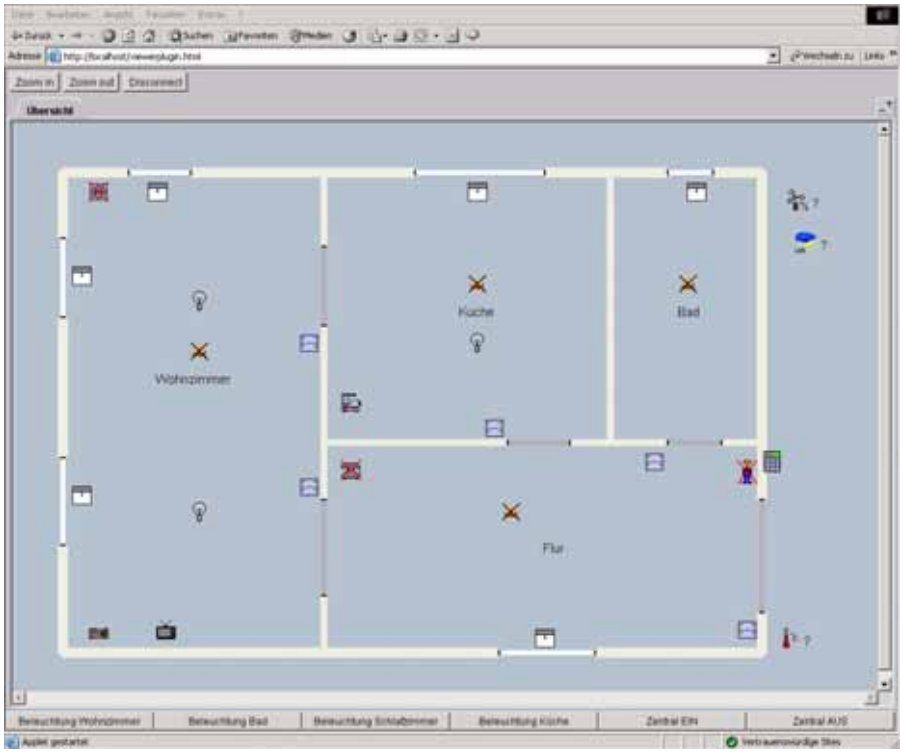
   During the creation of an application the configurator already allows the display to be tested.



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 the Netscape Communicator, 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.

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 interconnected 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).

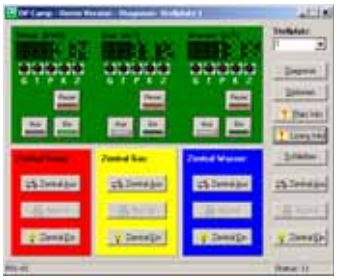
Operating the DDE interface is incredibly easy: the channels to be displayed are simply taken from the server face into the relevant application where they are immediately available. The Dupline channels are simply controlled via Visual Basic programming which is by now supported by all Office programmes.

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.

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 „Microsoft® Access Database“ 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 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 DSM 4R);
- 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 4.1.3 "Networks with DKG 20 / DKG 21-GSM"** on **Page 22**). 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 Remote“:

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 Remote (see below) programme.

There are two software interfaces for further processing of the values available currently:

1. The Microsoft® ODBC (Access) interface for direct access to the database
   - Provides access using Microsoft® ODBC data requests
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 Remote

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 remote uses the same software interfaces that are provided to the billing programmes. 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!

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 Notes on Project Planning

6.1 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.

6.2 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 6.3** on **Page 182** (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 6.3** on **Page 182** .
   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 3 "Notes on Wiring and Installation"** on **Page 18**.
   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.

6.3 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: Chan-nel.	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**oller**b**lind; 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

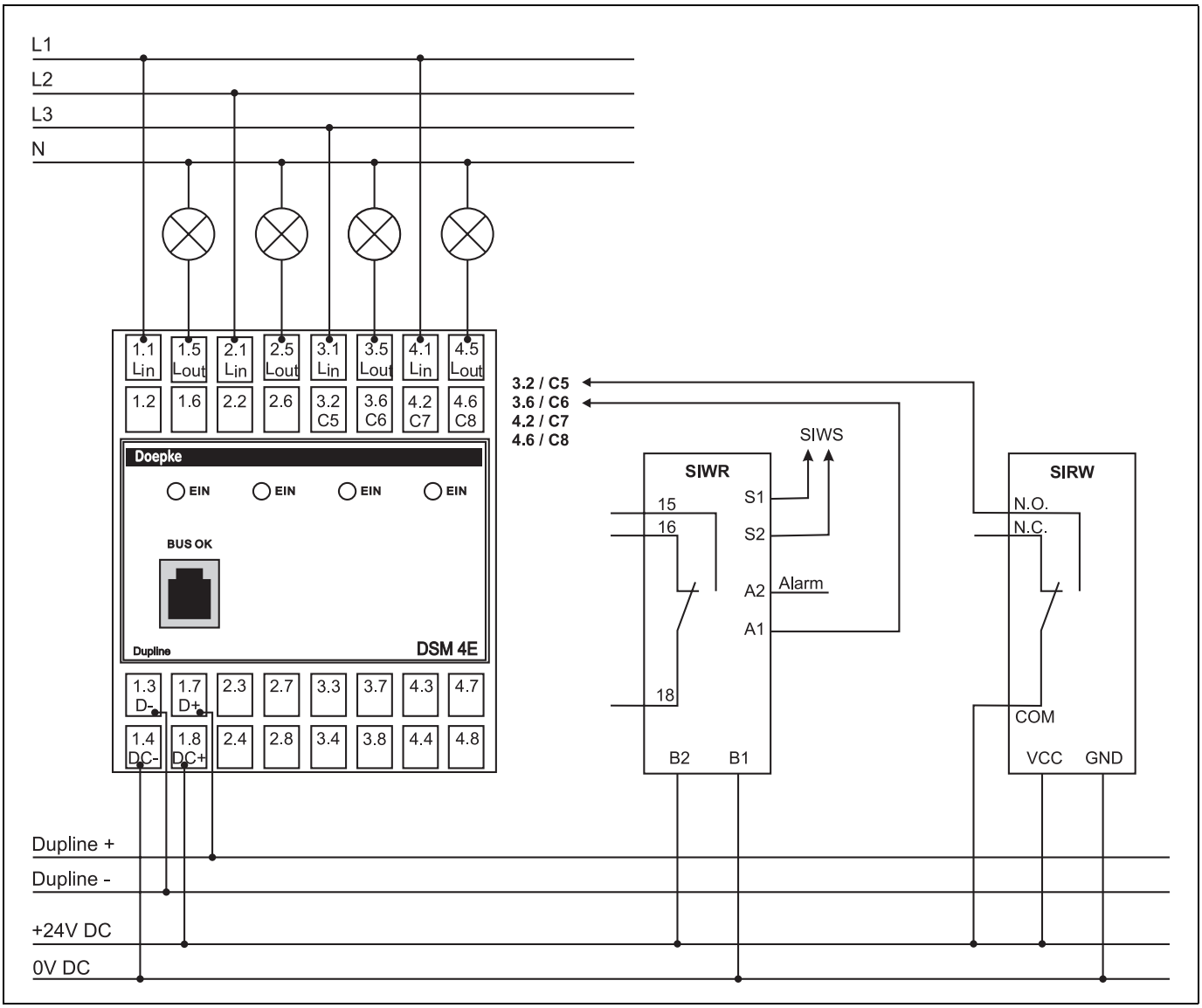
Chapter 7 Examples of Circuit Diagrams

7.1 Incorporating SI Components

7.1.1 Link-up of Wind / Rain Detectors (SIWR/SIRW) via DSM 4E

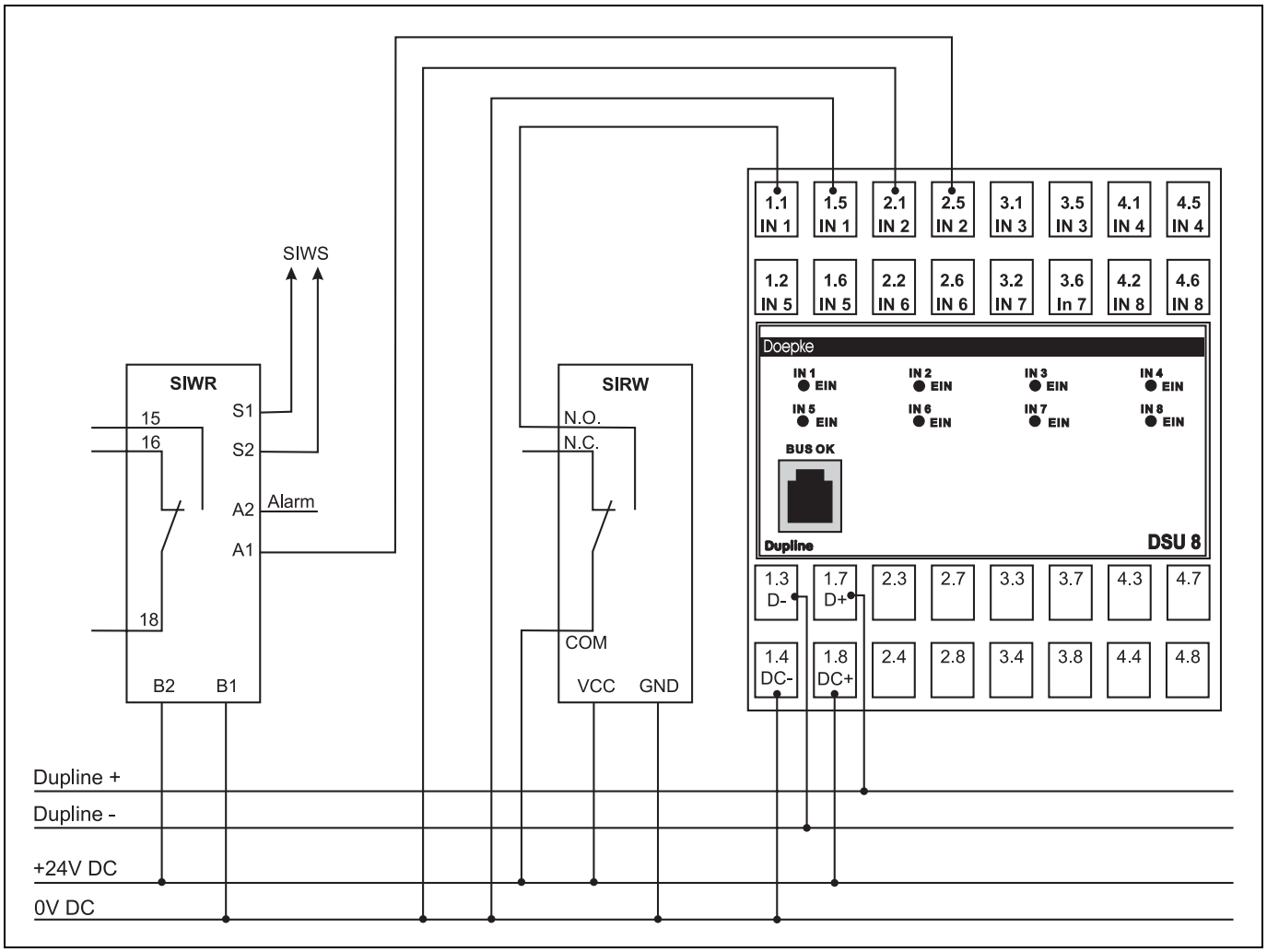
The following example of a circuit diagram illustrates how the wind detector or the wind relay (SIWS/SIWR) and the rain detector (SIRW) can be linked to the system via the inputs of the DSM 4E. Both the signal of the wind relay at the C5 input and the signal of the rain detector at C6 require a coded address and should be configured in ProLine as a "push-button function".

Note: Since the inputs of the DSM 4E are not potential free, please particularly pay attention to the general notes concerning the operation voltage supplies (**Chapter 2.3.4** on **Page 14**). Especially in this case the DSM 4E and the SIWR respectively the SIRW should be provided by the same power supply unit to avoid potential differences.



7.1.2 Link-up of Wind / Rain Detectors (SIWR/SIRW) via DSU 8

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. Both the signal of the wind relay at the IN1 input and the signal of the rain detector at IN2 require a coded address and should be configured in ProLine as a "push-button function".



7.2 DRO with DC Drives

Often skylights are equipped with DC drives with operating voltages of 12 V or 24 V. You can use these motors with the DRO 2 as well as with the DRO 4b resp. DRO 4c if you observe the following:

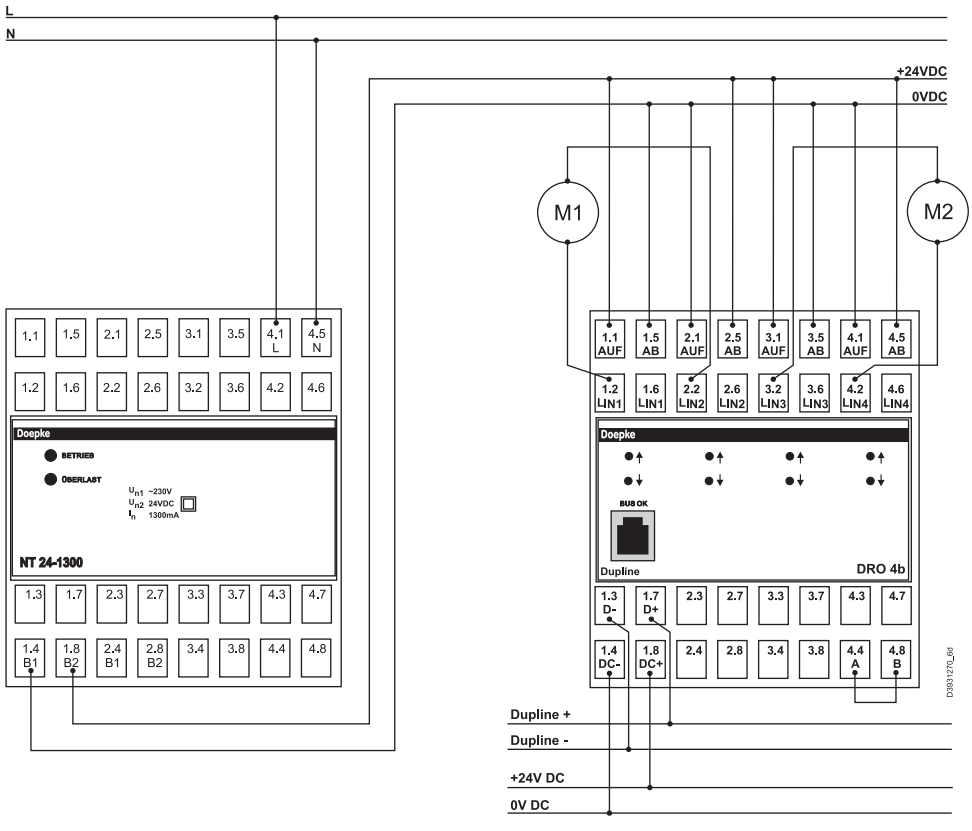
1. When using only one power supply, the DRO 2 is able to control one drive, the DRO 4b/c two drives.
2. The DRO 2 version has to be a new one, i.e. the input terminals L_{IN} must not be jumpered. Using a continuity tester is the easiest way to check this. Older models also can be recognised by means of missing terminals 2.2/2.6.

7.2.1 Feed-in by one Power Supply

Encode the shutter controls resp. configure the channel generator as follows:

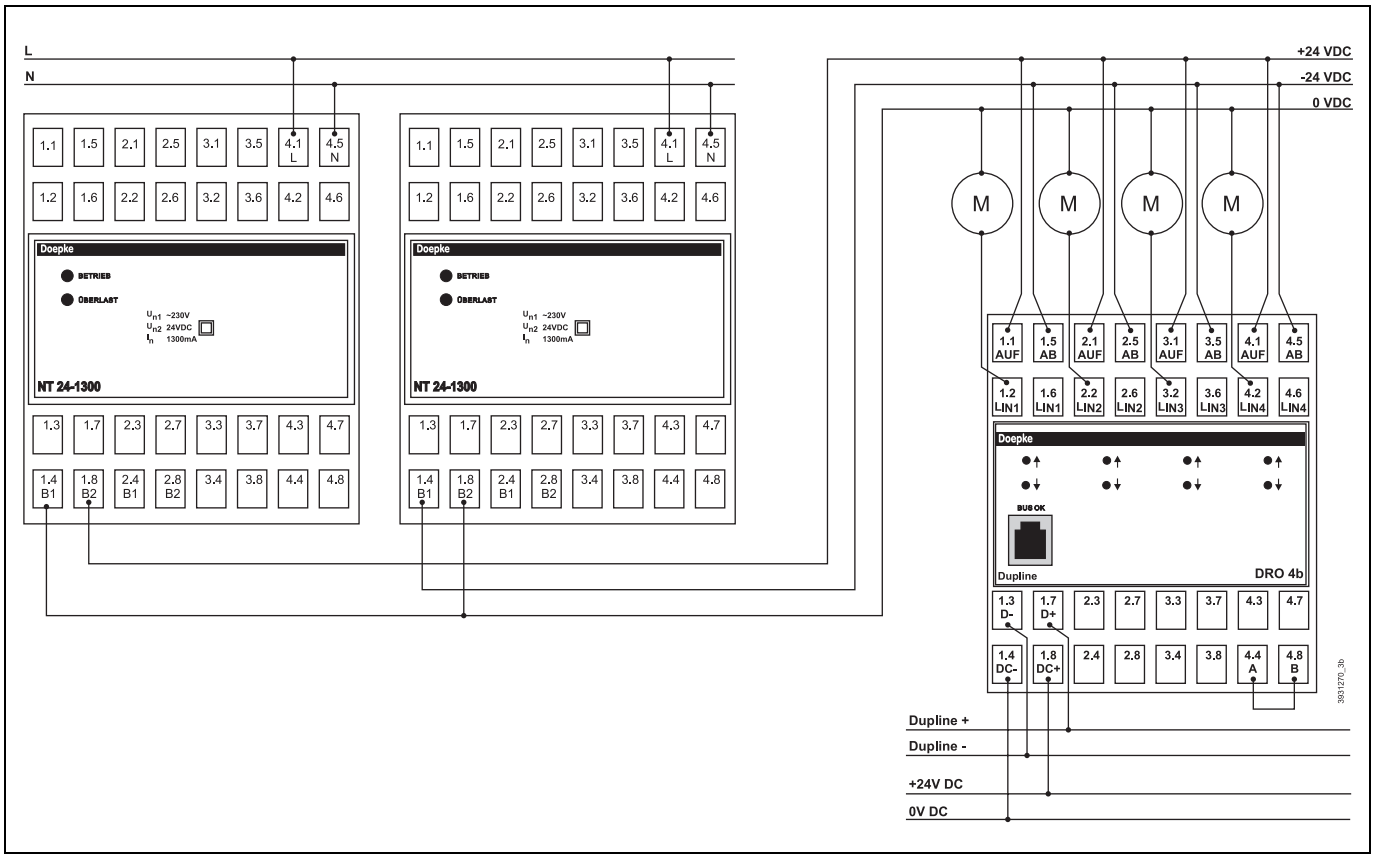
Motor 1 (DRO 2 / DRO 4b/c)		**Motor 2 (DRO 4b/c only)**	
Configuration in ProLine			
Shutter Control on A1 / A2		Shutter Control on A3 / A4	
Encoding of Channels			
1	A1	5	A3
2	A2	6	A4
3	A1	7	A3
4	A2	8	A4

Perform the wiring of the DRO 4 according to the following drawing (for DRO 2, use terminals with the same signification - see **Chapter 5.4.6 "DRO 2: Rail Mounted 2-Channel Shutter Control Unit"**):



7.2.2 Feed-in by two Power Supplies

When using two power supplies for the drives, each output can be used for one single shutter:



Chapter 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 2.2 "Signal Transmission"** 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. The DSM 4E (see **Chapter 5.5.2 "DSM 4E: 4-Way Binary Relay Output with 4 Semicond. Inputs, DIN-Rail"** on **Page 134**) allows to feed 24 VDC signals into Dupline. In addition, the components DSU 2U (see **Chapter 5.3.12** on **Page 75**) and DSU 8 (see **Chapter 5.3.13** on **Page 77**) allow converting DC voltages from 20 up to 300 V and AC voltages from 150 up to 250 V.

The incorporation of such components is illustrated by means of examples in **Chapter 7.1 "Incorporating SI Components"** on **Page 184**.

By means of the DSS 4R-EIB you also may integrate 2-way EIB operating signal sensors from different manufacturers. Therefor please read **Chapter 5.3.9** on **Page 67**.

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 or OFF) previously programmed with the DHK 1 hand encoder.

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.

No where in this document is the functionality of the components mentioned, such as e.g. the DRO 2 shutter control unit. Why?

This document only describes the hardware functions; any special functions such as starting and stopping of the shutters with the DRO 2 are controlled by the software. On the one hand the software controlled functions depend upon the operating system of the channel generator and, on the other, on the configuration options available with ProLine.

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 DSM 4E) offer control inputs (24 VDC) or outputs, which permit direct connection. Examples of such link-ups are given in **Chapter 7.1 "Incorporating SI Components"** on **Page 184**.

Is it possible to connect the inputs of input and output boards of the Dupline system to signal outputs of SI components?

Outputs of boards, provided they output 24 VDC, can be utilized for this purpose if you observer the notes in **Chapter 2.3.4 "Power Supply"** on **Page 14**. Inputs are however not suitable as they are only switched towards 0 V, whereas the SI system output is 24 VDC.

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 3 "Notes on Wiring and Installation"** on **Page 18**.
- 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.
- Are tableau boards of types DNP/DPN being used? If so, check the wiring of the 24 V supply and of the Dupline signal conductors. The 0V lead of the voltage supply must, on every board, be precisely connected to the Dupline signal conductor (DUP -) at the COM terminal.
- Similar to the cause quoted above is the position of the "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 OV 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 4R will generate a signal on the acknowledge channels 5 ...8 whenever the relevant output channels have been switched on. Also, the additional channels 2...7 of the DLUX light level sensor have frequently not been "coded out", so that the transmission of the analogue value results in switching on these channels.
- 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 DRO 1U and DRO 2 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, 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:

Doepke Schaltgeräte GmbH & Co. KG
Stellmacherstraße 11
26506 Norden
Germany
Tel.: +49 4931 1806-0
Fax: +49 4931 1806-101
Email: info@doepke.de
Internet: http://www.doepke.de/uk

Index

Numerics

08 501 01x, Licences of DPCamp 180
09 500 102, Remote actuator IF DFA-DI 150
09 500 162, Power supply unit NT 24-250 162
09 500 163, Power supply unit NT 24-1300 162
09 500 226, Remote dimmer module LT 500 159
09 500 227, Remote dimmer module LT 1200 159
09 501 001, Building Management CD 174
09 501 103, Hand encoder DHK 1 164
09 501 104, Channel Generator DKG 2 32
09 501 105, Two-way relay output DSM 2 121
09 501 106, Four-way relay output DSM 4E 136
09 501 110, Light level sensor DLUX 48
09 501 112, Temperature sensor DTS 1 81
09 501 113, Tester DTG 1 165
09 501 114, Relay output DSM 1U 118
09 501 116, Modbus interface DSI 1 156
09 501 117, 8-way output DNP 8A 106
09 501 121, 8-Way Relay Output DSM 8 130
09 501 122, Channel Generator DKG 1 32
09 501 124, Signal sensor DSS 4R-EIB 69
09 501 125, Encoder cable DKP 1 170
09 501 126, Encoder cable DKP 2 170
09 501 127, Tester cable DKT 1 171
09 501 128, Tester cable DKT 2 171
09 501 129, Interface cable DKK 1 167
09 501 130, DNP/DPN mounting unit DPH 1 172
09 501 131, 4-way input/output DNP 4 133
09 501 132, 4-way input/output DPN 4 133
09 501 133, 8-way output DPN 8A 106
09 501 134, Proximity detector DBM 1 43
09 501 136, Signal converter DSU 2U 76
09 501 137, Interface cable DKK 2 168
09 501 138, Shutter control unit DRO 1U 109
09 501 139, 8-way input DNP 8E 51
09 501 140, M12 interface cable DKM 1 168
09 501 141, M12 encoder cable DKP 3 170
09 501 142, 25-pole adapter DKK 3 168
09 501 143, Angle adapter DKA 1 167
09 501 145, Pulse counter DTZ 4 86
09 501 148, Software DSC 3-P 144, 148
09 501 152, DNP/DPN mounting unit DPH 2 172
09 501 154, Signal sensor DSS 4R 69
09 501 155, Signal converter DSU 8 79
09 501 168, Temperature sensor DTS 2 83
09 501 169, IR-receiver DIR 2 46
09 501 170, IR-transmitter DIR 2S 46
09 501 171, Room Thermostat DRT 1 60
09 501 172, Temperature sensor DTS 2-P 83
09 501 173, DDM 2 dimmer 103
09 501 174, 4-channel relay output DSM 4M 124
09 501 175, Scenario dimmer DDM 1Rplus 92
09 501 176, DDMU 2 1..10 V dimmer 103
09 501 179, DSC 3 touch screen panel 148
09 501 181, Lighting scene dimmer DDMU 1plus .. 96
09 501 185, DDMU 2plus scenario dimmer 103
09 501 187, DDM 2plus scenario dimmer 103
09 501 188, channel generator DKG 20 40
09 501 189, channel generator DKG 21-GSM 40
09 501 190, GSM antenna DGA 1 40
09 501 191, Active DCF antenna DDA 1 ..... 40, 167
09 501 193, DSA 1, Adapter DSC 3-DSI 1 168
09 501 194, Operating signal sensor DSS 2U 72
09 501 195, Operating signal sensor DSS 4U 72
09 501 196, Operating signal sensor DSS 8U 72
09 501 197, DWS 1 water stop sensor 88
09 501 199, Text display DDI 2 141
09 501 200, Adapter DSC 3-DKG 20/DKG 21 169
09 501 201, Presence detector DPM 1 55
09 501 202, DSC 3-UPG2 housing 173
09 501 203, DSC 10-232, Touch panel 3.8" 144
09 501 204, DSC 10-485, Touch panel 3.8" 144
09 501 205, DSC 10-DUP, Touch panel 3.8" 144
09 501 206, Signal converter DSU 1U 74
09 501 207, Software DSC 3-P (USB) 148
09 501 210, DSA 3 adapter DSC 10-DSI 1 169
09 501 211, DSA 4 adapter DSC 10-DKG 20 169
09 501 213, DSC 10-UPG housing 172
09 501 214, Shutter control unit DRO 4b 116
09 501 215, Shutter control unit DRO 4c 116
09 501 217, Smoke Detector DRD 3 58
09 501 220, Room thermostat DRT 2 66
09 501 222, DCI 2 Serial-to-Ethernet Port Server 154
37 501 149, DDS 1 DDE-Server 178
37 501 182, Dupline webserver 177
59 00 126, ProLine User Manual 174
59 00 142, ProLineNG User Manual 174

A

actuator interface for remote access 149
Adapters 166
adapters
  for DKG 1/DKG 2 167
  for DKK 1 168
addresses
  assignment 12, 14
  forms for assigning 182
AnaLink
  display of data 145
  transmission 12
analog data 12
angle adapter for DKG 1/DKG 2 167

B

BCD 12
billing programmes 179

C

cable
  branching 18
  for 25-pole connector 168
  for connecting two DKG 1/DKG 2 167
  for encoding M12-modules 170
  for hand encoder 170

for M12-modules 168
for programming DKG with ProLine 167
for ProLine and visualisation 167
for tester 170, 171
length 20
lightning 21
recommendations 19
resistance 20
routing 18
terminals 18
termination 20
twist 18
camping site billing systems 179
capacity
of cables 19
carrier signal 11
CD 174
channel generator 28, 33
configuration software 174
configuration
combined 10
linear 9
of Dupline systems 8
ring-type 9
software 174
star-type 9
via network 151
control states 12
counter
data 12
pulse and hours-run meter 84
cross-section 18

D

data
analog 12
control states 12
counter/meter 12
DBM 1 41
DC drives 186
DCF-Antenna 166
DCI 2 151
DDA 1 166
DDE-server 178
DDI 2 137
DDM 1Rplus 89
DDM 2/DDM 2plus 97
DDMU 1Rplus 93
DDMU 2/DDMU 2plus 97
detectors
rain and wind 185
smoke and fire 56
water 87
DFA-DI 149
DHK 1 163
dielectric resistivity 18
dimmer
DDM 1Rplus 89
DDM 2/DDM 2plus/DDMU 2/DDMU 2plus 97
DDMU 1Rplus 93
load modules LT 500 and LT 1200 157
DIR 2/DIR 2S 44
displays
DDI 2 text display 137
DRT 2 room thermostat 61
DSC 10 142
DSC 3 145
touch panel 145
DKA 1 167
DKG 1 ..... 28, 33
DKG 2 ..... 28, 33
DKG 20 33
DKG 21-GSM 33
DKK 1 ..... 29, 167
DKK 2 ..... 30, 167
DKK 3 168
DKM 1 168
DKP 1 170
DKP 2 170
DKP 3 170
DKT 1 170
DKT 2 171
DLUX 47
DNP 4 131
DNP 8A 104
DNP 8E 49
documentation
CD 174
with ProLine 30
DPCamp 179
DPH 1 172
DPH 2 172
DPM 1 52
DPN 4 131
DPN 8A 104
DRD 3 56
DRO 1U 107
DRO 2 ..... 110, 186
DRO 4 (replaced by DRO 4b/DRO 4c) 113
DRO 4b 186
DRO 4c 186
DRT 1 59
DRT 2 61
DSA 1 168
DSA 2 169
DSA 3 169
DSA 4 169
DSC 10 142
flush mounted housing 172
DSC 10-UPG 172
DSC 3 145
flush mounted housing 173
DSC 3-P 144, 148
DSC 3-P (USB) 148
DSC 3-UPG2 173
DSI 1 ..... 151, 155

DSM 1U 117
DSM 2 ..... 119, 122
DSM 4E 134, 184
DSM 4M 122
DSM 4R 125
DSM 8 128
DSS 2U 70
DSS 4R 67
DSS 4R-EIB 67, 188
DSS 4U 70
DSS 8U 70
DSU 1U 73
DSU 2U 75
DSU 8 ..... 77, 185
DTG 1 165
DTS 1 80
DTS 2/DTS 2-P 82
DTZ 4 84
Dupline
documentation 174
in general 7
problems with 189
DWS 1 87

E

EIB push buttons 67, 188
encoder 163
Ethernet. See network

F

FAQs (frequently asked questions) 188
fire detector 56

G

GAEB 174
GSM 35

H

hand encoder 163
hours-run meter 84

I

infrared remote control 44
input and output board 131
mounting units 172
input board
8-way 49
input for key signals 70
inputs
DSM 4E 134
general 14
signal converter DSU 1U 73
signal converter DSU 2U 75
signal converter DSU 8 77
installation notes 18
insulation resistance 18
interfaces
Modbus 155
remote
actuator (DFA-DI) 149
IP 17

L

leisure facilities billing systems 179
light level sensor 47
light scene dimmer 89, 93
lighting scene dimmer 97
lightning protection 19, 21
line termination 19, 20
load modules
LT 500 and LT 1200 157
logic connectives 28

M

meter data 12
Modbus
in DKG 1 / DKG 2 30
in DKG 20 / DKG 21-GSM 34
interface 155
modem
in DKG 21-GSM 33
modules
positioning of 19
mounting unit 172
for PCBs 172
for touch panels 172, 173

N

network
remote configuration via 151
viusalisation via Ethernet 175
with DKG 20/DKG 21-GSM 22, 33
NT 24-1300 160
NT 24-250 160

O

open circuit board
DNP 4 131
DNP 8A 104
DNP 8E 49
DPN 4 131
DPN 8A 104
operating signal sensor
DSS 2U/4U/8U 70
with acknowledgement 67
output board
4-way 131
8-way 104
outputs 14

P

planning of projects 181
power supply 14
NT 24-250 and NT 24-1300 160
presence detector
DBM 1 41
DPM 1 52
problems 189
programming software
for DDI 2 137

for DKG 174
for DSC 3/DSC 10 ..... 144, 148
ProLine / ProLineNG 174
protection types 17
proximity detector
DBM 1 41
DPM 1 52
pulse counter 84

R

radio transmission
distributed system radio modem 35
relay output
1-way 117
2-way 119
4-channel 122
4-way with acknowledge 125
4-way with inputs 134
8-way 128
remote
configuration/visualisation via network 151
control 44
control with SMS (GSM) 33
control with webserver 175
resistance 18
of cables 20
RGS 1 EM 21
RGS BE 21
Room thermostat
DRT 1 59
DRT 2 61
RS485 networks 22

S

sensors
for operating signals 67, 70
for proximity detection 41, 52
for rain and wind 185
light level 47
temperature 61, 80, 82
water 87
shielding 18
shutter control
1-channel 107
2-channel 110
4-channel 113
sticking relays 190
SI Building Management System 174, 189
signal
inputs and outputs 19
signal converter
DSU 1U 73
DSU 2U 75
DSU 8 77
single room temperature control 59, 61
SIRW 184, 185
SIWR 184, 185
SIWS 184
smoke detector 56
SMS 35
software
for channel generator 174
for touch panels 144, 148
switching contacts 15
system configuration 8

T

temperature sensor
DRT 2 61
DTS 1 80
DTS 2/DTS 2-P 82
tendering phase 174
termination
line 19, 20
of RS485 at DKG 20/DKG 21-GSM 33
of RS485 connections 22
tester 165
text display 137
thermostat 59, 61
time-division multiplex method 12
touch panel
DSC 3 145
DSC 10 142
housing 172, 173
programming software 144
transmission
of signals 11

V

visualisation
DDE-server 178
DPCamp 179
in leisure facilities 179
of DKG 1/DKG 2 30
of DKG 20/DKG 21-GSM 34
office applications 178
touch panel DSC 10 142
touch panel DSC 3 145
via network 151, 175
webserver 175

W

watchdog 29
water stop sensor 87
webserver 175
wires 18

Doepke

Doepke Schaltgeräte GmbH & Co KG
Stellmacherstraße 11
D-26506 Norden / Germany
Tel. +49 (0)4931 1806-0
http://www.doepke.de/uk
e-mail: info@doepke.de

Art.-Nr. 59 00 102