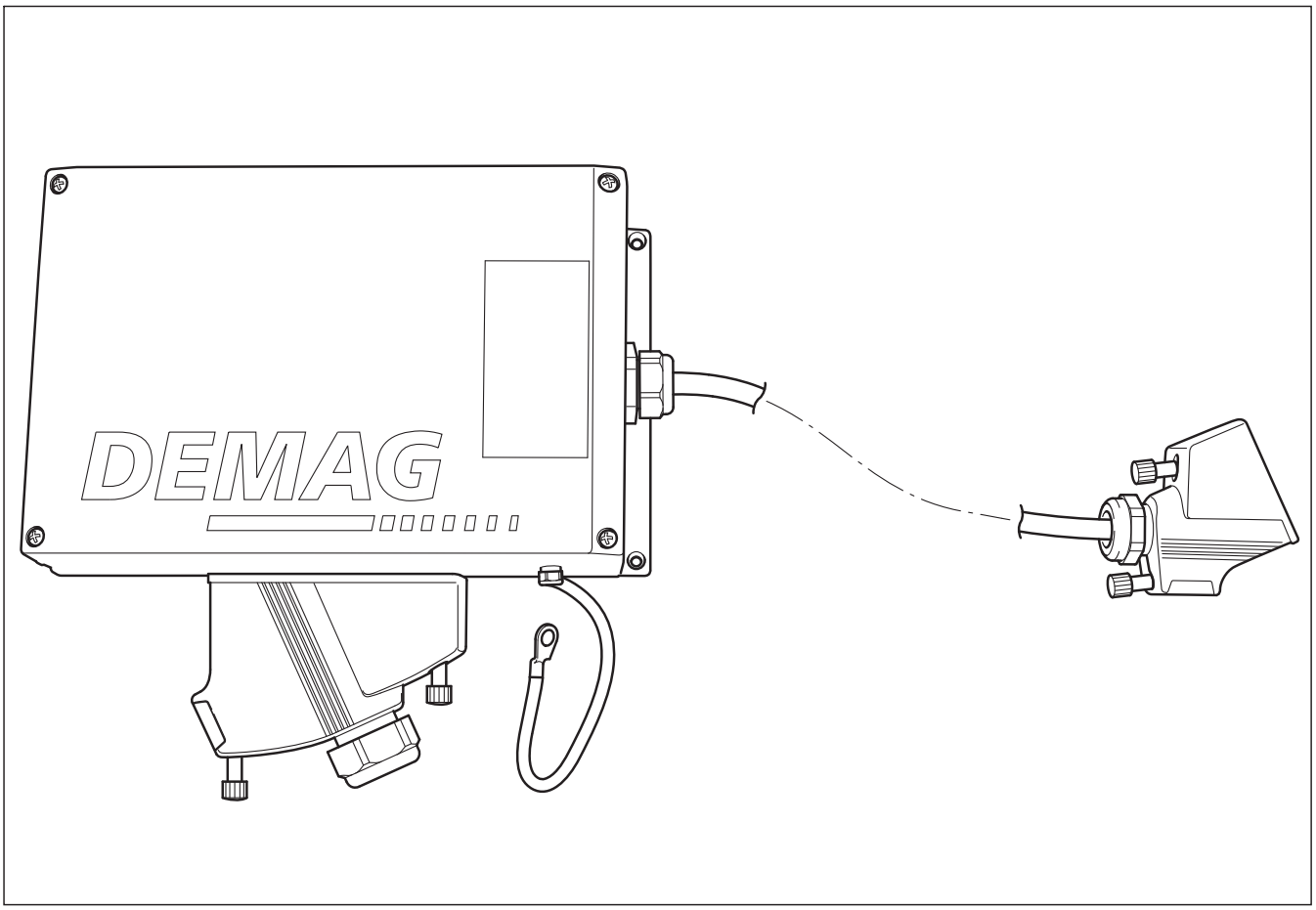
Operating/assembly instructions

Demag Parallel-CAN DPC



Original operating and assembly instructions

Manufacturer

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Please fill in the following table before first putting the unit into service. This provides you with a definitive documentation of your DPC module and important information if you ever have to contact the manufacturer or his representative.

Owner
Where in use
Operating voltage
Control voltage
Frequency
Wiring diagram number
Contactor control
Direct control

Tab. 1

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Table of contents

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1 General

1.1 Demag DPC module

The DPC module is supplied pre-assembled and packed.

Before beginning assembly, check that the delivery is complete using the enclosed shipping papers.

Construction, function and operating safety of the DPC module are state-of-the-art.

These operating/assembly instructions provide the user with instructions for safe and correct operation and facilitate simple maintenance. We provide information on how to fit and attach the assemblies.

1.2 Information on the operating and assembly instructions

These operating/assembly instructions are designed to provide the owner with appropriate instructions for safe and correct operation and for maintenance. The operating/assembly instructions are an integral part of the DPC module.

Every individual given the task of transporting, installing, commissioning, operating, maintaining and repairing our additional equipment must have read and understood

- the operating/assembly instructions
- the associated operating instructions
- the safety regulations
- and the safety instructions in the individual chapters and sections.

The operating/assembly instructions must be available to the operating personnel at all times in order to prevent operating errors and to ensure smooth and trouble-free operation of our products.

These operating/assembly instructions are designed to provide the owner and user with appropriate instructions for safe and correct operation and to facilitate maintenance of our products.

WARNING

Non-compliance with the regulations

Danger to life and limb.

All information required for safe operation of the DPC module can be found in chapter ⇒ "Safety instructions", Page 10.

Carefully read them before installation and commissioning.

The relevant accident prevention regulations, codes of practice and general safety regulations must be observed when operating our products.

Important information regarding e.g. the safety of operating personnel or the product is indicated by corresponding symbols.

Follow these instructions and recommendations in order to avoid personal injury and damage to equipment. Observe the safety regulations.

Based on Machinery Directive 2006/42/EC, the DPC module is also designated as a machine in the following in the sense of partly completed machinery.

1.3 After-sales service

Our after-sales service will provide you with all technical information on Demag products and their systematic application.

Should you have any questions regarding our products, please refer to one of our after-sales service centres, the relevant representative or the head office in Wetter.

Kindly quote the serial or order number (see test and inspection booklet, type plate) in any correspondence or for spare part orders. Quoting this data ensures that you receive the correct information or the required spare parts.

Manufacturer's address:
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1.4 Liability and warranty

All information included in these operating/assembly instructions has been compiled on the basis of the relevant regulations, state-of-the-art engineering principles and our many years of experience.

These operating/assembly instructions must be read carefully before starting any work on and with the machine, especially before the machine is put into service for the first time! We assume no liability for any damage which results from the following:

- Non-compliance with the operating/assembly instructions
- Inappropriate use of the machine
- Operation by insufficiently trained personnel
- Unauthorised conversions
- Any technical modifications

Wearing parts are not subject to liability for defects.

We reserve the right to incorporate technical modifications within the scope of improving the operating characteristics and further development of the machine.

1.5 Copyright

These operating/assembly instructions must be treated confidentially. They are only intended to be used by people who work with or on the machine.

Any and all content, texts, drawings, images and any other information are protected within the sense of copyright law and are subject to further industrial rights. Any misuse is an offence.

No part of this documentation, in whole or in part, may be reproduced, distributed, shown in public or used in any other way without specific prior consent. Infringements are an offence resulting in obligatory compensatory damages. Further rights reserved.

All industrial rights reserved.

1.6 Definitions

Terms and definitions

Manufacturer

The manufacturer is the person who:

1. manufactures machinery under his or her own name and places it on the market for the first time;
2. resells machinery made by other manufacturers under his or her own name, whereby the reseller is not considered to be the manufacturer, provided the name of the manufacturer (as defined in 1.) appears on the equipment;
3. imports machinery into Germany and places it on the market for the first time or
4. exports machinery to another member state of the European Union and hands it over direct to an owner in that country

Owner
Owners (employer, company) are defined as persons who own a machine and who use it as intended or allow it to be operated by suitable and trained persons.

Operating personnel/machine operator
Operating personnel or machine operators are defined as persons entrusted by the owner of a machine with operation of the equipment. The operating personnel must be trained by the owner in accordance with the tasks to be performed.

Trained person
Trained persons are defined as persons who, owing to their technical training, knowledge and experience of electrical machines as well as knowledge of the relevant valid standards, codes of practice and regulations, are able to assess the tasks given to them and to identify and eliminate potential hazards.

Specialist personnel
Specialist personnel are defined as persons assigned by the owner of a machine to carry out special tasks such as installation, setting-up, maintenance and fault elimination. Specialist personnel must be trained by the owner before any work is carried out on or with the machine.

Qualified electrician
Qualified electricians are defined as persons who, owing to their technical training, knowledge and experience of electrical machines as well as knowledge of the relevant valid standards, codes of practice and regulations, are able to assess the tasks given to them and to identify and eliminate potential hazards. Qualified electricians must be trained by the owner in accordance with the tasks to be performed.

Experienced technician
Experienced technicians are defined as persons who, owing to their technical training and experience, have sufficient knowledge in the field of machines. They must be familiar with the relevant national industrial safety regulations, codes of practice, accident prevention regulations, directives and generally accepted engineering standards enabling them to judge the safe operating condition of machines.

Assigned expert engineer (in the Federal Republic of Germany according to BGV D8, Section 23, for determining the S.W.P.)
An assigned expert engineer is defined as an experienced technician specifically assigned by the manufacturer to determine the remaining duration of service (service life) of the machine (S.W.P. = safe working period) and to carry out a general overhaul of the machine.

Authorised expert engineer (according to BGV D6, Section 28 in Germany)
In addition to the expert engineers of the Technical Supervisory and Inspection Board, an authorised expert engineer for the inspection of machines is defined as an expert engineer authorised by the Industrial Employers' Mutual Insurance Association.

1.7 Maintenance

If required, our trained specialists can carry out this work for you, either as a special order or as part as an inexpensive inspection agreement.

Our experts are highly experienced and are equipped with the latest overhaul and maintenance tools. They carry common wearing parts with them or can obtain them quickly from local service centres.

1.8 Inspection regulations

Suitability for operation

By means of suitable measures carried out by the manufacturer or on his behalf, the manufacturer ensures that the load handling attachments and machinery ready for operation function in complete safety before first being put into service. The specified measures must allow for the static and dynamic features of the machinery.

Acceptance inspection

Inspection in accordance with relevant national regulations, e.g. BGV D6 for cranes; BGV D8 for winches, hoists and towing devices in Germany.

Regular inspections

Cranes and equipment must be inspected by a specialist at least once a year. Regular inspections mainly consist of a visual inspection and a function check which should include a check to determine the condition of components and equipment regarding damage, wear, corrosion or other alterations and a check to determine the integrity and efficiency of safety devices.

Regular inspections must be carried out, for example, in accordance with BGV D6 and ZH 1/27 "Principles for the inspection of cranes" in Germany. The results of the inspection must be entered into a test and inspection booklet.

It may be necessary to remove parts in order to inspect wearing parts. Load carrying means must be inspected along their entire length, including those parts which cannot normally be seen.

Defective parts and components and parts close to failure must be replaced.

WARNING

Incorrect maintenance

There is danger to life and limb if maintenance work is not carried out in accordance with all relevant requirements.

All inspections must be arranged and documented by the owner.

1.9 Packing and storage

DPC modules and their accessories are supplied packed in cardboard packing and in bags.

Store the parts and their accessories in a dry place.

Before beginning assembly, check that the delivery is complete using the enclosed shipping papers.

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2 Introduction

2.1 Use of the DPC module

The DPC module is designed for use in connection with one or more DR control systems. These operating/ assembly instructions describe the user interface of the DPC module with reference to hardware version DR-PA-GB.200 and DR-PA-ZB.200 which is printed on the relevant board.

2.2 Functions

The DPC module converts the incoming input signals into equivalent bus signals to establish communication with one or more DR control systems. This makes it possible to use control pendant switches or radio control systems from different manufacturers to control DR control systems, for example. The DR control systems are located on the DR hoist unit or DR crane.

The DPC module covers a wide range of functionalities, including the following items:

- digital and analogue long-travel commands
- digital and analogue cross-travel commands
- Digital and analogue hoist commands
- Analogue control alternatively with PWM 24 V / 1 kHz or 0-10 V per axis
- Digital wide voltage range inputs (30 VAC-253 VAC absolute)
- Further digital inputs for special functions
- Isolated CAN-Bus connection with CANopen Safety protocol
- Redundant 2-processor system
- Error visualisation of the DR control system by means of 7-segment display
- Split into basic and additional board (basic board for solo crab and compatibility with previous parallel-in, additional board for DR crane and special functions)
- Safe key-operated switch (option)
- Safe galvanically isolated output (option)

3 Safety instructions

3.1 Symbols/signal words

Important safety information and instructions are marked by corresponding symbols and signal words in these operating/assembly instructions.

Safety instructions and information must be followed. Exercise particular caution to ensure that accidents, injuries and damage are avoided in such cases.

Any locally applicable accident prevention regulations and general safety regulations must also be followed.

The following symbols and instructions warn against possible injuries or damage and are intended to assist you in your work.

DANGER

This symbol indicates an immediate hazard which can result in serious injury or death.

– Follow these instructions at all times and be particularly careful and cautious.

WARNING

This symbol indicates a possibly hazardous situation which might result in serious injury or death.

– Follow these instructions at all times and be particularly careful and cautious.

CAUTION

This symbol indicates a possibly hazardous situation which might result in medium to light injury or damage.

– Follow these instructions at all times and be particularly careful and cautious.

Operating hazard for the installation

- This symbol indicates information on the appropriate use of machinery.
- If not complied with, the DPC module may malfunction or be damaged.

3.2 Intended use

The product may only be operated when in perfect working order by trained personnel in accordance with the relevant safety and accident prevention regulations. This also includes compliance with operating and maintenance conditions specified in the operating/assembly instructions.

This product is industrial equipment that is intended to be used with the rated voltage specified on the type plate. The relevant main switches must be switched off when maintenance work is carried out. During operation or when the main switch is not switched off, electrical components inside the enclosure carry dangerous voltages. This voltage may cause fatal injuries.

WARNING

Misuse, inappropriate use

Danger to life and limb due to an operating error.

Serious personal injury or damage to property may occur in the event of:

– unauthorized removal of covers,
– inappropriate use of the product,
– incorrect operation,
– insufficient maintenance,
– working on live parts.

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3.3 Inappropriate use

Certain work and practices are prohibited when using the product as they may involve danger to life and limb and result in lasting damage to the product, e.g.:

- Do not manipulate electrical equipment.
- Do not connect the unit to a power supply with a voltage or frequency other than those specified on the type plate.
- Comply with specified mounting positions.
- Comply with the maximum permissible operating temperature.

3.4 General safety information

Persons who are under the influence of drugs, alcohol or medication which affects the ability to respond must not install, start, operate, maintain, repair or remove the product. Any conversions and modifications to the installation must satisfy the safety requirements. Work on electrical equipment may only be carried out by specialists in accordance with electrical regulations. In the event of malfunctions, the product must be stopped, switched off and the relevant main switches locked immediately.

Malfunctions must be eliminated immediately.

National accident prevention regulations and codes of practice and general safety regulations must be observed when operating our products. Important information and instructions are marked by corresponding symbols. Follow these operating and safety instructions to avoid personal injury and damage to machinery.

The operating/assembly instructions must be permanently available at the place where the product is in use!

They include significant aspects and appropriate excerpts from the relevant guidelines, standards and regulations. The owner must instruct his personnel appropriately. Any non-compliance with the safety instructions may result in personal injury or even death.

In addition to the operating/assembly instructions, observe general statutory and other obligatory regulations relating to accident prevention and environmental protection and basic health and safety requirements. Such requirements may also relate, for example, to the handling of hazardous materials or the provision/wearing of personal protection equipment. Comply with these regulations and general accident regulations relevant for the place at which the product is used and follow the instructions therein when working with the product.

The product may still constitute a danger to life and limb if it is installed, operated, maintained or used inappropriately by personnel who have not been trained or specially instructed. The safety instructions must, if required, be supplemented by the owner with instructions and information (e.g. factory regulations) relating to organization of work, working procedures, operating personnel, etc. Supervising and reporting obligations as well as special operating conditions must also be taken into consideration.

Personnel assigned to working with the product must have read the operating/assembly instructions and the safety instructions. All activities relating to the product which are not described in the operating/assembly instructions may only be carried out by specifically trained specialist personnel. The owner must ensure that personnel work in a safety and hazard-conscious manner in compliance with the operating/assembly instructions.

The owner must ensure that product is only operated when in proper working order and that all relevant safety requirements and regulations are complied with. The product must be taken out of service immediately if any functional defects or irregularities are detected.

In the event of a stoppage (e.g. if defects regarding safe and reliable operation are detected, in emergency situations, in the event of operating malfunctions, for maintenance purposes, if damage is detected or after finishing work), the operator/experienced technician must carry out all prescribed safety measures or observe that they are automatically carried out.

Personal protective clothing must be worn as necessary or as required by regulations. Personnel must not wear any loose clothing, jewellery including rings or long hair loose. Injury may occur, for example, by being caught or drawn into the mechanism. All safety and hazard warnings on the product, its access routes and mains connection switches must be preserved completely and in legible condition. Modifications, additions to and conversions of the product which might impair safety in any way must not be carried out without the approval of Demag.

Safety devices must not be rendered inoperative.

Only genuine Demag spare parts may be used. Observe prescribed deadlines or those specified in the operating/assembly instructions for routine checks / inspections!

3.5 Safety instructions for installation and disassembly

For assembly work, comply with the following:

- Installation and disassembly work may only be performed by experienced technicians.
- Installation and disassembly work must be co-ordinated by the person carrying out the work and the owner within the scope of their responsibility.
- The assembly zone must be made safe.
- The installation must be isolated in accordance with the relevant electrical regulations.
- Customer-specific regulations must be observed.
- Only appropriate, tested and calibrated tools may be used.

3.6 Safety instructions when first putting the unit into service after completing assembly

Pay attention to the following before putting the product into service for the first time:

- The working area must be made safe.
- First check that the voltage and frequency specified on the type plates match the owner's mains power supply.
- In the course of putting the product into service, it may be necessary to render safety devices or features inoperative when carrying out adjustments or function checks.
- When putting the product into service, it may be necessary to perform work in the danger zone, therefore, it must be ensured that only appropriately trained personnel are employed for this work.

3.7 Safety instructions for operation

All measures and instructions described in the operating/assembly instructions with regard to safe operation and items concerning general safety and accident prevention which have to be observed before, during and after the product is put into service must be strictly followed. Any failure to comply can lead to accidents resulting in fatalities. The product must be taken out of service immediately or not put into operation if any defects relating to operating safety and reliability are detected. Safety devices must not be rendered inoperative or modified contrary to their intended use. Only operate the product when all protective devices and safety-relevant equipment, e.g. movable protective devices and emergency-stop devices, are fitted and fully functioning.

Switch off the product immediately in the event of damage to electrical devices and cables as well as parts of the insulation. Ensure that nobody is endangered by operation of the product before switching it on or putting it into operation. If the operator notices persons who may be exposed to a risk to health or personal safety by operation of the equipment, he must stop operation immediately and may not resume operation again until the persons are outside the danger zone.

The operator must be satisfied that the product is in safe and correct operating condition before putting the product into operation.

Work on the product may only be carried out when instructions to this effect have been issued, when operation and function of the equipment have been explained and when the working and danger zone has been made safe. Cooling devices, such as ventilation openings, may not be rendered permanently inoperative (e.g. covered or closed). Special local conditions or special applications can lead to situations which were not known when this chapter was written. In such cases, special safety measures must be implemented by the owner.

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4 Configuration

4.1 Overview

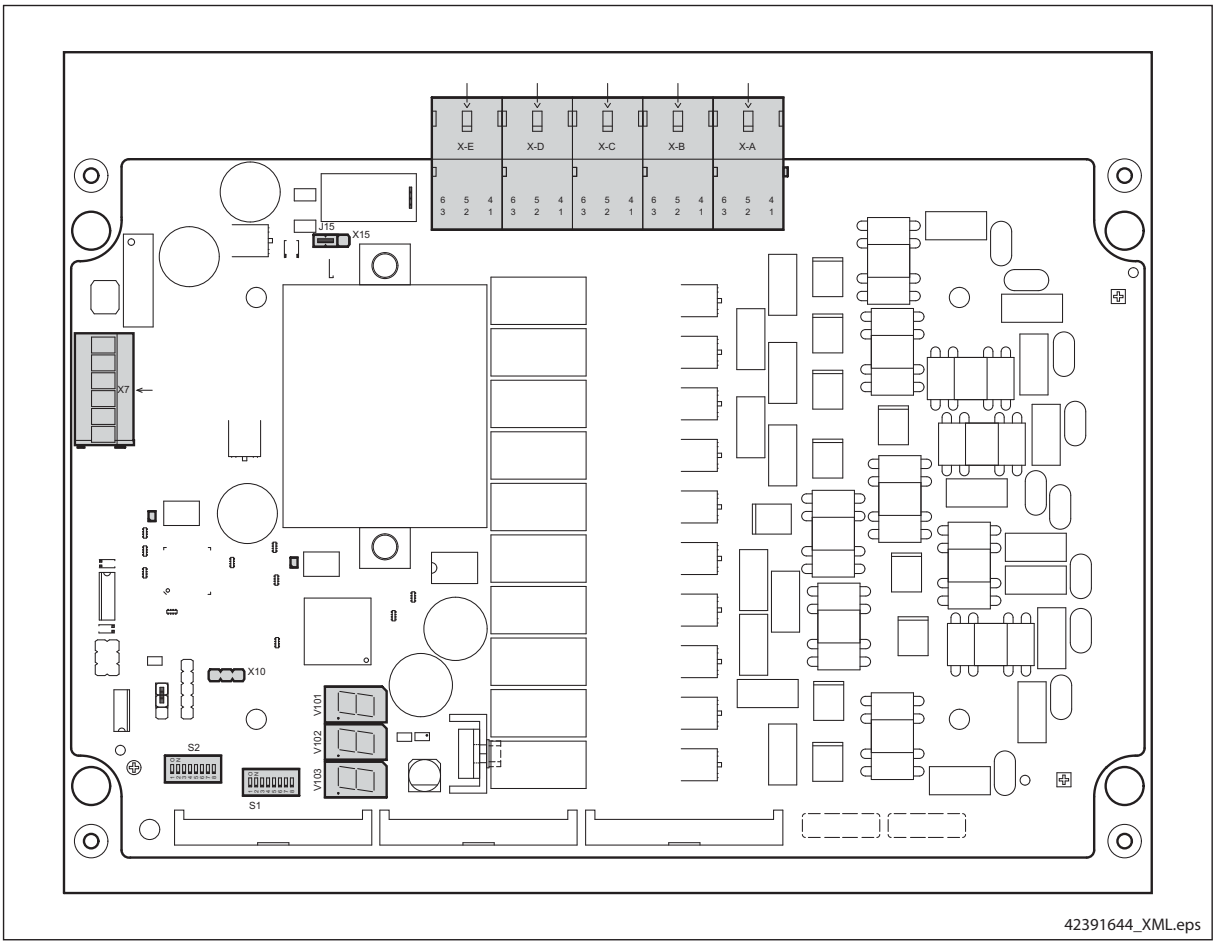

Fig. 1

In reference to their highly complex functionality, DPC modules are provided with various configuration possibilities to meet the requirements of the different control methods. These settings are partly made by means of DIP switches and also by means of jumpers on the basic board. ⇒ Fig. 1, Page 13 provides an overview of the jumper and DIP switch positions. This diagram also includes the connecting block that shows the user interface.

4.2 Analogue control

DPC modules have three analogue inputs for control of the lifting, cross-travel and long-travel axes.

Control may be effected by means of PWM or 0-10 V analogue signals.

In addition to the analogue signal, a digital direction signal is always required for a travel motion. If analogue control is not required, the inputs can remain disconnected.

4.3 Digital control

The digital inputs (e.g.: lifting) have a wide voltage range input, i.e. voltages between 32 V and 230 V are evaluated.

The inputs of the DPC module are isolated from the processor unit, and also from the control voltage by default. Isolation of the control voltage can be eliminated by means of a jumper according to the following table. In this way, it is possible to connect the digital inputs only by means of external contacts without an external voltage supply.

DPC modules can be used for infinitely variable and 2-stage control of DR hoist inverters.

For control in stages, inputs A3 (V1) and B2 (V2) are routed to the frequency inverter with a ratio of 1:5 (the infinitely variable hoist unit lifts with two fixed speeds). Due to the progressive signal interpretation of the DR logic system, it is not possible to specify a precise speed. Depending on the design, V1 may vary between ~15-20% of V2.

If other or more precise speed stages are required, the parameters of the DR hoist can be programmed accordingly.

Supply of the digital inputs	**J15 / X15**
External power supply (32V – 230V)	1-2 (default)
Supply via control voltage of the DPC module (tapped at X-E3)	2-3

Tab. 2

The jumper must be set according to the default setting for an external power supply.

4.4 DIP switch

4.4.1 Overview

Parameters for the DPC module itself and parameters for the connected peripherals are set via the DIP switches. The following tables provide an overview of the DIP switches . The possible variants (switch settings) are described in ⇒ "Node ID", Page 15, ⇒ "Baud Rate", Page 15 and ⇒ "Configuration of peripherals (DR control systems)", Page 15.

Configuration switch S1	**Pin #**
Node Id Bit 0	1
Node Id Bit 1	2
Node Id Bit 2	3
Baud rate Bit 0	4
Baud rate Bit 1	5
Baud rate Bit 2	6
Crab 1 present	7
Node Id Crab 1 Bit 0	8

Tab. 3

Configuration switch S2	**Pin #**
Node Id Crab 1 Bit 1	1
Crab 2 present	2
Node Id Crab 2 Bit 0	3
Node Id Crab 2 Bit 1	4
Crane present	5
Node Id Crane Bit 0	6
Node Id Crane Bit 1	7
Reserve	8

Tab. 4

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4.4.2 Node ID

The Node Id must be set as the CAN-Bus parameter of the DPC module. Every CANopen device is distinctly identified by the so-called Node Id in a CANopen-based network. The following table shows the assignment of the Node Id setting.

Resulting Node Id	Bit 2	Bit 1	Bit 0
1 (default)	0	0	0
2	0	0	1
3	0	1	0
4	0	1	1
5	1	0	0
6	1	0	1
7	1	1	0
8	1	1	1

Tab. 5

0 = DIP switch OFF

1 = DIP switch ON

4.4.3 Baud Rate

The CAN-Bus parameter Baud rate is specified and the identical rate must be selected for all users on the Bus. The following table shows the assignment of the Baud rate to the DIP switches.

Resulting Baud rate	Bit 2	Bit 1	Bit 0
125k (default)	0	0	0
10k	0	0	1
20k	0	1	0
50k	0	1	1
125k	1	1	1
250k	1	0	0
500k	1	0	1
1000k	1	1	0

Tab. 6

0 = DIP switch OFF

1 = DIP switch ON

4.4.4 Configuration of peripherals (DR control systems)

The "Present Bits" select the DR control systems connected to the DPC module. The relevant Node Ids for the individual selected DR control systems must be set according to the parameters programmed for the individual DR control systems.

With reference to the "Present" DIP switches, this results in the following combination of DR control systems and the associated fixed assignments:

Crab 1	Crab 2	Crane	Crane system
0	0	0	Invalid -> solo crab
0	0	1	Solo crane
0	1	0	Invalid -> solo crab
0	1	1	Invalid -> solo crab
1	0	0	Solo crab
1	0	1	Crab on the crane
1	1	0	Invalid -> solo crab
1	1	1	2 crabs on the crane

Tab. 7

0 = DR control system not present

1 = DR control system present

All invalid or meaningless combinations result in the "Solo crab" standard setting.

Examples of some standard applications are shown in the following. The following settings apply for the Node Id and the Baud rate for all standard applications shown:

Configuration switch S1	Pin #	Position
Node Id Bit 0	1	OFF
Node Id Bit 1	2	OFF
Node Id Bit	3	OFF
Baud rate Bit 0	4	OFF
Baud rate Bit 1	5	OFF
Baud rate Bit 2	6	OFF

Tab. 8

Application 1: Solo crab

Configuration switch S1	Pin #	Position
Crab 1 present	7	OFF or ON
Node Id Crab 1 Bit 0	8	OFF

Tab. 9

Configuration switch S2	Pin #	Position
Node Id Crab 1 Bit 1	1	OFF
Crab 2 present	2	OFF
Node Id Crab 2 Bit 0	3	OFF
Node Id Crab 2 Bit 1	4	OFF
Crane present	5	OFF
Node Id Crane Bit 0	6	OFF
Node Id Crane Bit 1	7	OFF
Reserve	8	OFF

Tab. 10

Application 2: Standard crane with one crab

Configuration switch S1	Pin #	Position
Crab 1 present	7	ON
Node Id Crab 1 Bit 0	8	OFF

Tab. 11

Configuration switch S2	Pin #	Position
Node Id Crab 1 Bit 1	1	OFF
Crab 2 present	2	OFF
Node Id Crab 2 Bit 0	3	OFF
Node Id Crab 2 Bit 1	4	OFF
Crane present	5	ON
Node Id Crane Bit 0	6	OFF
Node Id Crane Bit 1	7	OFF
Reserve	8	OFF

Tab. 12

Application 3: Standard crane with two crabs

Configuration switch S1	Pin #	Position
Crab 1 present	7	ON
Node Id Crab 1 Bit 0	8	OFF

Tab. 13

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Configuration switch S2	Pin #	Position
Node Id Crab 1 Bit 1	1	OFF
Crab 2 present	2	ON
Node Id Crab 2 Bit 0	3	ON
Node Id Crab 2 Bit 1	4	OFF
Crane present	5	ON
Node Id Crane Bit 0	6	OFF
Node Id Crane Bit 1	7	OFF
Reserve	8	OFF

Tab. 14

5 Serial interface

5.1 Use

The DPC module provides a serial interface with the following connection assignment. This interface provides extended diagnostic possibilities which may be used by Demag Service only.

Serial interface X10	Pin #
TxD	1
RxD	2
GND	3

Tab. 15

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5 7-segment display

5.1 Use

A DR control system communicates with the relevant control unit in standard applications. The display of this control unit shows status messages from the DR control system. With reduced functionality, due to the limited display possibilities, the display function is provided by the 7-segment display for the DPC module.

When the power supply is switched on, the following information is shown once on the 7-segment display in the following sequence:

- Main controller software version
- Auxiliary controller software version
- S1 DIP switch value determined by the DPC module
- S2 DIP switch value determined by the DPC module

The 7-segment display is then fed by the DR control system to provide status messages, as required. Nothing is displayed if there are no messages.

6 Connection diagram

6.1 Assignment of the socket

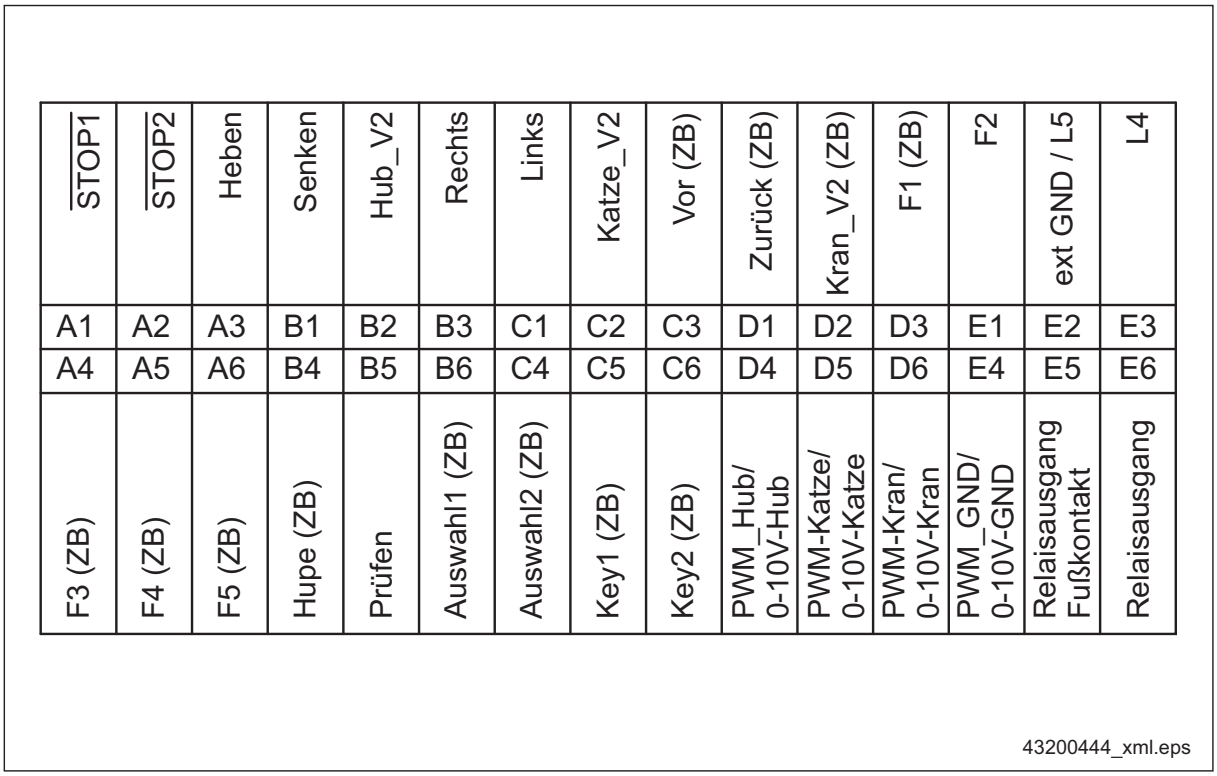

Fig. 2

A 30-pole Phoenix socket is provided as the user interface with the assignment shown in the following table.

The additional board is required in order use the functions indicated by ZB in brackets.

For safety reasons, the STOP signal must be provided as an external redundant signal (2 contacts).

The Key1, Key2 and relay output functions are not yet available.

	German designation	Designation in national language		German designation	Designation in national language
A4	F3 (ZB)	F3 (ZB)	A1	STOP1 (negiert)	STOP1 (negate)
A5	F4 (ZB)	F4 (ZB)	A2	STOP2 (negiert)	STOP2 (negate)
A6	F5 (ZB)	F5 (ZB)	A3	Heben	Lifting
B4	Hupe (ZB)	Horn (ZB)	B1	Senken	Lowering
B5	Prüfen	Test	B2	Hub_V2	Hoist_V2
B6	Auswahl1 (ZB)	Selection1 (ZB)	B3	Rechts	Right
C4	Auswahl2 (ZB)	Selection2 (ZB)	C1	Links	Left
C5	Key1 (ZB)	Key1 (ZB)	C2	Katze_V2	Crab_V2
C6	Key2 (ZB)	Key2 (ZB)	C3	Vor (ZB)	Forwards (ZB)
D4	PWM_Hub / 0-10V-Hub	PWM_Hoist / 0-10V-Hoist	D1	Zurück (ZB)	Reverse (ZB)
D5	PWM-Katze / 0-10V-Hub	PWM-Crab / 0-10V-Hoist	D2	Kran_V2 (ZB)	Crane_V2 (ZB)
D6	PWM-Kran / 0-10V-Hub	PWM-Crane / 0-10V-Hoist	D3	F1	F1
E4	PWM_GND / 0-10V-GND	PWM_GND / 0-10V-GND	E1	F2	F2
E5	Relaisausgang Fußkontakt	Relay output foot contact	E2	ext. GND / L5	ext. GND / L5
E6	Relaisausgang	Relay output	E3	L4	L4

Tab. 16 Designation of the sockets

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7 Description of individual functions

7.1 Selection

The following assignments are set with the Selection 1 and Selection 2 keys:

Selection	Selection 2	Selection 1
Crab 1	0	0
Crab 1	0	1
Crab 2	1	0
Crab 1 + 2	1	1

Tab. 17

0 = corresponding input 0 V or not connected

1 = corresponding input is supplied with voltage

7.2 Test

For safety reasons, a second additional limit switch is often used for cut-off in the limit positions. It is set in such a way that the additional limit switch first switches and stops the motion. It is approached in normal operation and is therefore referred to as an operating limit switch. The emergency limit switches (or emergency end switches) are never reached in normal operation when the system functions correctly. This only occurs when the operating limit switch fails. Correct functioning of the emergency limit switch can be tested by actuating the test button.

8 Application examples

8.1 Connection examples

8.1.1 Example 1

Control unit with digital control of the hoist motion and analogue control of the long and cross-travel directions. The control voltage of the DPC module is used for the inputs. The crane system consists of 2 crabs on the crane. Analogue control from 0-10 V.

The following jumper and DIP switch settings must be made:

J15 : 2-3

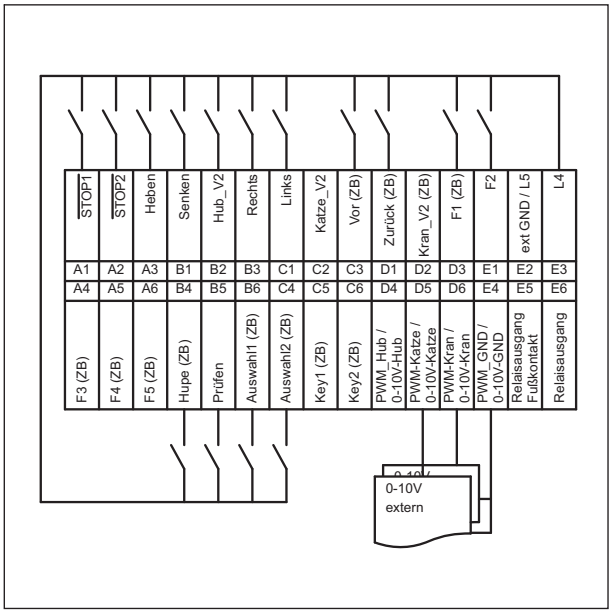

Fig. 3

Pin #	8	7	6	5	4	3	2	1
Position	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF

Tab. 18 DIP S1

Pin #	8	7	6	5	4	3	2	1
Position	OFF	OFF	OFF	ON	OFF	ON	ON	OFF

Tab. 19 DIP S2

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8.1.2 Example 2

Control unit with digital control of the hoist and long-travel motions and analogue control of the cross-travel motion. External power supply to the inputs. The crane system consists of one crab on the crane. The analogue source is PWM.

The following jumper and DIP switch settings must be made:

J15 : 1-2

Pin #	8	7	6	5	4	3	2	1
Position	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF

Tab. 20 DIP S1

Pin #	8	7	6	5	4	3	2	1
Position	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF

Tab. 21 DIP S2

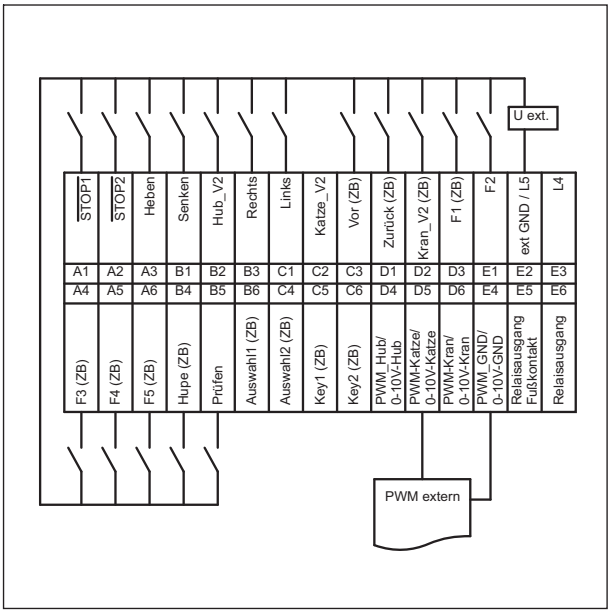

Fig. 4

8.2 DPC module mounting

8.2.1 ELKE, EDKE, EKKE with EKDR

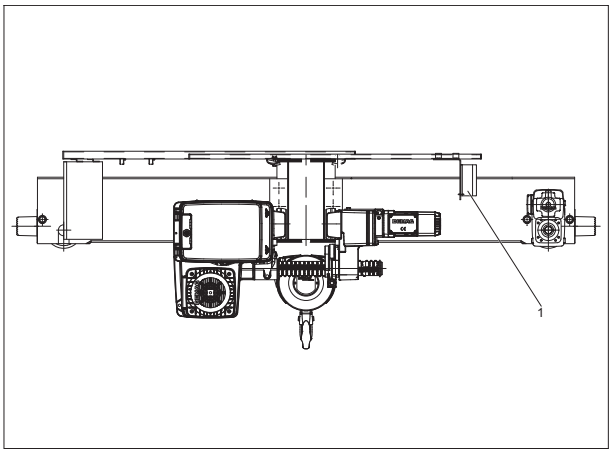

Fig. 5

1 DPC

8.2.2 EZDR

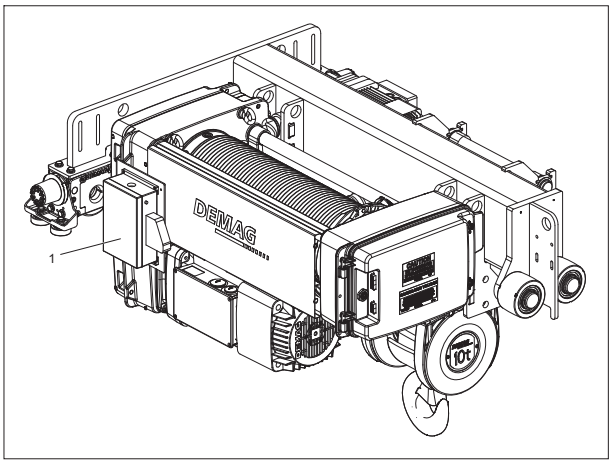

Fig. 6

1 DPC

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8.2.3 EKDR

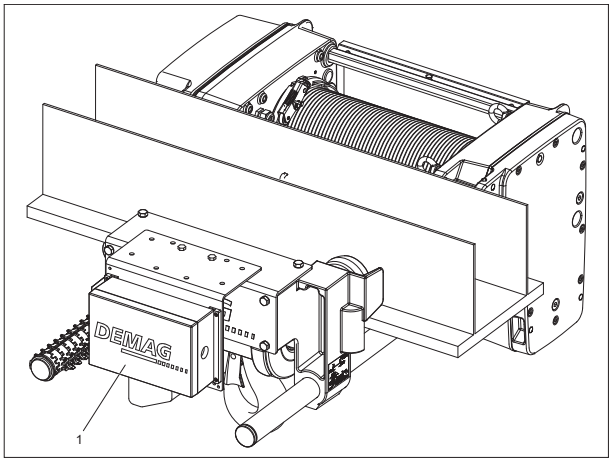

Fig. 7

1 DPC

9 Technical data

9.1 Component parts overview

9.1.1 Stock parts

The following units are available as stock parts:

719 412 45 DPC crab unit 32-230

719 414 45 DPC unit cpl. 32-230

9.1.2 Connection values

Connection values		
Control voltage		48 V AC ±10%; 50/60 Hz
Inputs		32 V - 230 V AC ±10%; 50/60 Hz
		0 - 10 V DC
		24 V PWM 1 kHz
Output relay contact	max. switchable output	60 W; 62,5 VA
	max. switchable current	2 A
	max. switchable voltage	220 V DC
		250 V AC
Operating conditions		
Permissible external temperatures		-10° C to 45° C

Tab. 22

9.1.3 Properties

IP class of the housing: IP66 to EN60529

Dimensions of the housing: 160x240x81 mm

Material: Aluminium

Possible fitting: 145 x 252 bore hole template external attachment

RAL 7038 agate grey powder coating

Cable length of the connected CAN-Bus plug: 3 m

Scope of supply: with mating connector

Mating connector: Phoenix Contact (5xVC-TFS6) included

Mating connector clamping range: 0,14 to 1,5 mm^2

Mating connector cable entry clamping range: Diameter 17 to 20,5 mm

Separate PE connection

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9.1.4 Housing dimensions

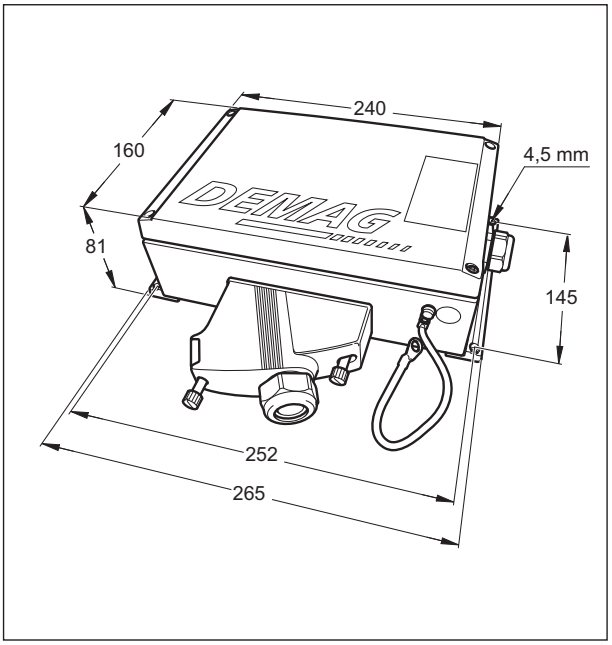

Fig. 8

10 Fault elimination

10.1 Possible defects on the DPC module

Before eliminating faults by measures on the DPC module, first check that the crane installation is supplied with power and is ready for operation and has not been switched off by safety devices. (Mains connection switch, crane isolating switch, emergency-stop switch, travel and lifting path limitation devices, overload protective device, motor circuit breakers, etc.)

No.	Problem	Advertisements		Possible causes	Information, section in these operating instructions
01	No function	Blue LED ○ off Green LED ○ off	⇒ Fig. 9, Page 28 a)	Power supply	- Check 48 V AC power supply
02	Crane does not respond to key commands	Blue LED ✹ blinking Green LED ✹ blinking	⇒ Fig. 9, Page 28 b)	Error code display Crane system or DPC module malfunction	- Inform Demag After Sales Service

Tab. 23

If the fault cannot be eliminated by following the instructions above, please contact Demag After Sales Service.

Segment display in the DPC module

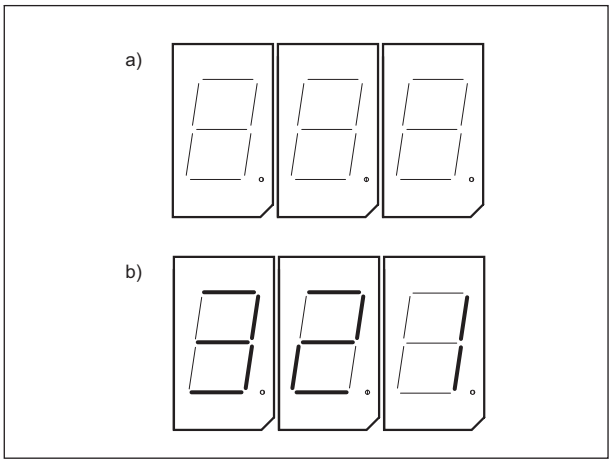

Fig. 9

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