EPC 25

Power supply and control unit for electro-permanent lifting devices

Instruction manual

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CONTENTS:

Copyright	4
Contents	5
Power supply and control unit EPC 25	6
Technical norms	6
Technical data	6
Control unit EPC 25 - control elements description	7
- control system instalation	8
Manipulation - magnetization cycle	9
- demagnetization cycle	9
Control unit settings - DIP switch configuration	10
- PRG programme	10
- RF (radio) remote control	10
- IR (infrared) remote control	10
- LEARN – save transmitter to EPC 25 memory	10
Remote control RF (IR)	11
Communication interface of EPC 25	12
RS 232 interface - description of the communication interface	13
- Control unit connection with PLC - type SIEMENS SIMATIC,	
UNITRONICS and similar	13
Transmition report description	14
EPC 25 instruction set	14
CRC (cyclic redundancy check) calculation	15
EPC 25 software (firmware) update	16
Update options - via Datamodul 2k EP	16
- via EPEdit control programme	17
EPEdit control programme – description	18
EPC 25 control unit mechanical versions	18
Version with IP00 protection - external dimensions	18
- fixing openings	18
Version with IP20 protection - external dimensions	18
- fixing openings	18
Control unit equipment	18
Warranty	19
Technical support and service	19

EPC 25 POWER SUPPLY AND CONTROL UNIT – GENERAL DESCRIPTION

- Small and powerful control system for electro-permanent lifting devices
- Input voltage 230 to 400 VAC
- Output voltage 10 to 200 (370) VDC
- Output current 0.5 to 25 ADC
- Measuring transformer of magnetization current
- 8 user-defined program memories
- RF remote control 433.92 MHz range up to 300m
- IR remote control
- RS 232 industrial bus support
- Ability to comunicate with common types of PLC
- Galvanic separation control and power part 1 kV
- LED signalization Power, TxD/RxD, Error
- Temperature range : -15°C to 70°C

EPC 25 control unit was desined in accordance with the following norms :

E.M.C. : EN 50081-2 L.V.D. : EN 61010-1

General description :

Control unit is suitable for power supply and impulse control of electro-permanent lifting devices. All functions are controlled by a powerful RISC microcontroller. The magnetization and demagnetization process is saved in the control unit internal memory. EPC 25 can be operated by a set of switches on the device, RS232 bus, RF radio or IR infrared controls. To increase safety the control unit is supplied with a measuring transformer of low magnetization level – it is not allowed to manipulate the lifted load when low magnetization level is indicated. The control unit support industrial RS232 bus which is intended for connection with superior industrial automatic machine PLC. This enables modification of control unit features to match specific (client's) demands.

Technical of	lata	:
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Parameter	Value
Power supply	230 to 400 V AC/50 Hz
Supply voltage tolerance	±10 %
Supply current – at no load	5 W
Max. continuing current	25 ADC
Temperature range	-15°C to 70°C
Connectivity input/output	4,0 mm ²



CONTROL UNIT EPC 25 – DESCRIPTION OF CONTROL ELEMENTS

INSTALLATION :

- Control units are supplied in IP00 protection version for inbuilding into the magnet or in IP20 increased protection.
- When installing it is necessary to connect protective terminal.
- Power supply is to be connected to terminals 1 and 2.
- Connect magnet to terminals 4 and 5.
- Magnetization and demagnetization pushbuttons and light are to be attached to connector X2.



MANIPULATION :

Before lifting load it is necessary to carry out following operations :

- Clean the surface of the load to ensure sufficient contact area.
- Place magnet onto gravity centre of load.

MAGNETIZATION – LOAD CLAMPING :

- Press green pushbutton S1 for 0.5 sec as a minimum.
- During the magnetization cycle the green LED L1 is flashing.
- After the magnetization cycle the green LED L1 is either constantly on or it is flashing in the intervals of 0.5 sec.

Green indicator L1 is on – the load has been successully clamped. Magnetization curent reached safe level. This level is set by manufacturer and is saved in control unit memory.

Green indicator L1 is flashing (magnetization error) – red light L5 on front panel is on. Magnetization current has not reached safe level – IT IS FORBIDDEN TO MANIPULATE WITH CLAMPED LOAD.

This can occure due to following causes :

- Low input voltage
- Disconnected coil of magnet
- Faulty fuse F1
- Damaged power part of control unit

DEMAGNETIZATION:

- Press red pushbutton S2 for 0.5 sec as a minimum.
- During the demagnetization cycle the red LED L2 is flashing.
- Once demagnetized the red LED L2 is permanently on.

Note : demagnetization current is not measured during the process.

CONTROL UNIT SETTINGS :

Warning : During the installation of control system which is alive it is necessary to work in accordance with valid ČSN (EN) about work with alive voltage.



On the front panel of the control unit the following can be set up by S3 DIP switch

- PRG choice of 8 programmes saved in control unit memory
- RF radio communication enabled
- IR infrared communication enabled
- LEARN function saving transmitter into control unit memory

S3 configuration switch :



Programme choice				
SW1	SW2	SW3	PRG	
Off	Off	Off	0	
On	Off	Off	1	
Off	On	Off	2	
On	On	Off	3	
Off	Off	On	4	
On	Off	On	5	
Off	On	On	6	
On	On	On	7	

RF		
communication		
SW4	RF	
Off	disabled	
On	enabled	

IR		
communication		
SW5	IR	
Off	enabled	
On	enabled	

LEARN function			
LEARN			
enabled			
On enabled			

Working programme can only be changed when the control unit is switched off.

REMOTE CONTROL RF (IR)

General description :

Due to the high safety of operation requirement a unique KEELOQ coding system by Microchip Technology Inc. is used for codin and decoding of transmitted commands. This systém ensures high reliability of data transmittion by using the technology of hoping code HCS. EPC 25 control unit communicate solely with remote controls by ATHEA Microsystems – remote controls by other manufactures are ignored by the control unit.

"LEARN" FUNCTION – SAVING TRANSMITTER INTO THE CONTROL UNIT MEMORY

EPC 25 control unit can be operated by RF radio or IR infrared remote controls. Up to 6 different remote controls (RF or IR) can be saved into the control unit memory.

RF or IR remote control can be saved into the memory as follows :

- Switch S3 (SW6) to LEARN On position
- Once LED L4 TxD/RxD is alight immediately return S3 (SW6) switch to LEARN Off position
- Press random pushbutton on the remote control several times.
- If LED L4 TxD/RxD flashed several times and subsequently then goes off the remote control has been saved into the control unit memory.

DELETING TRANSMITTERS FROM CONTROL UNIT MEMORY :

All transmitters saved in the control unit memory can be deleted as followings :

- Switch S3 (SW6) to LEARN On position
- Wait 8 sec.
- Once LED L4 TxD/RxD light goes off the memoryhas been deleted.
- Switch S3 (SW6) to LEARN Off position.

RS 232 COMMUNICATION INTERFACE :

RS 232 interface has been designed to connect the control unit with industrial automatic machine PLC or with PC. Control unit communicate with maximum speed of 33.6 kBd (1.2 kBd being the standard speed). All signals are driven out to the X3 connector and are galvanic separated from the power part.

Condition needed for reliable data transmission :

- Power and data circuits separation.
- Use of shielded communication cable.
- In ideal conditions the distance between the comunicating device should not exceed 30 m.

Outcoming/incoming data form :

Communication speed	1,2 kBd
Number of data bits	8
Parity	None
Stop-bits	1
Data flow control	None

X3 connector description : Pin number

n :	Pin number	Signal description		
	1	SDA – I2C bus DATA signal		
	2	SCL –I2C bus CLOCK signal		
	3	TEST – control signal		
	4	RxD – incoming data RS232		
	5	TxD – outcoming data RS232		
	6	GND – power supply		
	7	+ 5V – power supply		

Note : TxD and RxD data signals are TTL compatible. For connection to RS 232 bus it is neccessary to use Datamudule 2k EP which converts and inverts TTL signals to RS 232 signals.

INTERCONNECTION OF THE CONTROL UNIT WITH PLC SIEMENS SIMATIC

PLC industrial automatic machine which is equipped with Freeport (free programmable UART serial link with supported ASCII record) can be interconnect with control unit by 9-cored shielded conductor.

RS 232 transmission report description

Control unit continously monitors series data on the RxD input. The incoming data on this input must be in ASCII format in hexadecimal form. Once the data in correct format and with the correct target device address is received the requested order is carried out. Once the requested operation is completed the control unit send a message to the superior PLC.



EPC 25 CONTROL UNIT INSTRUCTION SET

Transmission report description :

All control unit function can be controlled via asynchronous serial link UART. All transmitted data must in hexadecimal form, coded in compliance with ASCII international standard.

Control unit continously monitors serial data on the RxD input. Once the control unit receives the data in valid format and with the correct target device address, it carries out the requisted order and confirms the execution of the order by sending the same message as received.

Each outgoing message always starts with the STX character, followed by ADDR character (target control unit address), C0 (required instruction), V0 (value related to the required instruction) and CRC (cyclic redundancy check). Finally, the ETX character is sent out which concludes and terminates the transmission.

Processing of the received instruction starts once the ETX character is received. The required instruction will not be carried out unless the received ADDR address and the address saved into the control unit memory are in agreement. If the received address differs from the saved address the control unit will ignore the whole message.

Transmitted data	STX	ADDR	C0	V0	CRC	ETX
Hex format	02	0x	0x	xx	хх	03
ASCII char.	⊕	хх	xx	хх	хх	*

Format of the received data :

Char. Description

- STX Start of transmitting
- ADDR Target device address
 - C0 Requested command
 - V0 Value related to the required instruction
- CRC CRC of all previous values (except STX)
- ETX End of transmitting

EPC 25 CONTROL UNIT INSTRUCTIONS DESCRIPTION

C0 instruction code (Hex)	C0 instruction description	Range of permitted values V0
01	START magnetization	XX
02	START demagnetization	XX

Note : xx - random value

Calculation of CRC – using XOR metod



Examples of ASCII strings :

STOP Magnetization (address 00)	:	●00000000 ♥
START Demagnetization (address 00)	:	●00020002 ♥

CONTROL UNIT SOFTWARE (FIRMWARE) UPDATE

Software update via Datamodule 2k EP :



Datamodul – memory which stores all information needed for working of the control unit. Datamodule is also neccessary for connection of the control unit with PC via RS 232.

Information saved in Datamodule can be moved to the control unit as followings :

- Turn off the control unit
- Insert Datamodule to X3 connector
- Turn on the control unit

During the data transmittion from Datamudule to control unit the yellow LED - TxD / RxD is on. The control unit programmed in this way will save its data even after the disconnection of feeding voltage in its internal EEPROM memory - after the finishing of the programme cvcle it is suitable to take the Datamodule out of the connector.

Datamodul 2k EP



Software update via control programme EPEdit :

The control unit can be connected via RS 232 bus to the PC, which enables modification of the properties of the control system according to the customer's demands. Control system communicates with the PC using serial port COM 1 to COM 4. Before connecting the control system to the PC it is necessary to install EPEdit operating programme. This software is designed for operating systems such as Win 95, 98, ME and XP

All settings can be saved in database file (*.dbf file) or in Datamodule 2k EP.



CONTROL PROGRAMME EPEDIT – DESCRIPTION :

Before installing of EPEdit it is neccessary to check all components according to the following list. In case of any discrepancy with the list, or if any item is damaged (e.g. illegible installation CD-ROM), please contact your supplier.

List of equipment of control unit EPC 25 :

- User manual in Czech and English version.
- Communication cable for connection of control unit EPC 25 to PC.
- Datamodul 2k EP

CONTROL PROGRAMME EPEdit :



WARANTY Guarantee conditions

There is a **12-month-guarantee** for the given product since the day of purchase. During this period the supplier agrees to repair or exchange free of charge all parts with defects obstructing their proper use according to the producer instructions. This concerns parts which have latent defects or which do not correspond by their configuration with the product documentation and technical conditions of the product. The transport costs are to be covered by the customer.

The guarantee does not apply to :

- defects caused by improper use of product, e.g. incorrect connection to the network or to the signal sources, incorrect connection of circuits, overloading or interference with the product.
- defects caused by external influences, e.g. damage caused by transport, crash, heat, water, aggressive substances, etc.
- signal lights, control elements, circuit breaker and power semiconductor elements (thyristors, triacks, diodes, etc.)
- eventual idle time of the machine as a result of the defect of the product.

We hope that you will be fully satisfied with our products.

	Date :
	S.N. :
Stamp of supplier:	Sign. :
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