

CFR, CUR xx

**Power supply and control unit
for electro-permanent magnetic devices**

Instruction manual

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CONTROL UNIT CFR, CUR XX – GENERAL DESCRIPTION

- small and powerful control system for electromagnetic clamping plates
- support of parallel interconnection of up to 8 control units
- automatic adjusting to power frequency within range 50 Hz to 60 Hz
- detection of disconnection of incoming conductor to the magnetic chuck
- support of RS 232 and RS 485 industrial concentrators
- ability to communicate with common PLC types
- speed of communication between 1,2 – 33,6 kBd
- galvanic separation of control and power part 1 kV
- software upgrading (firmware) of control unit via Internet (TCP/IP)*
- signalling LED – Power, TxD/RxD, Error
- working temperature range from -20°C to 70°C

Control unit CxR was designed in accordance with valid norms:

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

General description:

Control system is suitable for current supply and impulse control of electro-permanent magnetic clamping plates. All functions are controlled by an efficient RISC microprocessor. The control system automatically adapts to the frequency of power network. The level of magnetization can be fluently regulated by P1 potentiometer on the remote control (CUR) or it is according to a programme predeterminedly adjusted at the maximum of chucking power (CFR) . Control system is equipped with effective demagnetization cycle, which is intended for the removal of remanent magnetism of the workpiece, and which can be easily removed afterwards. For enhancement of manipulation safety, the control system is supplied with security contact which signals low level of magnetization – but you should always bear in mind that by using of lower level of magnetization it is not possible to achieve the specified safety. It is possible to connect the control system to PC via RS 232 bus, which enables to modify features of control system according to client's demands. Control system supports industrial RS 232 and RS 485 bus, which is intended for connection of control system to superior industrial automatic machine (PLC).

Technical data:

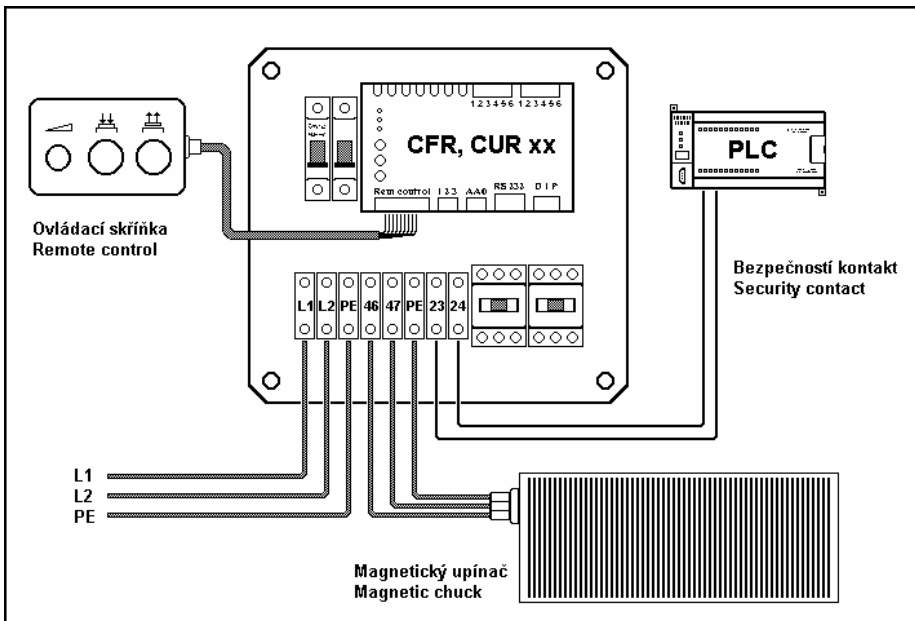
Parameter	Value
Supply voltage	400 V AC / 50 - 60 Hz
Tolerance of supply voltage	±10 %
Supply current at no load	50 mA
Working temperature range	-20°C to +70°C

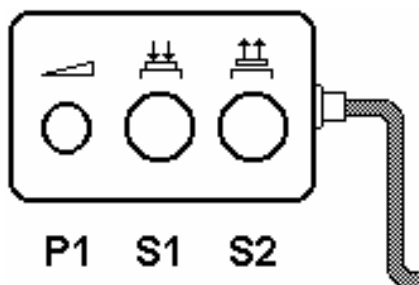
Power supply and control unit for electro-permanent magnetic devices

INSTALLATION :

- Control units CxR are supplied with covering IP00 version for placing into distributors, or with increased IP54 covering. The control system is intended for normal working environment in the range of working temperature from -20°C to +70°C in non-condensation maximum relative humidity 90%.
- Before the connection of the control system it is necessary to check if the supply voltage of network corresponds to the voltage indicated on the tag of the device.
- During the installation it is necessary that the safety terminal is attached to the PE.
- Supply voltage is connected to terminals L1 and L2.
- Electromagnetic clamping plate is connected to terminals 46 and 47.
- Terminals 23 and 24 (security contact) are connected to superior device (e.g. industrial automatic machine PLC, etc.)
- Remote control is connected to the control unit by 8-cored screened wire – terminals 1 to 9 of the connector of REMOTE CONTROL. This conductor must be placed separately from other (power) conductions.

Electrical connection of control unit CFR, CUR xx :



REMOTE CONTROL :**Operating controls description :**

P1 – potentiometer for setting up of chucking power level of magnetization

S1 – green illuminated pushbutton of magnetization

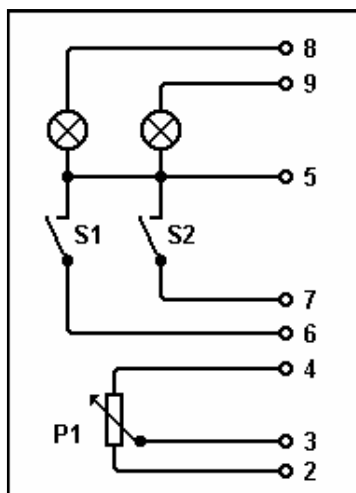
S2 - white illuminated pushbutton of demagnetization

Interconnection of remote control with the CxR control unit :

The remote control is connected to the control unit by 8-cored screened wire – terminals 1 to 9 of the connector of the Remote Control. This conductor must be placed separately from other (power) conductions.

Electrical connection :

Wire label	Wire significance	Wire color
1	Shielding	Black
2	P1/1	Green
3	P1/2	Yellow
4	P1/3	Brown
5	+12V DC	Grey
6	S1	White
7	S2	Red
8	S1 – LED	Blau
9	S2 - LED	Pink



MANIPULATION :

Before gripping of workpiece it is suitable to proceed following operations:

- To clean workpiece and the surface of magnetic fixture and to ensure good contact area
- To place the workpiece on the fixture area

Cycle of magnetization :

- Set potentiometer P1 into position of requisited chucking power (CUR).
- Press green pushbutton S1 for 0,5 s. as a minimum
- During the magnetization the green switch S1 is constantly on.
- During the magnetization the green switch S1 is either constantly on or it is flashing in the intervals of 0,5sec.
 - **Green indicator S1 illuminates** – magnetization passed through well. Protecting contact is **locked** (terminals 23 and 24), which means, that you start to tool the fastened subject.
 - **Green indicator S1 flashes** – error of magnetization. That means that magnetic fixture was magnetized by lower level of magnetization than setting value of trimer P2 – safety of operation level. Safety contact is **off-state** (terminals 23 and 24) – fastened subject is forbidden to tool.
- After finishing of magnetization the magnetic chuck is disconnected from supply network.

Cycle of demagnetization :

- Press white pushbutton S2 for the time of minimum 0,5 s.
- In the course of demagnetization the indicator lights S1 and S2 flash in turns. In the end of demagnetization cycle the white indicator S2 illuminates permanently. Safety contact is unbraced for the whole time of demagnetization.
- After finishing of demagnetization the magnetic chuck is disconnected from supply network.

CONTROL UNITS CUE, CUET, CFR A CUR :

Control units CUE, CFR and CUR are customer's industrial automatic machines, which were developed in accord with the newest requirements of industry and norms. The control units are suitable for the phase control of magnetization and demagnetization of magnetic chucks.

Classification of the control units:

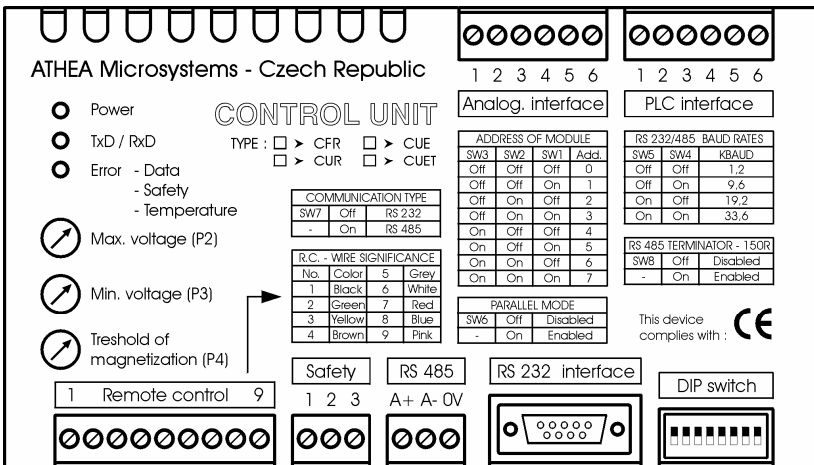
CUE – control unit for electromagnetic chucks without a transformer – up to the output power max. 1500W - it is possible to continuously regulate the clamping power by the P1 potentiometer on the remote control.

CUET – control unit for electromagnetic chucks with a transformer – for the output power between 2 500W - 25 000W - it is possible to continuously regulate the clamping power by the P1 potentiometer on the remote control.

CFR – control unit for electropermanent magnetic chucks intended for milling regime – the clamping power is preset by the producer on the maximum.

CUR – control unit for electropermanent magnetic chucks intended for grinding regime - it is possible to continuously regulate the clamping power by the P1 potentiometer on the remote control.

CONTROL UNIT CUE (CUET, CFR AND CUR):



DESCRIPTION OF CONTROL UNITS :

Signalizace provozních stavů :

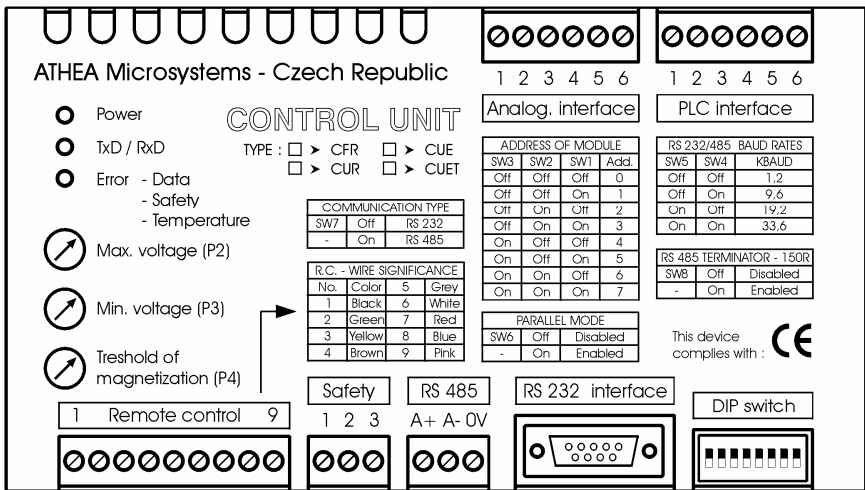
- Power - LED napájení
- TxD / RxD - LED komunikace
- Error - LED poruchy

Analogové vstupy :

- Vstupy - proud, transformátor
- teplotní čidlo
- hallova sonda

PLC rozhraní :

- Galvanicky oddělené rozhraní vhodné pro připojení PLC



Svorky pro připojení ovládací skřínky

Svorky relé bezpečnostního kontaktu

RS 485 rozhraní

Konfigurační přepínač DIP switch

Seřizovací prvky :

- P2 - potenciometr nastavení max. napětí
- P3 - potenciometr nastavení min. napětí
- P4 - potenciometr nastavení blokování stroje

RS 232 rozhraní :

- Konektor pro připojení - PC
- Datamodul 2k
- PLC (UART)

SETTING UP OF CONTROL UNIT:

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 minimum (P3) and the maximum (P2) of magnetization voltage can be set by using P4 potentiometer we can set the level of security treshold.

If the control unit is operated by PLC it is possible, by using configurational DIP switch, to set on the front panel:

- | | |
|----------------------|---|
| Control unit address | - up to 8 control units can parallely work on RS 485 bus. |
| Communication speed | - it can be set in the range between 1,2kBd and 33,6kBd. |
| Communication type | - choice between communication RS 232 or RS 485. |
| RS 485 terminator | - control unit is equipped with internal terminating resistor 150Ω. |

Setting up of maximum clamping power :

Maximum clamping power can be set by P2 potentiometer on the front panel of the control unit as follows:

- Set P1 potentiometer on the remote control into the position of maximum magnetization.
- By turning P2 potentiometer clockwise the level of maximum magnetization is increasing.
- By turning P2 potentiometer anti-clockwise the level of maximum magnetization is decreasing.

Setting up of minimum clamping power :

Minimum clamping power can be set by P3 potentiometer on the front panel of the control unit as follows:

- Set P1 potentiometer on the remote control into the position of minimum magnetization.
- By turning P3 potentiometer clockwise the level of minimum magnetization is increasing.
- By turning P3 potentiometer anti-clockwise the level of minimum magnetization is decreasing.

Setting up of machine blocking :

Blocking machine relay (terminals 23 and 24) switches when the minimum clamping power is achieved.

- If the clamping power is higher than security treshold level – contacts of blocking machine relay will clasp.
- If the clamping power is lower than security treshold level – contacts of blocking machine relay will unclasp.

Security treshold level can be set by P4 trimer on the front panel of the control unit as follows:

- By turning the P4 trimer clockwise the security treshold level is increasing.
- By turning the P4 trimer anti-clockwise the security treshold level is decreasing.

Blocking machine relay is also unclapsed in following cases:

- After the connection of control system to feeding.
- During demagnetization cycle.
- After the disconnection of feeding voltage.
- When the incoming conductor is disconnected to the electromagnetic chuck.

Maximum switched current by relay contacts: 5A AC/DC

Maximum switched voltage by relay contacts: 230 V AC/DC

Setting-up of configurational switch (DIP switch):

If the control unit is subordinated to the industrial automatic machine PLC, it is possible, with the change of DIP switch, to modify the qualities of the control unit. The DIP switch is intended to optimize the communication of the control unit with the superior PLC. Setting-up of the switch should be done with the disconnected feeding voltage (switched-off state).

If the control unit is not connected to the superior PLC (it is controlled only by the remote control), it is not necessary to set up the DIP switch and constituent switches can be in any position.

Fig. 1 -

ADDRESS OF MODULE			
SW3	SW2	SW1	Add.
Off	Off	Off	0
Off	Off	On	1
Off	On	Off	2
Off	On	On	3
On	Off	Off	4
On	Off	On	5
On	On	Off	6
On	On	On	7

Setting up of the address of the control system:

- if several control units are parallelly connected to one bus, the superior industrial automatic machine PLC has a different access to each control unit.

Important: if there are more control units connected to one bus, it is necessary to assign a different address to each of them.

Fig. 2 -

RS 232/485 BAUD RATES		
SW5	SW4	KBAUD
Off	Off	1,2
Off	On	9,6
On	Off	19,2
On	On	33,6

Setting up of communication speed :

- the control unit supports four standard communication speeds. Setting up of the communication speed is common for all types of favoured bus.

Fig. 3 -

PARALLEL MODE		
SW6	Off	Disabled
-	On	Enabled

Parallel interconnection of control units :

- up to 8 control units can be parallelly interconnected through the interface RS 232 or RS 485.

Fig. 4 -

COMMUNICATION TYPE		
SW7	Off	RS 232
-	On	RS 485

Type of communication :

RS 232 – intended for connection to PC or PLC

RS 485 – intended for connection to PC or PLC

Fig. 5 -

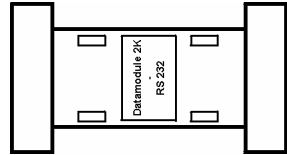
RS 485 TERMINATOR - 150Ω		
SW8	Off	Disabled
-	On	Enabled

Terminating resistor 150Ω:

- possibility of connection (disconnection) of the internal resistor.

SOFTWARE UPGRADING OF THE CONTROL UNIT VIA DATAMODULE 2K :

Datamodule – memory in which all information needed for the activity of the control unit is saved.



Information saved in Datamodule can be replaced to the control unit in the following way:

- Turn off the control system.
- Insert Datamodule into the connector RS 232 Interface according to the picture.
- Turn on the control system.

During the data transmission from Datamodule into to control unit the yellow light LED-TxD / RxD which signalsises the data transmission is switched 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 cycle it is suitable to take the Datamodule out of the connector.

Software upgrading of the control unit via Datamodule 2k :

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CONTROL UNIT

TYPE : > CFR > CUE > CUR > CUET

COMMUNICATION TYPE	
SW7	Off RS 232
-	On RS 485

R.C. - WIRE SIGNIFICANCE	
No.	Color
1	Black
2	Green
3	Yellow
4	Brown
5	White
6	Grey
7	Red
8	Blue
9	Pink

ADDRESS OF MODULE	
SW3	SW2
SW1	Acid
Off	Off
Off	On
On	Off
On	On
On	Off
On	On

RS 232/485 BAUD RATES	
SW5	SW4
Off	Off
Off	On
On	Off
On	On
On	Off
On	On

RS 485 TERMINATOR - 150Ω	
SW6	Off
-	On

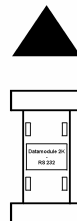
PARALLEL MODE	
SW8	Off
-	On

This device complies with :

1 Remote control 9

1 2 3 Safety RS 485 RS 232 interface DIP switch

Insert Datamodule into the RS 232 interface



SOFTWARE UPGRADING OF THE CONTROL UNIT VIA MAGNETEDIT DEMO OPERATING PROGRAMME :

Control system can be connected via concentrator RS 232 to the PC, which enables modification of the qualities 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 MagnetEdit Demo operating programme. This software is assigned for operating systems such as Win 95, 98, ME and XP and is common to all control systems CUE, CUET, CFR and CUR.

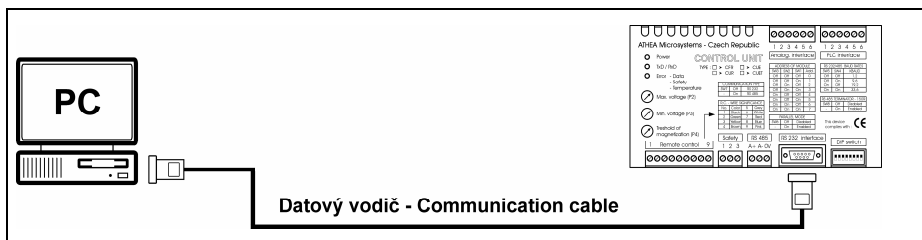
MagnetEdit Software (full version) can be used for setting up of :

- Number of sections of magnetic chuck.
- Magnetisation voltage.
- Number of magnetisation impulses.
- Demagnetisation process.
- Other (service) settings – communication between parallelly connected control systems, additional sensors (current transformers, thermistors, hall probes), heat protection, current protection, etc.

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

Before interconnection of control unit to the PC it is necessary to carry out :

- Choice of free communication port COM 1 to COM 4 in MagnetEdit programme.
- Setting up of RS 232 communication type using switch (DIP switch) – SW7 on the front panel of the control unit.
- Choice of communication speed using switch (DIP switch) – SW4 and SW5. Control unit communication speed must be in compliance with the communication speed set in MagnetEdit operating programme.
- Interconnection of control unit and PC by using original communication cable.



**Any other interconnection can lead to damage of the computer or control unit.
It is recommended to use galvanic separation of serial computer port.**

MagnetEdit Demo operating software :

MagnetEdit Demo software is provided with all control systems of the type CUE, CUET, CFR and CUR. Before you start to install and use MagnetEdit software, please check all the necessary 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 system CFR, CUR xx :

- User manual in Czech or English version.
- Communication cable for connection of control unit CxR to PC.
- Datamodule 2k

Recommended requirements for the control PC :

- Pentium processor 100 MHz and more
- 32 MB of free RAM
- 1 x CD-ROM
- Hard disc with free capacity of 10 MB
- One serial communication port COM.

Installation of MagnetEdit Demo software :

Start the installation programme Setup.exe from the enclosed CD and follow the instructions.

Programming procedure of control unit :

- Start MagnetEdit Demo operating software.
- Choose free communication port COM 1 to COM 4.
- Choose communication speed between 1,2 and 33,6 kBd, which is the same as the communication speed set by DIP switch on the front panel of control unit.
- From the menu open **Type of control system** and choose an indication of connected control unit or press the button Autodetection.
- From the menu open **Setting of control system (magnetic chuck type)** and choose an indication of magnetic chuck connected to the control system.
- Press the button **Program the control system**. After termination of programming cycle the reset of the control unit will be automatically carried out.

MagnetEdit Demo operating software :

The screenshot shows the MagnetEdit 1.23 software interface. The main window displays a bar chart titled 'Zbytkový magnetismus (%)' (Residual magnetism (%)) for a 'w/PM Elektromagnet - 500 x 1500 mm (w/BM)'. The chart shows 17 data points with values ranging from -100 to 80. The interface includes various control panels for system configuration, safety settings, and data management.

Point	Value (%)
1	-100
2	80
3	-67
4	53
5	-42
6	35
7	-28
8	22
9	-17
10	13
11	-10
12	8
13	-6
14	4
15	-3
16	3
17	-3

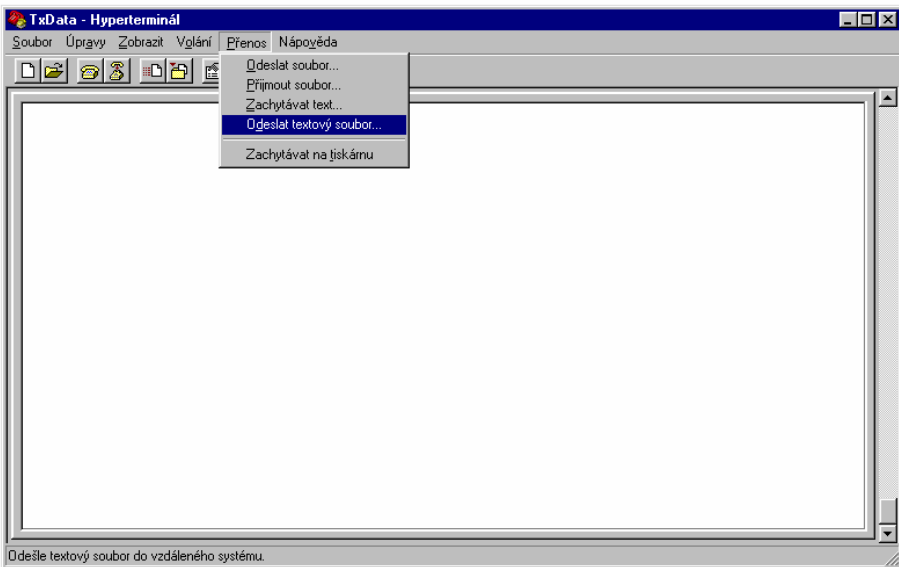
SOFTWARE UPGRADING OF CONTROL UNIT VIA HYPERTERMINAL:

It is possible to reprogram the control units CUE, CUET, CFR and CUR via the communication programme Hyperterminal, which is integral part of all operating systems such as Windows 95, 95, ME and XP. Hyperterminal programme is standardly placed in the menu START-PROGRAMMES-ACCESSORIES-COMMUNICATION-HYPERTERMINAL.

Programming procedure of control unit CUE (CUET, CFR and CUR):

- Request TxData.ht and TxData.txt files from the supplier.
- Open TxData.ht file in Hyperterminal programme.
- If necessary, change the communication port COM 1 to COM 4 in the menu FILE – PROPERTIES – CONNECT here choose free communication port.
- Interconnect control unit and the PC via the original communication cable.
- Program the control unit: in the menu TRANSFER – SEND TEXT FILE – choose TxData.txt file and the programming cycle will be started.

Hyperterminal software :



1. PLC INTERFACE

This communication interface is intended for the simplest industrial automatic machines PLC, which are not equipped with the communication channel UART (e.g. SIEMENS LOGO!). All the interface signals are taken out to the clips 1 to 6 of the connector PLC Interface and are galvanically (optically) separated from the control unit. PLC interface requires external feeding ranging from 5 to 30 V DC. All outputs are secured against short circuit by internal resistors.

Description of the connector PLC interface :

Terminal marking	Signal marking	Signal description
1	+ U	Supply voltage + 5 až 30V DC
2	MAG	Starting of magnetisation
3	DEM	Starting of demagnetisation
4	BUSY	Activity indication
5	GND	0V DC
6	N.C.	Not connected

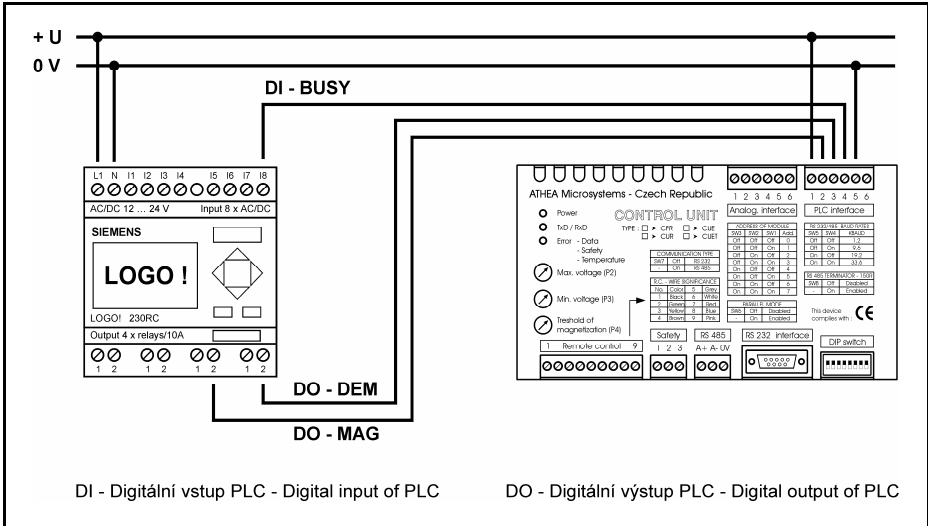
Description of individual signals of PLC interface :

+ U	Terminal for external supply voltage + 5 až 30V DC
MAG	Control impuls terminal for magnetisation of magnetic chuck. Recommended length of control impuls is min 0,5 sec. During the whole process of magnetisation the BUSY signal is generated by the control unit.
DEM	Control impuls terminal for demagnetisation of magnetic chuck. Recommended length of control impuls is min 0,5 sec. During the whole process of magnetisation the BUSY signal is generated by the control unit.
BUSY	Signalization of control unit activity. The signal is current limited to 50mA.
GND	0V DC.
N.C.	Not connected

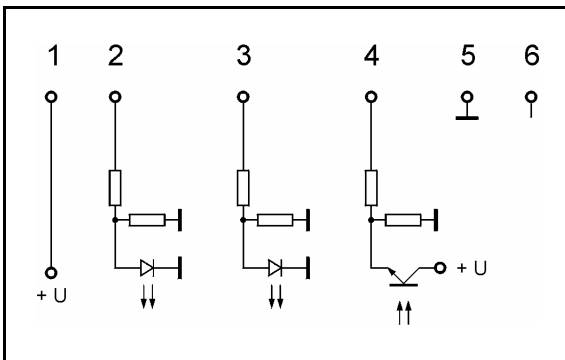
Power supply and control unit for electro-permanent magnetic devices

Typical interconnection of control unit with PLC of SIEMENS LOGO! type :

Interconnection of the control unit with PLC should be done using shielded conductor. This circuit must be placed separately from the other (power) circuits.



Electrical connection of PLC interface :



2. RS 232 COMMUNICATION INTERFACE :

Communication interface RS 232 is projected for connection of the control unit with the industrial automatic machine PLC, possibly with PC. Control unit communicates with maximum of 33,6 kBd. All signals are driven out to the connector **RS 232 Interface** (Cannon 9) and are galvanically separated from the power part.

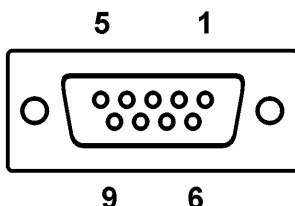
Conditions needed for secure data transmission :

- Separate power and data circuits.
- Using shielded communication cable.
- In ideal conditions the distance between communicating devices should not exceed 30 m.

Format of outgoing data :

Communicat. speed	According to the DIP switch 4,5
Number of data bits	8
Parity	None
Stop-bits	1
Data flow control	None

RS 232 Interface (connector):

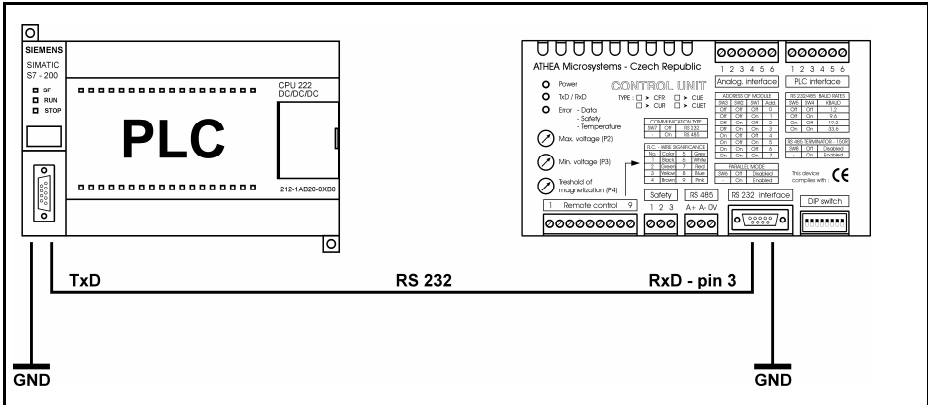


Pin number	Signal description
1	SDA – signal of I2C bus
2	+ 5V – intern. power supply
3	RxD – receive data RS 232
4	TxD – transmit data RS232
5	GND – 0V
6	N.C. – not connected
7	N.C. – not connected
8	TEST – control signal
9	SCL – signal of I2C bus

Power supply and control unit for electro-permanent magnetic devices

Typical unidirectional interconnection of the control unit with PLC of SIEMENS SIMATIC CPU 22x type :

PLC industrial automatic machine equipped by Freeport (free programmable UART serial link with supported ASCII record) is possible to interconnect to the control unit CxR with the help of 2-venous shielded conductor. The signals RxD and GND are used for data transmitting – all other signals must be left unconnected.



For secure data transmission the following is necessary to carry out :

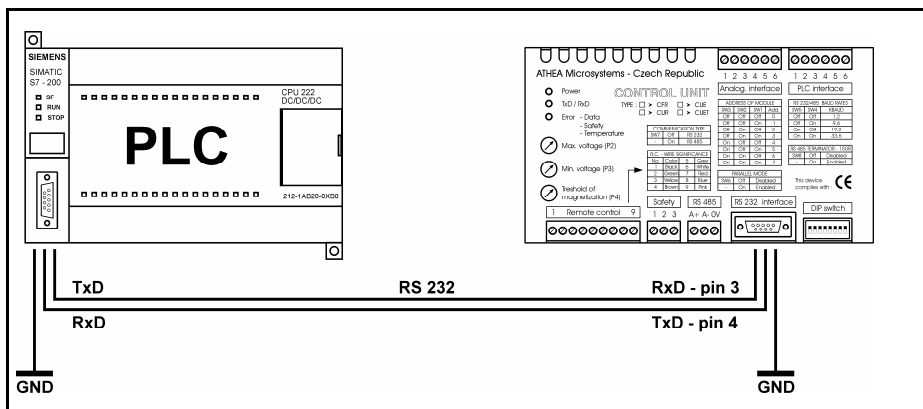
- Interconnection of TxD signal of PLC automatic machine to the RxD signal of CxR control unit.
- Interconnection of GND signal of PLC automatic machine with the GND signal of CxR control unit.
- Setting up of communication to RS232 – DIPswitch SW7=Off.
- Setting up of parallel interconnection of control units – DIPswitch SW6=Off.
- Setting up of communication speed – DIP switch SW4 to SW5.
- Setting up of control unit address – DIP switch SW1 to SW3.

Description of transmitting report RS 232 :

Control unit continuously monitors serial data on the input RxD. Incoming data on this input must be in ASCII format in hexadecimal form. When the control unit receives data in the valid format and with the right address of the target device, the requested order will be carried out.

Typical bidirectional interconnection of the control unit with PLC of SIEMENS SIMATIC CPU 22x type :

PLC industrial automatic machines equipped by Freeport (free programmable serial link UART with supported record ASCII) is possible to interconnect to the control unit CxR with the help of 3-venued shielded conductor. The signals TxD, RxD and GND are used for data transmitting – all other signals must be left unconnected.



For secure data transmission the following is necessary to carry out :

- Interconnection of TxD signal of PLC automatic machine to the RxD signal of CxR control unit.
- Interconnection of RxD signal of PLC automatic machine with TxD signal of CxR control unit.
- Interconnection of GND signal of PLC automatic machine with GND signal of CxR control unit.
- Setting up of communication to RS232 – DIPswitch SW7=Off.
- Setting up of parallel interconnection of control units – DIPswitch SW6=On.
- Setting up of communication speed – DIP switch SW4 to SW5.
- Setting up of control unit address – DIP switch SW1 to SW3.

Description of transmitting report RS 232 :

Control unit continuously monitors serial data on the input RxD. Incoming data on this input must be in ASCII format in hexadecimal form. When the control unit receives data in the valid format and with the right address of the target device, the requested order will be carried out. After finishing of the required operation (magnetisation, demagnetisation) the control unit will send off a message to the superior PLC.

3. RS 485 COMMUNICATION INTERFACE :

Communication interface RS 485 is projected for connection of control unit with the industrial concentrator RS 485. Control unit communicates at maximum speed of 33,6 kBd. A+ and A- signals are driven out to the RS 485 connector and are galvanically separated from the power part.

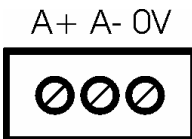
For secure data transmission the following is necessary to carry out :

- Separate power and data circuits.
- Using of twisted communication cable of 0,35-0,8mm² cross-section with characteristic impedance of 120Ω.
- Distance between communicating devices in ideal conditions should not exceed 1600 m (concerns conductors with capacity of 65pF/m).
- Using of terminating resistor 150Ω (just in case of necessity).

Format of outcoming data :

Communicat. speed	According to the DIP switch 4,5
Number of data bits	8
Parity	None
Stop-bits	1
Data flow control	None

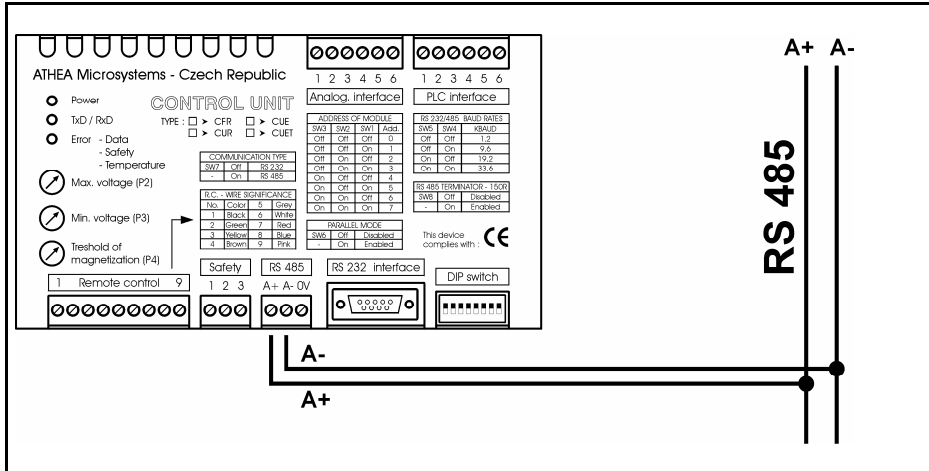
Connecting of the connector RS 485 Interface :



Marking	Signal description
A+	A+ signal
A-	A- signal
0V	0 V DC

Typical interconnection of control unit to the RS 485 bus :

Control unit CxR is interconnected to the RS 485 concentrator using 2- cored twisted conductor. For data transmission A+ and A- signals are used. Oll other signals must be left unconnected.



For secure data transmission the following is necessary to carry out :

- Connection of A+ signal to the RS 485 concentrator.
- Connection of A- signal to the RS 485 concentrator.
- Setting up of communication on RS 485 – DIP switch SW7 = On.
- Setting up of parallel interconnection of control units – DIP switch SW6 = Off.
- Setting up of communication speed – DIP switch SW4 to SW5.
- Setting up control unit address – DIP switch SW1 to SW3.
- Using of terminating resistor 150Ω (just in case of need) – DIP switch SW7.

Description of transmission report RS 485 :

Control unit continuously monitors serial data on the A+ and A- inputs (concentrator is in a state of high impedance). Incoming data on this inputs must be in ASCII format in hexadecimal form. When the control unit receives data in the valid format and with the right address of the target device, the requested instruction will be carried out. After finishing of the required operation the control unit will send off a message to the superior PLC and re-initiates the concentrator to the state of high impedance.

INSTRUCTION SET OF THE CONTROL UNIT CXR

Description of the transmission report :

All functions of control units can be operated via asynchronous serial line (UART), which is common to concentrators RS 232 and RS 485. All transmitted data must be in hexadecimal form coded in compliance with the international standard of ASCII.

Control unit constantly monitors serial data on the RxD input, eventually A+ and A-. When the control unit receives data in valid format and with the right address of the target device, the requested instruction will be carried out. The control unit will confirm the accomplishing of the instruction by sending off the same message which it received. This is not true in parallel connection of control units, in which the control unit only receives the outgoing address. This property enables the concatenation of control units, in which one control unit activates the following control unit.

Each outgoing message always starts with sending off the **STX** character. Then **ADDR** follows (target address of the control unit), **C0** (required instruction), **V0** (value related to the required instruction) and **CRC** (control total XOR). The **ETX** characteristic is sent out as the last one and terminates the transmission.

The processing of the required instruction starts at the moment of reception of ETX characteristic. Required instruction will not be carried out unless the received address ADDR and the address set on the front panel of the control unit (DIP switch) are in agreement. If the received address is not in agreement, then the control unit will ignore the whole received message.

Format of the received data :

Transmitted data	STX	ADDR	C0	V0	CRC	ETX
Hex format	02	0x	0x	xx	xx	03
ASCII character	☺	xx	xx	xx	xx	♥

Význam použitých zkratk :

Zkratka Popis

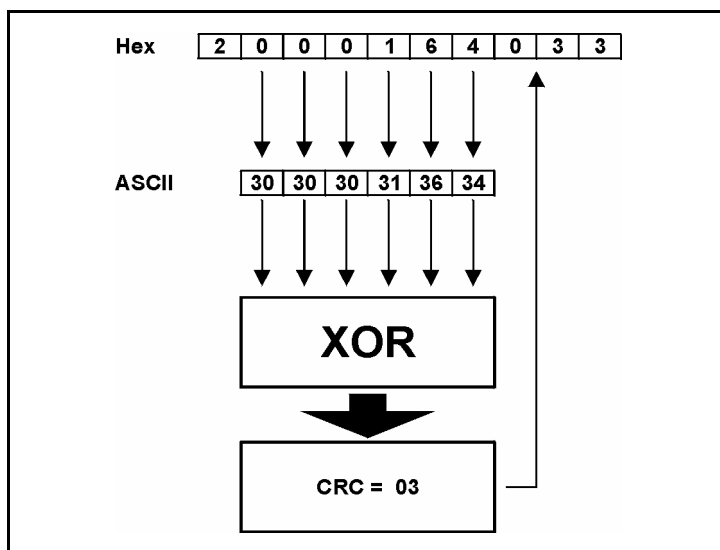
STX	Start of transmitting
ADDR	Address of target device
C0	Requested instruction
V0	Value related to requested instruction
CRC	CRC of all previous values (except STX)
ETX	End of transmitting

Description of instructions of the control unit CxR :

Instruction code C0 (Hex)	Description of instruction C0	Range of permitted values V0
00	STOP magnetization	xx
01	START magnetization	00 Hex – 64 Hex
02	START demagnetization	xx

Notes: xx - random value
 00 Hex – 64 Hex - value of magnetisation voltage in the range of 0-100%

Calculation of CRC control total using XOR method :



Examples of ASCII strings :

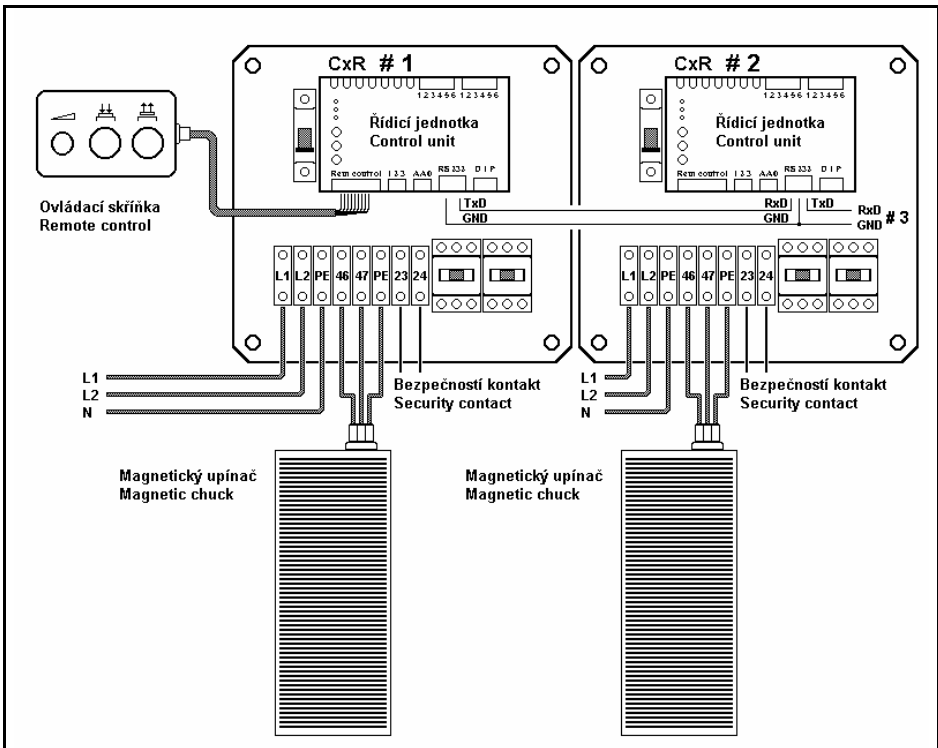
START Magnetisation 100% (address 00) : ● 00016403 ♥
 STOP Magnetisation (address 00) : ● 00000000 ♥
 START Demagnetisation (address 00) : ● 00020002 ♥

PARALLEL INTERCONNECTION OF CONTROL UNITS CXR

In case we have to control more electro-permanent magnetic chucks at the same time or electromagnetic chucks with more section windings, it is suitable to use the possibility of parallel interconnection of control units.

Important : It is not permitted to parallelly connect the outputs of control units (terminals 46 and 47).

Operating of more control units by one remote control to the RS 232 bus :



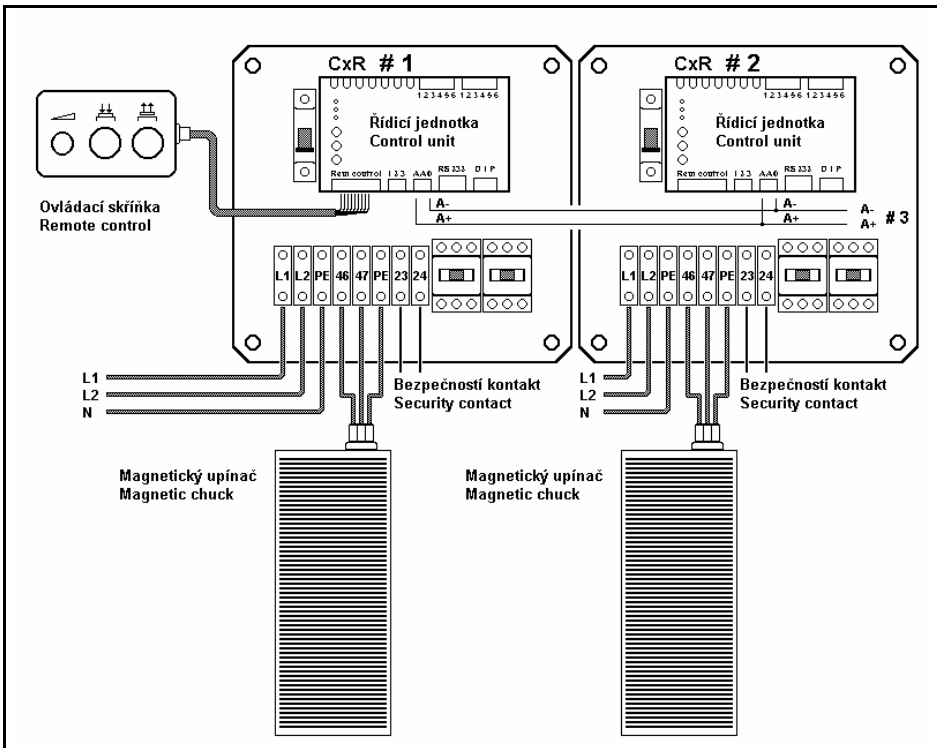
DIP switch	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
CUE # 1	Off	Off	Off	Off	Off	On	Off	Off
CUE # 2	On	Off	Off	Off	Off	On	Off	Off

PARALLEL INTERCONNECTION OF CONTROL UNITS CUE

In case we have to control more electromagnetic chucks at the same time or electromagnetic chucks with more section windings, it is suitable to use the possibility of parallel interconnection of control units.

Important : It is not permitted to parallelly connect the outputs of control units (terminals 46 and 47).

Operating of more control units by one remote control to the RS 485 bus :



DIP switch	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
CUE # 1	Off	Off	Off	Off	Off	On	On	Off
CUE # 2	On	Off	Off	Off	Off	On	On	Off

OPERATING OF MORE CONTROL UNITS BY ONE PLC AUTOMATIC MACHINE TO THE RS 232 BUS :

PLC=MASTER-CUE=SLAVE Version

By using this version the industrial automatic machine communicates with all control units.

- Set up RS 232 communication on all control units.
- Set up the same communication speed for all control units.
- Assign original address to each control unit.
- Interconnect RxD signals for all control units.
- Interconnect TxD signal of the industrial automatic machine to the connected RxD signals of control units.
- Interconnect GND signals of all control units.

PLC=MASTER-CUE=MASTER-CUE=SLAVE Version

By using this version PLC industrial automatic machine communicates only with the first control unit which starts the following control unit.

- Allow the parallel mode on all control units.
- Set up RS 232 communication on all control units.
- Set up the same communication speed on all control units.
- Assign original address to each control unit.
- Connect TxD signal of the industrial automatic machine to the RxD signal of the first control unit.
- Interconnect the TxD signal of the first control unit to RxD signal of the following control unit.
- Interconnect GND signals of all control units.

OPERATING OF MORE CONTROL UNITS BY ONE PLC AUTOMATIC MACHINE TO THE RS 485 BUS:

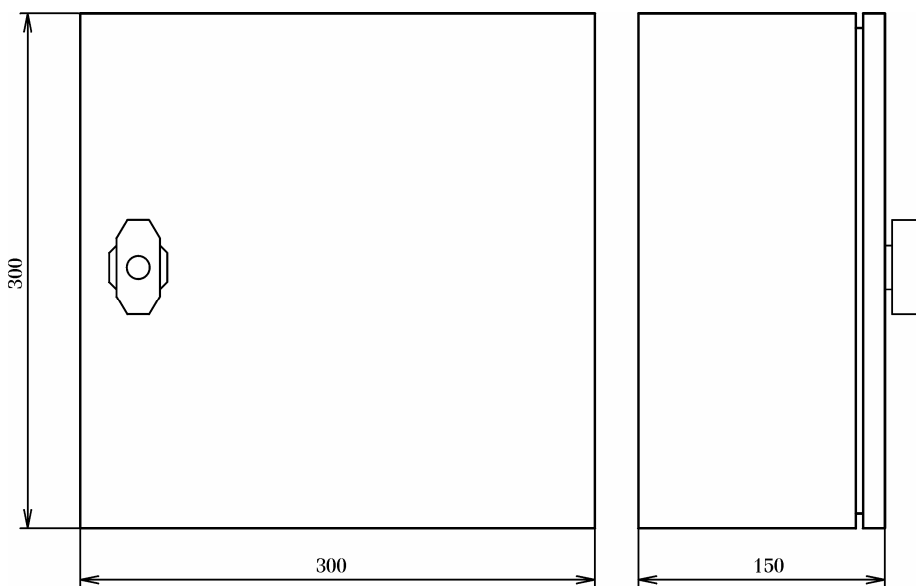
PLC=MASTER-CUE=SLAVE Version

By using this version the industrial automatic machine communicates with all control units.

- Interconnect all A+ signals of control units to the A+ signal of PLC automatic machine.
- Interconnect all A- signals of control units to the A- signal of PLC automatic machine.

MECHANICAL CONSTRUCTION OF CONTROL SYSTEM CFR, CUR XX**Technical characteristics:**

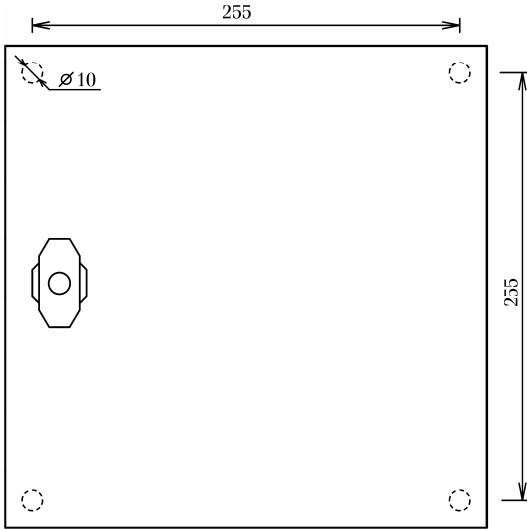
- IP 54 cover according to EN 60 529
- Mechanical resistance according to EN 50 102- IK 10
- Certification – LCIE, UL, DNV, BV
- Construction – closed welded box, the front profile in the form of roof gutter made from the double sheet gauge, which secures high consistency of the frame and impermeability of the door
- Door with turning possibility and with the opening angle of 130°
- Colour- polyester powdered composition in the colour shade RAL 7032

CFR, CUR xx enclosure sizes :

* all dimensions in mm

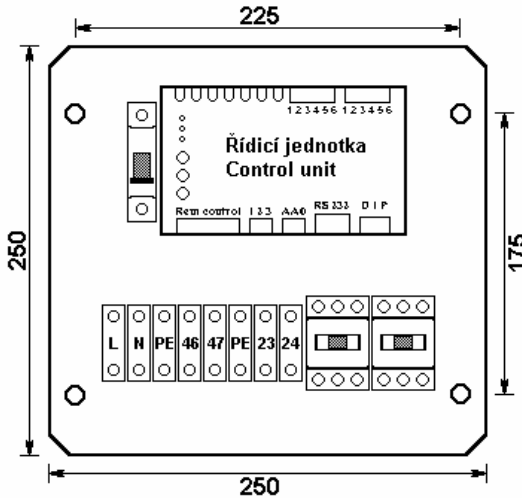
Power supply and control unit for electro-permanent magnetic devices

CFR, CUR xx – version with IP 54 protection



* all dimensions in mm

CFR, CUR xx – version with IP 00 protection



* all dimensions in mm

CONTROL SYSTEM EQUIPMENT:

Together with the CxR control system the following equipment is supplied. In case of any discrepancy with this list, or if any item is damaged (e.g. illegible installation CD-ROM), please contact your supplier.

- User manual in Czech or English version..
- Communication cable for connection of CxR control unit to PC.
- Datamodul 2k.

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.**

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

Guarantee and post-guarantee
service is provided by:

Martin Valeš
Sídliště 322
672 01 Moravský Krumlov
Czech Republic

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E-mail : athea@athea.cz
Internet : www.athea.cz