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Spezialelektronik GmbH

MICC controller with USB and CAN Interface

Option with Ethernet

Note

The information in this manual is subject to change without notice. We take no responsibility for any error in the document. We reserve the right to make changes in the product design without reservation and without notification to the users.

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1 General information

The MICC (Multichannel Interface Crate Controller) is a remote control interface for MMC Crates. Available interfaces are an Ethernet (Lantronix XPort) interface and an USB to RS-232 Converter (FTDI) on the front panel. These interfaces use the iseg SCPI command set described later in this manual. Furthermore, a CAN interface is located at the back panel. The CAN EDCP / DCP command list is described in the manuals EHS_EDS_MULTI_CHANNEL_CAN.PDF and "CIO_MULTI_CHANNEL_CAN.PDF".

To configure the Ethernet interface or to use that as a virtual COM port it is necessary to install the corresponding tools from Lantronix company. The Lantronix Device Installer driver files can be found on the attached CD or from the Lantronix home page. Please read the part to the Lantronix tools of this manual.

To use the USB remote control it is necessary to install the corresponding FTDI USB driver files. These driver files can be found on the attached CD.

A higher application layer such as the programs isegTerminal, isegCANHVControl or the isegHVOPCServer controls the HV units in the different slots of the MMC crate as independent HV channels. The left slot position of the MMC crate will be controlled as HV channel 0, the next slot as HV channel 1 and so on.

2 User calibration

The MICC get the information which HV module is plugged in a specific slot via a user calibration. The MICC cannot check if another HV module was plugged in.

The MICC converts between the physical values of the HV module and the logical values of the HV slots. In order to control the HV modules via interface a user calibration of the MICC is necessary for one time. In most cases this user calibration was already made during the factory process. Only if a HV unit will be changed by another one with different nominal values or a free slot will be used the first time, a user calibration of this slot is necessary.

A user calibration will be made via the program isegTerminal by execution of a script file. The script file have to be adapted to the nominal values of the special HV unit. There are a collection of example script files for the user configuration (see page 9 for a script file example and chapter 10 for isegTerminal).

Another way to do a user calibration is with the program isegCANHVControl by using the password "UserDefines" (please use the online help of isegCANHVControl).

⚠ After every power on of the MICC, the user have to confirm the special HV configuration in order to accept the user calibration, before the HV can be switched ON.

SCPI :CONFIGURE:HVMICC:HV_OK
CAN "cgHVOK" (CANID Length:8 DATA_BYTES:0x12 0x40 0x63 0x67 0x48 0x56 0x4f 0x4b)

3 iseg SCPI command set

Command	Description
:**VOLT**age	
␣<Voltage>[V],(@<Channel>)	set channel voltage <VOLTAGE> unsigned value for modules without EPU <VOLTAGE> signed value for modules with EPU
␣<ON>,(@<Channel>)	switch on High Voltage with configured Ramp speed
␣<OFF>,(@<Channel>)	switch off High Voltage with configured Ramp speed
␣<EMCY OFF>,(@<Channel>)	shut channel High Voltage emergency off (without ramp)
␣<EMCY CLR>,(@<Channel>)	clear shut channel emergency off
:BOUnds ␣<voltage>[V],(@<Channel>)	set channel voltage bounds
:**CURR**ent	
␣<Current>[A],(@<Channel>)	set channel current
:BOUnds ␣<current>[A],(@<Channel>)	set channel current bounds
:**Ev**ent	
␣<CLEAR>,(@<Channel>)	clear channel events
:MASK ␣<word>,(@<Channel>)	set channel event mask
:CONFigure	set/get module configuration
:RAMP	set module voltage ramp speed, give the parameter in percent of Vnominal per second
:VOLTage ␣<RampSpeed>[%/s]	
:CURRent ␣<RampSpeed>[%/s]	set module current ramp speed, give the parameter in percent of Inominal per second
:AVERage ␣<nFilterSteps>	number of average filter steps (1, 16, 64, 256, 512, 1024)
:AVERage**?**	query the digital filter value
:KILL ␣ENABLE/ DISABLE	set function kill enable or kill diable
:KILL?	query the value for the kill enable function
:ADJust ␣ENABLE/ DISABLE	set function fine adjustment
:ADJust?	query the fine adjustment
:EVent	
␣<CLEAR>	clear module events
␣<word>	reset module event status
:MASK	set module event mask
:CHANMASK	set module event channel mask
:SERIAL	
:ECHO 1	echo all received characters
:ECHO 0	don't echo received characters
:ECHO?	query if there is set a serial echo
:HVMICC	set/get the configuration of the MICC HV system
␣**HV_NOT_OK**	MICC system is not configured to switch ON any HV module. The system is in configuration mode to change the nominal values of the installed HV modules.
␣**HV_OK**	MICC system is properly configured. It is possible to switch ON any of the connected HV modules.

Channel 0..NumberOfChannels -1
␣ Space
EPU module featured with polarity switch-able electronically

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Command	Description
:MEASure	
:VOLTage**?** (@<Channel>)	query measured channel voltage, reply is a signed value
:CURRent**?** (@<Channel>)	query measured channel current, reply is an unsigned value
:READ	
:VOLTage**?** (@<Channel>)	query set voltage value reply is an unsigned value for modules without EPU reply is a signed value for modules with EPU
:LIMit**?** (@<Channel>)	query voltage limit
:NOMinal**?** (@<Channel>)	query channel voltage nominal reply is signed value for modules without EPU reply is an unsigned value for modules with EPU
:BOUnds**?** (@<Channel>)	query channel voltage bounds
:ON? (@<Channel>)	query channel control bit setON
:EMCY? (@<Channel>)	query channel control bit setEMCY
:CURRent? (@<Channel>)	query set current value
:LIMit**?** (@<Channel>)	query current limit
:NOMinal**?** (@<Channel>)	query channel current nominal, reply an unsigned value
:BOUnds**?** (@<Channel>)	query channel current bounds
:RAMP	
:VOLTage**?**	query voltage ramp speed in percent of Vnominal per second [%/s]
:VOLTage**?** (@<Channel>)	query voltage ramp speed in [V/s]
:CURRent**?**	query current ramp speed in percent of Inominal
:CURRent**?** (@<Channel>)	query voltage ramp speed in [A/s]
:MODule	
:CONTrol**?**	query module control word
:STATus**?**	query module status word
:EVent	
:STATus**?**	query module event status word
:MASK?	query module event mask word
:CHANSTATus**?**	query module channel event status
:CHANMASK?	query module channel event mask
:SUPply	
:P24V?	query module supply +24V
:P12V?	query module supply +12V
:N12V?	query module supply -12V
:P5V?	query module supply +5V
:TEMPerature**?**	query measured temperature
:CHANnelnumber**?**	query number of channels
:CHANnel	
:CONTrol**?** (@<Channel>)	query channel control word
:STATus**?** (@<Channel>)	query channel status word
:EVent	
:STATus**?** (@<Channel>)	query channel event status word
:MASK? (@<Channel>)	query channel event mask word
:IDNT?	query module identification
:FIRMware	
NAME?	query firmware name
RELease**?**	query firmware release

Command	Description
:SYStem	
:USER	
:CONFIG 458xxx	configure the MICC to change the nominal values and to make a user recalibration, as parameter give the six digit serial number
:WRITE	
:VNOMinal	set-up a new value for the nominal voltage
<Voltage>[V],(@<Channel>)	<VOLTAGE> signed value for modules without EPU <VOLTAGE> unsigned value for modules with EPU
:INOMinal	set-up a new value for the nominal current
<Current>[A],(@<Channel>)	
:EPU	module featured with polarity switch-able electronically
<YES>,(@<Channel>)	yes module is equipped with an EPU
<NO>,(@<Channel>)	no module is not equipped with an EPU
:READ	
:VNOMinal**?** (@<Channel>)	read back the definition of the nominal voltage user value
:INOMinal**?** (@<Channel>)	read back the definition of the nominal current user value
:CALIB	
V,(@1)	recalibration and saving data for the HV of the channel
I,(@1)	recalibration and saving data for the current of the channel
:**RECA**LL 1	activate the user configuration (nominal and calibration values)

Please see script file example also

4 Common instruction set

The common instruction set is independent from the selected language (SCPI) and can always be used.

*IDN?	query module identification reply *iseg Spezialelektronik GmbH,MICC 10 508,458005,3.00*
*CLS	clear module (event-)status
*RST	reset device to save values: – turn HV off for all channels – set all set voltages to zero for all channels – set all set currents to the current nominal for all channels
*INSTR?	query the selected instruction set reply *EDCP*
*INSTR,SCPI	
or	
*INSTR,EDCP	select SCPI instruction set

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5 Output formats for voltage and current

Vnominal	Output format voltage values
1 V ≤ V_{nom} < 10 V	1.23456V
10 V ≤ V_{nom} < 100 V	12.3456V
100 V ≤ V_{nom} < 1 kV	123.456V
1 kV ≤ V_{nom} < 10 kV	1.23456E3V
10 kV ≤ V_{nom} < 100 kV	12.3456E3V

Inominal	Output format current values
10 µA ≤ I_{nom} < 100 µA	12.3456E-6A
100 µA ≤ I_{nom} < 1 mA	123.456E-6A
1 mA ≤ I_{nom} < 10 mA	1.23456E-3A
10 mA ≤ I_{nom} < 100 mA	12.3456E-3A
100 mA ≤ I_{nom} < 1 A	123.456E-3A
1 A ≤ I_{nom} < 10 A	1.23456A
10 A ≤ I_{nom} < 100 A	12.3456A

5.1 Examples

Set Voltage to 1000.501V on channel 2 :VOLT 1000.501,(@2)
Set Current to 1.58mA on channel 0 :CURR 0.00158,(@0)
Set Voltage Ramp speed to 10% of Vnominal per second :CONF:RAMP:VOLT 10

5.2 Advanced Examples

// Voltage ramp speed for all slots will be set 20 percent of Vnominal per second
CONF:RAMP:VOLT 20%/s
//Confirmation that the HV configuration of all slot's is checked and accepted by the user
CONF:HVMICC HV_OK;:CONF:HVMICC? HV_OK
:VOLT 2000.5,(@1); :READ:VOLT? (@1); :CURR 0.002,(@1); :READ:CURR? ((@1)
2.0005E3V; 2E-3A

:MEAS:VOLT? (@1); CURR? (@1)
2.00002V; 1.99973E-3A

//Voltage set value 1000Volt for channel 0, 2 to 4 and 7
:VOLT 1000V,(@0,2-4,7)
//Query voltage set value of channel 0, 2 to 4 and 7
:READ:VOLT? (@0,2-4,7)
1.00000E3V,1.00000E3V,1.00000E3V,1.00000E3V,1.00000E3V
//Switch on the HV for channel 0, 2 to 4 and 7
:VOLT ON,(@0,2-4,7)

5.3 Example for a user calibration

Please, execute these steps only if an adjust of the specific slot is necessary

Example script file for a specific user calibration of slot 0, 1, 2 and 3:

User definition 3kV and 4mA

- communication via program isegTerminal.exe, HV of all channels is off
- request the instruction set
- request the module identification
- changes the user nominal values
- fits the calibration parameters of the HV channel 1
- configure the channel for a module with polarity switch-able electronically
- recall the user definitions to the working memory

```
*INSTR?                    EDCP
*IDN?                      iseg Spezialelektronik GmbH,MICC \d{1,3} \d{3},458\d{3},\d{1,2}\.\d{2}
*CLS
CONF:HVMICC HV_NOT_OK;:CONF:HVMICC?                                HV_NOT_OK
SYS:USER:CONF 458008;:READ:MOD:EV:STAT? 0

SYS:USER:WRITE:VNOM 3000, (@0-3)
SYS:USER:CALIB V,(@0-3)
SLEEP 1000
SYS:USER:READ:VNOM? (@0-3)                 (3\.00000E3V.?){4}

SYS:USER:WRITE:INOM 0.004,(@0-3)
SYS:USER:CALIB I,(@0-3)
SLEEP 1000
SYS:USER:READ:INOM? (@0-3)                 (4\.00000E-3A.?){4}

SYS:USER:WRITE:EPU YES,(@0-3)
SLEEP 400
SYS:USER:READ:EPU? (@0-3)                  (YES.?){4}

SYS:RECA 1
CONF:HVMICC HV_OK
STOP
```


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6 Description of the single bits of control, status, event status and mask and data point's

6.1 Channel status (read access)

:READ:CHANnel:STATus? UI2

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit 8	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
isVLIM	isCLIM	isTRP	isEINH	isVBND	isCBND	res	res	isCV	isCC	isEMCY	isRAMP	isON	IERR	isREG	isPOS

The ChannelStatus register describes the actual status. Depending on the status of the module the bits will be set or reset.
The bit InputError will be set if the given parameter is not plausible or it exceeds the module parameters (e.g. if the command Vset=4000V is given to a module with NominalVoltage=3000V). The bit InputError is not set if the given values are temporarily not possible (e.g. Vset=2800 at a module with NominalVoltage=3000V, but HardwareLimitVoltage=2500V). A certain signature which kind of input error it is does not exist.

isVLIM	IsVoltageLimitExceeded	voltage limit set by V_{max} is exceeded
IsCLIM	IsCurrentLimitExceeded	current limit set by I_{max} is exceeded
isTRP	IsTripExceeded	Trip is set when Voltage or Current limit or Iset has been exceeded (when KillEnable=1)
isEINH	IsExtInhibit	External Inhibit
isVBND	IsVoltageBoundsExceeded	Voltage out of bounds
isCBND	IsCurrentBoundsExceeded	Current out of bounds
isCV	IsControlledVoltage	Voltage control active (evaluation is guaranteed when no ramp is running)
isCC	IsControlledCurrent	Current control active (evaluation is guaranteed when no ramp is running)
isEMCY	IsEmergencyOff	Emergency off without ramp
isON	IsOn	On
isRAMP	IsRamping	Ramp is running
IERR	InputError	Input error
isREG	IsRegulationError	faster error detection of the channel hardware is not in regulation (check it every 5ms)
IsPOS	IsPositive	Polarity of the HV (for devices with EPU only)
res	Reserved	

isVLIM=0 channel is ok
isVLIM=1 the hardware voltage limit is exceeded
isCLIM=0 channel is ok
isCLIM=1 the hardware current limit is exceeded
isTRP=0 channel is ok
isTRP=1 V_O is shut off to 0V without ramp because the channel has tripped.
isEINH=0 channel is ok
isEINH=1 External Inhibit was scanned
isVBND=0 channel is ok
isVBND=1 |Vmeas - Vset| > Vbounds
isCBND=0 channel is ok
isCBND=1 |Imeas - Iset| > Ibounds
isCV=1 channel is in state of voltage control
isCC=1 channel is in state of current control
isEMCY=1 channel is in state of emergency off,
VO has been shut off to 0V without ramp
isON=0 channel is off
isON=1 channel voltage follows the Vset value
isRAMP=0 no voltage is in change
isRAMP=1 voltage is in change with the stored ramp speed value
IERR=0 no input-error
IERR=1 incorrect message to control the module
isREG=0 normal error evaluation
isPOS=1 positive polarity
isPOS=0 negative polarity
isREG=0 fast detection of a regulation error (OPTION)

6.2 Channel event status (read access)

:READ:CHANnel:EVent:STATus? UI2

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
EVLIM	ECLIM	ETRP	EEINH	EVBNDs	ECBNDs	res	res	ECV	ECC	EEMCY	EEOR	EOn2Off	EIER	res	res

EVLIM	EventVoltageLimit	Event: Hardware- voltage limit has been exceeded
ECLIM	EventCurrentLimit	Event: Hardware- current limit has been exceeded
ETRP	EventTrip	Event: Trip is set when Voltage or Current limit or Iset has been exceeded (when KillEnable=1)
EEINH	EventExtInhibit	Event external Inhibit
EVBNDs	EventVoltageBounds	Event: Voltage out of bounds
ECBNDs	EventCurrentBounds	Event: Current out of bounds
ECV	EventControlledVoltage	Event: Voltage control
ECC	EventControlledCurrent	Event: Current control
EEMCY	EventEmergencyOff	Event: Emergency off
EEOR	EventEndOfRamp	Event: End of ramp
EOn2Off	EventOnToOff	Event: Change from state "On" to "Off"
EIER	EventInputError	Event: Input Error
res	Reserved	

An event bit is permanently set if the status bit is 1 or is changing to 1. Different to the status bit an event bit isn't automatically reset. A reset has to be done by the user by writing an 1 to this event bit.

6.3 Channel event mask (write access, read access)

:CONF:EVent:MASK? UI2
:READ:CHANnel:EVent:MASK? UI2

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
MEVLIM	MECLIM	METRP	MEEINH	MEVBNDs	MECBNDs	res	res	MECV	MECC	MEEMCY	MEEOR	MEOn2Off	MEIER	res	res

MEVLIM	MaskEventVoltageLimit	EventMask: Hardware- voltage limit has been exceeded
MECLIM	MaskEventCurrentLimit	EventMask: Hardware- current limit has been exceeded
METRIP	MaskEventTrip	EventMask: Voltage limit or Current limit or Iset has been exceeded (when KillEnable=1)
MEEINH	MaskEventExtInhibit	EventMask: External Inhibit
MEVBNDs	MaskEventVoltageBounds	EventMask: Voltage out of bounds
MECBNDs	MaskEventCurrentBounds	EventMask: Current out of bounds
MECV	MaskEventControlledVoltage	EventMask: Voltage control
MECC	MaskEventControlledCurrent	EventMask: Current control
MEEMCY	MaskEventEmergencyOff	EventMask: Emergency off
MEEOR	MaskEventEndOfRamp	EventMask: End of ramp
MEOn2Off	MaskEventOnToOff	EventMask: Change from state on to off
MEIER	MaskEventInputError	EventMask: Input Error
res	Reserved	

6.4 Channel control: (read access)

:READ:CHANnel:CONTRrol? UI2

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
res	res	res	res	res	res	res	res	res	res	setEMCY	res	setON	res	res	res

The signals SetOn and SetEmergencyOff control are basic functions of the channel. The signal SetOn is switching ON the HV of the channel and is a precondition for giving voltage to the output. As far as a VoltageSet has been set and no event has occurred and is not registered yet (in minimum, bit 10 to 15 of the register Channel Event Status must be 0), a start of a HV ramp will be synchronized (a ramp is a software controlled, time proportionally increase / decrease of the output voltage).

setEMCY	SetEmergencyOff	Set “Emergency Off”
setON	SetOn	Set On
res	Reserved	

setEMCY=0 channel emergency cut-off works
setEMCY=1 cut-off V_O shut off to 0V without ramp
setOn=0 switch the channel to OFF
setOn=1 switch the channel to ON

(If Vset has been set to a value unequal to zero (0V) before the status bit ‘isOn’ is changed from (1) one to (0) zero a ramp down of the voltage to zero (0V) will be started.)

6.5 ModuleStatus (read access)

:READ:MODule:STATus? UI2

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
isKILena	isTMPgd	isSPLYgd	isMODgd	isEVNTact	1	isnoRAMP	isnoSERR	res	res	0	isSrvc	res	res	res	isADJ

The status bits as there are IsTemperatureGood, IsSupplyGood, IsModuleGood, IsEventActive, IsSafetyLoopGood, IsNoRamp and IsNoSumError indicate the single status for the complete module.

isKILena	IsKillEnable	Module state of kill enable
isTMPgd	IsTemperatureGood	Module temperature good
isSPLYgd	IsSupplyGood	Power supply good
isMODgd	IsModuleGood	Module in state good
isEVNTact	IsEventActive	Any event is active and mask is set
isnoRAMP	IsNoRamp	All channels stable, no ramp active .
isnoSERR	IsNoSumError	Module without failure
IsSrvc	IsService	Hardware failure detected (consult iseg Spezialelektronik GmbH)
isADJ	IsFineAdjustment	Mode of the fine adjustment
res	Reserved	

isKILLena=0 Module in state kill disable
isKILLena=1 Module in state kill enable

isTMPgd=0 if module temperature is higher than 55°C then all channels are switched off permanently
isTMPgd=1 module temperature is within working range

isSPLYgd=0 supply voltages are out of range (range 24V +/-10% and 5V +/-5%)
isSPLYgd=1 supply voltages are within range

isMODgd=0 module is not good, that means (isnoSERR AND (ETMPngd OR ESPLYngd OR ESFLPngd))==0
isMODgd=1 module is good, that means (isnoSERR AND NOT(ETMPngd OR ESPLYngd OR ESFLPngd))==1 (see module event status also)

isEVNTact=0 no Event is active
isEVNTact=1 any Event is active

isnoRAMP=0 V_O is ramping in at least one channel
isnoRAMP=1 no channel is ramping

isnoSERR=0 voltage limit, current limit, trip, voltage bound or current bound has been exceeded in at least one of the channels or external INHIBIT ⇒ error, reset by reset of the corresponding flag of the 'Channel Status'
isnoSERR=1 evaluation of the 'Channel Status' over all channels to a sum error flag ⇒ LIM&CLIM&CTRP&EINH&VBND&CBND=0 ⇒ no errors

isADJ=0 Fine adjustment is off.
isADJ=0 Fine adjustment is on (default)

6.6 Module EventStatus (read access)

:READ:MODule:EVent:STATus? UI2

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
res	ETMPngd	ESPLYngd	res	res	0	res	res	res	res	res	ESrvc	res	res	res	res

ETMPngd	EventTemperatureNotGood	Event: Temperature is above 55°C
ESPLYngd	EventSupplyNotGood	Event: at least one of the supplies is not good
EHwVLIMngd	EventHardwareVoltageLimitNotGood	Event: Hardware voltage limit is not in proper range, only for HV distributor modules with current mirror;
ESrvs	EventService	Event: A hardware failure of the HV module has been detected. The HV is switched off without the possibility to switch on again. Please consult the iseg Spzialelektronik GmbH.
res	Reserved	

6.7 ModuleControl (read access)

:READ:MODule:CONTRol? UI2

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
res	setKILena	res	setADJ	set ENDN	res	res	res	res	doCLEAR	res	res	res	res	res	res

setKILena	KillEnable	Kill function
setADJ	Adjust	Switch ON of fine adjustment
setENDN	Endian	Order of bytes in word: 0 = Little Endian (INTEL); 1 = Big Endian (MOTOROLA)
doCLEAR	ClearKill	Hardware ClearKill signal and clear all event signals of the module and the channels
res	Reserved	

setKILL=0 kill function disable
setKILL=1 kill function enable
setADJ=0 fine adjustment OFF
setADJ=1 fine adjustment ON
setENDN=1 big endian (MOTOROLA format)
doCLEAR=1 Hardware ClearKill signal and clear all event signals of the module and the channels
doCLEAR=0 no action

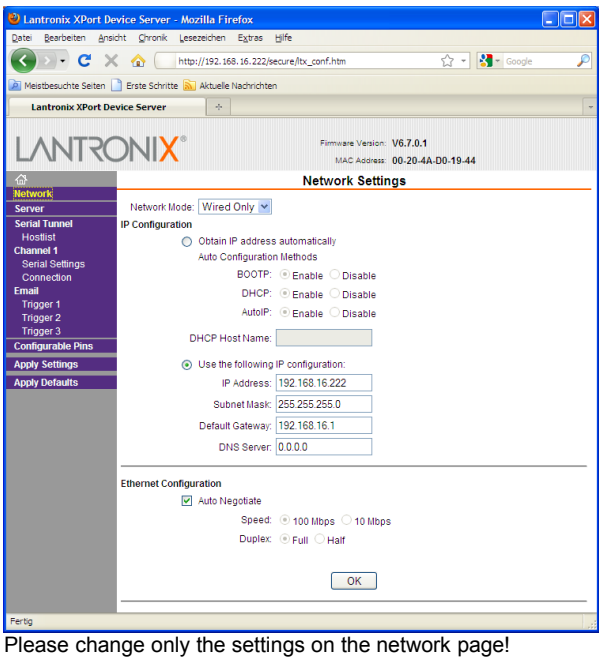
7 Ethernet Interface

Attention: Turn off the device with mains switch POWER before connecting/disconnecting the interface cable.

The 100 MBit/s Full duplex Ethernet Interface is connected via a RJ-45 socket at the MICC front panel.

The device can be connected to a switch via patch cable. If it shall be connected to a PC directly, a crossover cable has to be used.

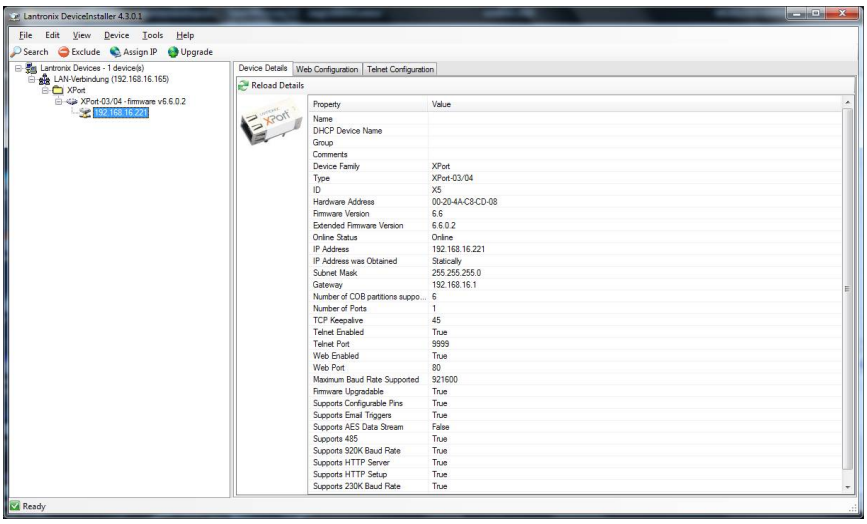
The configuration of the Ethernet interface is done with a web browser



Please change only the settings on the network page!

or the tools of Lantronix company:

http://www.lantronix.com/support/downloads/?p=XPORT



Factory Ethernet settings are shown in the following table:

IP-address:	192.168.16.221
Net mask:	255.255.255.0
Default Gateway:	192.168.16.1
Command port:	10001 (fixed)

The connection can be tested with the ping command (Start → programs → accessories → command).

```
C:\>ping 192.168.16.221

Ping will done for 192.168.16.211 with 32 bytes data:

Answer from 192.168.16.221: bytes=32 time=4ms TTL=128
Answer from 192.168.16.221: bytes=32 time=4ms TTL=128
Answer from 192.168.16.221: bytes=32 time=4ms TTL=128
Answer from 192.168.16.221: bytes=32 time=4ms TTL=128

Ping statistic for 192.168.16.221 :
Package: sent = 4, received = 4, lost = 0
Time in millisecond:
minimum = 1ms, maximum = 4ms, average = 1ms
```

During communication, the HV unit act as server, the control PC acts as client. The following table shows the principle sequence of communication between PC and HV unit.

Step	Function call	Computer → HV unit	HV unit → Computer
1.	connect()	SYN	
2.			SYN, ACK
3.		ACK	
4.	send()	"*IDN?\r\n"	
5.	recv()		"iseg Spezialelektronik GmbH[...]\r\n"
6.	closesocket()	FIN, ACK	
7.			FIN, ACK
8.		ACK	

The first three packages establish a TCP-Connection between Computer and HV unit (three way handshake). Fourth step is the inquiry from PC to HV unit. The command is ASCII coded in data field of the TCP packet. The answer is also ASCII coded send to the PC in step 5. Package No. 6 confirms the receipt of the packet and sends a FIN for termination of connection. Step 7 and 8 are the confirmation of termination of connection from HV unit and PC.

The communication can be monitored with a network sniffer (e. g. Wireshark). Control is done with the instruction sets described later. The preferred command set for Ethernet is “SCPI with EDCP”, as you can build longer Frames which reduces Ethernet Overhead.

It is also possible to configure the MICC Ethernet interface to communicate as a virtual COM port.

Please use the Lantronix COM Port Redirector Manager (CPR Manager) for this.

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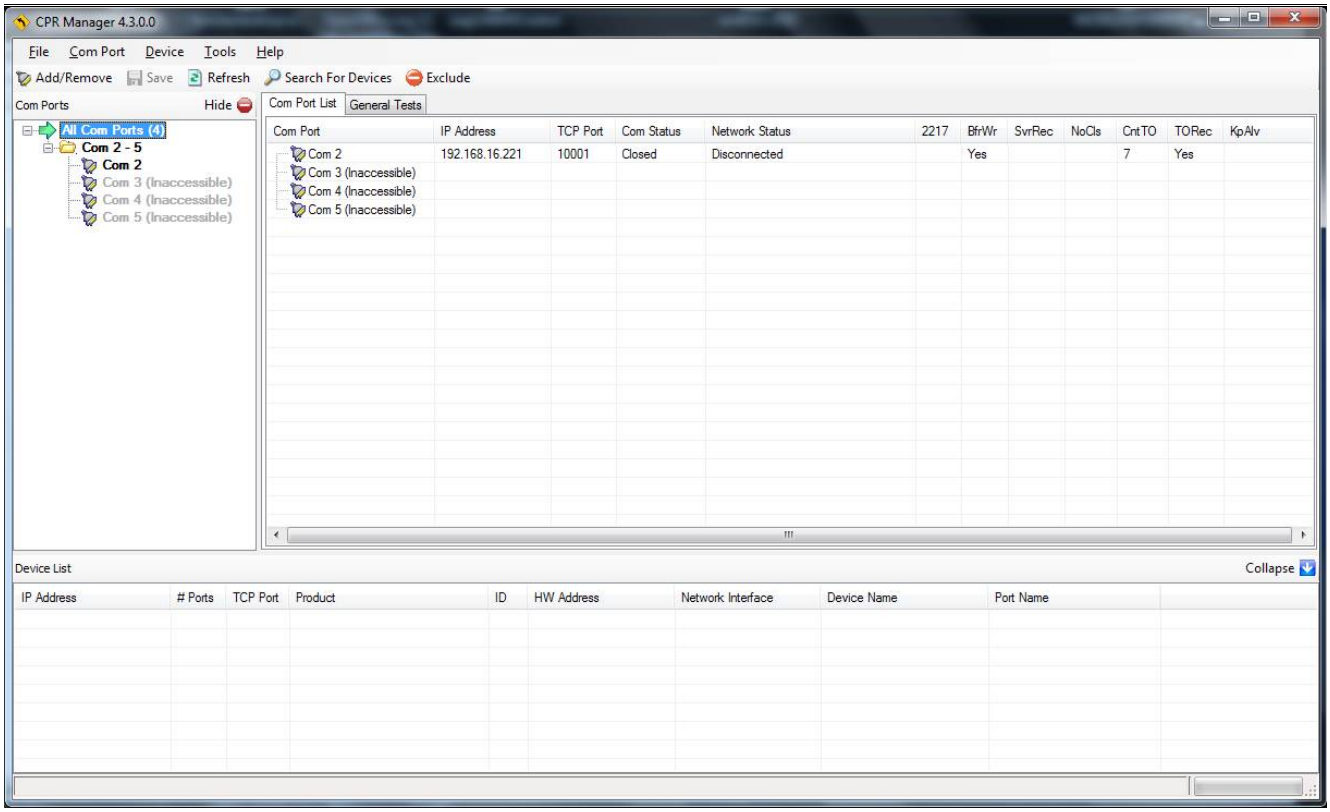
CPR Manager 4.3.0.0
File
Com Port
Device
Tools
Help
Add/Remove
Save
Refresh
Search For Devices
Exclude
Com Ports
Hide
All Com Ports (4)
Com 2 - 5
Com 2
Com 3 (Inaccessible)
Com 4 (Inaccessible)
Com 5 (Inaccessible)
Com Port List
General Tests
Com Port
IP Address
TCP Port
Com Status
Network Status
2217
BfrWr
SvrRec
NoCls
CntTO
TORec
KpAlv
Com 2
192.168.16.221
10001
Closed
Disconnected
Yes
7
Yes
Com 3 (Inaccessible)
Com 4 (Inaccessible)
Com 5 (Inaccessible)
Device List
Collapse
IP Address
Ports
TCP Port
Product
ID
HW Address
Network Interface
Device Name
Port Name

7.1 Programming

Simple programming example (without error handling) for communication with the HV device over Ethernet. This program was compiled and tested with Microsoft Visual C++ 6.0 on Windows XP.

```
#include <stdio.h>
#include <winsock.h>

int main(int argc, char *argv[])
{
	WSADATA     wsadata;
	SOCKET      sock;
	SOCKADDR_IN sockaddr_in;
	int         retcode;
	char        cmd[255] = "*IDN?\r\n";
	char        ans[255] = "";
	char        buf[255];
	char        *crlf;

	// init sockets (Berkeley style, UNIX compatible)
	WSAStartup(2, &wsadata);

	// create TCP socket
	sock = socket(AF_INET, SOCK_STREAM, IPPROTO_TCP);

	// bind socket to dynamic local port
	memset(&sockaddr_in, 0, sizeof(sockaddr_in));
	sockaddr_in.sin_family = AF_INET;            // UDP, TCP
	sockaddr_in.sin_port   = htons(10001);       // remote Port
	sockaddr_in.sin_addr.S_un.S_un_b.s_b1 = 192; // IP address
	sockaddr_in.sin_addr.S_un.S_un_b.s_b2 = 168;
	sockaddr_in.sin_addr.S_un.S_un_b.s_b3 =  16;
	sockaddr_in.sin_addr.S_un.S_un_b.s_b4 = 221;

	// connect to server (three way handshake)
	connect(sock, (SOCKADDR *)&sockaddr_in, sizeof(SOCKADDR_IN));

	// send command to server
	send(sock, cmd, strlen(cmd), 0);

	// read answer from server
	do {
		retcode = recv(sock, buf, sizeof(ans), 0);

		if (retcode > 0) {
			buf[retcode] = 0;
			strcat(ans, buf);
		}

		crlf = strstr(ans, "\r\n");
	} while ( (retcode > 0) && (crlf == 0) );

	if (crlf > 0) {
		*crlf = 0;
	}

	// close socket (three way handshake) and clean up
	closesocket(sock);
	WSACleanup();

	printf("%s\n", ans);

	getchar();

	return 0;
}
```


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8 USB interface

The USB interface is realized with a female USB-B connector at the device front panel. Internal, the USB is implemented with an USB serial converter FTDI FT232R.

Windows USB driver installation

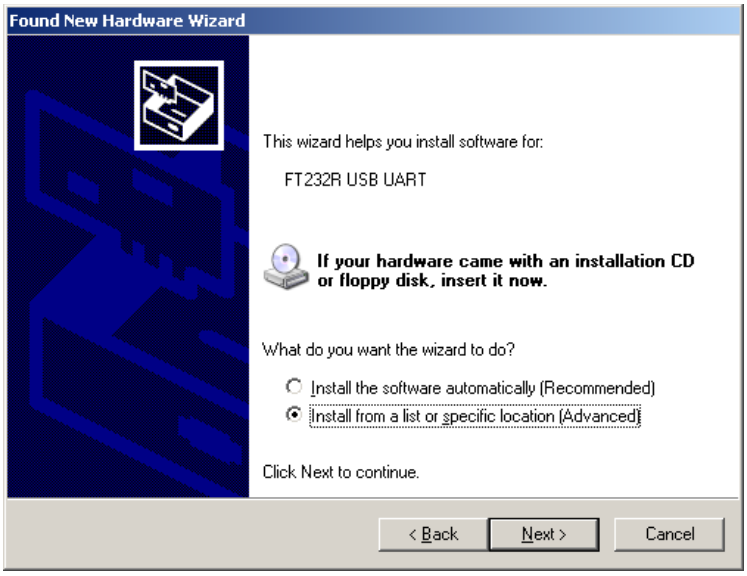
The FTDI VCP driver (Virtual COM Port) can be downloaded from

http://www.iseg-hv.com → Download → Software → USB driver for THQ/EHQ/HPS

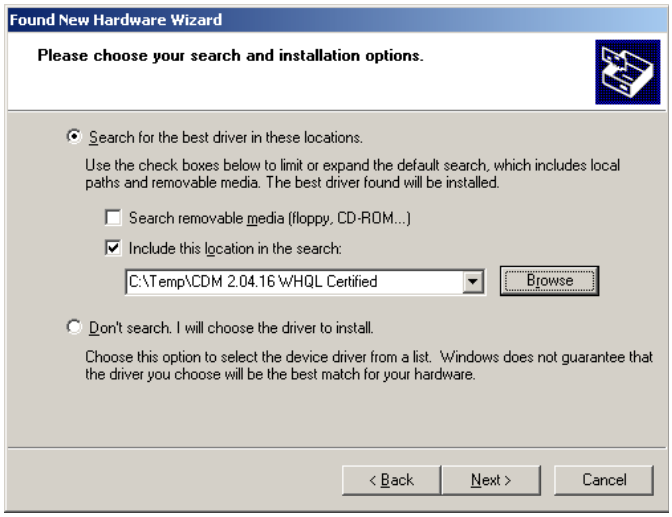
The following steps are necessary for installation:

1. Extract the FTDI driver “CDM 2.04.16 WHQL Certified.zip“, e. g. to C:\Temp\
2. Connect the HV device to the computer via USB
3. The Found new Hardware wizard appears. Please choose “No, not this time” in the first dialog and then click Next.

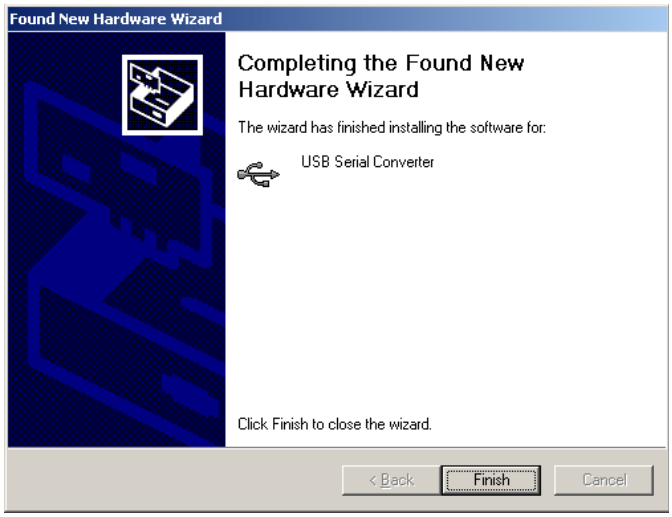
4. Choose “Install from a list or specific location” in the next dialog and then click Next:



5. Please choose the directory you extracted the driver to and the click Next:



6. After some copying you get the final dialog:



It may be necessary to do the steps 3 to 6 again, before the device can be used (the first time, a bus driver is installed, the second time, the virtual COM port driver is installed).

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8.1 Linux USB driver installation

The driver is already included in Kernel series 2.6 and should be loaded automatically when connecting the device. The driver provides a virtual serial port /dev/ttyUSB0 that can be accessed with an Terminal program (e. g. CuteCom).

The following dmesg output shows how the device is recognized and the driver loaded:

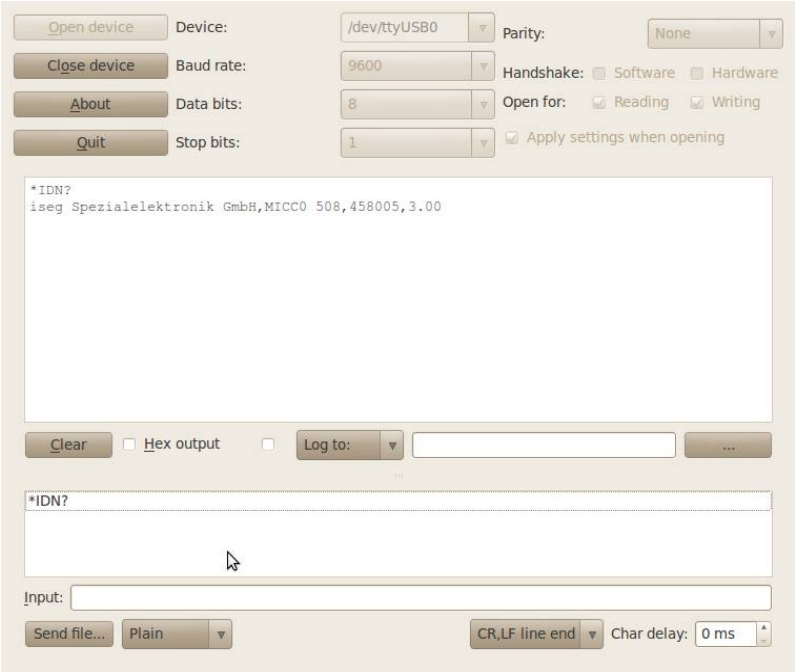
```
[234.496011] usb 1-2: new full speed USB device using uhci_hcd and address 2
[234.694884] usb 1-2: configuration #1 chosen from 1 choice
[234.704371] usb 1-2: New USB device found, idVendor=0403, idProduct=6001
[234.704376] usb 1-2: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[234.704380] usb 1-2: Product: FT232R USB UART
[234.704382] usb 1-2: Manufacturer: FTDI
[234.704385] usb 1-2: SerialNumber: A60075cx
[234.807627] usbcore: registered new interface driver usbserial
[234.807649] usbserial: USB Serial support registered for generic
[234.807679] usbcore: registered new interface driver usbserial_generic
[234.807683] usbserial: USB Serial Driver core
[234.816739] usbserial: USB Serial support registered for FTDI USB Serial Device
[234.816774] ftdi_sio 1-2:1.0: FTDI USB Serial Device converter detected
[234.816805] ftdi_sio: Detected FT232RL
[234.816855] usb 1-2: FTDI USB Serial Device converter now attached to ttyUSB0
[234.816872] usbcore: registered new interface driver ftdi_sio
[234.816876] ftdi_sio: v1.4.3:USB FTDI Serial Converters Driver
```

The following screenshot shows the connection to the MICC with the graphical Terminal program CuteCom (Download at http://cutecom.sourceforge.net).

To communicate with the MICC, following settings are needed:

Device	/dev/ttyUSB0 (or other interface, see dmesg output)
Baud rate:	9600
Data bits:	8
Stop bits:	1
Parity:	None
Handshake:	None
Line end:	CR,LF

Now the serial interface can be opened by „Open device” to test the communication:



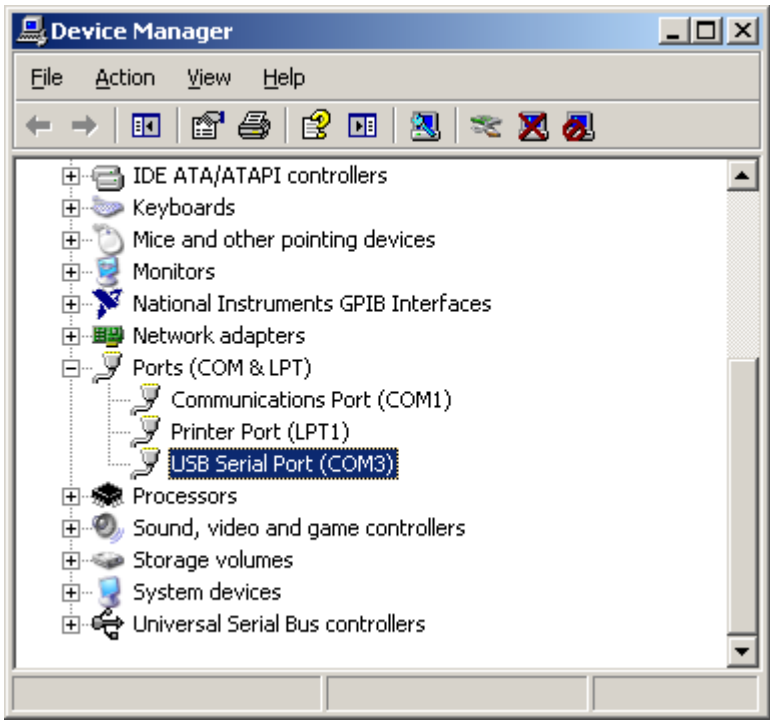
9 Interface test in Windows

9.1 Determine the serial USB interface with Device Manager

Start the Device Manager with:

Start → Settings → Control Panel → System → Device Manager

All MICC devices with USB interface get an USB Serial Port assigned in section Ports (COM & LPT), in this case COM3:

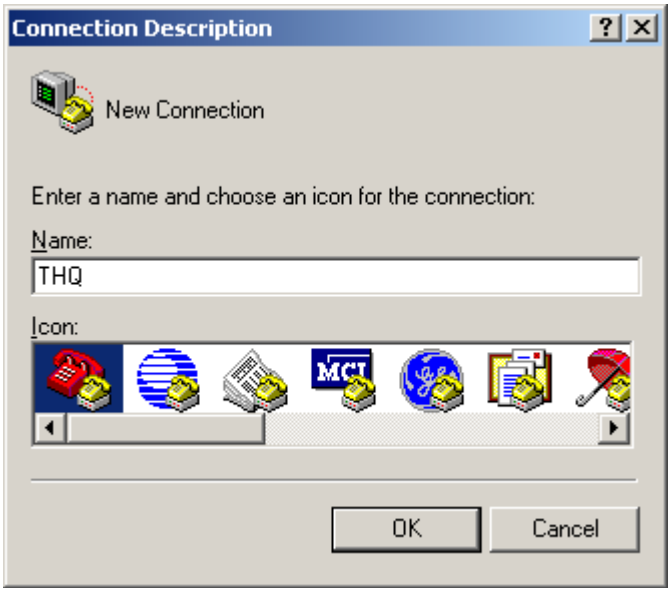


9.2 Test with HyperTerminal

HyperTerminal is included in Windows 2000 / XP and can be started with:

Start → Programs → Accessories → Communications → HyperTerminal

Create a new connection with menu “File → New Connection“, name it e. g. “MICC” and click OK.



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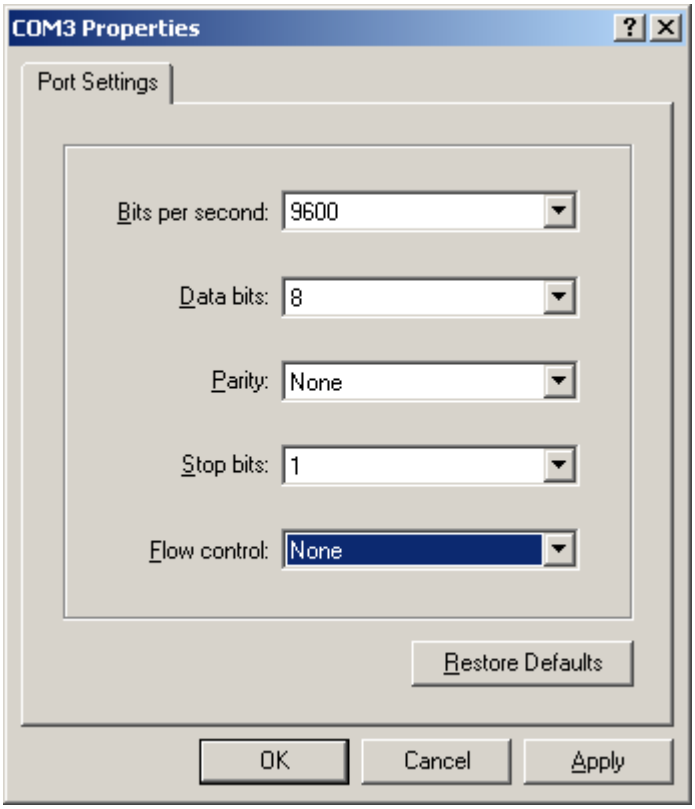
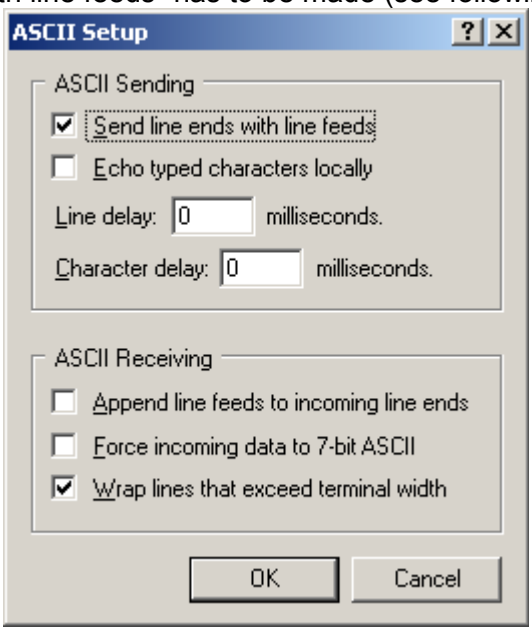
The following dialog appears. Choose your serial port and click OK:

Please enter the the interface parameters in the following dialog:

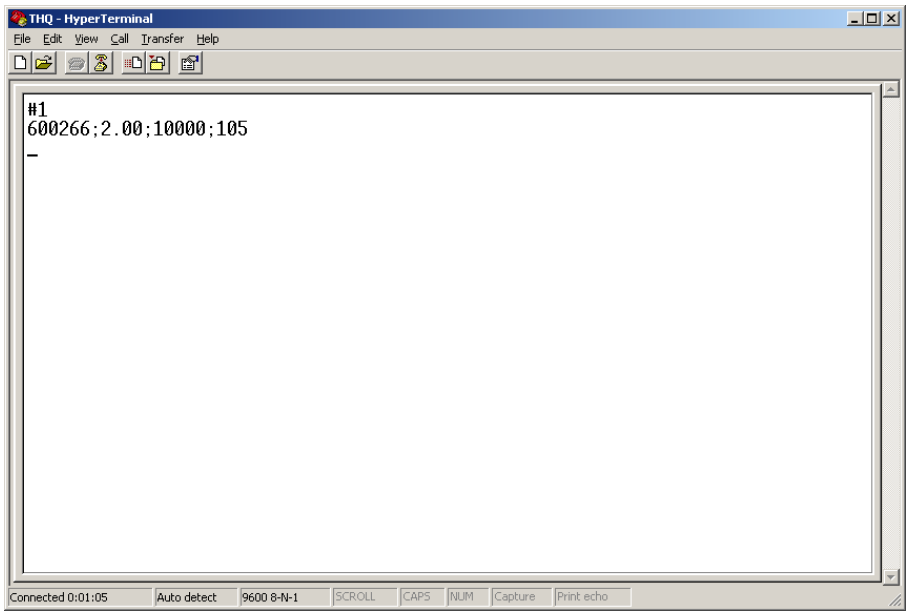


After clicking OK, the interface setup is finished.

As last setting,
The setting “Send line ends with line feeds” has to be made (see following picture).



You can now test the communication with the device:



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10 isegTerminal

isegTerminal is a Windows program to control iseg high voltage devices with RS-232, USB, GPIB (IEEE-488) or Ethernet interface using their ASCII command sets.

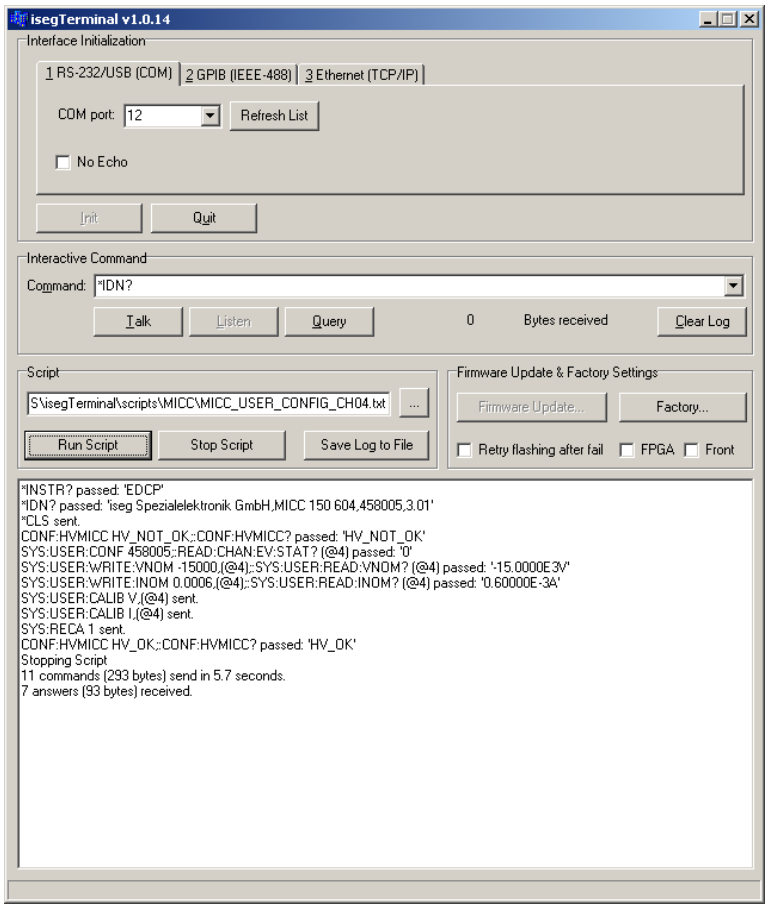
The latest version is available from the iseg website http://www.iseg-hv.com → Download → Software

For serial communication, choose “1 RS-232/USB” in the Interface List and select the COM-Port you connected your iseg device to. With a click on Init, the serial port is opened and you can send commands to your device by clicking the Query button (or simple pushing the Enter key).

The answer is shown in the output window.

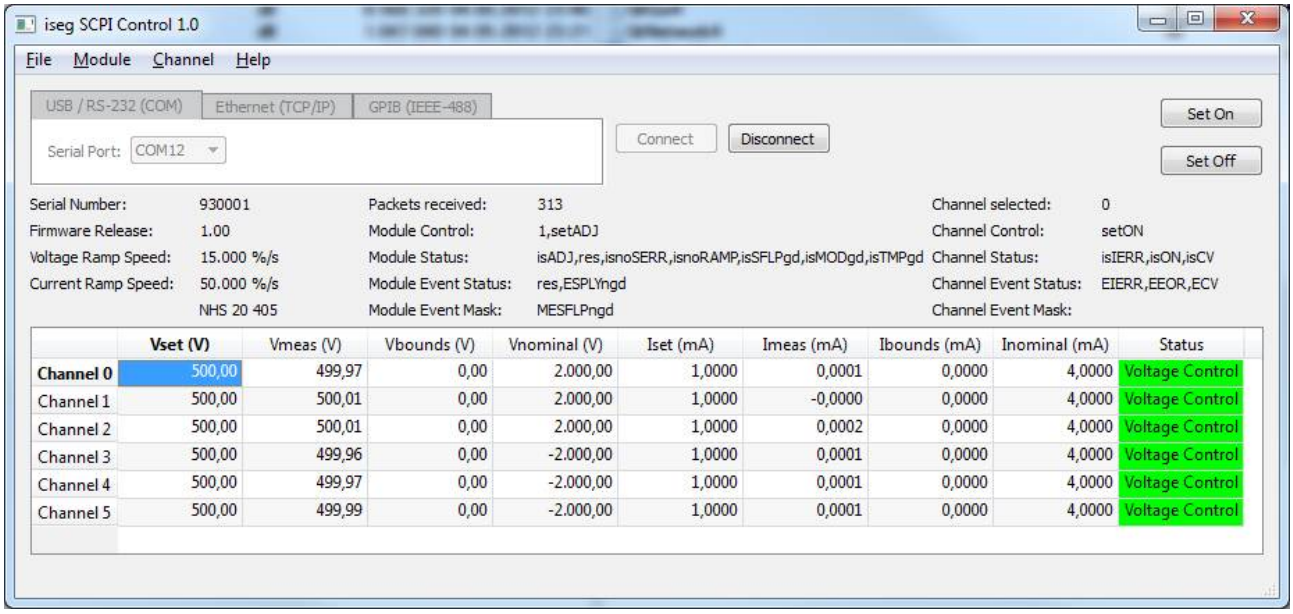
For detailed command set descriptions, please see the documentation for the specific device.

The following command is used for device identification query: “*IDN?”



11 iseg SCPI Control

isegScpiControl is a Windows program to control the MICC and MICP devices via USB or Ethernet interface. All important data points will be displayed via a table and an input of new set value can be made via short cuts. The corresponding short cuts are displayed with the text entries of the file menu.



USB:

The control of MICC/MICP devices via USB requires a FTDI driver installation. For the communication and additional serial port is used.

Ethernet:

Please enter the programmed IP address of the MICC/P in the IP input line. It is also possible to scan for the IP address via File – Scan for IP Address.

The connection will be established by means of the button “Connect” and a continuous request of the data points is started.

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12 Troubleshooting

Problem	Solution
The set voltage cannot be switched on and the green LED on the MICC/P front panel is blinking.	Send the confirmation “:CONF:HVMICC HV_OK”
There is no communication between the MICC and a Host possible even if you.	Check if the delivered SUB-D9 CAN termination connector plugged in even if you are communicate via USB or Ethernet!
The CAN communication is not stable and isegCANHVControl generates communication errors.	Please keep attention for the CAN bus topology and read the document SchematicEth2Can.pdf also.
The program iseg SCPI Control cannot connect the MICC/P.	Check that the IP address from the MICC/MICP is used. Read chapter 11. Use iseg SCPI Control for scan of the IP-address. If another IP address is necessary use the web server to change the IP address of MICC/P.
There is furthermore no communication via Ethernet.	Please check the serial settings of the Ethernet interface via web server in comparison to the document SerialSettingsMICCPXPort.pdf.