ComLib Library

TXV 003 51.02
5th edition
August 2010
subject to alterations

Changes history

Date	Edition	Change description
March 2009	1	First edition
September 2009	2	Information for ComLib_v1.3 added
November 2009	3	Description of fbRecvFrom and fbSendTo according to ComLib_v1.3 added (input variable channel was renamed to chanCode)
March 2010	4	Description of GetChanStat() function and Tuni_STAT data type Description of GetChanSettings() and SetChanSettings() functions Correspond to ComLib_v14
August 2010	5	Example of using of constants for modem control parameter of serial communication channel repaired (*chanSettings.modemControl*) Correspond to ComLib_v14

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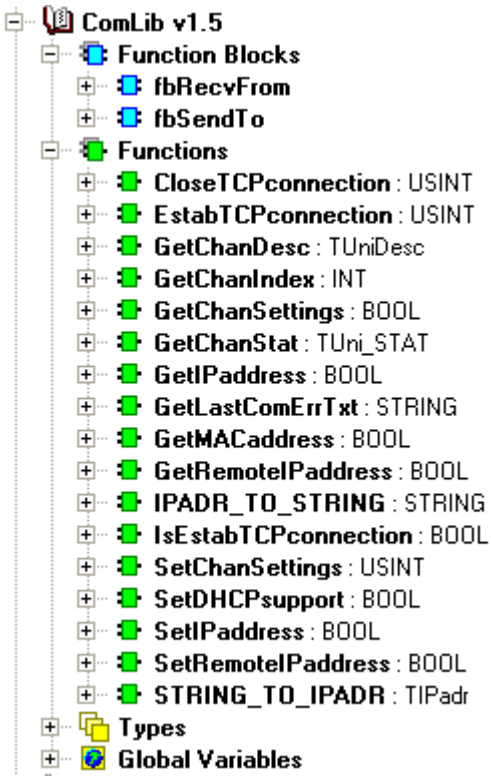
1 INTRODUCTION

The ComLib library is supplied standardly as a part of Mosaic programmable environment. The library contains functions and function blocks enabling reception and sending of messages via the communication PLC channel. The channel can be either a serial line or Ethernet.

The following picture shows the structure of the ComLib library within Mosaic



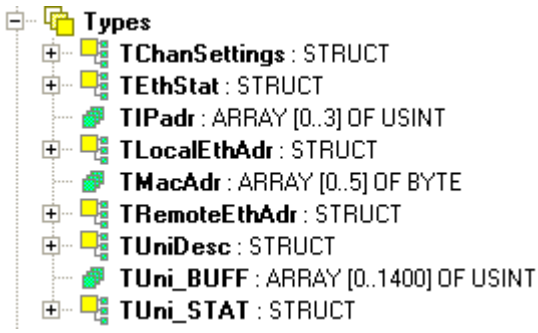
If we want to use functions from the ComLib library in the application program of the PLC, firstly, it is neccessary to add this library to the project. The library is supplied as a part of installation of the Mosaic environment from version v2.0.15.0.

The ComLib library is not supported within systems TC-650, within the system TC700 is not possible to use the library with processor modules CP-7002, CP-7003 and CP-7005.

Function and function blocks of the ComLib library are supported in central units of K rank (TC700 CP-7000 and CP-7004, all versions of Foxtrot system) from version v4.4. Some functions require central units firmware v4.9 or higher (see e.g. Function SetDHCPsupport).

2 DATA TYPES

Data types in the ComLib library can be divided into two groups. First group consists of data types used internally within the library, second group consists of data types designed for use within the application program.

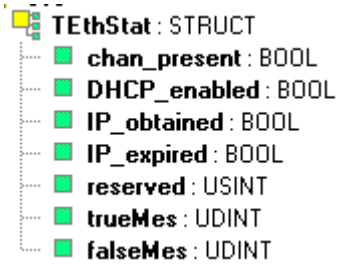


The brief description of data types is given in the following table:

Identifier	*Type*	*Signification*
TEthStat	STRUCT	Status information about ethernet interface
TIPadr	ARRAY	IP address
TLocalEthAdr	STRUCT	Structure containing PLC IP address, network mask and gate-way address
TRemoteEthAdr	STRUCT	Structure containing remote IP address, remote port and local port
TmacAdr	ARRAY	Array of 6 bytes designed for MAC address saving
TUniDesc	STRUCT	Description of communication channel mapping (used only for internal purposes)
TUni_BUFF	ARRAY	buffer for broadcasted or received data (used only for internal purposes)
TUni_STAT	STRUCT	Communication channel status zone
TChanSettings	STRUCT	Serial communication channel settings

2.1 Type TEthStat

Library : *ComLib*



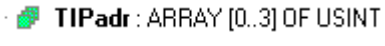
Data type *TEthStat* is a structure containing information about the ethernet interface. This structure have global variables *ETH1_STAT* and *ETH2_STAT* that contain information about interfaces ETH1 and ETH2.

Particular items of the structure *TEhtStat* have the following signification:

Identifier	***Type***	***Signification***
TEthStat	STRUCT	Structure containing information about Ethernet interface
.chan_present	BOOL	Ethernet channel is present (is mounted)
.DHCP_enabled	BOOL	Automatic assignment of IP address by DHCP server enabled
.IP_obtained	BOOL	IP address assigned by DHCP server
.IP_expired	BOOL	Validity of automatically assigned IP address expired
.reserved	USINT	Reserved for further use
.trueMes	UDINT	Total number of packets that were processed by the system
.falseMes	UDINT	Number of packets their processing was denied (the reason can be invalid packet or a packet with protocol that is not supported by the control system)

See also Global variables

2.2 Type TIPadr



Library : *ComLib*

Data type *TIPaddr* is an array of 4 items of USINT type. It is used in cases when it is necessary to define the IP address or network mask.

Type TIPadr is in the library declared as follows:

```
TYPE
  TIPaddr :  ARRAY [0..3] OF USINT;
END_TYPE
```

The item with index 0 contains the first number of IP address, the item with index 3 contains the last number of IP address.

The example of usage of data type *TIPadr*:

```
VAR
  my_IP_adr   : TIPaddr := [192,168,001,010];  // 192.168.1.10
  my_net_mask : TIPaddr := [255,255,255,000];  // 255.255.255.0
END_VAR
```

See also Type TLocalEthAdr, Type TRemoteEthAdr

2.3 Type TLocalEthAdr

Library : *ComLib*

The structure of *TLocalEthAdr* type is used by functions *GetIPaddress* and *SetIPaddress* to transfer the IP address, mask and gate address. All items of this structure are of *TIPadr* type which is the array with four items of USINT type.

Significance of particular items of the structure *TLocalEthAdr* is as follows:

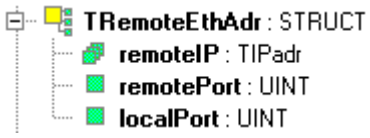
- *IP* IP address (e.g. 192. 168.001.010)
- *IM* IP mask (e.g. 255.255.255.0)
- *GW* gate address (e.g. 192. 168.001.100)

The example of initialization of the variable of *TlocalEthAdr* type:

```
VAR
  new_eth_adr  : TLocalEthAdr := ( IP:= [192,168,001,010],
                                   IM:= [255,255,255,000],
                                   GW:= [192,168,001,100] );
END_VAR
```

See also Function GetIPaddress, Function SetIPaddress

2.4 Type TRemoteEthAdr



Library : *ComLib*

The structure of *TRemoteEthAdr* type uses function *SetRemoteIPaddress* to set the target IP address, target port and local port. The function can be used for ethernet channels ETH1 and ETH2 that are set to universal mode with switched on protocol TCP or UDP. Channel ETH1 is generally located in the PLC processor unit, channel ETH2 can be found on the communication unit (e.g. SC-7102, etc.).

Signification of particular items of the structure *TRemoteEthAdr* is as follows:

- *remoteIP* target IP address (e.g. 192. 168.001.010)
- *remotePort* target port (i.e. port where the message by TCP protocol is sent to, e.g. 61000)
- *localPort* source port (i.e. port where the message by TCP protocol is sent from, e.g. 61001)

The example of initialization of the variable of *TremoteEthAdr* type:

```
VAR
  new_eth_adr  : TRemoteEthAdr := ( remoteIP   := [192,168,001,010],
                                    remotePort := 61000,
                                    localPort  := 61001 );
END_VAR
```

See also Function GetRemoteIPaddress, Function SetRemoteIPaddress

2.5 Type TMacAdr

Library : *ComLib*

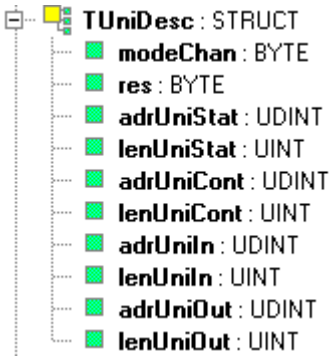
The array of *TMacAdr* type uses function *GetMacAddress* that detects MAC address of the ethernet interface.

The example of the usage of the variable of *TmacAdr* type:

```
PROGRAM prgTestGetMAC
  VAR
    mac_adr   : TMacAdr;
    tmp       : BOOL;
    message   : STRING;
  END_VAR

  tmp := GetMACaddress( EthChan := ETH1, MacAdr := my_mac_adr);
  IF (mac_adr[0] = 0) AND (mac_adr[1] = 16#0A) AND (mac_adr[2] = 16#14) THEN
    message := 'This is Teco device';
  END_IF;
END_PROGRAM
```

See also Function GetMACaddress

2.6 Type TUniDesc



Library : *ComLib*

Data type *TUniDesc* is a structure describing communication channel mapping that is returned by function *GetChanDesc()*. This is a service function used for internal purposes of the library.

Type *TUniDesc* is in the library declared as follows:

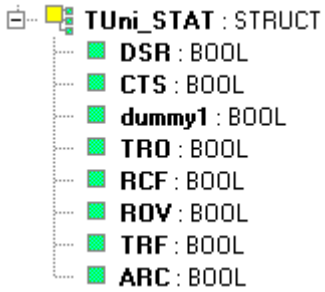
```
TYPE
  TUniDesc : STRUCT
    modeChan    :     byte;          // channel mode
    res         :     byte;          // reserve
    adrUniStat  :     udint;         // status zone address
    lenUniStat  :     uint;          // status zone length
    adrUniCont  :     udint;         // control zone address
    lenUniCont  :     uint;          // control zone length
    adrUniIn    :     udint;         // receiving zone address
    lenUniIn    :     uint;          // receiving zone length
    adrUniOut   :     udint;         // sending zone address
    lenUniOut   :     uint;          // sending zone length
  END_STRUCT;
END_TYPE
```

Channel that is set within the universal mode sets the item *modeChan* in the structure *TuniDesc* to the value 5.

See also Type TLocalEthAdr, Type TRemoteEthAdr

2.7 Type TUni_STAT

Library : *ComLib*



Data type *TUni_STAT* is a structure describing actual status of the communication channel that is returned by function *GetChanStat()*.

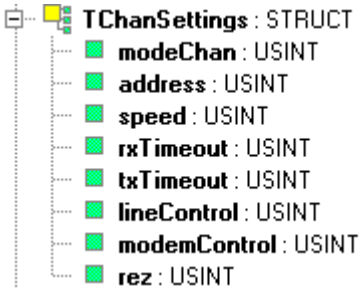
Signification of particular items of the structure *TUni_STAT* is as follows:

Identifier	***Type***	***Signification***
TUni_STAT	STRUCT	Structure containing information on the communication channel actual status
.DSR	BOOL	DSR signal status
.CTS	BOOL	CTS signal status (ready to sending)
.dummy1	BOOL	Reserved for the next use
.TRO	BOOL	Sending stacks are overfill, next message entry will be invalid (log.1)
.RCF	BOOL	Receiving stacks are overfill, actually received message will be lost (log.1)
.ROV	BOOL	overflow (log.1) – received message is longer than reserved receiving zone
.TRF	BOOL	Sending in progress, next message entry will be accepted after transmitting (log.1)
.ARC	BOOL	Receiving alternation- when new message is received the bit is changed

See also Chyba: zdroj odkazu nenalezen

2.8 Type TChanSettings

Library : *ComLib*



Data type *TChanSettings* is a structure containing an actual settings of a serial communication channel that is set by function *GetChanSettings()*. The same structure is used by function *SetChanSettings() that can be used for changing of serial channel settings.*

Signification of particular items of the structure *TchanSettings* is as follows

Identifier	***Type***	***Signification***
TChanSettings	STRUCT	Structure containing information on the communication channel actual settings
.modeChan	USINT	Communication channel mode see constants MODE_OFF, MODE_PC, MODE_UNI,...
.address	USINT	Address for communication
.speed	USINT	Communication speed see constants BAUD_50, BAUD_100,...
.rxTimeout	USINT	Timeout for receiving (minimal idle time for the line that corresponds to the number of received bytes after that receiving of the next message will begin). After elapsing this time the received message is thought to complete.
.txTimeout	USINT	Timeout for sending (minimal guarateed idle time between two sent messages corresponding to number of sent bytes). This parameter provides that the idle time at minimum of this length will be kept on the line between two sent messages.
.lineControl	USINT	Parity, number of bits, number of stopbits see also constants PARITY_ODD, PARITY_EVEN, ...
.modemControl	USINT	Modem signals (RTS signal settings) see also constants RTS_AUTO, HALF_DUPLEX,...
.rez	USINT	reserve

See also Chyba: zdroj odkazu nenalezen, Chyba: zdroj odkazu nenalezen

3 CONSTANTS

There are following constants defined within the ComLib library:

VAR_GLOBAL CONSTANT

- MODE_OFF : USINT := 16#00
- MODE_PC : USINT := 16#02
- MODE_UNI : USINT := 16#05
- MODE_MPC : USINT := 16#06
- MODE_MDB : USINT := 16#07
- MODE_PFB : USINT := 16#08
- BAUD_50 : USINT := 16#01
- BAUD_100 : USINT := 16#02
- BAUD_200 : USINT := 16#03
- BAUD_300 : USINT := 16#04
- BAUD_600 : USINT := 16#05
- BAUD_1200 : USINT := 16#06
- BAUD_2400 : USINT := 16#07
- BAUD_4800 : USINT := 16#08
- BAUD_9600 : USINT := 16#0A
- BAUD_14400 : USINT := 16#0B
- BAUD_19200 : USINT := 16#0C
- BAUD_28800 : USINT := 16#0D
- BAUD_38400 : USINT := 16#0E
- BAUD_57600 : USINT := 16#10
- BAUD_76800 : USINT := 16#12
- BAUD_93750 : USINT := 16#13
- BAUD_115200 : USINT := 16#14
- NO_PARITY : USINT := 16#00
- PARITY_ODD : USINT := 16#08
- PARITY_EVEN : USINT := 16#18
- PARITY_0 : USINT := 16#28
- PARITY_1 : USINT := 16#38
- SEVEN_BITS : USINT := 16#40
- EIGHT_BITS : USINT := 16#00
- ONE_STOP_BIT : USINT := 16#00
- TWO_STOP_BITS : USINT := 16#80
- RTS_0 : USINT := 16#00
- RTS_1 : USINT := 16#02
- RTS_MAN : USINT := 16#40
- RTS_AUTO : USINT := 16#80
- RTS_CTS_AUTO : USINT := 16#C0
- HALF_DUPLEX : USINT := 16#08
- ANY_IP : TIPadr := [0]
- ETH1_uni0 : UINT := 16#07E1
- ETH1_uni1 : UINT := 16#17E1
- ETH1_uni2 : UINT := 16#27E1
- ETH1_uni3 : UINT := 16#37E1
- ETH1_uni4 : UINT := 16#47E1
- ETH1_uni5 : UINT := 16#57E1
- ETH1_uni6 : UINT := 16#67E1
- ETH1_uni7 : UINT := 16#77E1
- ETH2_uni0 : UINT := 16#07E2
- ETH2_uni1 : UINT := 16#17E2
- ETH2_uni2 : UINT := 16#27E2
- ETH2_uni3 : UINT := 16#37E2
- ETH2_uni4 : UINT := 16#47E2
- ETH2_uni5 : UINT := 16#57E2
- ETH2_uni6 : UINT := 16#67E2
- ETH2_uni7 : UINT := 16#77E2
- CH1_uni : UINT := 16#0101
- CH2_uni : UINT := 16#0202
- CH3_uni : UINT := 16#0103
- CH4_uni : UINT := 16#0204
- CH5_uni : UINT := 16#0105
- CH6_uni : UINT := 16#0206
- CH7_uni : UINT := 16#0107
- CH8_uni : UINT := 16#0208
- CH9_uni : UINT := 16#0109
- CH10_uni : UINT := 16#020A
- ETH1 : USINT := 16#E1
- ETH2 : USINT := 16#E2
- ETH3 : USINT := 16#E3
- ETH4 : USINT := 16#E4
- SCH1 : USINT := 16#01
- SCH2 : USINT := 16#02
- SCH3 : USINT := 16#03
- SCH4 : USINT := 16#04
- SCH5 : USINT := 16#05
- SCH6 : USINT := 16#06
- SCH7 : USINT := 16#07
- SCH8 : USINT := 16#08
- SCH9 : USINT := 16#09
- SCH10 : USINT := 16#0A
- COM_OK : USINT := 0
- COM_ERR1 : USINT := 1
- COM_ERR2 : USINT := 2
- COM_ERR3 : USINT := 3
- COM_ERR4 : USINT := 4
- COM_ERR5 : USINT := 5
- COM_ERR6 : USINT := 6
- COM_ERR7 : USINT := 7
- COM_ERR8 : USINT := 8
- COM_ERR16 : USINT := 16#10
- COM_ERR17 : USINT := 16#11
- COM_ERR18 : USINT := 16#12
- COM_ERR19 : USINT := 16#13
- COM_ERR20 : USINT := 16#14
- COM_ERR24 : USINT := 16#18
- COM_ERR25 : USINT := 16#19
- COM_ERR49 : USINT := 16#31
- COM_ERR50 : USINT := 16#32
- COM_ERR64 : USINT := 16#40

Constants *ETH1_uni0* up to *ETH1_uni7* are used for specification of Ethernet channel within functions *EstabTCPconnection*, *CloseTCPconnection*, *SetRemoteIPaddress* and in function blocks *fbSendTo* and *fbRevcFrom*. The same meaning have constants *ETH2_uni0* up to *ETH2_uni7*.

Identifier	***Type***	***Value***	***Signification***
ETH1_uni0	UINT	16#07E1	ethernet channel ETH1, connection uni0
ETH1_uni1	UINT	16#17E1	ethernet channel ETH1, connection uni1
ETH1_uni2	UINT	16#27E1	ethernet channel ETH1, connection uni2
ETH1_uni3	UINT	16#37E1	ethernet channel ETH1, connection uni3
ETH1_uni4	UINT	16#47E1	ethernet channel ETH1, connection uni4
ETH1_uni5	UINT	16#57E1	ethernet channel ETH1, connection uni5
ETH1_uni6	UINT	16#67E1	ethernet channel ETH1, connection uni6
ETH1_uni7	UINT	16#77E1	ethernet channel ETH1, connection uni7
ETH2_uni0	UINT	16#07E2	ethernet channel ETH2, connection uni0
ETH2_uni1	UINT	16#17E2	ethernet channel ETH2, connection uni1
ETH2_uni2	UINT	16#27E2	ethernet channel ETH2, connection uni2
ETH2_uni3	UINT	16#37E2	ethernet channel ETH2, connection uni3
ETH2_uni4	UINT	16#47E2	ethernet channel ETH2, connection uni4
ETH2_uni5	UINT	16#57E2	ethernet channel ETH2, connection uni5
ETH2_uni6	UINT	16#67E2	ethernet channel ETH2, connection uni6
ETH2_uni7	UINT	16#77E2	ethernet channel ETH2, connection uni7

Similarly, constants *CH1_uni* up to *CH10_uni* determine the concrete serial channel during the function blocks *fbSendTo* and *fbRevcFrom* call.

Identifier	***Type***	***Value***	***Signification***
CH1_uni	UINT	16#0101	serial channel CH1, uni mode
CH2_uni	UINT	16#0202	serial channel CH2, uni mode
CH3_uni	UINT	16#0103	serial channel CH3, uni mode
CH4_uni	UINT	16#0204	serial channel CH4, uni mode
CH5_uni	UINT	16#0105	serial channel CH5, uni mode
CH6_uni	UINT	16#0206	serial channel CH6, uni mode
CH7_uni	UINT	16#0107	serial channel CH7, uni mode
CH8_uni	UINT	16#0208	serial channel CH8, uni mode
CH9_uni	UINT	16#0109	serial channel CH9, uni mode
CH10_uni	UINT	16#020A	serial channel CH10, uni mode

Constants *ETH1* up to *ETH2* are used for ethernet interface selection within functions *SetIPaddress*, *GetIPaddress* and *GetMACaddress*.

Identifier	Type	Value	Signification
ETH1	USINT	16#E1	ethernet interface on the PLC central unit
ETH2	USINT	16#E2	ethernet interface on communication module (e.g. SC-7102 for TC700 system)
ETH3	USINT	16#E3	ethernet interface on communication module (e.g. SC-7104 for TC700 system)
ETH4	USINT	16#E4	ethernet interface on communication module (e.g. SC-7104 for TC700 system)

Similarly, constants S*CH1* up to S*CH10* determine the concrete serial channel during the functions *GetChanSettings* and *SetChanSettings* call.

Identifier	Type	Value	Signification
SCH1	USINT	16#01	serial channel CH1
SCH2	USINT	16#02	serial channel CH2
SCH3	USINT	16#03	serial channel CH3
SCH4	USINT	16#04	serial channel CH4
SCH5	USINT	16#05	serial channel CH5
SCH6	USINT	16#06	serial channel CH6
SCH7	USINT	16#07	serial channel CH7
SCH8	USINT	16#08	serial channel CH8
SCH9	USINT	16#09	serial channel CH9
SCH10	USINT	16#0A	serial channel CH10

Constants *COM_OK*, *COM_ERR1* up to *COM_ERR64* are release values that return function blocks *fbSendTo* and *fbRevcFrom* in the output variable *error*. The signification of particular constants is as follows:

Identifier	Type	Value	Signification
COM_OK	USINT	0	Communication with no errors
COM_ERR1	USINT	1	Required channel is not set within the universal mode
COM_ERR2	USINT	2	Too many sent data or, rather, too small buffer of the channel in the uni mode
COM_ERR3	USINT	3	Too many received data or, rather, received data does not fit in the specified variable
COM_ERR4	USINT	4	Communication channel invalid number
COM_ERR5	USINT	5	Previous message was not sent yet (sending stacks are overfilled)

COM_ERR6	USINT	6	Zero length of sent data
COM_ERR16	USINT	16	Incorrect initial character
COM_ERR17	USINT	17	Parity error
COM_ERR18	USINT	18	Maximum message lenght exceeded
COM_ERR19	USINT	19	Incorrect second byte of the confirmation
COM_ERR20	USINT	20	Incorrect second byte of the terminator
COM_ERR24	USINT	24	Invalid check sum
COM_ERR25	USINT	25	Invalid terminator
COM_ERR49	USINT	49	Invalid length of sent data
COM_ERR50	USINT	50	Zero length of sent data
COM_ERR64	USINT	64	Timeout not adhered
COM_ERRc6	USINT	198	Serial channel is not in requested mode

Constants *MODE_xx* are used for the determination of serial communication channel mode (see *TchanSettings.modeChan*)

Identifier	***Type***	***Value***	***Signification***
MODE_OFF	USINT	16#01	No mode set , channel is not operated
MODE_PC	USINT	16#02	Mode PC
MODE_UNI	USINT	16#05	Mode uni
MODE_MPC	USINT	16#06	Mode MPC
MODE_MDB	USINT	16#07	Mode Modbus (slave)
MODE_PFB	USINT	16#08	Mode Profibus DP (master)

Constants *BAUD_xx* are used for the determination of serial communication channel speed (see *TchanSettings.speed*)

Identifier	***Type***	***Value***	***Signification***
BAUD_50	USINT	16#01	Communication speed 50 Baud
BAUD_100	USINT	16#02	Communication speed 100 Baud
BAUD_200	USINT	16#03	Communication speed 200 Baud
BAUD_300	USINT	16#04	Communication speed 300 Baud
BAUD_600	USINT	16#05	Communication speed 600 Baud
BAUD_1200	USINT	16#06	Communication speed 1200 Baud
BAUD_2400	USINT	16#07	Communication speed 2400 Baud
BAUD_4800	USINT	16#08	Communication speed 4800 Baud
BAUD_9600	USINT	16#0A	Communication speed 9600 Baud
BAUD_14400	USINT	16#0B	Communication speed 14400 Baud

BAUD_19200	USINT	16#0C	Communication speed 19200 Baud
BAUD_28800	USINT	16#0D	Communication speed 28800 Baud
BAUD_38400	USINT	16#0E	Communication speed 38400 Baud
BAUD_57600	USINT	16#10	Communication speed 57600 Baud
BAUD_76800	USINT	16#12	Communication speed 76800 Baud
BAUD_93750	USINT	16#13	Communication speed 93750 Baud
BAUD_11500	USINT	16#14	Communication speed 11500 Baud

The following constants are used for the parameter of line control of the serial communication channel (see *TchanSettings.lineControl*). The resulting settings is obtained as a logical sum of required parameters. For example *chanSettings.lineControl := EIGHT_BITS OR PARITY_EVEN OR ONE_STOP_BIT.*

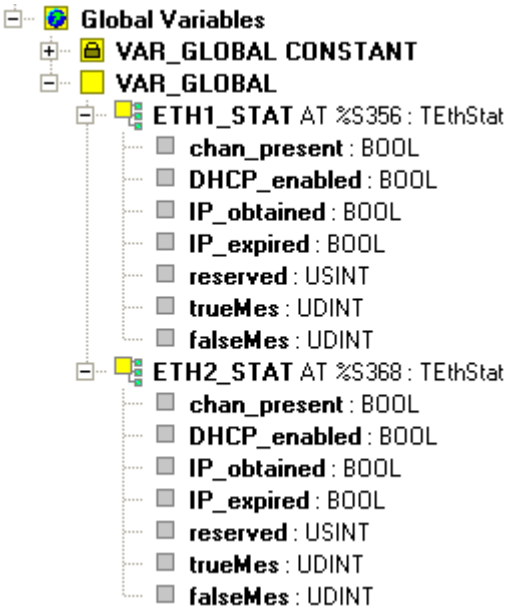
Identifier	***Type***	***Value***	***Signification***
NO_PARITY	USINT	16#00	No parity
PARITY_ODD	USINT	16#08	Odd parity
PARITY_EVEN	USINT	16#18	Even parity
PARITY_0	USINT	16#28	Parity permanently 0
PARITY_1	USINT	16#38	Parity permanently 1
SEVEN_BITS	USINT	16#40	Seven bits per character
EIGHT_BITS	USINT	16#00	Eight bits per character
ONE_STOP_BIT	USINT	16#00	One STOP bit
TWO_STOP_BIT	USINT	16#80	Two STOP bits

The constants mentioned in the following table are determined for modem control parameter of the serial communication channel (see *TchanSettings.modemControl*). The resulting settings is obtained as a logical sum of required parameters. For example *chanSettings.modemControl := RTS_AUTO OR HALF_DUPLEX.*

Identifier	***Type***	***Value***	***Signification***
RTS_0	USINT	16#00	Signal RTS permanently 0
RTS_1	USINT	16#02	Signal RTS permanently 1
RTS_MAN	USINT	16#40	Signal RTS controlled from PLC program
RTS_AUTO	USINT	16#80	Signal RTS set automatically (according to transmitting)
RTS_CTS_AUTO	USINT	16#C0	Signals RTS and CTS automatically
HALF_DUPLEX	USINT	16#08	Half duplex (when sending message the receiver is switched off)

4 GLOBAL VARIABLES

In the ComLib library following global variables are defined:



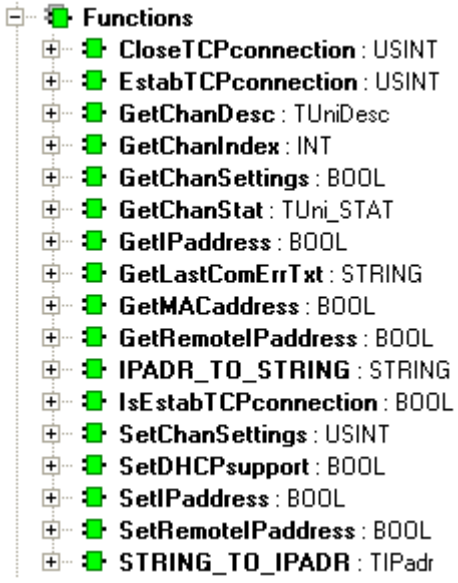
Global variables *ETH1_STAT* and *ETH2_STAT* contain information about status of ethernet interface ETH1 and ETH2. These variables are of *TEthStat* type that is also defined in the library.

Particular items of the structure *TEthStat* have the following signification:

Identifier	***Type***	***Signification***
TEthStat	STRUCT	Structure containing information about status of ethernet interface.
.chan_present	BOOL	Ethernet channel is present (is mounted)
.DHCP_enabled	BOOL	Automatic assignment of IP address by DHCP server enabled
.IP_obtained	BOOL	IP address was assigned by DHCP server
.IP_expired	BOOL	Validity of automatically assigned IP address expired
.reserved	USINT	Reserve for further use
.trueMes	UDINT	Total number of packets that were processed by the system
.falseMes	UDINT	Number of packets their processing was denied (the reason can be invalid packet or a packet with protocol that is not supported by the control system)

5 FUNCTIONS

The ComLib library contains following functions:

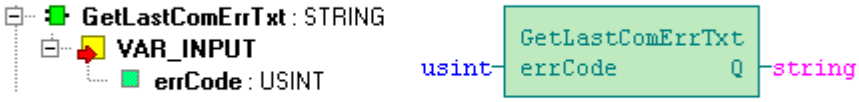


Function	*Description*
GetChanDesc	service function, used internally within the library that returns the communication channel descriptor
GetChanIndex	service function, used internally within the library that returns the communication channel index
GetLastComErrTxt	function returns the text of an error occurred during communication
EstabTCPconnection	function sets up the TCP connection
CloseTCPconnection	function terminates TCP connection
IsEstabTCPconnectio	function tests if the TCP connection is set up
SetRemoteIPaddress	function sets the remote IP address, remote port and local port for the given ethernet channel
GetRemoteIPaddress	function returns actual remote IP address, remote port and local port for the given ethernet channel
GetIPaddress	get the actual IP address, mask and gate address
SetIPaddress	set new IP address, mask and gate address
GetMACaddress	get MAC address of the given ethernet interface
SetDHCPsupport	switch on the support fo automatic IP address assignment by DHCP server
STRING_TO_IPADR	IP address conversion from a string to the Ipadr structure
IPADR_TO_STRING	IP address conversion from the structure Ipadr to the string
GetChanStat	Function returns communication channel status

Function	***Description***
GetChanSettings	Function returns serial communication channel settings (communication speed, timeouts, etc.)
SetChanSettings	Function sets up parameters of serial communication channel (communication speed, timeouts, etc.)

5.1 Function GetLastComErrTxt

Library : *ComLib*



The GetLastComErrTxt function returns the text describing an error occurred during communication. The input parameter of the function is the error code that is returned by function blocks *fbSendTo* and *fbRecvFrom*.

This function is supported within central units of K rank (TC700 CP-7004, Foxtrot) from version v4.4.

Variable description :

	Variable	*Type*	*Signification*
		VAR_INPUT	
	errCode	USINT	Error code indicated by function block of the type *fbSendTo* or *fbRecvFrom*
		GetLastComErrTxt	
	Release value	STRING	Communication error description

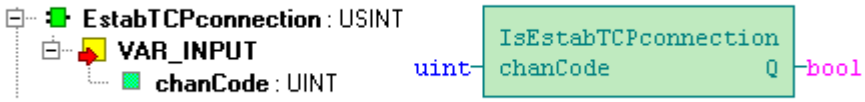
The example of the program with the *GetLastComErrTxt* function call:

```
PROGRAM ExampleGetLastComErrTxt
  VAR
    RecvFromCH1 : fbRecvFrom;
    rxBuf       : STRING[100];
    errMsg      : STRING;
  END_VAR

  // receiving
  RecvFromCH1( rq       := TRUE, chanCode := CH1_uni,
               lenRx    := 100,  data     := void(rxBuf));

  if RecvFromCH1.mesRec then
    // new message received
    if RecvFromCH1.error = 0 then
      // process new message
      // ...
    else
      // show error as a text
      errMsg := GetLastComErrTxt( RecvFromCH1.error);
    end_if;
  end_if;
END_PROGRAM
```

See also Function block fbRecvFrom, Function block fbSendTo

5.2 Function EstabTCPconnection

Library : *ComLib*



The *EstabTCPconnection* function initiates the process of TCP connection setup if the previous connection is terminated. The function input parameter is the code of the communication channel (*ETH1_uni0*., …, *ETH2_uni7*). Function returns the error code. If everything is in order, the function returns *COM_OK* (0, no error). Function is worth in case of the ethernet channel ETH1 or ETH2 that must be set to the mode uni – master TCP. Setting up the TCP connection is a process during which the client (PLC) and server exchange synchronization frames via TCP protocol. The period of connection establisment is dependant on many conditions (e.g. if communication is undertaken within the local network, etc.). Information whether the connection was successfully set up can be retrieved using the function *IsEstabTCPconnection.*

This function is supported on central units of K rank (TC700 CP-7004, Foxtrot) from version v4.4.

Variable description :

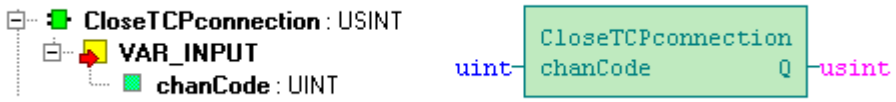
	Variable	*Type*	*Signification*
		VAR_INPUT	
	chanCode	USINT	Communication channel selection (ETH1_uni0, …, ETH1_uni7, ETH2_uni0, …, ETH2_uni7)
		EstabTCPconnection	
	Release value	USINT	0 if there is no error (COM_OK) error code in other cases (COM_ERR1, …, COM_ERR64)

The example of the program with the *EstabTCPconnection* function call:

```
PROGRAM prgExampleEstabTCPcon
  VAR
  END_VAR

  IF NOT IsEstabTCPconnection(chanCode := ETH1_UNI0) THEN
    EstabTCPconnection(chanCode := ETH1_UNI0);
  END_IF;
END_PROGRAM
```

See also Function CloseTCPconnection, Function IsEstabTCPconnection

5.3 Function CloseTCPconnection



Library : *ComLib*

The *CloseTCPconnection* function terminates TCP connection. Function input parameter is the code of the communication channel (*ETH1_uni0*., …, *ETH2_uni7*). Function returns error code. If everything is in order, function returns *COM_OK* (0, no error). Function is worth in case of the ethernet channel ETH1 or ETH2 that must be set to the mode uni – master TCP. Information whether the connection was successfully set up can be retrieved using the function *IsEstabTCPconnection*.

This function is supported on central units of K rank (TC700 CP-7004, Foxtrot) from version v4.4.

Variable description :

	Variable	*Type*	*Signification*
		VAR_INPUT	
	chanCode	USINT	Communication channel selection (ETH1_uni0, …, ETH1_uni7, ETH2_uni0, …, ETH2_uni7)
		CloseTCPconnection	
	Release value	USINT	0 if there is no error (COM_OK) error code in other cases (COM_ERR1, …, COM_ERR64)

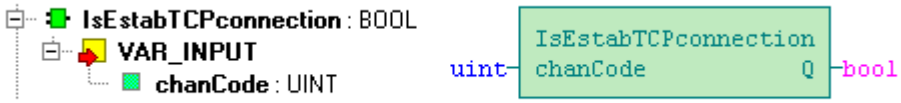
The example of the program with the *CloseTCPconnection* function call:

```
PROGRAM prgExampleIsEstabTCPcon
  VAR
  END_VAR

  IF IsEstabTCPconnection(chanCode := ETH1_UNI0) THEN
    CloseTCPconnection(chanCode := ETH1_UNI0);
  END_IF;
END_PROGRAM
```

See also Function EstabTCPconnection, Function IsEstabTCPconnection

5.4 Function IsEstabTCPconnection

Library : *ComLib*



The *IsEstabTCPconnection* function tests whether the TCP connection is established. Function input parameter is the code of the communication channel (*ETH1_uni0*., …, *ETH2_uni7*). Function returns value TRUE if the connection is established, if the connection is terminated, it returns value FALSE. Communication channel must be set to the mode uni, type of the protocol TCP master or TCP slave.

This function is supported on central units of K rank (TC700 CP-7004, Foxtrot) from version v4.4.

Description variable :

	Variable	*Type*	*Signification*
		VAR_INPUT	
	chanCode	USINT	Communication channel selection (ETH1_uni0, …, ETH1_uni7, ETH2_uni0, …, ETH2_uni7)
		IsEstabTCPconnection	
	Release value	BOOL	TRUE if the connection is established FALSE in other cases

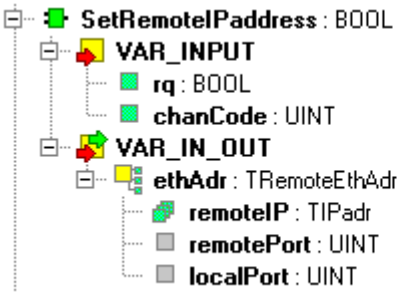
The example of the program with the *IsEstabTCPconnection* function call:

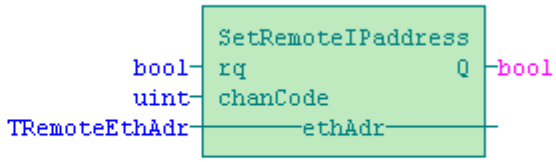
```
PROGRAM prgExampleIsEstabTCPcon
  VAR
  END_VAR

  IF IsEstabTCPconnection(chanCode := ETH1_UNI0) THEN
    CloseTCPconnection(chanCode := ETH1_UNI0);
  END_IF;
END_PROGRAM
```

See also Function CloseTCPconnection, Function EstabTCPconnection

5.5 Function SetRemoteIPaddress

Library : *ComLib*





The *SetRemoteIPaddress* function sets the remote IP address, number of the remote port and number of the local port if the input parameter *rq* has the value TRUE. Within the parameter *chanCode* the communication channel code (*ETH1_uni0*., …, *ETH1_uni7*) is transferred by the function. Function returns the value TRUE if the requirement on new setup is accepted.

Parameter *remoteIP* determines the IP address of the station that the communication will be undertaken with. Parameter *remotePort* determines the port number where messages will be sent to. Parameter *localPort* determines which port will receive messages.

If the communication channel is set to communication via UDP protocol, the new IP address and ports will be set within the nearest PLC cycle turn. Afterwards, all UDP messages sent by the communication channel routed to the new IP address and new remote port. Between setup of the new target IP address and message sending to this address, at least one PLC cycle must be done. Also the message reception will run only from station which IP address corresponds to the newly set IP address and which uses corresponding port numbers.

If *remoteIP* address is 0.0.0.0, the channel receives a message from the station with any IP address providing that the port onto which the message is directed corresponds to the number entered in the parameter *localPort*. At the moment of the message reception the parameter *remoteIP* is set on the IP address of the station from which the message was received. Also, parameter *remotePort* changes the value according to the port number from which the message was sent. Therefore, after the reception of the UDP packet, the communication channel is set so that it is possible to answer to the message received.

If the communication channel is set onto the communication via the TCP protocol, new IP address and ports can be set providing that the connection is closed. Therefore, the settings can be changed if the TCP connection is setup. When the settings is changed, first it is necessary to terminate the connection. Further behaviour is similar as in the case of the UDP protocol.

Message sending onto the address 0.0.0.0 is not allowed.

This function is supported on central units of the K rank (TC700 CP-7004, Foxtrot) from version v4.4. The function is supported for interface ETH1 only.

Variable description :

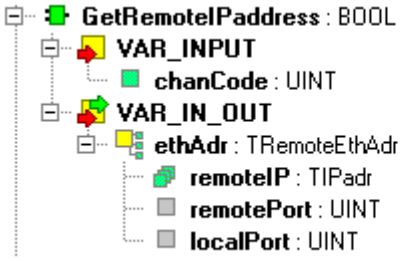
	Variable	*Type*	*Signification*
		VAR_INPUT	
	rq	BOOL	Request on new IP address setup which the communication will run with. The entering edge on this input causes the initiation of the IP address change (if the new IP address is different from the current one)
	chanCode	USINT	Communication channel selection (ETH1_uni0, …, ETH1_uni7)
		VAR_IN_OUT	
	EthAdr	TRemoteEthAdr	IP address of the remote device and port numbers via which the communication is ran
	.remoteIP	TIPadr	IP address of the device for communication
	.remotePort	UINT	Port number onto which messages will be sent, or rather, from which messages are received
	.localPort	UINT	Port number onto which messages will be sent, or rather, from which messages are received
		SetRemoteIPaddress	
	Release value	BOOL	TRUE if the remote IP address is successfully set. Otherwise, FALSE

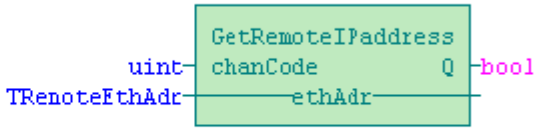
The example of the program with the *SetRemoteIPaddress* function call:

See also Function GetRemoteIPaddress

5.6 Function GetRemoteIPaddress

Library : *ComLib*





The *GetRemoteIPaddress* function returns currently set remote IP address, number of remote port and local port number.

This function is supported on central units of the K rank (TC700 CP-7004, Foxtrot) from version v4.4. The function is supported on the interface ETH1 only.

Variable description :

	Variable	*Type*	*Signification*
		VAR_INPUT	
	chanCode	USINT	Communication channel selection (ETH1_uni0, …, ETH1_uni7)
		VAR_IN_OUT	
	EthAdr	TRemoteEthAdr	IP address of the remote device and port numbers via which the communication is ran
	.remoteIP	TIPadr	IP address of the device for communication
	.remotePort	UINT	Port number onto which messages will be sent, or rather, from which messages are received
	.localPort	UINT	Port number onto which messages will be sent, or rather, from which messages are received
		GetRemoteIPaddress	
	Release value	BOOL	TRUE if the remote IP address is uploaded successfuly. Otherwise, FALSE

The example of the program with the *GetRemoteIPaddress* function call:

See also Function SetRemoteIPaddress

[TECO_HTML_TO_HTML_GENERATOR]
[TITLE] 5.7 Funkce SetIPaddress [/TITLE]
[GROUP] Funkce [/GROUP]

[KEYWORDS] [/KEYWORDS]
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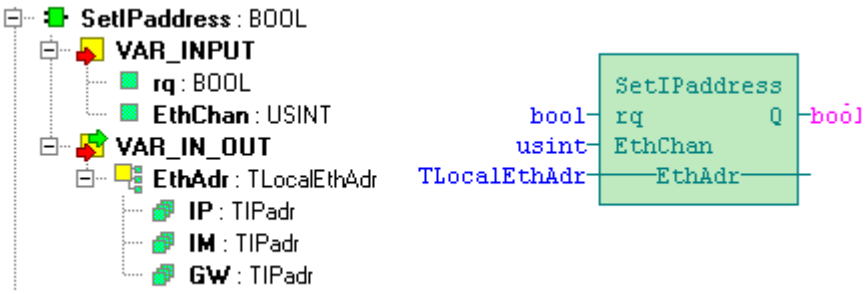
[HIDDEN] SetIPaddress [/HIDDEN]
[HIDDEN_GLOBALS] [/HIDDEN_GLOBALS]
[NOTHING] [/NOTHING]
[/TECO_HTML_TO_HTML_GENERATOR]

5.7 Function SetIPaddress

Library : *ComLib*



The *SetIPaddress* function sets new local IP address, IP mask and gate address. New values are awaited in the variable *EthAdr* which is of the *TlocalEthAdr* type. The setup of the new address is done onto the entering edge of the input variable *rq*. The setup will take several PLC cycles and will return the TRUE value at the moment when the new IP address is set. All communication with the previous IP address will be cancelled. Simultaneously, the request on the automatic IP address obtaining from the DHCP server is cancelled (if it was on). Information on the actual status of the ethernet interface can be obtained anytime in the global variable *ETH1_STAT* or *ETH2_STAT*.

This function is supported on central units of the K rank (TC700 CP-7004, Foxtrot) from version v4.4.

Variable description :

	Variable	*Type*	*Signification*
		VAR_INPUT	
	rq	BOOL	Request on new IP address setup The entering edge on this input causes the initialization of the IP address change (if the new IP address is different from the current one)
	EthChan	USINT	Ethernet channel specification (ETH1 for Ethernet on the central unit, ETH2 for Ethernet on the communication module)
		VAR_IN_OUT	
	EthAdr	TLocalEthAdr	IP address, mask and gate

	Variable	*Type*	*Signification*
	.IP	TIPadr	IP address
	.IM	TIPadr	IP mask
	.GW	TIPadr	Gate address
		SetIPaddress	
	Release value	BOOL	TRUE if the new IP address is set successfully. Otherwise, FALSE

The example of the program with the *SetIPaddress* function call:

```
PROGRAM prgTestSetIP
  VAR
    old_eth_adr    : TLocalEthAdr;
    new_eth_adr    : TLocalEthAdr;
    set, res, tmp : BOOL;
  END_VAR

  // read actual IP
  tmp := GetIPaddress( EthChan := ETH1, EthAdr := old_eth_adr);
  if new_eth_adr.IP[0] = 0 then
    new_eth_adr := old_eth_adr;           // use as init value for new adr
  end_if;

  // set new IP address if rq = TRUE
  res := SetIPaddress( rq := set, EthChan := ETH1, EthAdr := new_eth_adr);
  if res then set := FALSE; end_if;
END_PROGRAM
```

See also Function GetIPaddress, Type TLocalEthAdr, Function SetDHCPsupport

[TECO_HTML_TO_HTML_GENERATOR]
[TITLE] 5.8 Funkce GetIPaddress [/TITLE]
[GROUP] Funkce [/GROUP]

[KEYWORDS] [/KEYWORDS]
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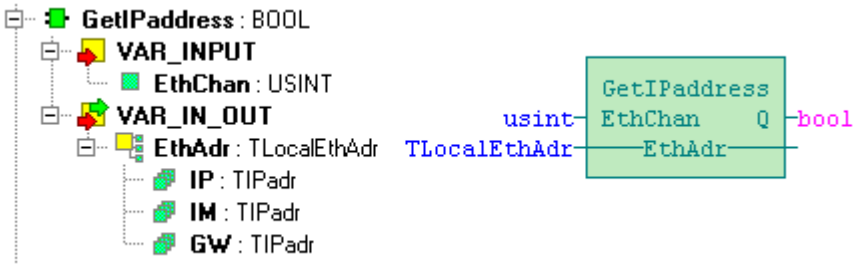
[HIDDEN] GetIPaddress [/HIDDEN]
[HIDDEN_GLOBALS] [/HIDDEN_GLOBALS]
[NOTHING] [/NOTHING]
[/TECO_HTML_TO_HTML_GENERATOR]

5.8 Function GetIPaddress

Library : *ComLib*



The *GetIPaddress* function returns the actual IP address, IP mask and gate address for the set ethernet channel. These values are saved into the variable *EthAdr* that has the structure of the *TlocalEthAdr* type. Declaration of this structure is a part of the library ComLib.

This function is supported on central units of the K rank (TC700 CP-7004, Foxtrot) from version v4.4.

Variable description :

	Variable	*Type*	*Signification*
		VAR_INPUT	
	EthChan	USINT	Ethernet channel specification (ETH1 for Ethernet on the central unit, ETH2 for Ethernet on the communication module)
		VAR_IN_OUT	
	EthAdr	TLocalEthAdr	Curret IP address, mask and gate
	.IP	TIPadr	IP address
	.IM	TIPadr	IP mask
	.GW	TIPadr	Gate address
		GetIPaddress	
	Release value	BOOL	TRUE if the IP address is uploaded successfuly Otherwise, FALSE

The example of the program with the *GetIPaddress* function call:

```
PROGRAM prgTestGetIP
  VAR
    old_eth_adr   : TLocalEthAdr;
    new_eth_adr   : TLocalEthAdr;
    set, res, tmp : BOOL;
  END_VAR

  // read actual IP
  tmp := GetIPaddress( EthChan := ETH1, EthAdr := old_eth_adr);
  if new_eth_adr.IP[0] = 0 then
    new_eth_adr := old_eth_adr;           // use as init value for new adr
  end_if;

  // set new IP address if rq = TRUE
  res := SetIPaddress( rq := set, EthChan := ETH1, EthAdr := new_eth_adr);
  if res then set := FALSE; end_if;
END_PROGRAM
```

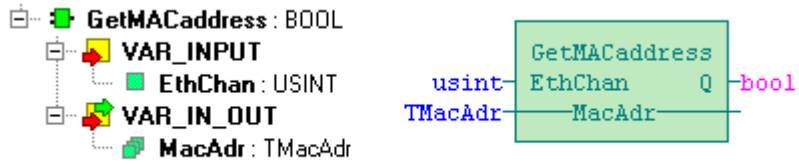
See also Function SetIPaddress, Type TLocalEthAdr

[TECO_HTML_TO_HTML_GENERATOR]
[TITLE] 5.9 Funkce GetMACaddress [/TITLE]
[GROUP] Funkce [/GROUP]

[KEYWORDS] [/KEYWORDS]
[GLOBALS] [/GLOBALS]
[HIDDEN] GetMACaddress [/HIDDEN]
[HIDDEN_GLOBALS] [/HIDDEN_GLOBALS]
[NOTHING] [/NOTHING]
[/TECO_HTML_TO_HTML_GENERATOR]

5.9 Function GetMACaddress

Library : *ComLib*



The *GetMACaddress* function returns the actual MAC address for the ehternet channel set. MAC address is saved in the variable *MacAdr* that has the structure of the *TmacAdr* type. Declaration of this structure is a part of the library ComLib. MAC address is a unique number in the whole world.

This function is supported on central units of the K rank (TC700 CP-7004, Foxtrot) from version v4.9.

Variable description :

	Variable	*Type*	*Signification*
		VAR_INPUT	
	EthChan	USINT	Ethernet channel specification (ETH1 for Ethernet on the central unit, ETH2 for Ethernet on the communication module)
		VAR_IN_OUT	
	MacAdr	TMacAdr	Current MAC address for the ethernet channel set
		GetMACaddress	
	Release value	BOOL	TRUE the MAC address is uploaded successfuly. Otherwise, FALSE

The example of the program with the *GetMACaddress* function call:

```
PROGRAM prgTestGetMAC
  VAR
    mac_adr   : TMacAdr;
    tmp       : BOOL;
    message   : STRING;
```

```
  END_VAR

  tmp := GetMACaddress( EthChan := ETH1, MacAdr := mac_adr);
  IF (mac_adr[0] = 0) AND (mac_adr[1] = 16#0A) AND (mac_adr[2] = 16#14) THEN
    message := 'This is Teco device';
  END_IF;
END_PROGRAM
```

See also Type TMacAdr

[TECO_HTML_TO_HTML_GENERATOR]
[TITLE] 5.10 Funkce SetDHCPsupport [/TITLE]
[GROUP] Funkce [/GROUP]

[KEYWORDS] [/KEYWORDS]
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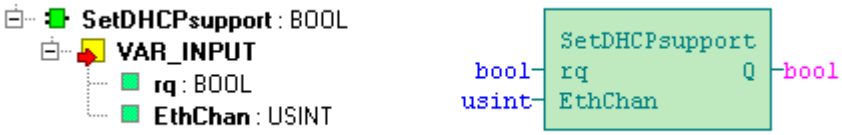
[HIDDEN] SetDHCPsupport [/HIDDEN]
[HIDDEN_GLOBALS] [/HIDDEN_GLOBALS]
[NOTHING] [/NOTHING]
[/TECO_HTML_TO_HTML_GENERATOR]

5.10 Function SetDHCPsupport

Library: *ComLib*



The *SetDHCPsupport* function switch on the function for automatic acquirement of the IP address of the PLC from the DHCP server within the PLC. Simultaneously, it terminates all currently running communications. The transfer to the automatic IP address will take several PLC cycles and function *SetDHCPsupport* returns the value TRUE at the moment when the transfer is ceased. Afterwards, PLC request the DHCP server on the IP address assignment that will be set on the ethernet interface set. From the moment when the transfer to the automatic IP address acquirement is initiated up to the moment of its assignment, the PLC operates only protocols ARP, ICMP and DHCP. If during the 4 seconds the IP address is not obtained (e.g. DHCP server is not present on the local networt), the PLC use as an alternative configuration of IP address saved in the Ethernet interface configuration which is saved in the memory EEPROM. Information on actual status of the ethernet interface can be abtained anytime in the global vatiable *ETH1_STAT* or *ETH2_STAT*. The requirement on the automatic IP address acquirement is stored in the PLC even during the supply switch off. Therfore, after the supply is switched on, the PLC will again require the RHCP server for IP address assignment. The request on automatic IP address acquirement can be cancelled by the function *SetIPaddress* that will set firm IP address for the ethernet interface set.

DHCP server assigns IP address for a limited time only (typically one day). If the support of DHCP is switched on, PLC automatically requests for extension of the period which the IP address was assigned for. If this period can not be extended, PLC will keep the last assigned IP address and will set the global variable *ETH1_STAT.IP_expired* to the TRUE value.

This function is supported on central units of the K rank (TC700 CP-7004, Foxtrot) from version v4.9. The function is supported on the ETH1 interface only. Into the library ComLib is the function *SetDHCPsupport* located from ComLib_v13.

Variable description :

	Variable	*Type*	*Signification*
		VAR_INPUT	
	rq	BOOL	Reques on switch on of support of the DHCP protocol The entering endge on this input invokes the termination of all communications with the current IP address and initiates the

	Variable	*Type*	*Signification*
			request on assignment of a new IP address on the DHCP server
	EthChan	USINT	Specification of the ethernet channel (ETH1 for Ethernet on the central unit)
		SetDHCPsupport	
	Release value	BOOL	TRUE, when the transfer to automatic acquirement of IP address of the PLC from the DHCP server is successful, otherwise, FALSE Value TRUE means that the PLC will try to obtain the IP address from the DHCP server. Information whether the address was obtained is saved in the global variable *ETH1_STAT.IP_obtained*

The example of the program with the *SetDHCPsupport* function call:

```
PROGRAM prgTestDHCPsupport
  VAR
    set_fix_IP : BOOL;        // request for fixed IP address
    set_aut_IP : BOOL;        // request for obtaining IP address from DHCP
    my_IP      : TLocalEthAdr;
    info       : STRING;
    fix_IP     : TLocalEthAdr := (IP := [192,168,1,1],
                                  IM := [255,255,255,0],
                                  GW := [192,168,1,200]);
  END_VAR

  IF set_fix_IP THEN
    IF SetIPaddress(rq:= set_fix_IP, EthChan:= ETH1, EthAdr:= fix_IP) THEN
      set_fix_IP := FALSE;
    END_IF;
  ELSE
    IF set_aut_IP THEN
      IF SetDHCPsupport(rq := set_aut_IP, EthChan := ETH1) THEN
        set_aut_IP := FALSE;
      END_IF;
    END_IF;
  END_IF;

  GetIPaddress(EthChan := ETH1, EthAdr := my_IP);
  IF ETH1_STAT.DHCP_enabled AND ETH1_STAT.IP_obtained THEN
    info := 'DYNAMIC IP:' + IPADR_TO_STRING(IPAdr := my_IP.IP);
  ELSE
    info := 'FIXED IP:' + IPADR_TO_STRING(IPAdr := my_IP.IP);
  END_IF;
END_PROGRAM
```

The program sets the firm IP address 192.168.1.1 on the ETH1 interface in case that the TRUE is entered into the variable *set_fix_IP* (e.g. From the WebMakeru). If we enter TRUE into the variable *set_aut_IP*, then the program will try to obtain the IP address from DHCP server. The actually set IP address can be checked out in the variable *info*.

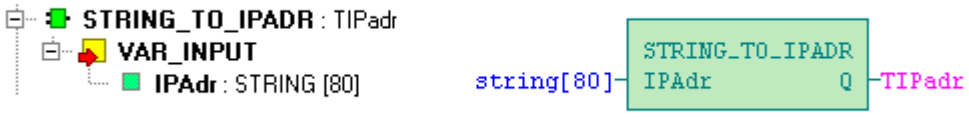
See also Function SetIPaddress, Global variables

[TECO_HTML_TO_HTML_GENERATOR]
[TITLE] 5.11 Funkce STRING_TO_IPADR [/TITLE]
[GROUP] Funkce [/GROUP]

[KEYWORDS] [/KEYWORDS]
[GLOBALS] [/GLOBALS]
[HIDDEN] STRING_TO_IPADR [/HIDDEN]
[HIDDEN_GLOBALS] [/HIDDEN_GLOBALS]
[NOTHING] [/NOTHING]
[/TECO_HTML_TO_HTML_GENERATOR]

5.11 Function STRING_TO_IPADR

Library : *ComLib*



Function *STRING_TO_IPADR* undertakes the conversion of the IP address registered in the variable of the STRING type into the structure of the TIPadr type. Function awaits IP address in the common form e.g. '192.168.33.1', so as decimal numbers separated by a dot. Head zero are addmissible e.g. '192.168.033.001'. Spaces within the string are not supported.

The function *STRING_TO_IPADR* is located into the library ComLib from version ComLib_v13.

Variable description :

	Variable	*Type*	*Signification*
		VAR_INPUT	
	IPAdr	STRING	IP address, string of characters containing 4 decimal numbers separated by dots
		STRING_TO_IPADR	
	Release value	TIPadr	Input string transferred onto the array with 4 elements USINT If the transfer is not successful, the function returns ANY_IP i.e. 0.0.0.0

The example of the program with the *STRING_TO_IPADR* function call:

```
PROGRAM prgTest_STRING_TO_IPADR
  VAR
    tst_IP      : TLocalEthAdr;
    IP_addr     : STRING[16] := '192.168.1.1';
    IP_mask     : STRING[16] := '192.168.1.13';
    GW_addr     : STRING[16] := '192.168.1.200';
  END_VAR

  tst_IP.IP := STRING_TO_IPADR(IPAdr := IP_addr);
```

```
  tst_IP.IM := STRING_TO_IPADR(IPAdr := IP_mask);
  tst_IP.GW := STRING_TO_IPADR(IPAdr := GW_addr);
END_PROGRAM
```

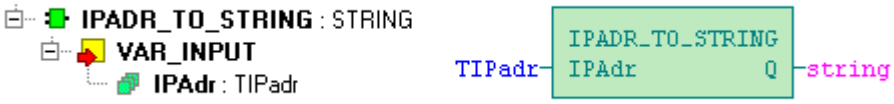
See also Function IPADR_TO_ STRING

[TECO_HTML_TO_HTML_GENERATOR]
[TITLE] 5.12 Funkce IPADR_TO_STRING [/TITLE]
[GROUP] Funkce [/GROUP]

[KEYWORDS] [/KEYWORDS]
[GLOBALS] [/GLOBALS]
[HIDDEN] IPADR_TO_STRING [/HIDDEN]
[HIDDEN_GLOBALS] [/HIDDEN_GLOBALS]
[NOTHING] [/NOTHING]
[/TECO_HTML_TO_HTML_GENERATOR]

5.12 Function IPADR_TO_ STRING

Library : *ComLib*



The *IPADR_TO_ STRING* function undertakes the conversion of the IP address registered in the variable of the TIPadr type into the variable of the STRING type.

The function *IPADR_TO_ STRING* is located into the library ComLib from version ComLib_v13.

Description variable :

	Variable	*Type*	*Signification*
		VAR_INPUT	
	IPAdr	TIPadr	IP aaddress entered as an array with 4 elements of the USINT type
		IPADR_TO_STRING	
	Release value	STRING	The string of characters containing 4 decimal numbers separated by dots

The example of the program with the *IPADR_TO_ STRING* function call:

```
PROGRAM prgTest_IPADR_TO_STRING
  VAR
    my_IP       : TLocalEthAdr;
    info        : STRING;
  END_VAR

  GetIPaddress(EthChan := ETH1, EthAdr := my_IP);
  info := ' IP: ' + IPADR_TO_STRING(IPAdr := my_IP.IP) +
          ' IM: ' + IPADR_TO_STRING(IPAdr := my_IP.IM) +
          ' GW: ' + IPADR_TO_STRING(IPAdr := my_IP.GW);
END_PROGRAM
```

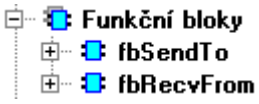
See also Function STRING_TO_IPADR

[TECO_HTML_TO_HTML_GENERATOR]
[TITLE] 6 Úvod [/TITLE]
[GROUP] Funkční bloky [/GROUP]

[KEYWORDS] [/KEYWORDS]
[GLOBALS] [/GLOBALS]
[HIDDEN] [/HIDDEN]
[HIDDEN_GLOBALS] [/HIDDEN_GLOBALS]
[NOTHING] [/NOTHING]
[/TECO_HTML_TO_HTML_GENERATOR]

6 FUNCTION BLOCKS

The ComLib library contains following function blocks:



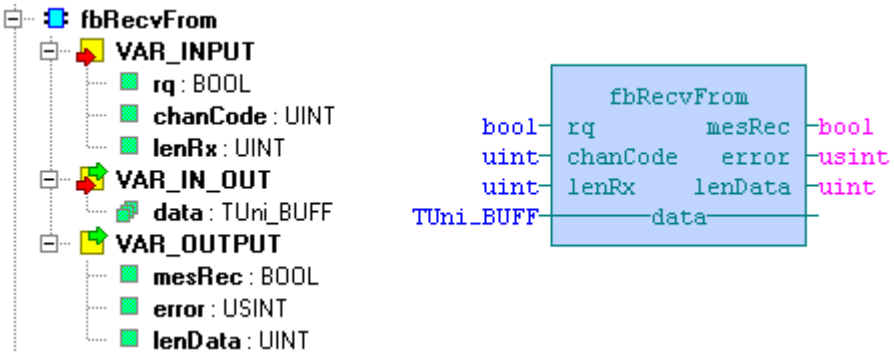
- *fbRecvFrom* Function block for message receiving pro příjem zpráv
- *fbSendTo* Function block for message sending

[TECO_HTML_TO_HTML_GENERATOR]
[TITLE] 6.1 Funkční blok fbRecvFrom [/TITLE]
[GROUP] Funkční bloky [/GROUP]

[KEYWORDS] [/KEYWORDS]
[GLOBALS] [/GLOBALS]
[HIDDEN] fbRecvFrom [/HIDDEN]
[HIDDEN_GLOBALS] [/HIDDEN_GLOBALS]
[NOTHING] [/NOTHING]
[/TECO_HTML_TO_HTML_GENERATOR]

6.1 Function block fbRecvFrom

Library : *ComLib*



The *fbRecvFrom* function block is used for message reception from the serial channel or from the ethernet. The communictaion channel must be set to the *uni* mode.

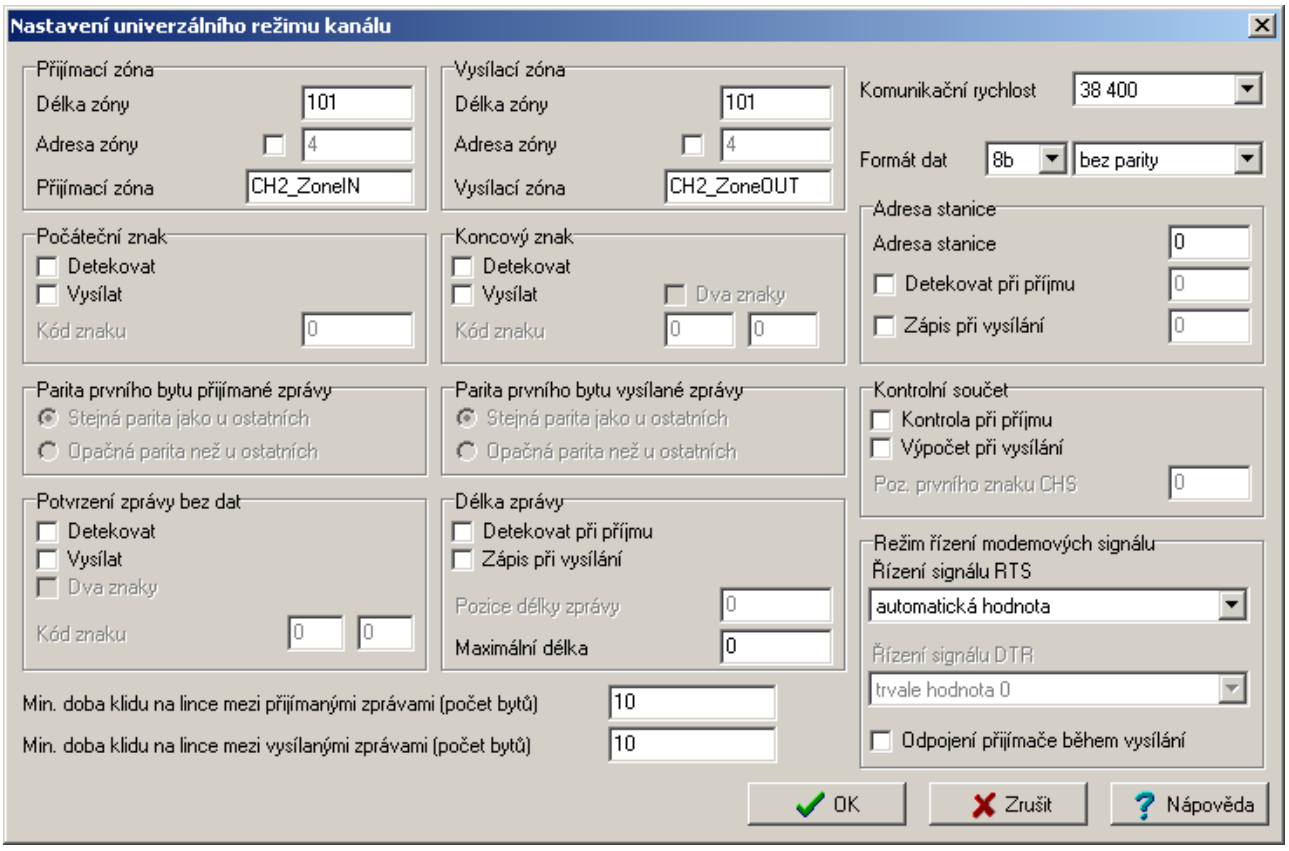
This function block is supported on central units of the K rank (TC700 CP-7004, Foxtrot) from version v4.4.

Variable description :

	Variable	*Type*	*Signification*
VAR_INPUT			
	rq	BOOL	Control variable. If it is TRUE, the function block receives data from the communication channel, if it is FALSE the data reception is forbidden
	chanCode	UINT	Communication channel code *ETH1_uni0* ethernet channel ETH1, connection uni0 …. *ETH1_uni7* ethernet channel ETH1, connection uni7 *ETH2_uni0* ethernet channel ETH2, connection uni0 …. *ETH2_uni7* ethernet channel ETH2, connection uni7 *CH1_uni* sériový channel CH1, mode uni …. *CH10_uni* sériový channel CH10, mode uni
	lenRx	UINT	Max. length of data received (size of variable which the received message will be saved into)
VAR_IN_OUT			

	Variable	*Type*	*Signification*
	data	TUniBuf	Variable where the received message will be saved into
VAR_OUTPUT			
	mesRec	BOOL	The flag of the received message If it is TRUE, new message was received.
	error	USINT	Error code. If it is 0 (COM_OK), the reception passed withou an error In case of an error, the codes COM_ERR1, …, COM_ERR64 are returned
	lenData	UINT	Lenght of the received message (number of bytes)

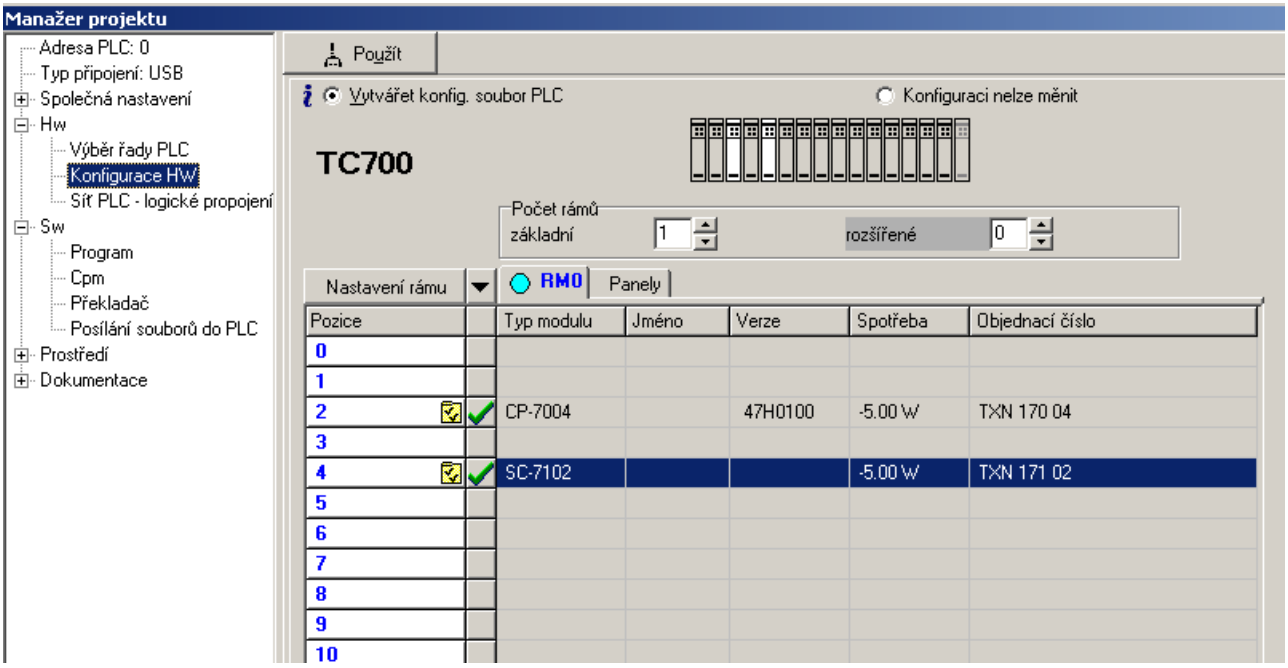
In the following example there is a functio block *fbRecvFrom* used for the message rec eption from the serial channel CH1. The reception of text messages with the max size of 100 characters is expected. The setup of transmission parameters of the serial channel is apparent from the following dialogue.



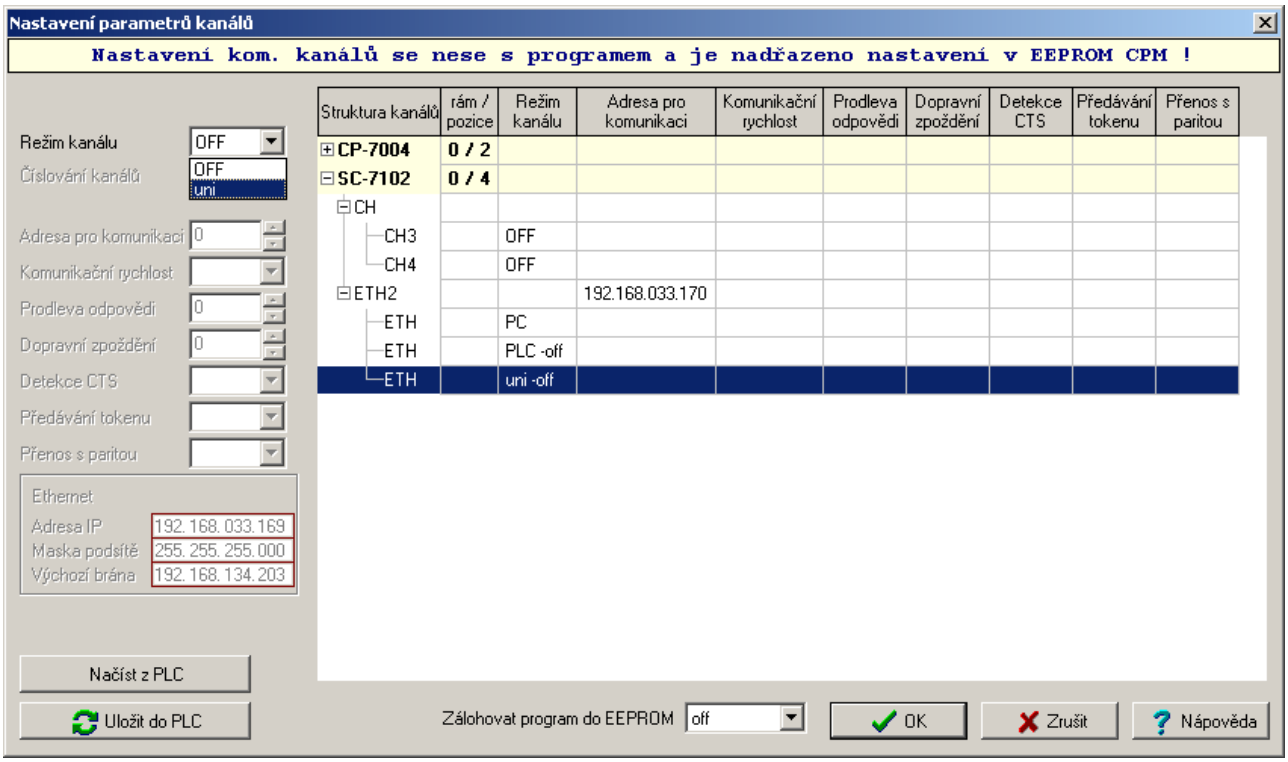

```
PROGRAM ExampleRecvFrom
  VAR
    RecvFromCH1 : fbRecvFrom;
    rxBuf       : STRING[100];
    errMsg      : STRING;
  END_VAR
```

```
  // receiving
  RecvFromCH1( rq := TRUE, chanCode := CH1_uni,
               lenRx := 100, data := void(rxBuf));
  if RecvFromCH1.mesRec then
    // new message received
    if RecvFromCH1.error = 0 then
       // process new message
       // ...
    else
      errMsg := GetLastComErrTxt( RecvFromCH1.error);  // show error as a text
    end_if;
  end_if;
END_PROGRAM
```

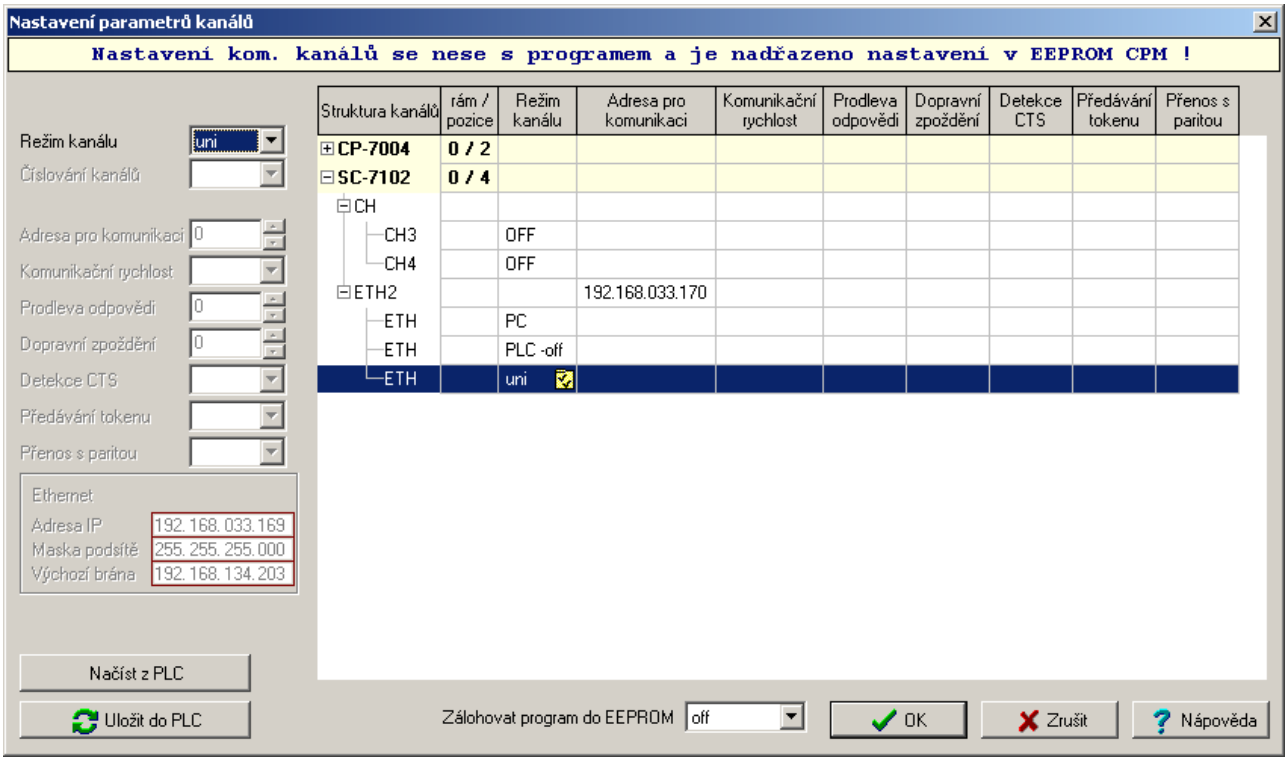
The following example shows the use of function block *fbRecvFrom* for reception of messages vie TCP protocol. First of all, it is neccessary to set the uni mode for ethernet interface. The setup is undertaken in the Mosaic environment in the Project manager in the node of HW configuration. It this concrete case, the interface ETH2 was used on the module SC-7102.



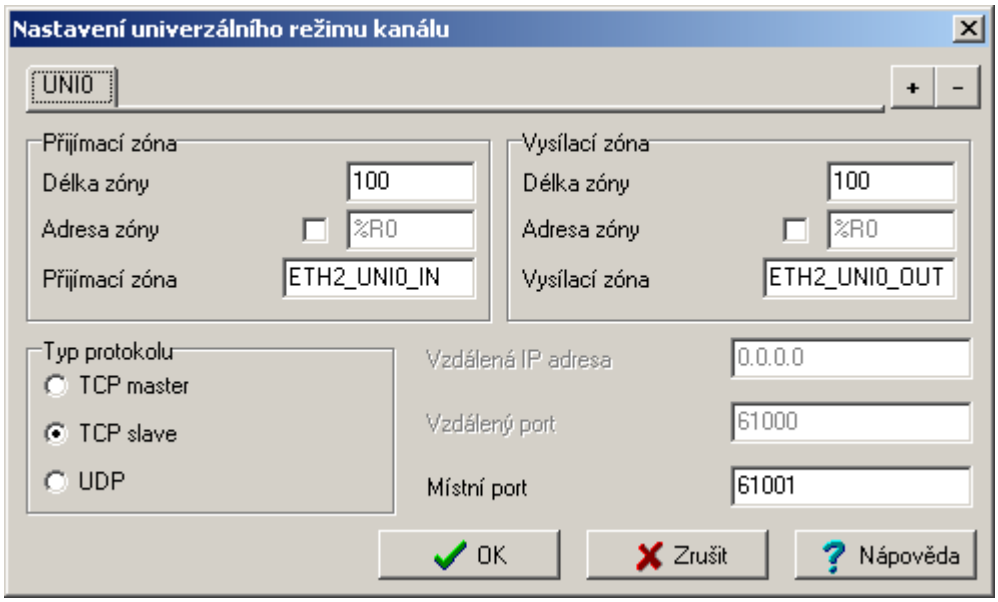
By clicking on the yellow icon of the module SC-7102 (see the highlighted line in the following picture) the setting of communication for module SC-7102 is initiated. In this dialogue, it is neccessary first to switch on the uni mode of the channel on the ethernet interface so, that we click on the line ETH uni-off (highlighted in the following picture) and then we switch the channel mode in the left upper corner from the value OFF to uni.



After setting to uni mode, the dialogue should appear as follows



By clicking on the yellow icon on the line ETH uni (highlighted in the previous picture) the next dialogue is initiated where maximum size of sending and receiving zone is set (number of bytes), the type of the TCP slave protocol is selected (PLC will not setup the TCP connection actively) and the port numer is set where data will be awaited (local port).



The following program receives data broadcasted by the TCP protocol on the port 61001. Received data are saved in the variable `rxData`. Establishment and termination of the TCP connection is controlled by the station that is sending data. This station can be for example PLC with the program `prgTestSendTCP` which is stated in examples in the following chapter.

```
PROGRAM prgTestRecvTCP
  VAR
    recvTim    : TON;
    recvFrom   : fbRecvFrom;
    rxData     : ARRAY[0..49] OF USINT;
    cntOK      : UDINT;
    cntERR     : UDINT;
    lastErr    : USINT;
    lastErrTxt : STRING;
  END_VAR

  recvTim(IN := TRUE, PT := T#35s);
  IF recvTim.Q THEN
    cntERR := cntERR + 1; recvTim( IN := false);
  END_IF;
  recvFrom( rq := true, chanCode := ETH2_uni0,
            lenRx := sizeof(rxData), data := void(rxData),
            error => lastErr);

  IF recvFrom.mesRec THEN
    recvTim( IN := false);
    IF recvFrom.error = COM_OK THEN
      cntOK := cntOK + 1;
      // process incoming data (see rxData[])
      // ...
    ELSE
      cntERR := cntERR + 1;
      lastErrTxt := GetLastComErrTxt(errCode := lastErr);
    END_IF;
  END_IF;
END_PROGRAM
```

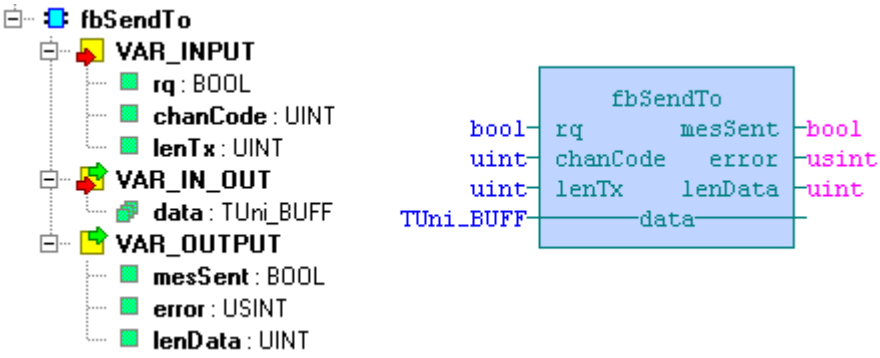
See also Function block fbSendTo

[TECO_HTML_TO_HTML_GENERATOR]
[TITLE] 6.2 Funkční blok fbSendTo [/TITLE]
[GROUP] Funkční bloky [/GROUP]

[KEYWORDS] [/KEYWORDS]
[GLOBALS] [/GLOBALS]
[HIDDEN] fbSendTo [/HIDDEN]
[HIDDEN_GLOBALS] [/HIDDEN_GLOBALS]
[NOTHING] [/NOTHING]
[/TECO_HTML_TO_HTML_GENERATOR]

6.2 Function block fbSendTo

Library : *ComLib*



The *fbSendTo* function block is used for message sending form the serial channel or ethernet. Communication channel must be set to *uni* mode.

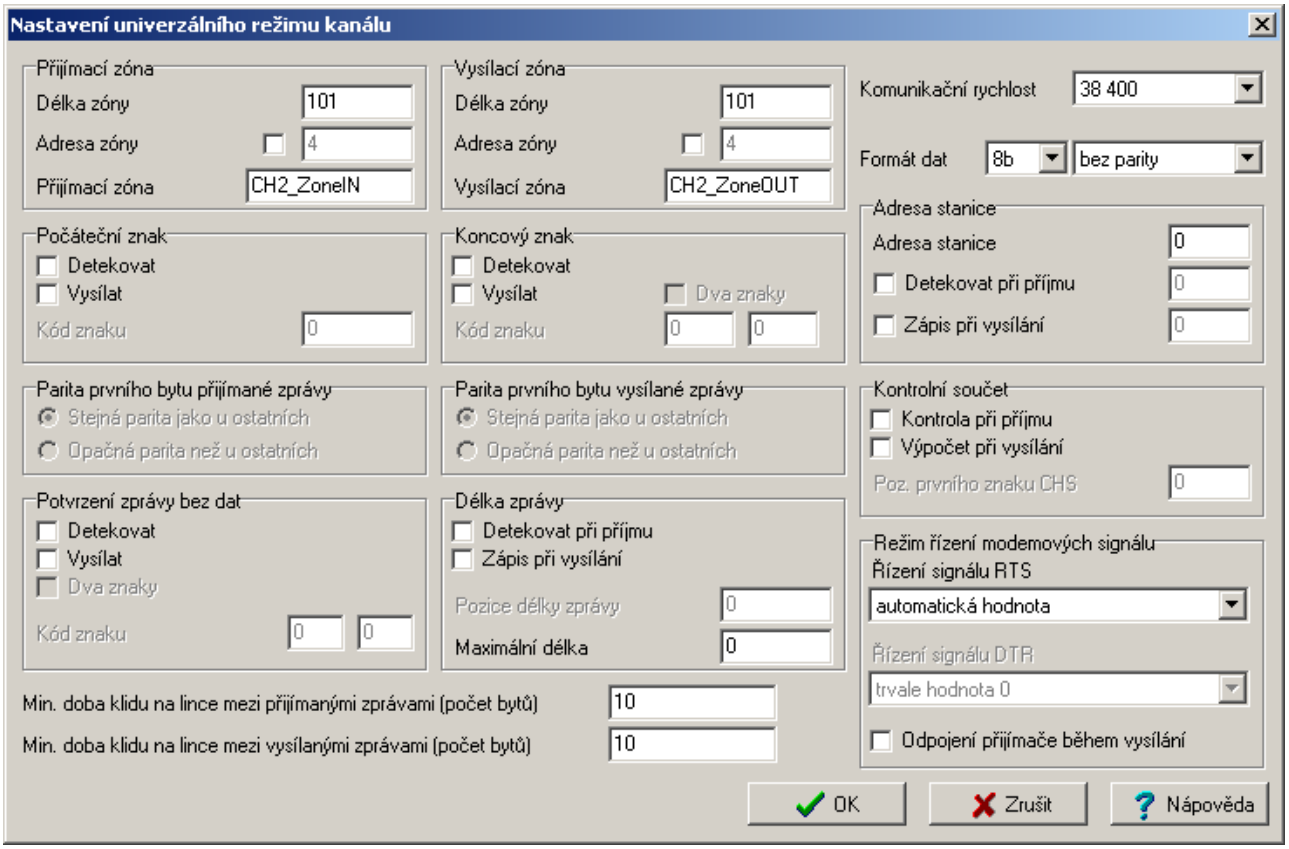
Tthis function block is supported on central units of the K rank (TC700 CP-7004, Foxtrot) from version v4.4.

Variable description :

	Variable	*Type*	*Signification*
VAR_INPUT			
	rq	BOOL	Control variable. If it is TRUE, the function block broadcasts data into the communication channel
	chanCode	UINT	Communication channel code *ETH1_uni0* ethernet channel ETH1, connection uni0 …. *ETH1_uni7* ethernet channel ETH1, connection uni7 *ETH2_uni0* ethernet channel ETH2, connection uni0 …. *ETH2_uni7* ethernet channel ETH2, connection uni7 *CH1_uni* serial channel CH1, mode uni …. *CH10_uni* serial channel CH10, mode uni
	lenTx	UINT	Sent message lenght (number of bytes)
VAR_IN_OUT			

	Variable	*Type*	*Signification*
	data	TUniBuf	Variable where the broadcasted message is ready
VAR_OUTPUT			
	mesSent	BOOL	Sent message flag If it is TRUE, the sending was commenced
	error	USINT	Error code. If it is 0 (COM_OK), all ran errorless In case of an error, it returns codes COM_ERR1, …, COM_ERR64
	lenData	UINT	Sent message lenght (number of bytes)

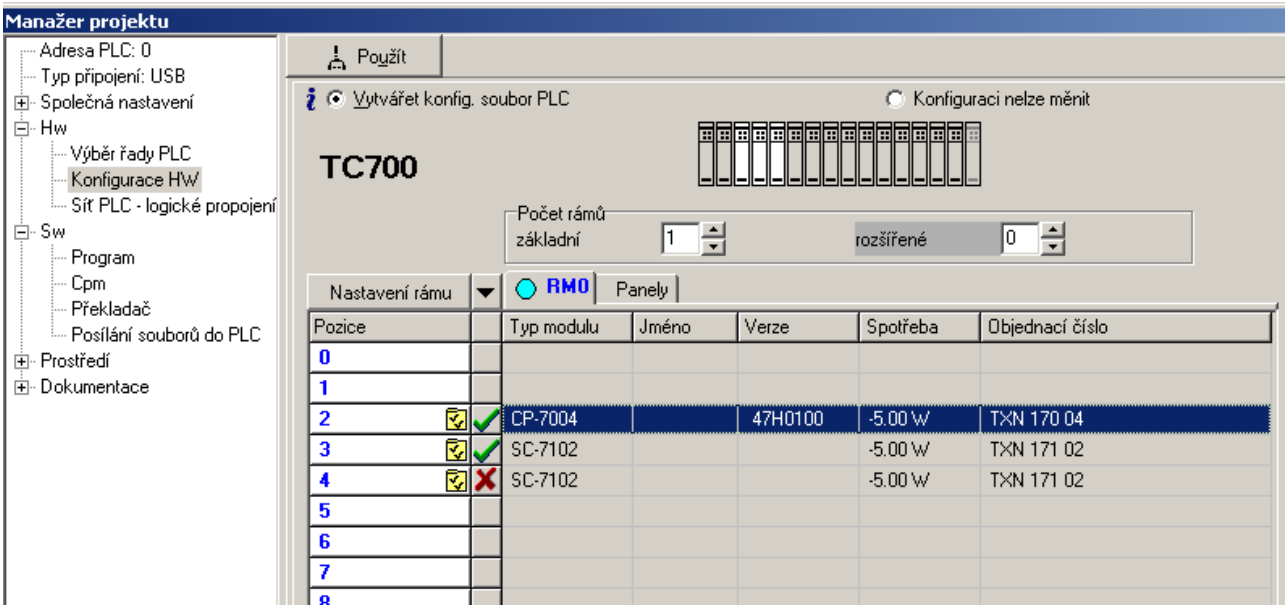
In the following example the function block *fbSendTo* is used for cyclic broadcasting of the message by the seriál channel CH1. The text „`Message number : 1`“ is sent as a message. The number stated in the string is incremented during each message sending so, that it indicates the number of messages sent. The rythm of sending is controlled by the timer `sendTim`. The particular setup of the seriál channel is shown in the following picture.



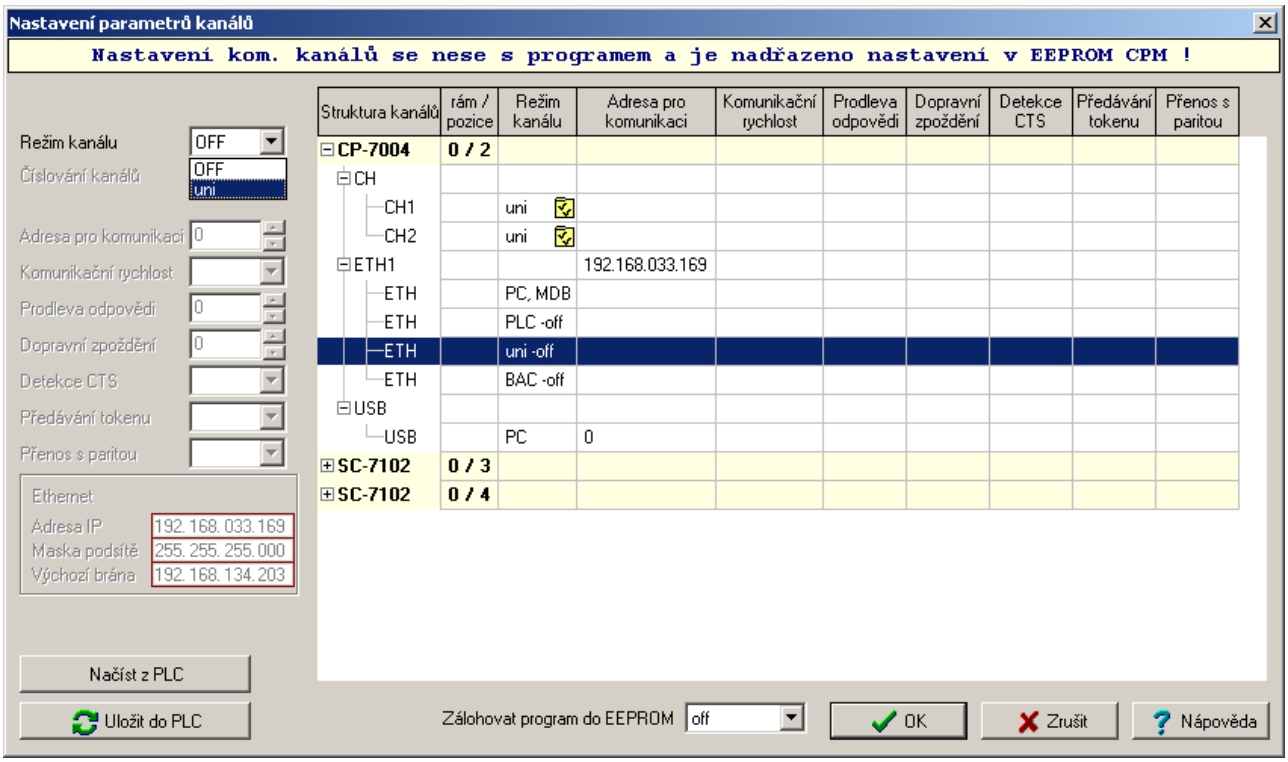

```
PROGRAM ExampleSendTo
  VAR
    SendToCH1    : fbSendTo;
    txBuf        : STRING[100];
    sendTim      : TON;
    sendCnt      : UDINT;
    errMsg       : STRING;
  END_VAR

  sendTim(IN := TRUE, PT := T#3s);
```

```
  if sendTim.Q then                                  // send new message every 3 sec
    sendCnt := sendCnt + 1;                          // number of messages
    txBuf := 'Message number : ' + UDINT_TO_STRING( sendCnt);
    SendToCH1( rq := TRUE, chanCode := CH1_uni,
               lenTx := len(txBuf), data := void(txBuf));
    if SendToCH1.error = 0 then                      // no error
      if SendToCH1.mesSent then                      // message sent succesfully
        sendTim(IN := FALSE);                        // timer restart
      end_if;
    else
      errMsg := GetLastComErrTxt( SendToCH1.error);  // show error as a text
    end_if;
  end_if;
END_PROGRAM
```

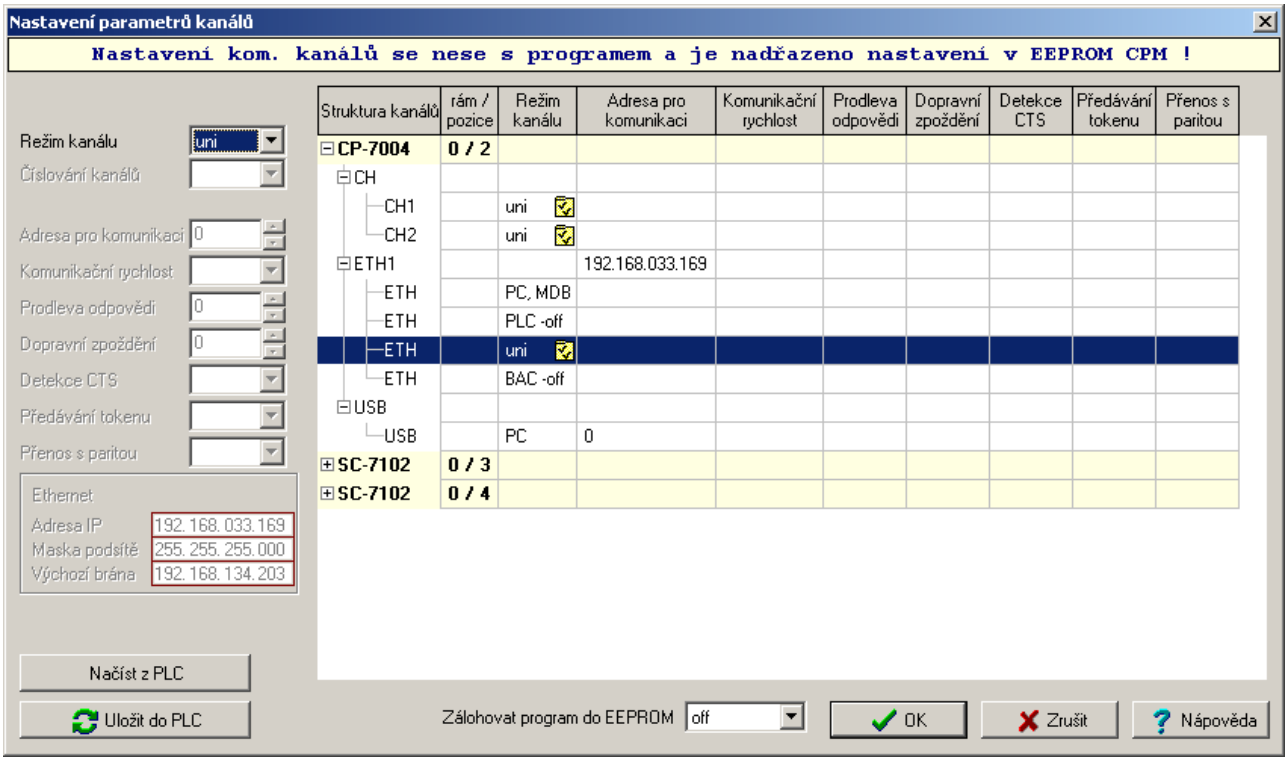
Another example shows the use of the function block *fbSendTo* for data sending by TCP protocol via the interface ETH1. Program establishes the connection via TCP protocol every 30 seconds, sends data and closes the connection again. The target IP address and port numbers are, in this case, firmly set by the ethernet channel settings. The setup is undertaken in the Mosaic environment in the Project manager in the node of HW configuration.



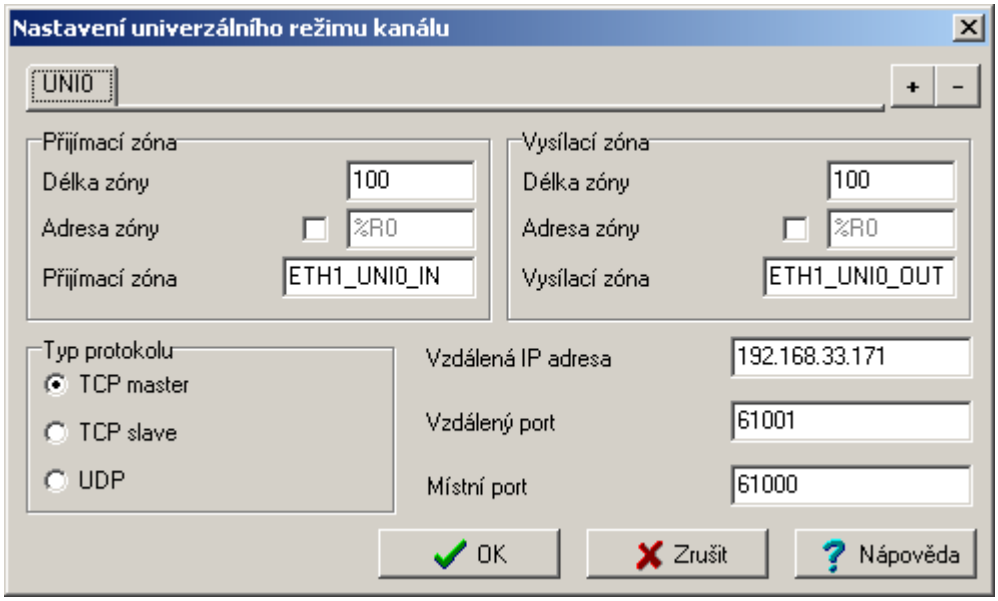
By clicking on the yellow icon on the line with the central unit (here CP-7004), the dialogue for ethernet interface setup is opened. In this dialogue, it is neccessary first to switch on the uni mode of the channel on the ethernet interface so, that we click on the line ETH uni-off (highlighted in the following picture) and then we switch the channel mode in the left upper corner from the value OFF to uni.



After setting to uni mode, the dialogue should appear as follows



By clicking on the yellow icon on the line ETH uni (highlighted in the previous picture) the next dialogue is initiated where maximum size of sending and receiving zone is set (number of bytes), the type of the TCP master protocol is selected (PLC will setup the TCP connection actively) and the IP address of the system is set where data will be sent to. The remote port is a port where data will be sent to, the local port is, on the contrary, a port where data are sent form.



Program that sends data cyclically every 30 seconds onto the addres 192.168.33.171 and remote port 61001 appears as follows.

```
TYPE
  states : (idle, estabCon, sendData, closeCon);
END_TYPE

PROGRAM prgTestSendTCP
  VAR
    sendTim    : TON;
    chkTim     : TON;
    state      : states := idle;
    txData     : ARRAY[0..49] OF USINT;
    sendTo     : fbSendTo;
    cntOK      : UDINT;
    cntERR     : UDINT;
    lastErr    : USINT;
    lastErrTxt : STRING;
  END_VAR

  sendTim(IN := true, PT := T#30s);
  CASE state OF
    idle     :
      IF IsEstabTCPconnection(chanCode := ETH1_UNI0) THEN
        CloseTCPconnection(chanCode := ETH1_UNI0);
      END_IF;
      IF sendTim.Q THEN
        state := estabCon; sendTim(IN := false); chkTim(IN := false);
      END_IF;

    estabCon :
      lastErr := EstabTCPconnection(chanCode := ETH1_UNI0);
      IF lastErr = COM_OK THEN
        state := sendData;
      END_IF;

    sendData :
      IF IsEstabTCPconnection(chanCode := ETH1_UNI0) THEN
```

```
            // prepare outgoing data (see txData)
            txData[0] := txData[0] + 1;
            sendTo( rq := true, chanCode := ETH1_UNI0,
                    lenTx := sizeof(txData), data := void(txData),
                    error => lastErr);
            IF sendTo.mesSent THEN
              cntOK := cntOK + 1;
            END_IF;
            state := closeCon;
          ELSE
            chkTim(IN := true, PT := T#20s);
            IF chkTim.Q THEN
              lastErr := COM_ERR64;
              state := closeCon; cntERR := cntERR + 1;
            END_IF;
          END_IF;

        closeCon :
          CloseTCPconnection(chanCode := ETH1_UNI0);
          state := idle;
      END_CASE;

      lastErrTxt := GetLastComErrTxt(errCode := lastErr);
    END_PROGRAM
```

See also Function block fbRecvFrom
[TECO_HTML_TO_HTML_GENERATOR]
[/TECO_HTML_TO_HTML_GENERATOR]