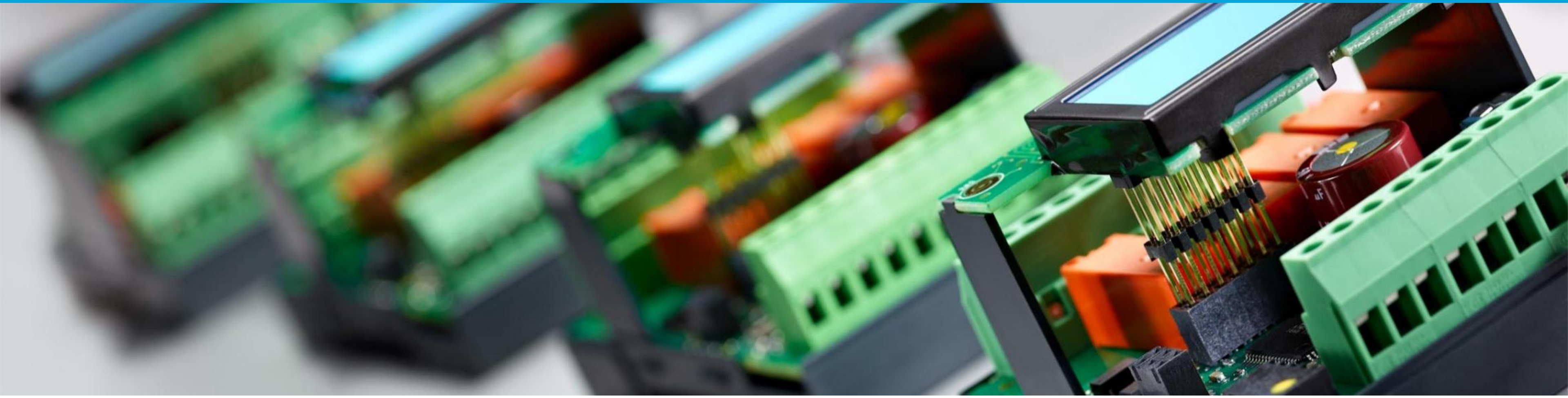
08/10/2014

em4 ⇔ MTPX/XX MODBUS COMMUNICATION

em4 TUTORIAL

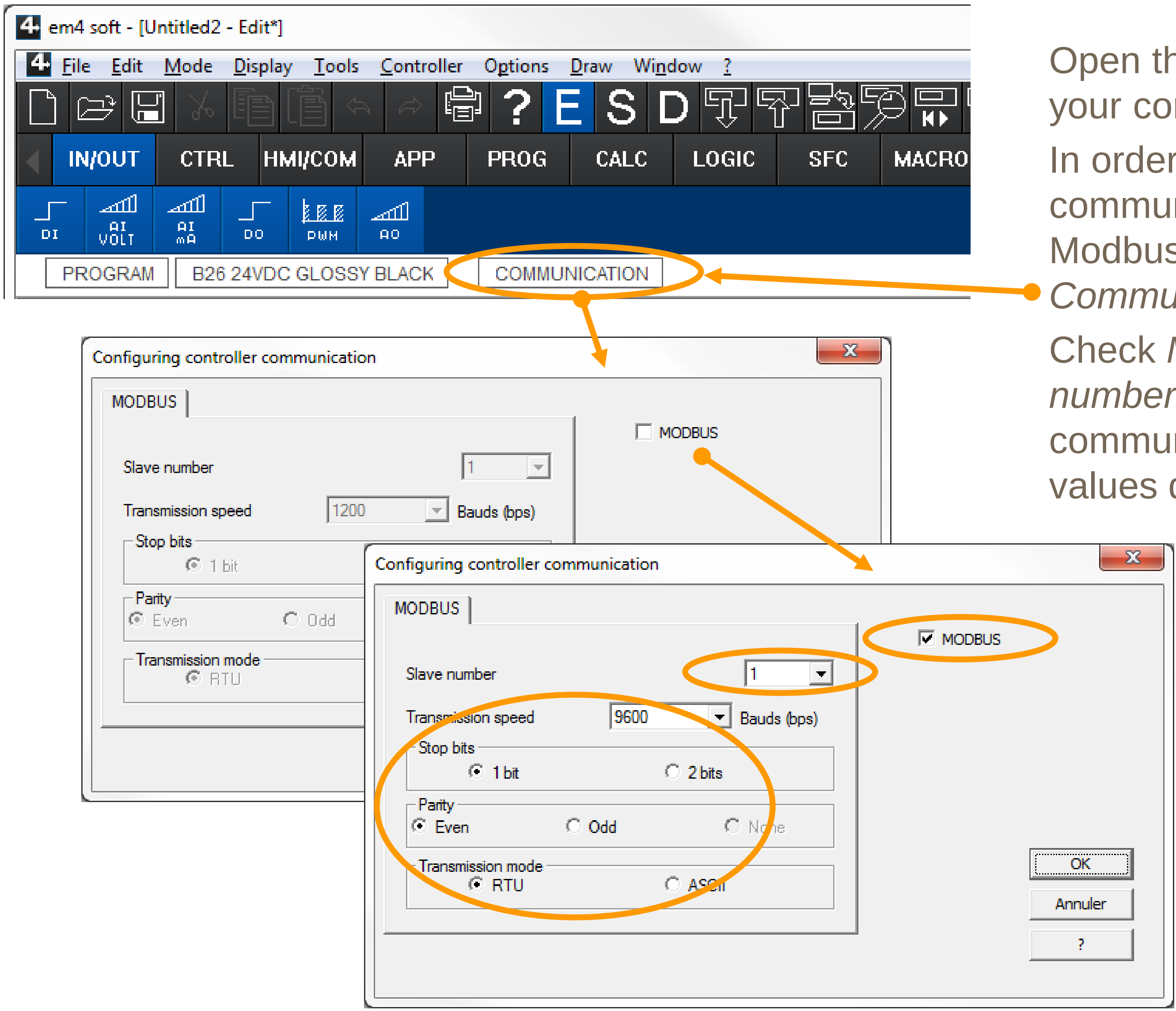


SUMMARY

- Configuring Modbus Communication
- em4 Modbus Addresses
- MTPX/XX Modbus RTU Wiring
- MTPX/XX Modbus RTU Network Configuration
- Modbus RTU Addressing
- Modbus RTU Addressing using BIN/DEC converter

CONFIGURING MODBUS COMMUNICATION

Configuring Modbus Communication



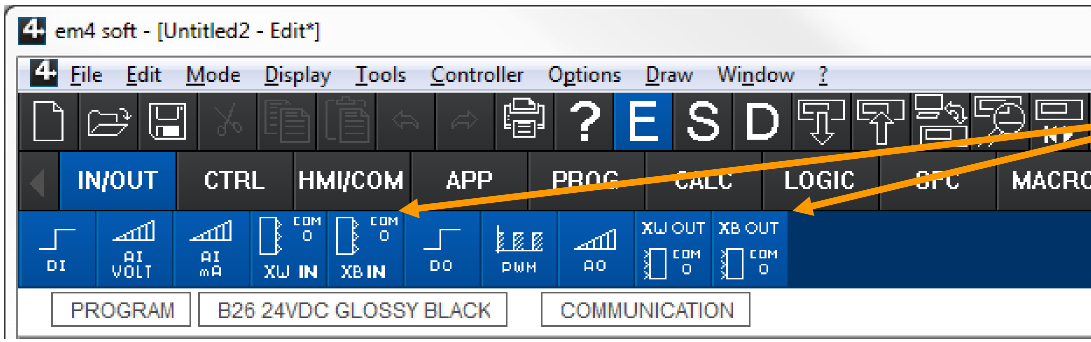
Open the software and select your controller.

In order to activate the Modbus communication and access the Modbus addresses click on *Communication*.

Check *Modbus*, define the *Slave number*, and and adjust the communication parameters to the values defined in the MTPX/XX (Modbus master).

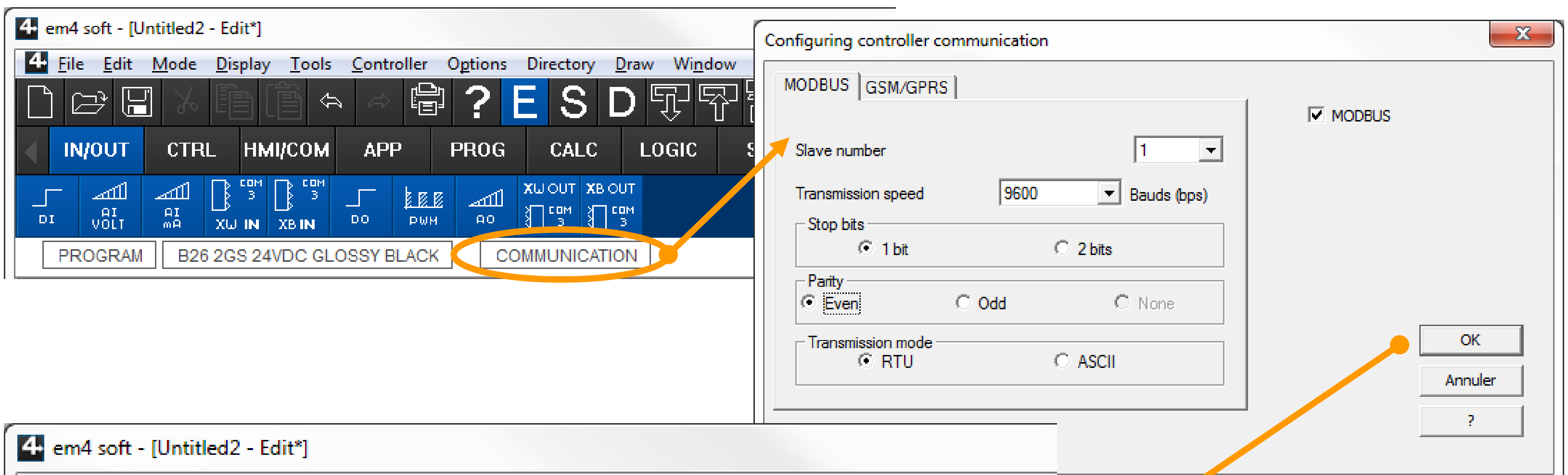
Then click *OK*.

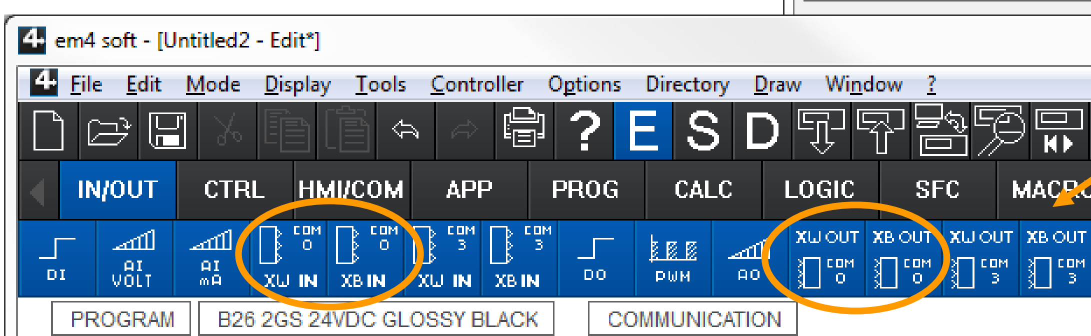
Configuring Modbus Communication



Immediately afterwards the *COM 0* functions become available.

Example em4 local

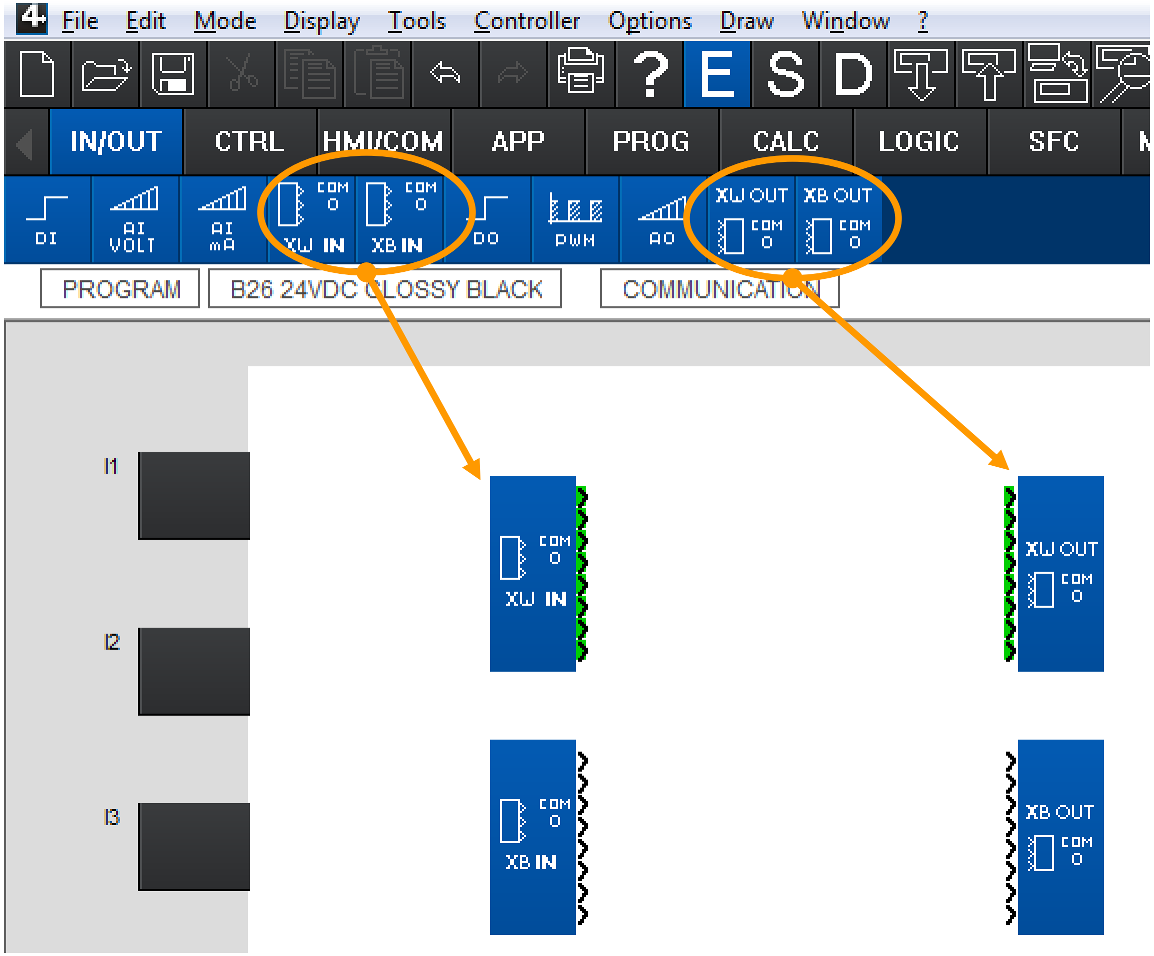




In an em4 alert or em4 remote the *COM 0* functions become accessible next to the *COM 3* functions.

em4 MODBUS ADDRESSES

em4 Modbus Addresses



Drag and drop the *COM 0* functions into your worksheet.

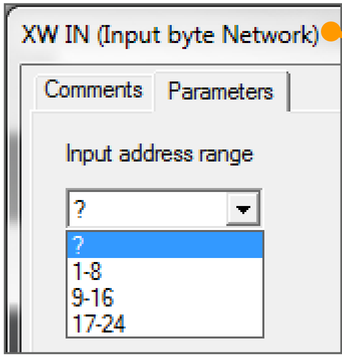
XW IN ⇒ Byte input from network 8 inputs each, can be used 3 times, allows to enter 24 words into an em4 program.

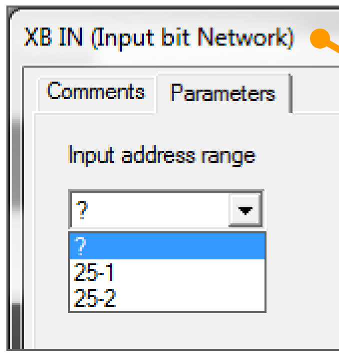
XB IN ⇒ Bit input from network, 8 inputs each, can be used 2 times, allows to enter 16 bit into an em4 program.

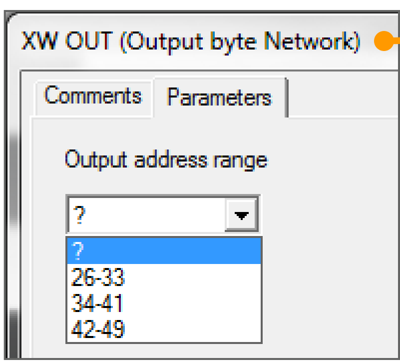
XW OUT ⇒ Byte output to network, 8 outputs each, can be used 3 times, allows to make 24 words accessible to a network.

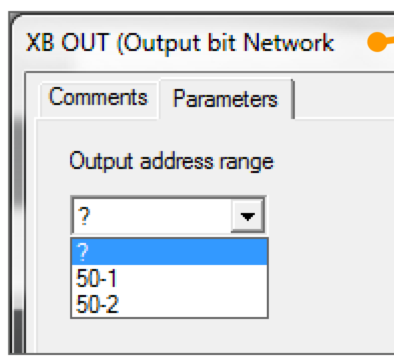
XB OUT ⇒ Bit output to network, 8 outputs each, can be used 2 times, allows to make 16 bit accessible to a network.

em4 Modbus Addresses









Double click on one of the *COM 0* functions opens the parameters window.

XW IN ⇒ Word address range for a FB: 1-8 or 9-16, or 17-24.

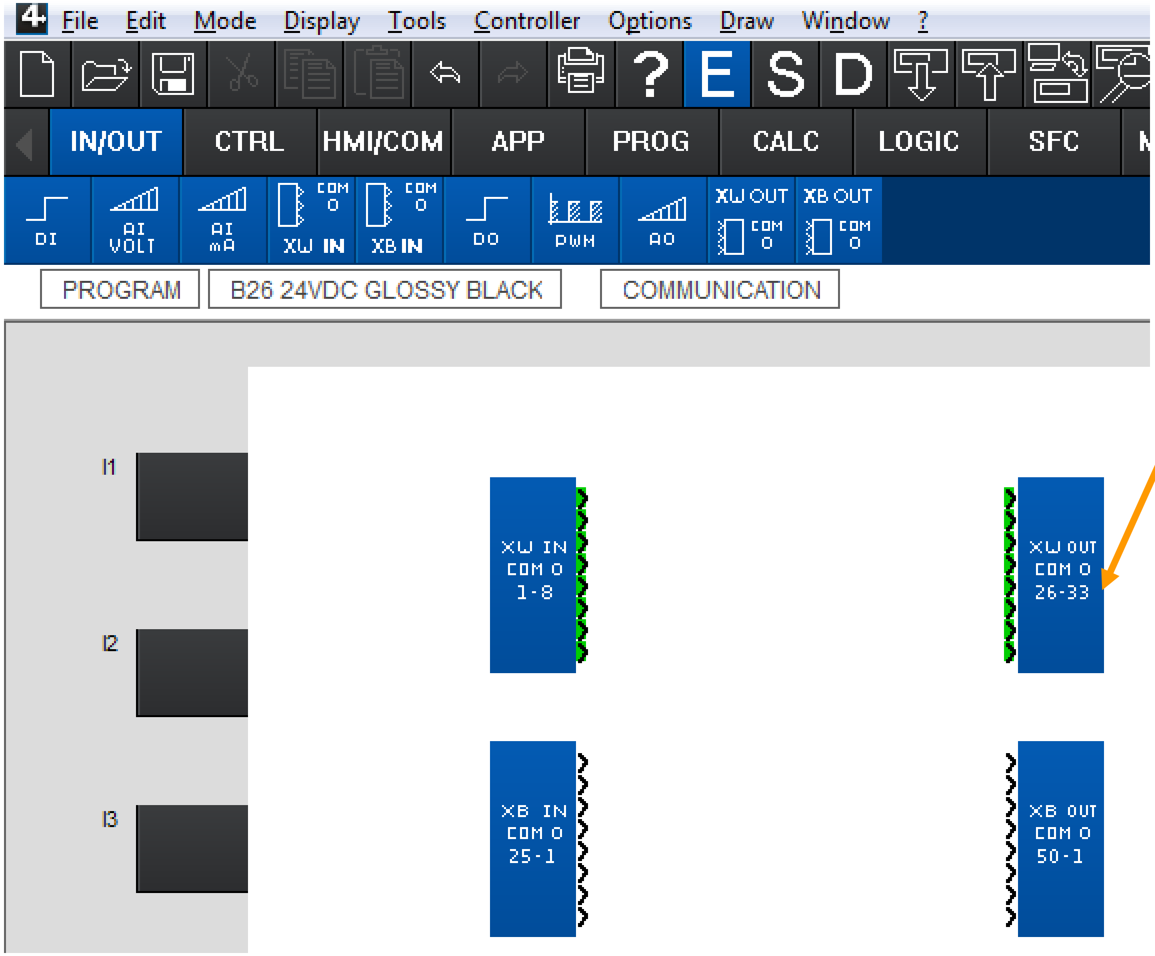
XB IN ⇒ Uses word address 25. Bit address range for a FB:
8 bit on 25-1, or 8 bit on 25-2.

XW OUT ⇒ Word address range for a FB: 26-33, or 34-41, or 42-49.

XB OUT ⇒ Uses word address 50. Bit address range for a FB:
8 bit on 50-1, or 8 bit on 50-2.

If no address range has been assigned to a *COM 0* FB placed in the worksheet, a error message will appear when the program is saved.

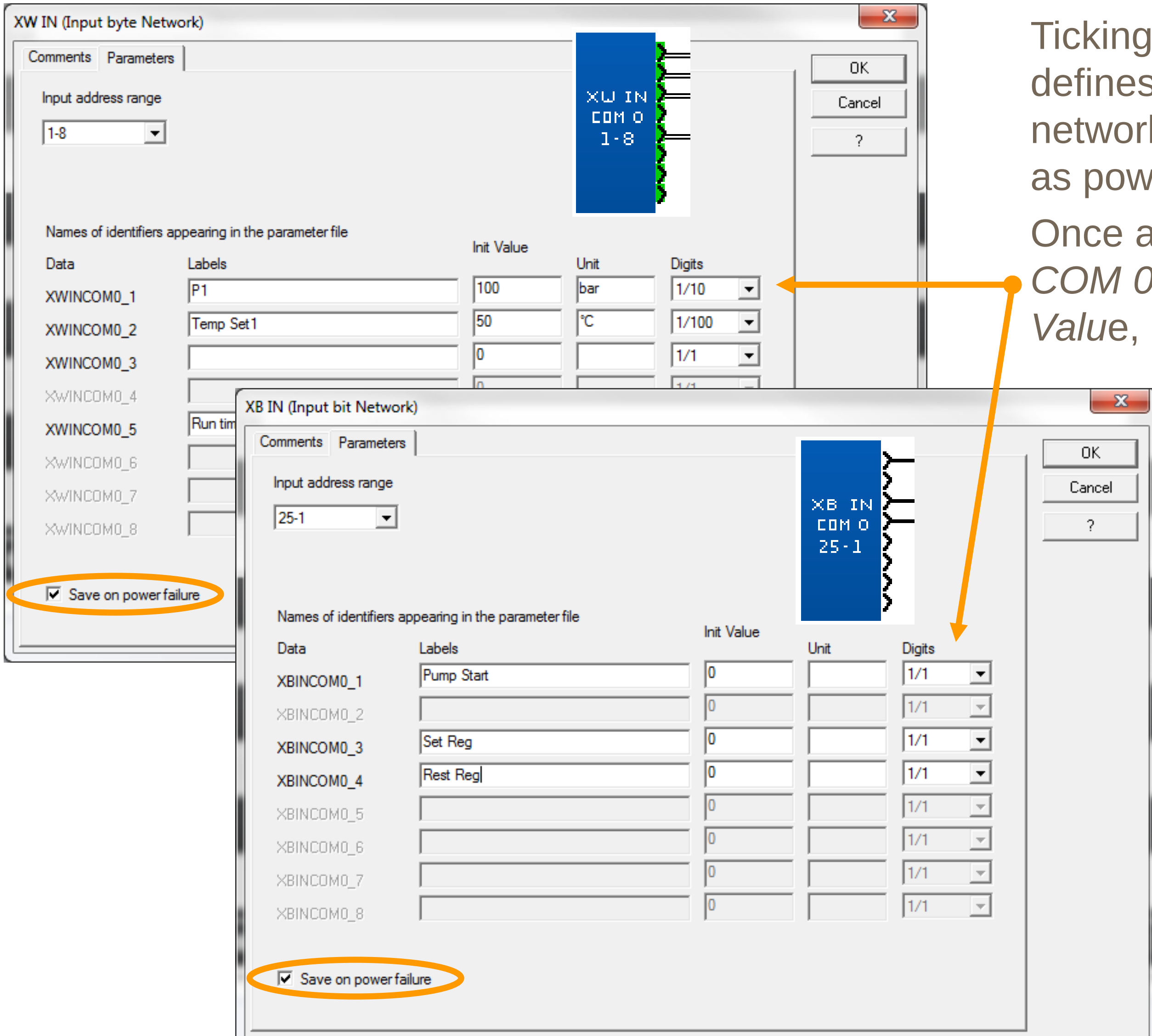
em4 Modbus Addresses



Once the address range of a FB has been defined, it is displayed on the block.

Each addresses corresponds to %MW and can directly be entered into the communication parameters used by a Modbus master.

em4 Modbus Addresses



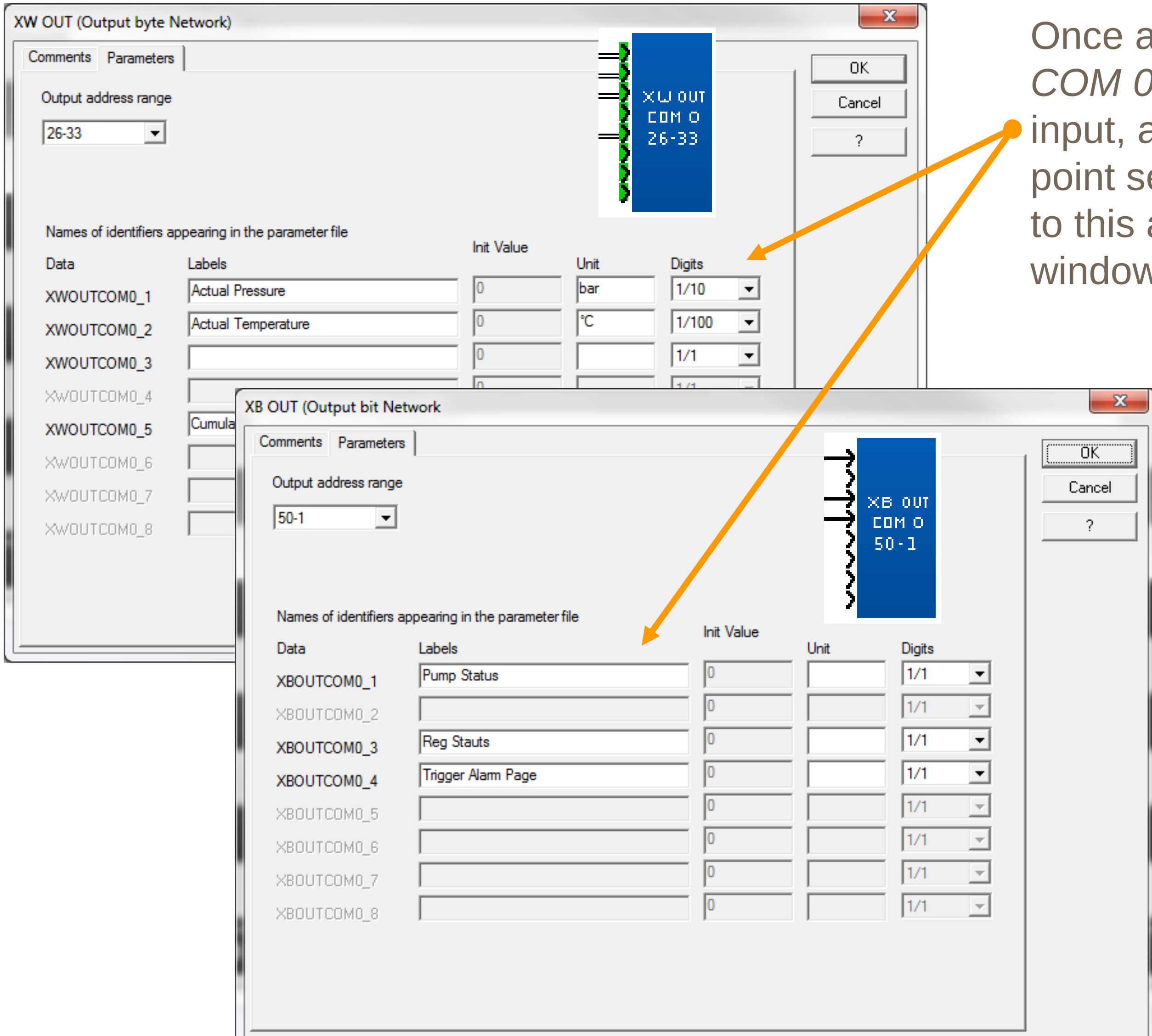
Ticking *Save on power failure* defines all values arriving from the network at this XW IN or XB IN FB as power fail safe.

Once a link has been connected to a *COM 0* FB output, a *Label*, an *Initial Value*, a *Unit*, and a decimal point setting (*Digits*) can be assigned to this address in the *Parameters* window.

Init Value ⇒ base value for fist power up (cold init) and fallback value in case of network communication failure.

Labels, *Unit* and *Digits* are commentaries that are saved in an XML file in addition to the program.

em4 Modbus Addresses



Once a link has been connected to a *COM 0* (XW OUT, XB OUT) FB input, a *Label*, *Unit* and a decimal point setting (*Digits*) can be assigned to this address in the *Parameters* window.

Labels, *Unit* and *Digits* are commentaries that are saved in an XML file in addition to the program.

em4 Modbus Addresses

Further Modbus addresses 1:

Name	R/W	Address		
MSB STATE ETAT MSB ESTADO MSB	R	0051	0x0000	
LSB STATE ETAT LSB ESTADO LSB	R	0052	0x0000 : Stop - Stop - Stop	0x0001 : Run - Run - Ejecutar 0x0002 : Debugging - Debugging - Debugging 0x0040 : Setting front - Paramétrage en face avant - Ajuste frontal 0x0800 : Défaut alimentation
MSB STATUS STATUS MSB ESTADO MSB	R	0053	See code warning / error - Voir code warning / erreur - Ver código de advertencia / error	
LSB STATUS STATUS LSB ESTADO LSB	R	0054	See code warning / error - Voir code warning / erreur - Ver código de advertencia / error	

em4 Modbus Addresses

Further Modbus addresses 2:

Name	R/W	Address		
CLOCK HORLOGE RELOJ	R/W	0055	Second - Seconde - Segundo	
	R/W	0056	Minute - Minute - Minuto	
	R/W	0057	Hour - Heure - Hora	
	R/W	0058	Day - Jour - Día	Day of the week
	R/W	0059	Date - Date - Fecha	Day of the month
	R/W	0060	Month - Mois - Mes	
	R/W	0061	Year - Année - Año	
SUMMER/WINTER ETE/HIVER VERANO/INVIERNO	R/W	0063	Change - Changement - Cambio	0x0000 : invalid - non validé - no validado 0x0001 : Europe - Europe - Europa 0x0002 : USA - USA - EE. UU. 0x0003 : manual - manuel - manual
	R/W	0064	SUMMER month - Mois ETE - Mes de VERANO	0x0001 : January - Janvier - Enero 0x000C : December - Décembre - Diciembre
	R/W	0065	Date SUMMER - Date ETE - Fecha de VERANO	0x0001 : 1st Sunday - 1er dimanche - 1er domingo 0x0005 : 5th Sunday - 5ème dimanche - 5to domingo
	R/W	0066	WINTER Month - Mois HIVER - Mes de INVIERNO	0x0001 : January - Janvier - Enero 0x000C : December - Décembre - Diciembre
	R/W	0067	Date HIVER	0x0001 : 1st Sunday - 1er dimanche - 1er domingo 0x0005 : 5th Sunday - 5ème dimanche - 5to domingo
DRIFT DERIVE DERIVA	R/W	0068	Drift - Dérive - Deriva	0xFFC5 : -59 0x003B : +59
RUN/STOP	W	0069	0x0000 : Stop - Stop - Parar	0x0001 : Run - Run - Ejecutar

MTPX/XX MODBUS RTU WIRING

MTPX/XX Modbus RTU Wiring

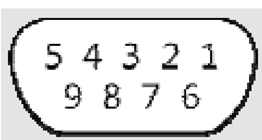
Preliminary solution

Two different Modbus communication cables exist today:

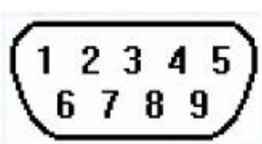
- 88 970 503 (SubD9 Female to RJ45) for the *MTPX/50*
- 88 970 504 (SubD9 Male to RJ45) for the *MTP8/70*

To be used with the em4 Modbus extension, the RJ45 connectors have to be cut off, the wires need to be stripped and connected according to the table below.

MTPX/50 & 8/70 connector layout:

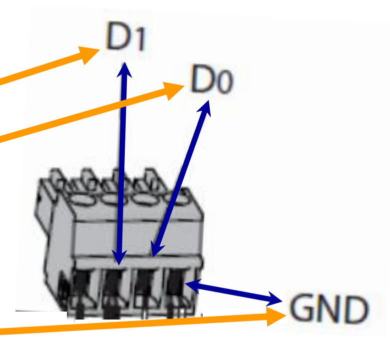


MTPX/50



MTP8/70

PIN#	Symbol	Com1 [RS485]2w
1	Rx-	Data-
2	Rx+	Data+
3	Tx-	
4	Tx+	
5	GND	
6	Data-	
7	TxD	
8	RXD	
9	Data+	



MTPX/50 MTP8/70	Modbus connector	Color
Pin1	D1	black
Pin2	D0	white
Pin5	GND	yellow

If you are unsure about the pin ⇔ color layout of your cable, or if the Modbus communication doesn't work, please 'beep' (check) the connections!

MTPX/XX Modbus RTU Wiring

- Insert the *88 970 503 Modbus communication cable* with the wired connector to the serial port of the *MTPX/50*

or

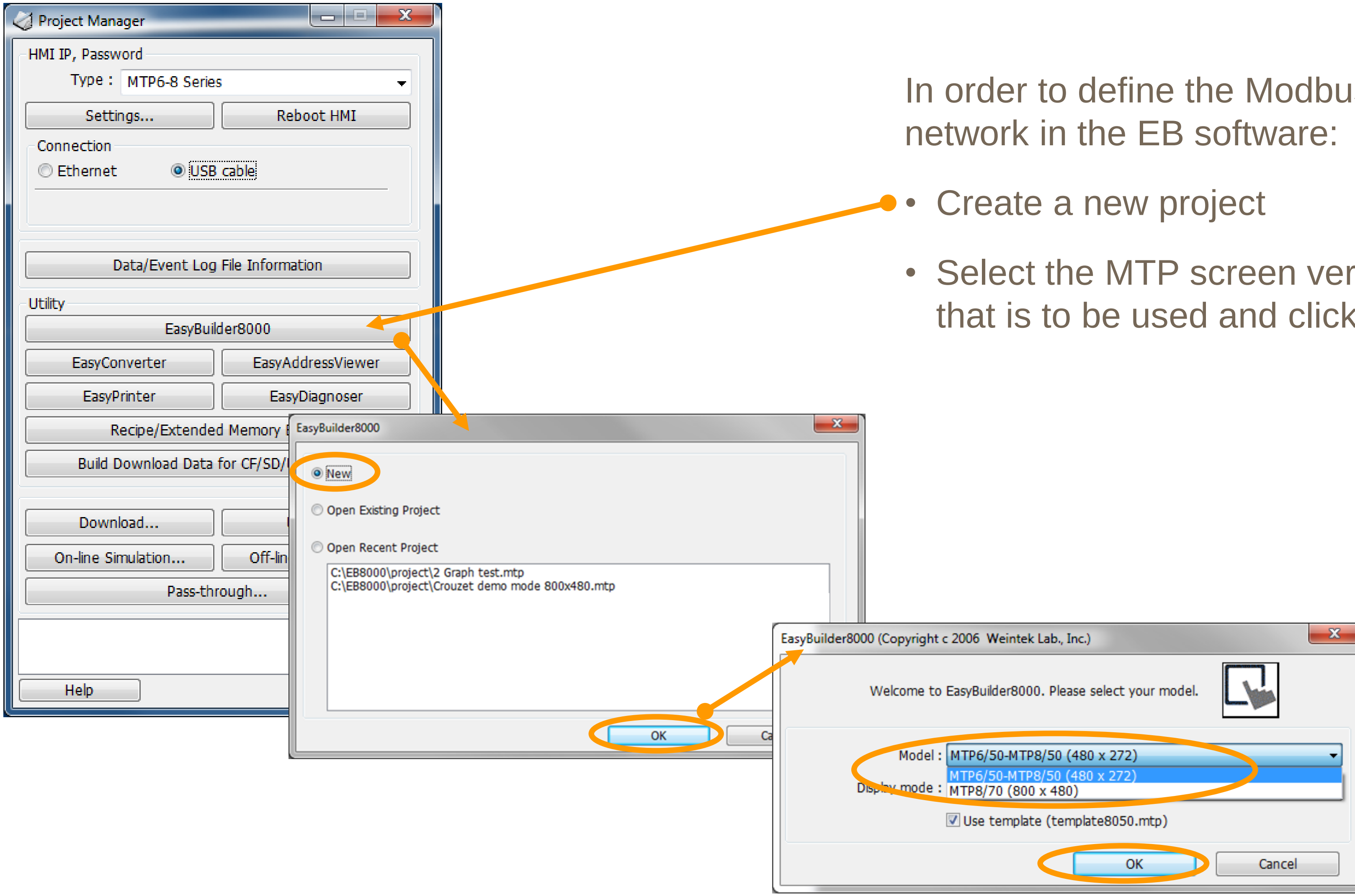
- The *88 970 504 Modbus communication cable* with the wired connector to the serial port of the *MTP8/70*

- Plug the connector into the em4 *Modbus S RS485* interface inserted in the the em4

MTPX/XX MODBUS RTU NETWORK CONFIGURATION

CROUZET AUTOMATION

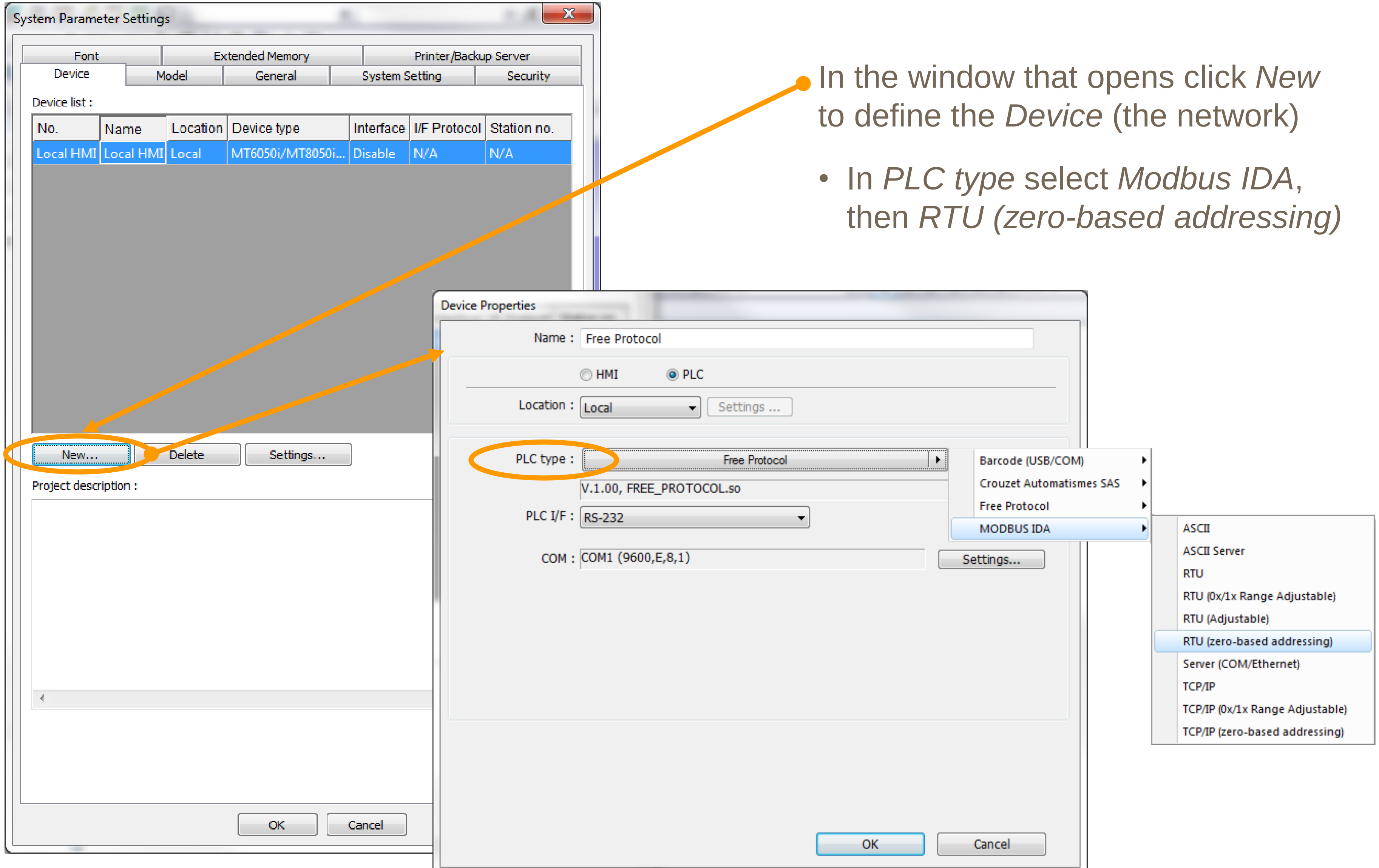
Modbus RTU Network Configuration



In order to define the Modbus network in the EB software:

- Create a new project
- Select the MTP screen version that is to be used and click on *OK*

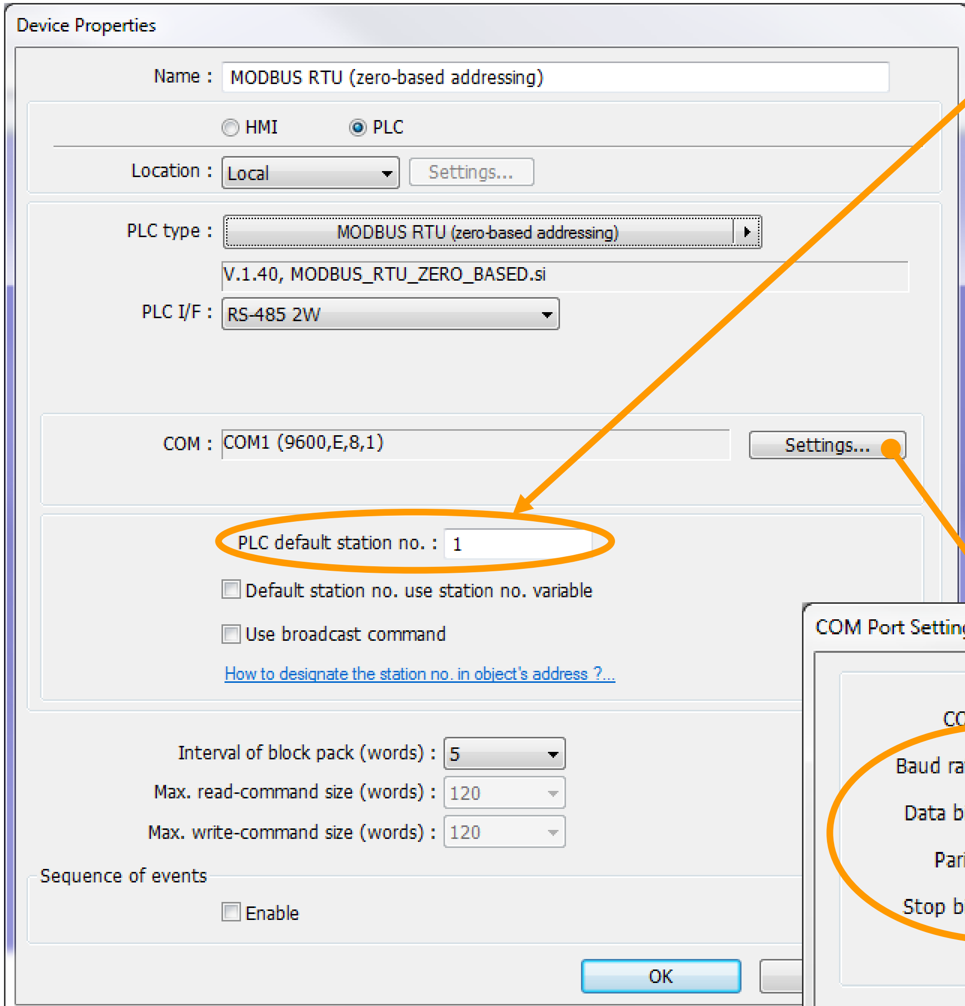
Modbus RTU Network Configuration

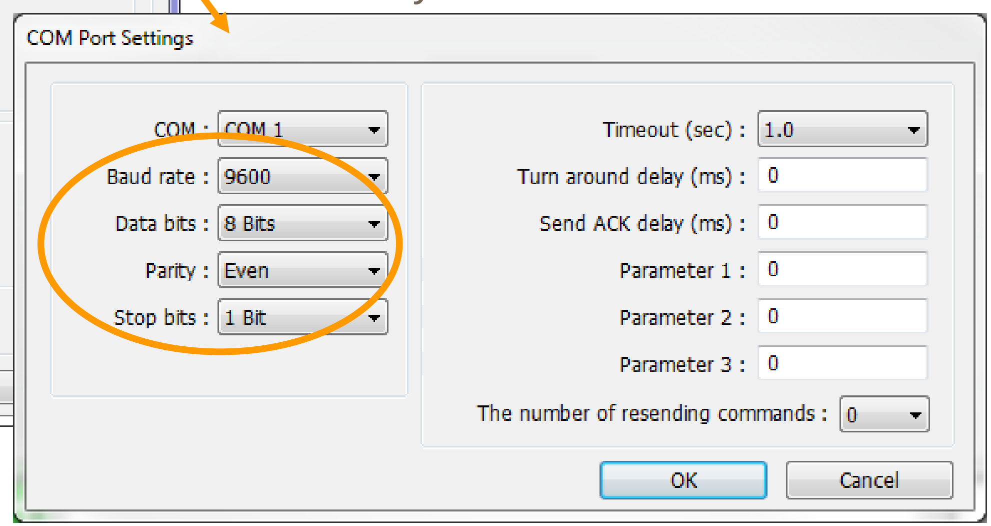


In the window that opens click *New* to define the *Device* (the network)

- In *PLC type* select *Modbus IDA*, then *RTU (zero-based addressing)*

Modbus RTU Network Configuration





- Enter the em4 *PLC default station no.* (slave number)
- Click *Settings* to define the communication parameters
- The communication parameters have to be set *identical* in the MTPX/XX and in each em4 slave!
- Repeat the steps *New, Device*, *Slave n°* and *COM Settings* for every em4 in the Modbus network

CROUZET AUTOMATION

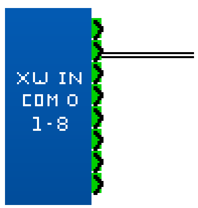
MODBUS RTU ADDRESSING

Modbus RTU Addressing Word

Example of how to address a word

Writing a set point from MTP to em4 (slave n° 5)

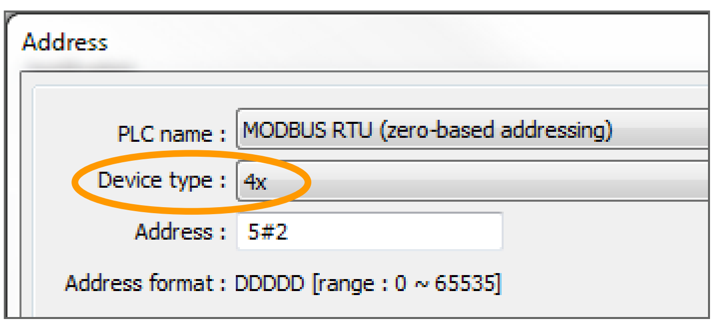
⇒ em4: COM 0, XW IN 2



⇒ EB: *Device type* 4x

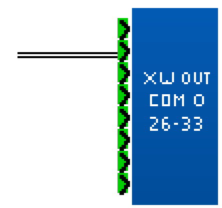
Address 5#2

Slave n°5, write address XW IN 2



Reading an em4 value (slave n° 5) by the MTP

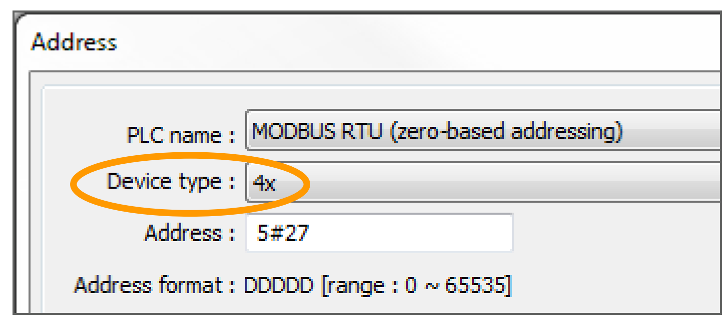
⇒ em4: COM 0, XW OUT 27



⇒ EB: *Device type* 4x

Address 5#27

Slave n°5, read address XW OUT 27



Modbus RTU Addressing Write Bit

EB software: write/read a bit to em4 via Modbus RTU

Modbus to em4

EB - Modbus		em4
bit 2500	XB IN COM 0 25-1	Value1
bit 2501		Value2
bit 2502		Value3
bit 2503		Value4
bit 2504		Value5
bit 2505		Value6
bit 2506		Value7
bit 2507		Value8
bit 2508	XB IN COM 0 25-2	Value1
bit 2509		Value2
bit 2510		Value3
bit 2511		Value4
bit 2512		Value5
bit 2513		Value6
bit 2514		Value7
bit 2515		Value8

Modbus RTU Addressing Read Bit

EB software: reading a bit from em4 via Modbus RTU

em4 to Modbus

em4		EB - Modbus
Value1	XB OUT COM 0 50-1	bit 5000
Value2		bit 5001
Value3		bit 5002
Value4		bit 5003
Value5		bit 5004
Value6		bit 5005
Value7		bit 5006
Value8		bit 5007
Value1	XB OUT COM 0 50-2	bit 5008
Value2		bit 5009
Value3		bit 5010
Value4		bit 5011
Value5		bit 5012
Value6		bit 5013
Value7		bit 5014
Value8		bit 5015

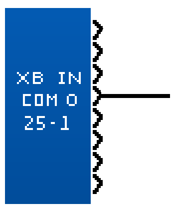
CROUZET AUTOMATION

Modbus RTU Addressing

Example of how to address a bit

Writing a bit from the MTP to em4 (slave n° 5)

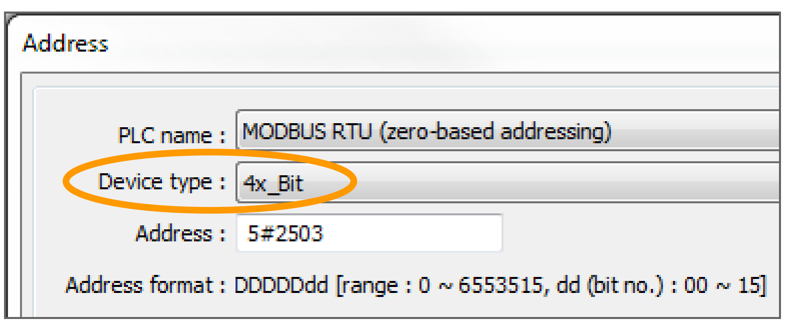
⇒ em4: COM 0, XB IN 25-1 Value4



⇒ EB: *Device type:* 4x_Bit

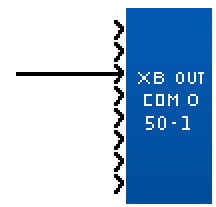
Address: 5#2503

Slave n°5, write address XB IN 25-1



Reading an em4 bit (slave n° 5) by the MTP

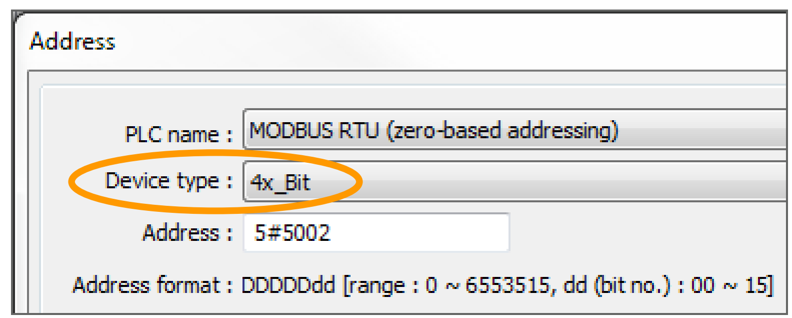
⇒ em4: COM 0, XB OUT 50-1 Value3



⇒ EB: *Device type:* 4x_Bit

Address: 5#5002

Slave n°5, read address XB OUT 50-1



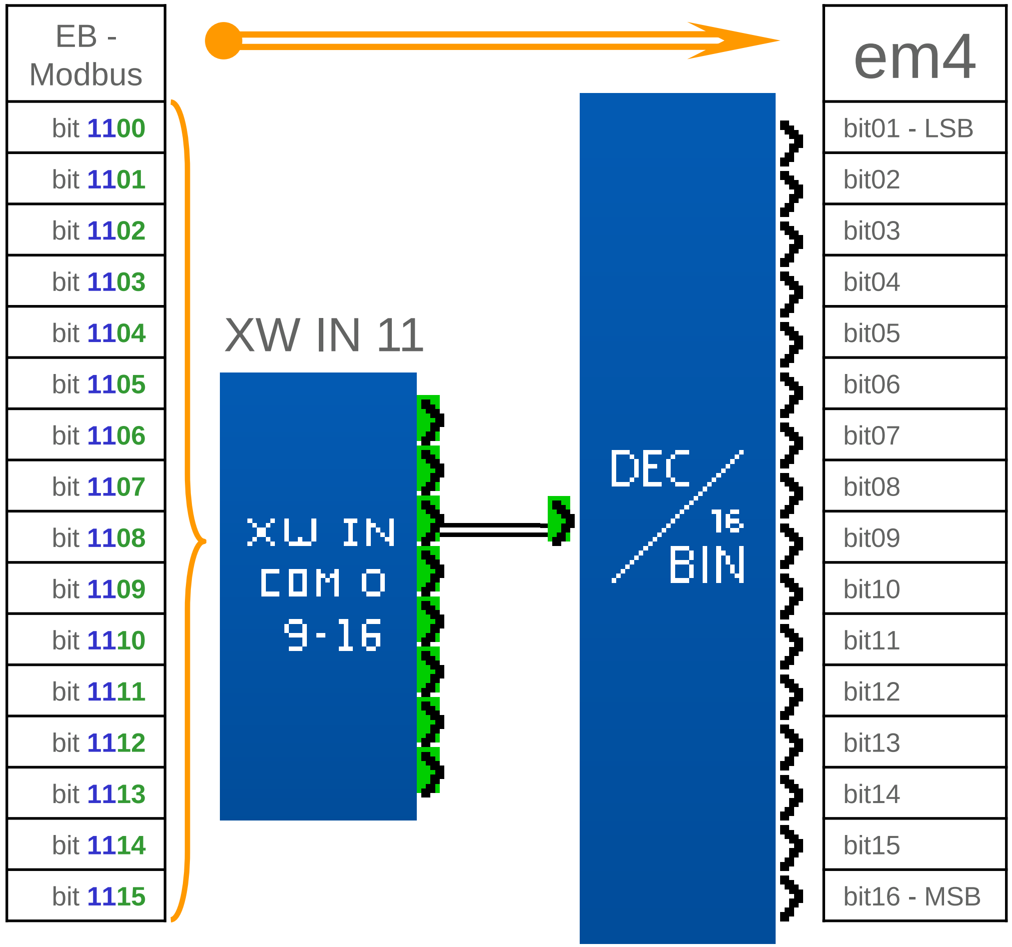
MODBUS RTU ADDRESSING USING BIN/DEC CONVERTER FB'S

Modbus RTU Addressing

EB software: writing/reading a bit to em4 via Modbus RTU

Using DEC/BIN converter option

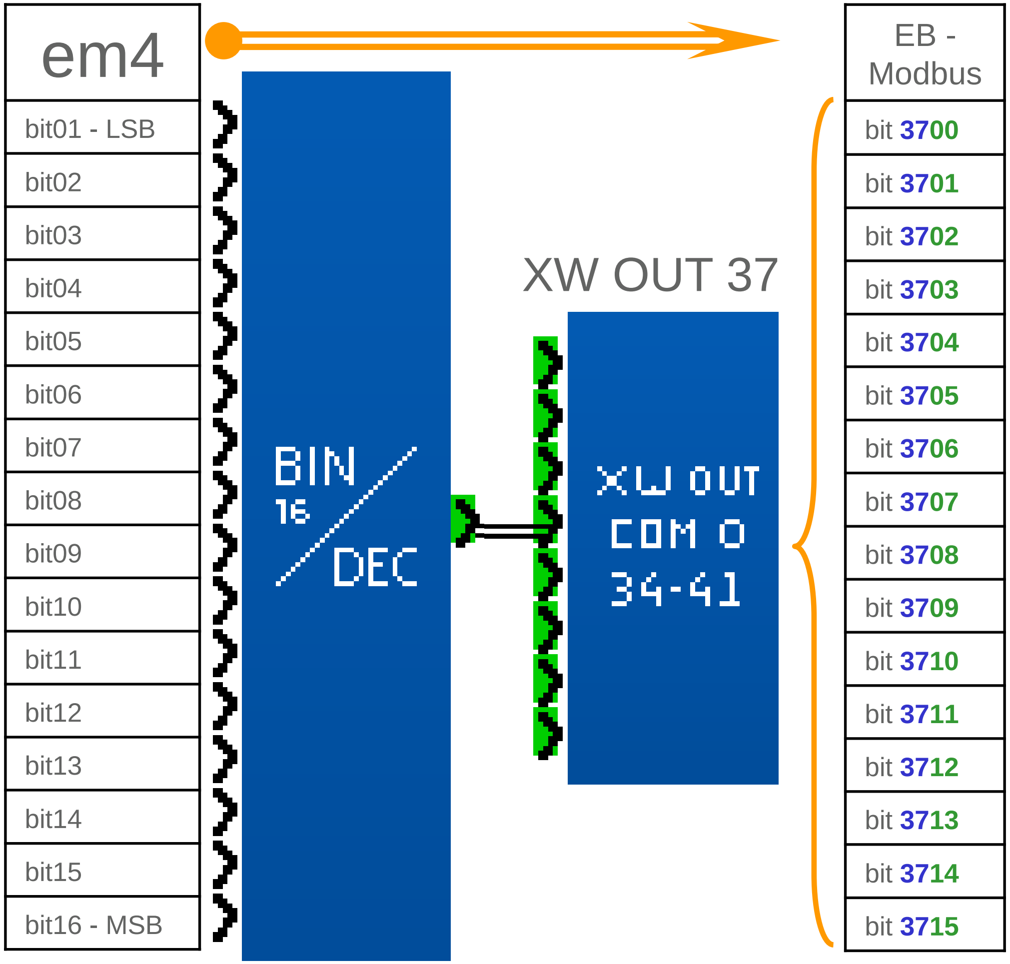
Modbus to em4



EB software: reading a bit from em4 via Modbus RTU

Using BIN/DEC converter option

em4 to Modbus



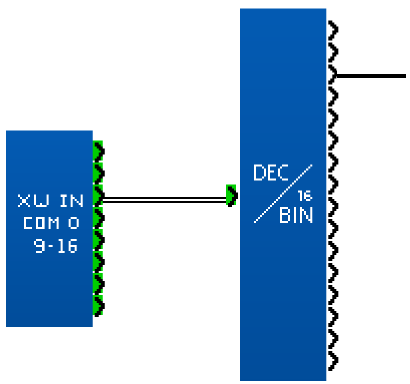
Modbus RTU Addressing

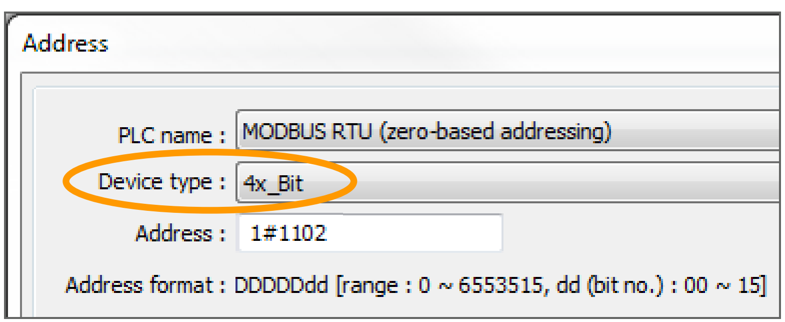
Example of how to address a bit
using DEC/BIN and BIN/DEC converters

Writing a bit from the MTP to em4 (slave n° 1)

⇒ em4: COM 0, XW IN 11, bit 03

⇒ EB: *4x_Bit, 1#1102*

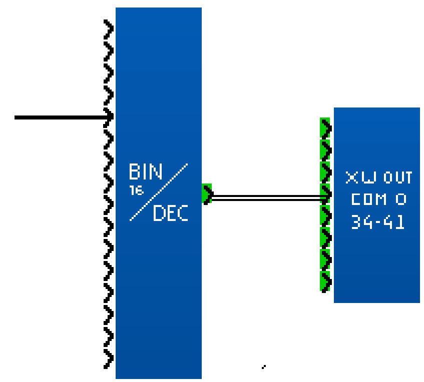


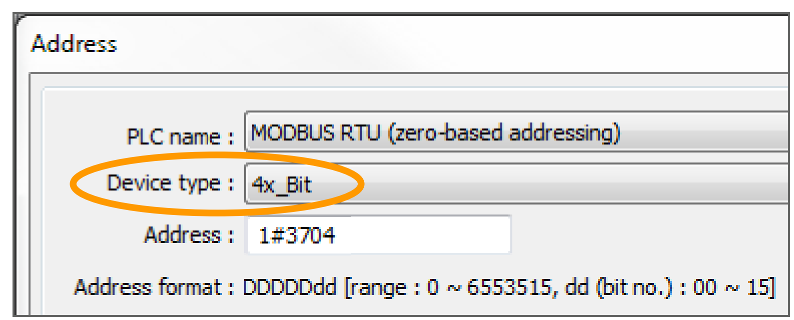


Reading an em4 bit (slave n° 1) by the MTP

⇒ em4: COM 0, XW OUT 37, bit 05

⇒ EB: *4x_Bit, 1#3704*





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