FAQ: How do I address an AMCI Nexus unit in my Modbus TCP/IP network?

AMCI NEXUS modules provides a Modbus/TCP Server interface according to Modbus/TCP Specification V 1.0.

MODBUS is an application layer messaging protocol, positioned at level 7 of the OSI model. It provides client/server communication between devices connected on different types of buses or networks. MODBUS is a request/reply protocol and offers services specified by **function codes**. MODBUS function codes are elements of MODBUS request/reply Protocol Data Units. The MODBUS/TCP messaging service provides a Client/Server communication between devices connected on an Ethernet TCP/IP network.

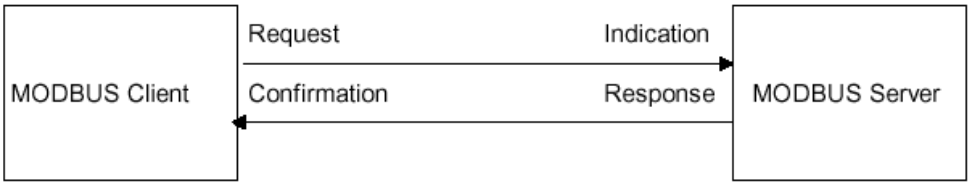

Figure 1. Modbus Client/Server dialog

The function indicates to the server what kind of action to perform. On reception of a MODBUS request the module actives a local action to read, to write or to achieve some other actions. The processing of these actions is done totally transparently for the application programmer. The main MODBUS server functions are to wait for a MODBUS request on 502 TCP port, to treat this request and then to build a MODBUS response depending on device context.

For more detailed information on the Modbus/TCP Protocol refer to the Open Modbus Specification Ver. 1.0.

AMCI NEXUS Modbus/TCP Module Configuration:

- Maximum Number of simultaneous TCP connections - **8**
- TCP Port Number - **502**

Modbus Functions Supported by NEXUS:

Function Code	Function Name	Class	Affects device words	Addressing method
1	Read Coils	1	OUTPUT	Bit (bit addr. 16384..16543)
2	Read Discrete Inputs	1	INPUT	Bit (bit addr. 0..335)
3	Read Holding Registers	0	OUTPUT	Word (reg. addr. 1024..1033)
4	Read Input Registers	1	INPUT	Word (reg. addr. 0..20)
5	Write Single Coil	1	OUTPUT	Bit (bit addr. 16384..16543)
6	Write Single Register	1	OUTPUT	Word (reg. addr. 1024..1033)
7	Read Exception Status	1	-	-
15	Write Multiple Coils	2	OUTPUT	Bit (bit addr. 16384..16543)
16	Write Multiple Registers	0	OUTPUT	Word (reg. addr. 1024..1033)
22	Mask Write Register	2	OUTPUT	Word (reg. addr. 1024..1033)
23	Read/Write Registers	2	INPUT/OUTPUT	Word

NEXUS Input Words (Data sent from NEXUS to the network/master)

NEXUS Word #	Modbus Reg. Addr.	Bit Address in Modbus Command								
0	**000**h (**0**d)	**000F**h (**15**d)	**000E**h	**000D**h	**000C**h	…	**0003**h	**0002**h	**0001**h	**0000**h (**0**d)
1	**001**h (**1**d)	**001F**h (**31**d)	**001E**h	**001D**h	**001C**h	…	**0013**h	**0012**h	**0011**h	**0010**h (**16**d)
2	**02**h (**2**d)	**002F**h (**47**d)	**002E**h	**002D**h	**002C**h	…	**0023**h	**0022**h	**0021**h	**0020**h (**32**d)
3	**03**h (3d)	**003F**h (**63**d)	**003E**h	**003D**h	**003C**h	…	**0033**h	**0032**h	**0031**h	**0030**h (**48**d)
…	…	…	…	…	…	…	…	…	…	…
NEXUS Word Format ->		**Bit 15**	**…**	**(MSByte)**	**…**		**…**	**(LSByte)**	**…**	**Bit 0**

Note: The above table only shows the beginning of the data that is sent from the AMCI Nexus unit to the network. The total number of words sent will vary with the type of Nexus unit. Please check the unit's user's manual to determine the exact number of words. The manual will also show the function of the Input Words.

NEXUS Output Words (Data sent to NEXUS from the network/master):

NEXUS Word #	Modbus Reg. Addr.	Bit Address in Modbus Command								
0	**400**h (**1024**d)	**400F**h (**16399**d)	**400E**h	**400D**h	**400C**h	…	**4003**h	**4002**h	**4001**h	**4000**h (**16384**d)
1	**401**h (**1025**d)	**401F**h (**16415**d)	**401E**h	**401D**h	**401C**h	…	**4013**h	**4012**h	**4011**h	**4010**h (**16400**d)
2	**402**h (**1026**d)	**402F**h (16431d)	**402E**h	**402D**h	**402C**h	…	**4023**h	**4022**h	**4021**h	**4020**h (16416d)
3	**403**h (**1027**d)	**403F**h (16447d)	**403E**h	**403D**h	**403C**h	…	**4033**h	**4032**h	**4031**h	**4030**h (16432d)
…	…	…	…	…	…	…	…	…	…	…
NEXUS Word Format ->		**Bit 15**	**…**	**(MSByte)**	**…**		**…**	**(LSByte)**	**…**	**Bit 0**

Note: The above table only shows the beginning of the data that is sent from the network to the AMCI Nexus unit. The total number of words sent will vary with the type of Nexus unit. Please check the unit's user's manual to determine the exact number of words. The manual will also show the function of the Output Words.

MODBUS uses a 'Big-Endian' representation for addresses and data items. This means that when a numerical quantity larger than a single byte is transmitted, the most significant byte is sent first. For each register, the first byte contains the high order bits and the second contains the low order bits.

Supported Modbus Exception Codes:

Code	Name	Description
01	Illegal function	The module does not support the function code in the query
02	Illegal data address	The data address received in the query is outside the initialized memory area
03	Illegal data value	The data in the request is illegal

File: Nexus_modbus.doc

Date: 12/4/09