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AnyBus-Communicator for Profibus and ABB C100

Application Note

Rev. 1.0

About this application note:

This application note describes how to configure an ABB C100 Temperature Regulator together with an AnyBus-Communicator for Profibus-DP on a Profibus Network. The contents describe step by step how a configuration is done. AnyBus Communicator will be referred as "ABC" in this document.

This document assumes that the reader is familiar with serial communication, Profibus networks and PLC architecture.



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History

Revision	Date	Description	Responsible
0.1	2002-03-10	Created	TTH & STD
1.0	2002-04-02	Language corrections, minor technical issues updated	ANH



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1 Requirement & Documentation

Description	Name / Type	Version
ABB Commander C100	C100/0310/STD	
AnyBus Communicator Profibus (ABC-PDP)	AB7000	n.a.
RS422 cable (to connect C100 with ABC/PDOP serial port)	n.a.	n.a.
ABC Installation Pack (Config Cable and ABC Config Tool Software running on a PC)	017620	n.a.
GSD file for the ABC-PDP (ABS-PDP)	HMS_1803.GSD	1.0
AnyBus-Communicator User Manual	SDM-7061-059	1.00
AnyBus-S Fieldbus Appendix Profibus	ABS-PDP-1.2	1.2
Profibus standard cable	n.a.	n.a.
Profibus D-SUB contacts	n.a.	n.a.
Power supply 24VDC	n.a.	n.a.
PLC (or PC based) system with a Profibus Master	n.a.	n.a.



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1.1 System configuration

The scope of this Application Note is to show how simple it is to set-up a device with a serial ModBus port to a Profibus network, using the AnyBus Communicator, ABC, for Profibus-DP.

This Application Note describes how to set up the communication with some of the parameters in the ABB Commander C100 Device. However, this document can be used as a guideline describing the general functionality of AnyBus Communicator.

Profibus-DP and PLC programming will not be covered in detail by this application note. For a detailed Application Note about how to configure a Profibus Network by using a Siemens PLC, see other Application Notes on www.hms-networks.com



Figure 1 ABB Commander C100



Figure 2 AnyBus Communicator for Profibus-DP

The Application Note describes how to set up the following data for the ABB Commander C100:

- Change the reference in "Local Set Point" (Input Register #42) to 12.8 % and 51.2 % (using Modbus command 0x06).
- Verify that the C100 regulator (after a while) responds to the new set point by returning the same value in "Process Variable" (Output Register #12) (using Modbus command 0x03).
- Read the "Output Value" from the regulator (Output Register #14) (using Modbus command 0x03).

The write command returns data in the response, and this data should not be visible from the Fieldbus. Also, the write commands should only be sent if the data from the Profibus master has changed.

If the ABC detects a timeout while talking to the regulator, you should tell it to try to re-establish the communication four times before it considers the regulator to missing, and then try again after 8 seconds.

The serial communication parameters should be set to 9600 bits per second, even parity, 1 stop bit and 8 data bits. The physical interface should be set to RS422.

2 System configuration

Below an overview of the system configuration described in this document can be found. Other Profibus nodes may be attached to the network, but are not mandatory.

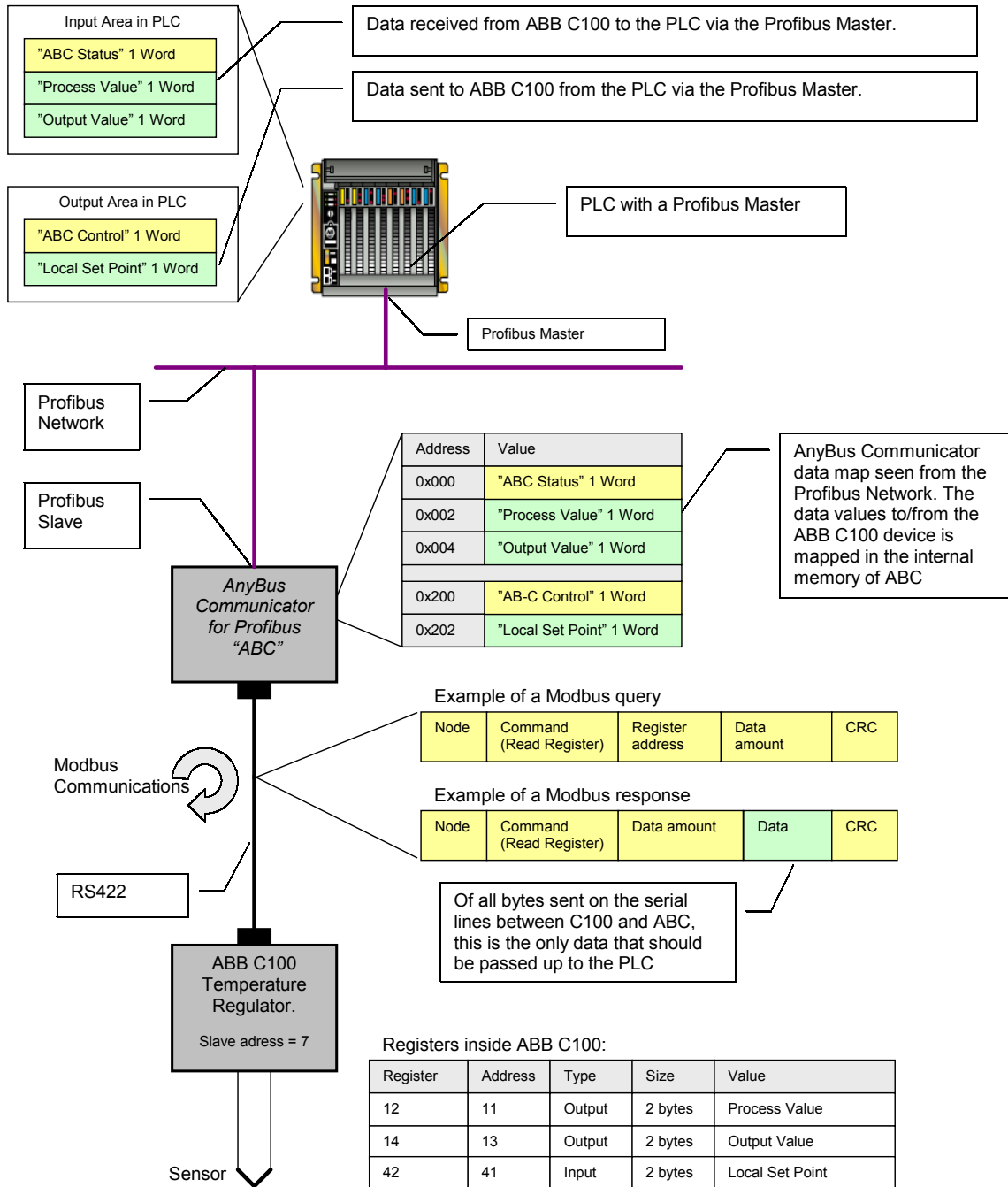


Figure 3 System overview



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3 ABC subnet configuration/C100 Network Set-up

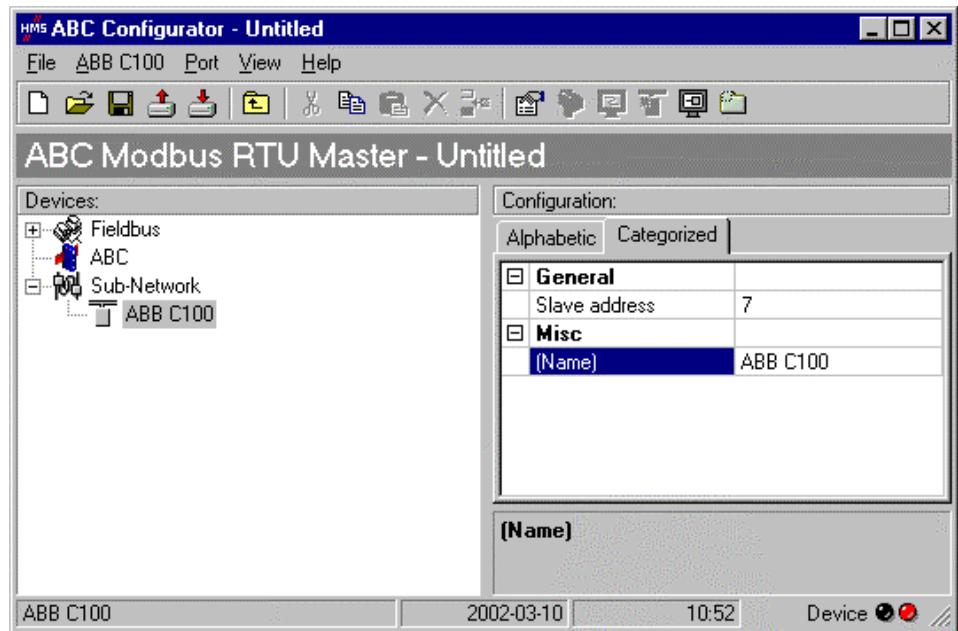
There are several ways to build a correct and working configuration for the ABC, and this document only shows one of them. It is assumed that the reader has some basic knowledge of the Modbus RTU protocol, the basic properties of Profibus and serial communication.

1.1.1 Start up of ABC and ABC Config Tool Software

Install the ABC Config Tool software on the PC. Connect the serial port of ABC Profibus to the C100 and the PC via the configuration cable. Power it up and start the ABC Config Tool software on the PC.

If everything works correctly, the ABC Config Tool should see the ABC and automatically detect the Fieldbus type. If this is not the case, check that the correct serial port is selected in the ABC Config Tool. Otherwise manually set the Fieldbus type to "Profibus-DP" (click on "Fieldbus" in the "Devices" tree, and then choose "Profibus-DP" from the "Fieldbus type" drop list).

A new name, such as "ABB C100", can be assigned to the slave node if desired. This is done by clicking on "New node" in the "Devices" tree and then enter a new name in the "Name" box in the "Configuration" pane. While changing the slave name, also check that the "Slave address" is correct. Our application uses Address 7 as a slave on the Modbus network.





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The ABC needs some information about the sub-net in order to do its job, so let us take a look at it. Click on the “Sub-network” in the “Devices” tree. There are now a couple of parameters to set, so compare them with the instructions given earlier and adjust them where necessary. Note that the “Message delimiter” should not be adjusted - leave it at zero.

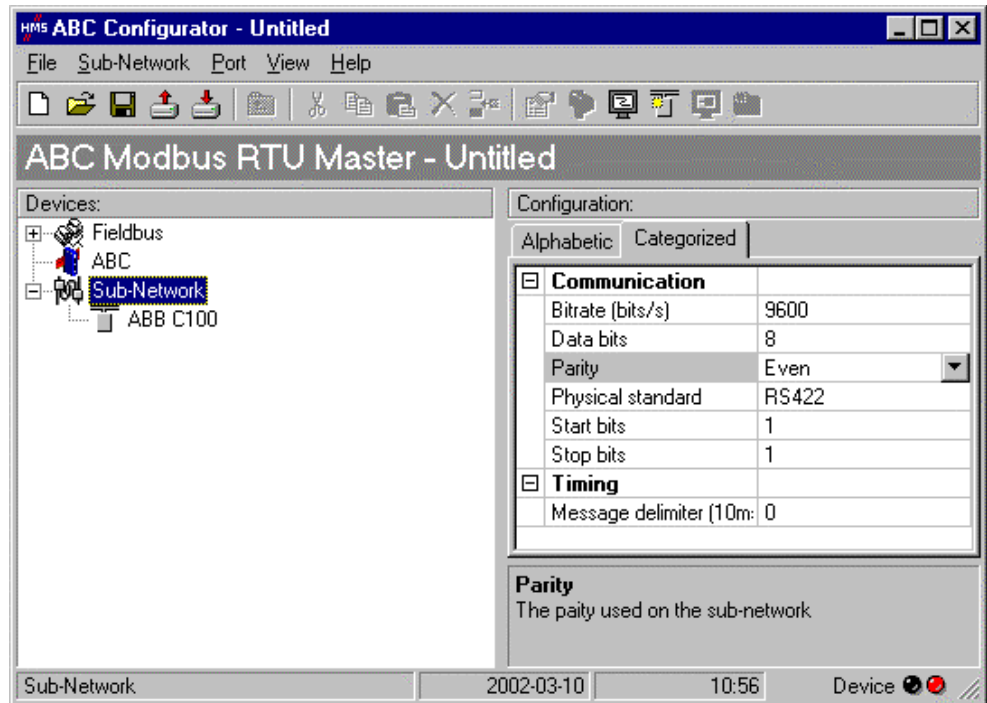


Figure 4 Overview of Sub-network settings

1.2 Adding some commands

The ABC needs to be told what to do with the data on the sub-net. For this purpose a scan list needs to be built for it. As mentioned before,


there are three points listed that each will give one Modbus command:

- “Change the reference (the Local Set Point) to 12.8 % and 51.2 % (using Modbus command 0x06).” The write command returns data in the response, and this data should not be visible from the Fieldbus. Also, the write commands should only be sent if the data from the Profibus master or the Modbus/TCP software has changed.
- “Verify that the C100 regulator (after a while) responds to the new set point by returning the same value in Process Variable Input (using Modbus command 0x03).”
- “Read the Output Value from the regulator (using Modbus command 0x03).”

The ABB C100 manuals has some more information about what registers that need to be read from or written to. The “Process Variable” and the “Output 1” is available in register 12 and 14, the “Local Set Point” is available in register 42.

Based on this information, the Modbus Command between the ABC and the C100 device can now be set up.

Begin by adding the first command. Right-click on the node in the device tree, and choose “Add Command” in the menu. In the new window double-click on “Preset Single Register” (command 0x06), since this is the command that we elect to use.

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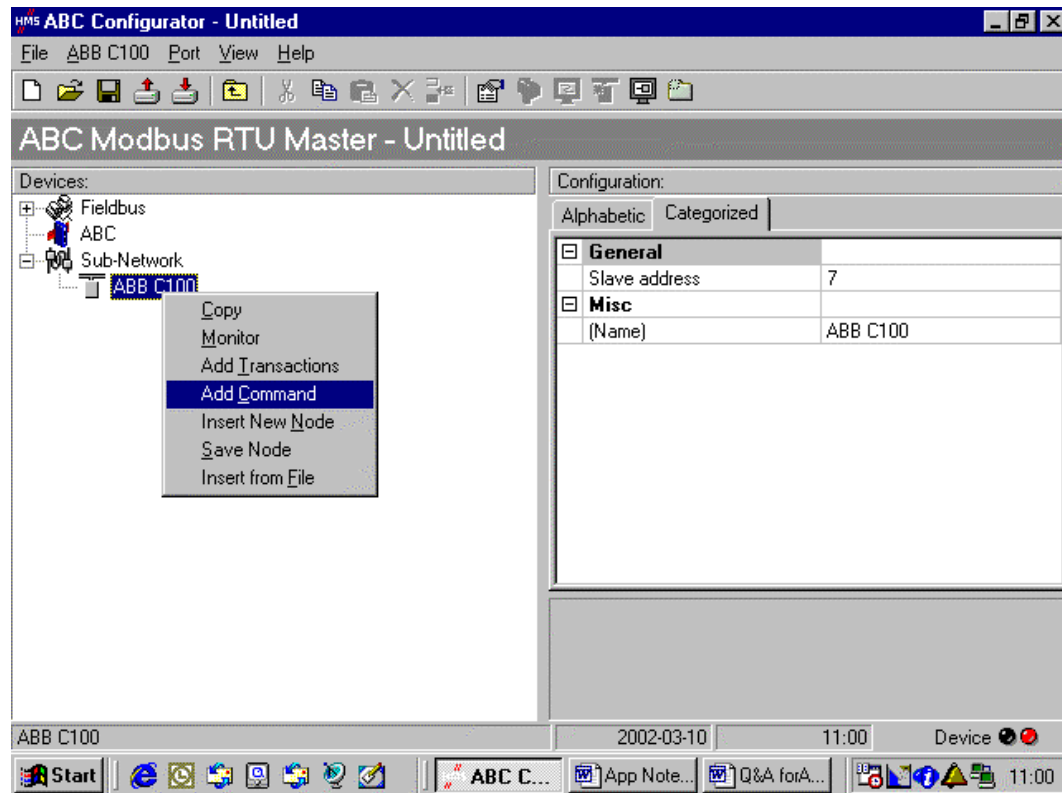


Figure 5 How to access the Command Window

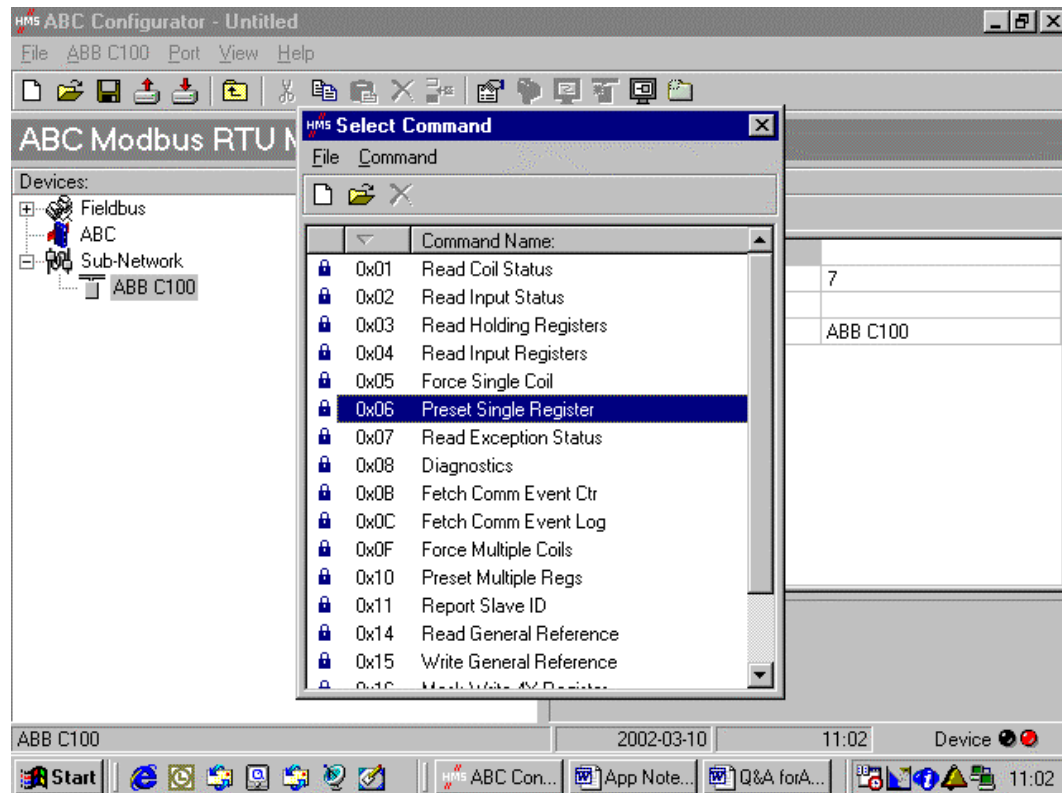


Figure 6 Overview of the Modbus Commands



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Now, expand the command, and click the “Query”. There are some things that should be changed here, the first one being the “Update Mode”. As stated earlier, this message should only be sent when the data from the master has changed, so change this setting from “Cyclically” to “On data change”. The “Retries” should also be changed to 4 and the “Reconnect time” should be changed to 800. Now expand the query and change the “Registers” and “Preset data”.

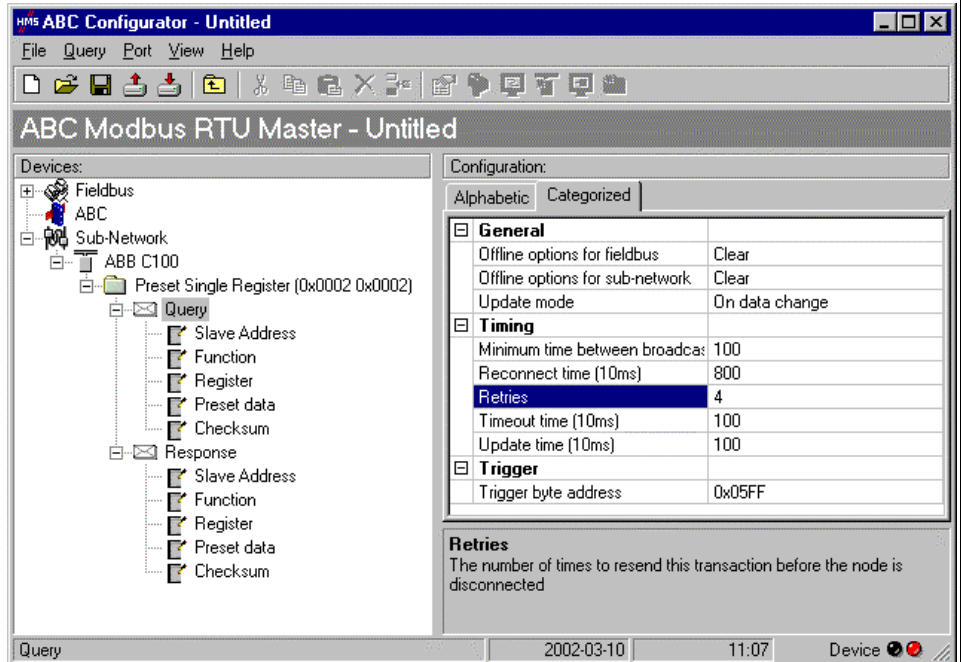


Figure 7 Overview of a Modbus Command – Query Settings

The ABB C100 manual states that register 42 should be read, so enter 41 in the “Register” field (yes, 41 - the ABC uses absolute addresses instead of register numbers, and the absolute address equals the register number minus one).

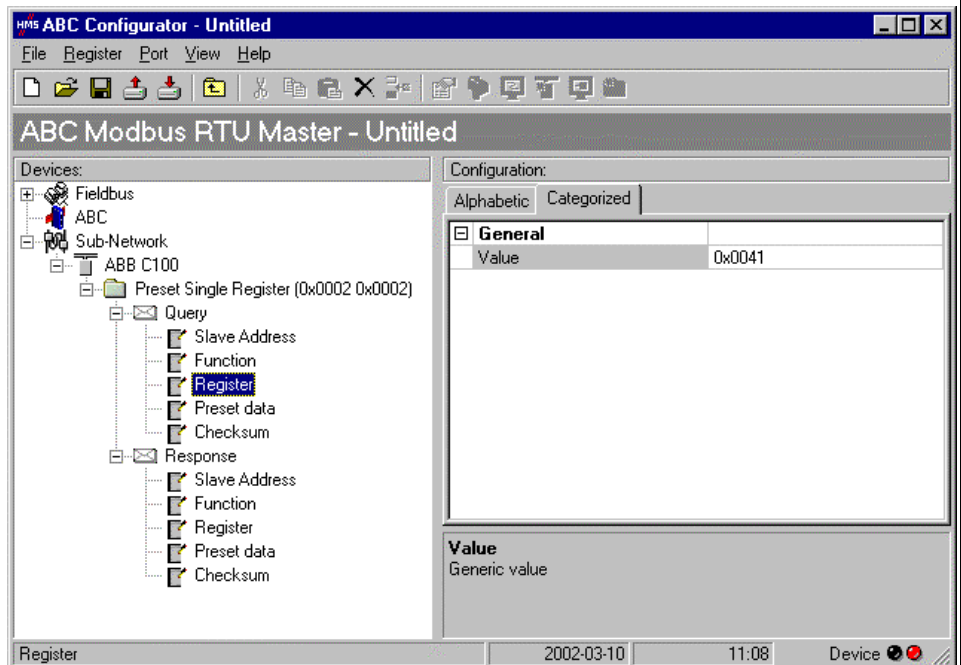


Figure 8 Overview of a Modbus Command – Query Register



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The “Preset data” also needs to be changed, one register is being written to and the data is taken from the output area in the ABC, so the “Data length” should be set to 2 (one word is being written), and the “Data location” should be set to 0x0202 (bytes 02 and 03 are being used in the output area).

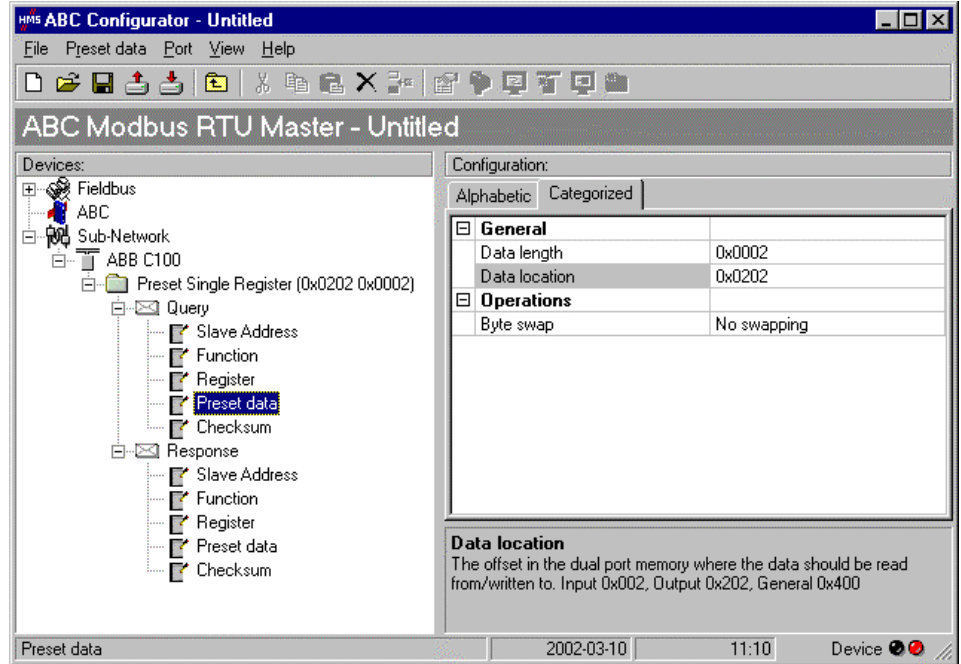


Figure 9 Overview of Modbus Command – Query Preset Data

The response should follow the same configuration, with the exception that the “Data location” should be 0x400. The data in the response is not needed, and to avoid cluttering the bus with it, the general area is written to instead of the input area - this data block is thus being “discarded”.

The internal data area of the ABC at address 400 and above can be used as a general “scratch pad”. The data in this area is not transferred up to the Fieldbus.

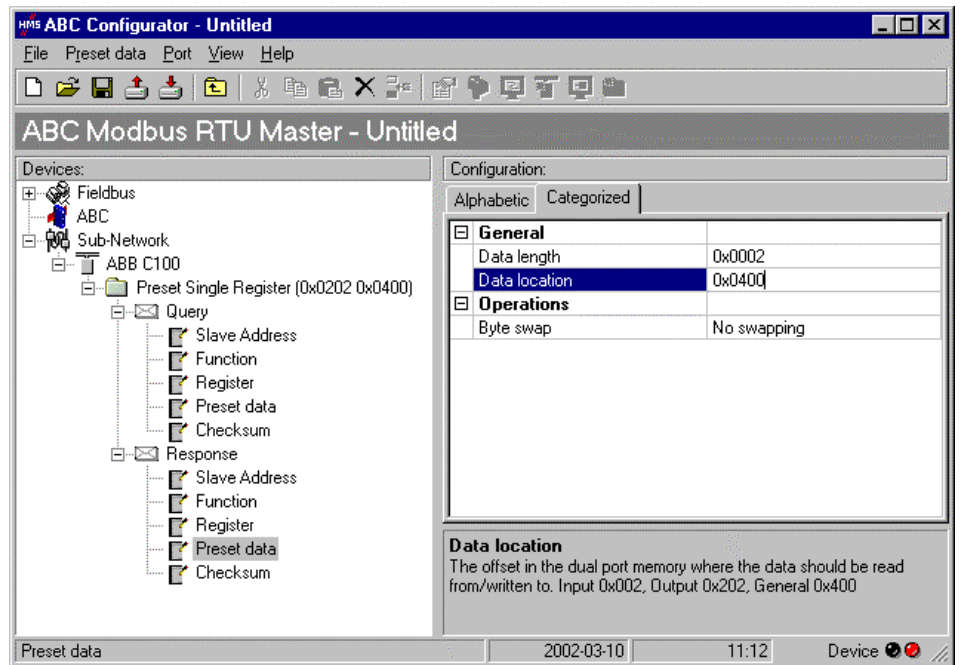


Figure 10 Overview of Modbus Command - Response



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The same rules and the same method are used for the other two registers. Add the command and adjust the timing parameters, the addresses, the register amount, the data lengths and the data locations.

The first Output Register (“Process Value”) should be a “Read Holding registers” that is starting on address 11, reading one register (which means that the “Number of points” should be 1 and the “Byte count” should be 2) and places the data in location 0x002 in the ABC (bytes 02 and 03 in the input area).

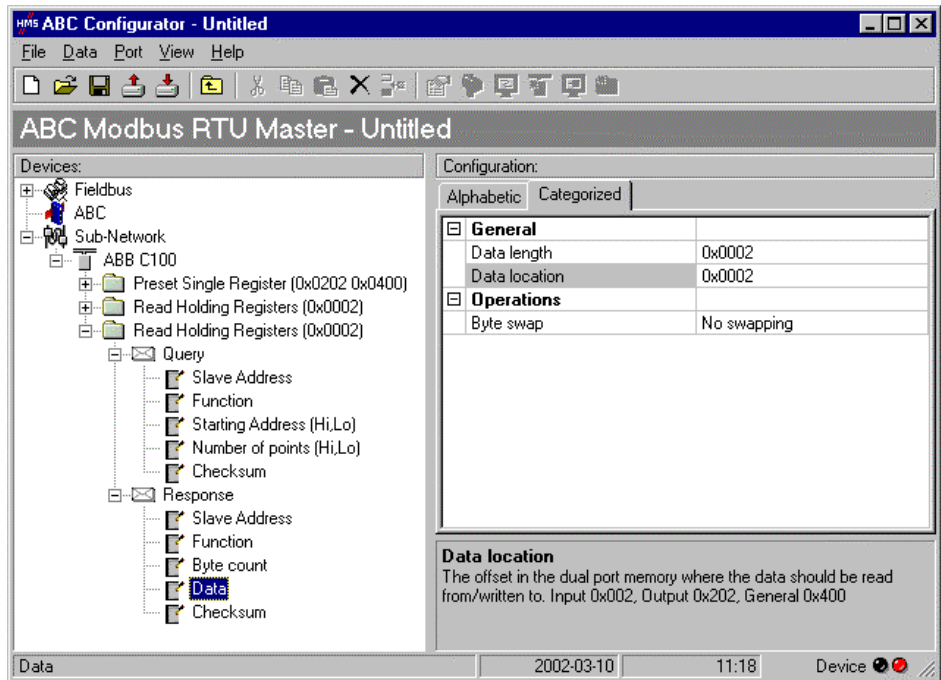


Figure 11 Overview of Modbus Command – Read Holding Registers

The second Output Register (“Output Value”) should also be a “Read Holding registers”. It should start on address 12, reading one register (“Number of points” and “Byte count” is also 1 and 2 respectively) and it should place the data in location 0x004 in the ABC (bytes 04 and 05 in the input area).

When all of this data is entered, take a moment to double-check that it actually is entered correctly. Using the address map (right-click on the “Sub-network” and choose “Monitor”) to check for any collisions may also be a good idea.

You can also enable/disable the view for each Command.

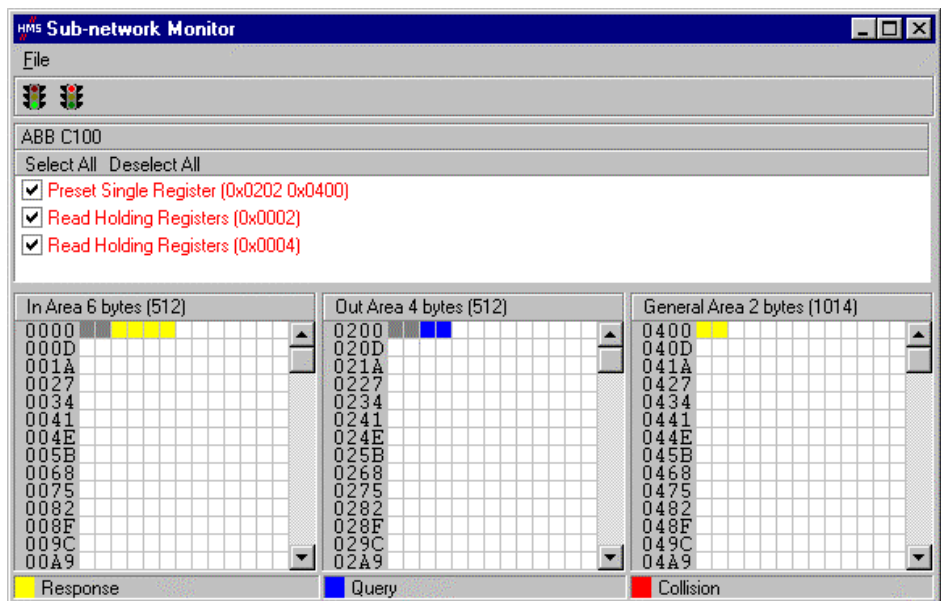


Figure 12 Overview of Sub-network monitor



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4 Download the Configuration

When the configuration is finished, it is time to download it. Before make a download it can be wise to save your configuration.

If the ABC was automatically detected when the ABC Config Tool was started (if the indicator light in the lower right corner is green), then just go ahead and press the download icon in the toolbar. Otherwise, verify that the correct serial port is selected before beginning the download. If the ABC does not respond to the download, check that all connections are ok and that the port selection is valid. On some laptop computers it might be worth trying the other serial port. Also make sure that no other programs (such as any PLC communication drivers) are blocking access to the serial ports.

5 Profibus Network Set-up

1.2.1 Profibus set up

The Profibus Slave address must be set using the two rotary switches on ABC.

Note that the last devices (end devices) on the Profibus network must be terminated. Many Profibus D-SUB connectors are equipped with a built-in termination switch.

1.2.2 Importing the GSD file

It is necessary to import the file HMS_1003.GSD to the ABC Config Tool tool in order to include the ABC as a slave on the Profibus network. This GSD file describes the AnyBus-S module that is used inside of ABC as a Profibus-DP interface card. Please refer to the User Manual of the selected Fieldbus Master for more details.

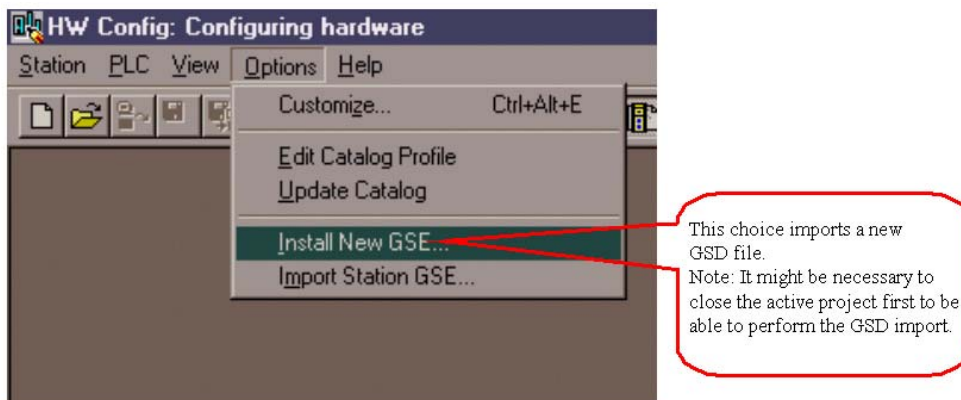


Figure 13 Install a new GSD file in "HW Config"



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6 Enable ABC to start communication

For safety reasons the ABC will not start communicate on the sub-network before the PLC sets the start bit in the ABC command register (first data Word from the ABC).

The PLC must set bit X of this register 000 in ABC. This will start the sub network communication and the C100 will be able to communicate with ABC.

7 More information about the network and products

- The latest manuals and GSD file for the AnyBus-S module can be found on the HMS homepage www.hms-networks.com
- The Profibus User Organization web page: www.profibus.com. Several technical guides are available in or via this page.
- ABB Commander C100 information in PDF-format: [ABB C100 information](#).

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