ENGLISH

Anybus® CompactCom™ Adapter Board for STM32 Nucleo™

INSTALLATION GUIDE

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Important User Information

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Contact Information
Postal address:
Box 4126
300 04 Halmstad, Sweden

E-Mail: info@hms.se

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1. Preface

1.1. About This Document

This document is intended to provide a good understanding of how to install and get started using the Anybus CompactCom adapter board for Arduino UNO-type connector together with an STM32 Nucleo board.

The reader of this document is expected to be familiar with hardware design and communication systems in general. For additional related documentation and file downloads, please visit www.hms-networks.com.

1.2. Related Documents

Document	Author	Document ID
Anybus CompactCom 40 Hardware Design Guide	HMS	HMSI-216-126
Anybus CompactCom 40 Software Design Guide	HMS	HMSI-216-125
Anybus CompactCom Host Application Implementation Guide	HMS	HMSI-27-334
Anybus CompactCom 40 Network Guides (separate document for each supported fieldbus or network system)	HMS	-

1.3. Document History

Version	Date	Description
1.0	2024-09-26	Initial release

1.4. Trademark Information

Anybus® is a registered trademark of HMS Industrial Networks AB.

Arduino® is a registered trademark of Arduino SA.

STM32 Nucleo™ is a trademark of STMicroelectronics International NV.

STM32Cube™ is a trademark of STMicroelectronics International NV.

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1.5. Document Conventions

Lists

Numbered lists indicate tasks that should be carried out in sequence:

1. First do this
2. Then do this

Bulleted lists are used for:

- Tasks that can be carried out in any order
- Itemized information

User Interaction Elements

User interaction elements (buttons etc.) are indicated with bold text.

Program Code and Scripts

```
Program code and script examples
```

Cross-References and Links

Cross-reference within this document: Document Conventions (page 1)

External link (URL): www.hms-networks.com

Safety Symbols

DANGER
Instructions that must be followed to avoid an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING
Instructions that must be followed to avoid a potential hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION
Instruction that must be followed to avoid a potential hazardous situation that, if not avoided, could result in minor or moderate injury.

IMPORTANT
Instruction that must be followed to avoid a risk of reduced functionality and/or damage to the equipment, or to avoid a network security risk.

Information Symbols

NOTE
Additional information which may facilitate installation and/or operation.

TIP
Helpful advice and suggestions.

2. Getting Started

2.1. General Information

There are numerous microcontroller development boards that incorporate the Arduino UNO-type Rev3 connector, with which the Anybus CompactCom can be evaluated. For these types of boards Anybus provides an adapter board to enable a simple hardware interface towards the Anybus CompactCom module. Along with the adapter board comes a version of the Anybus host application example code ported to the STM32 Nucleo H753ZI board. The host application example code contains a driver for the CompactCom 40-series and an example of a simple host application to help a developer get started.

2.1.1. Disclaimer

The Anybus adapter board is not tested, nor verified, for integration into commercial products. The intended use is for the evaluation of the Anybus CompactCom.

3. Starter Kit Contents

- Anybus CompactCom adapter board compatible with Arduino UNO-type Rev3 female connectors

4. Required Items

The following items are required, but not included in the starter kit.

Hardware:

- Anybus CompactCom 40 module
- Network cable for Anybus CompactCom
- STM32 Nucleo H753ZI board
- MicroUSB cable for ST-Link
- Power supply 7-12 VDC / ≥1.5A (shall connect to 0.64mm square pins)
- Computer (to run STM32Cube IDE)

Software

- **HMS Networks Software**
  - Host Application Example Code (zip file downloaded from www.hms-networks.com) version 3.08 or later.
- **Third Party Software**
  - STM32CubeIDE

5. Hardware Overview

5.1. Connectors

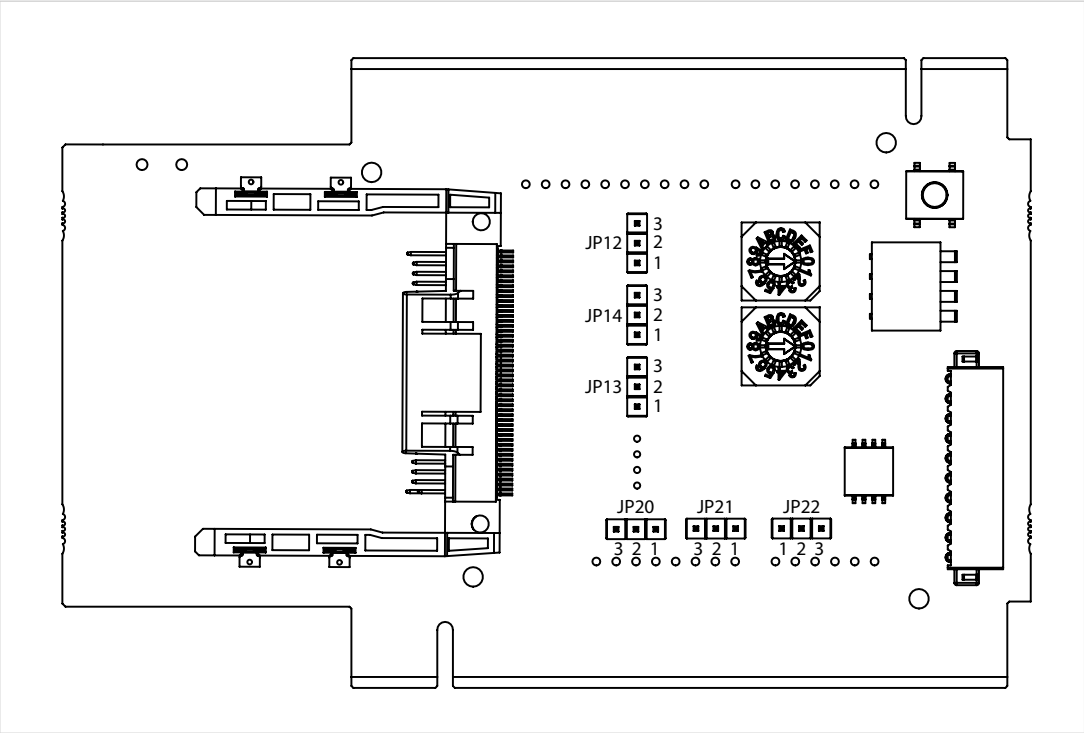

Figure 1. Top view of the adapter board with jumper (JP) headers marked

The adapter board incorporates six jumper headers that are marked in Top view of the adapter board with jumper (JP) headers marked (page 6). Adapter Board Jumper Descriptions. (page 6) describes the function of each jumper.

Table 1. Adapter Board Jumper Descriptions.

Item	Description	Recommendation
JP12	Functionality not relevant.	Leave open
JP13	Functionality not relevant.	Leave open
JP14	Functionality not relevant.	Leave open
JP20	1-2: Powers the Nucleo board with 3.3V from the adapter board's onboard voltage regulator via the Arduino UNO connector. **Not recommended.** 2-3: No effect (pin 3 is not connected).	Leave open
JP21	1-2: Supplies the onboard voltage regulator from the Arduino UNO "Vin" power rail. 2-3: Supplies the onboard voltage regulator from the Arduino UNO "5V" power rail.	1-2
JP22	Pin 1: Can be used to supply external power (7-12V, ≥1.5A) to the Arduino UNO "Vin" power rail. Pin 2: Not connected. Pin 3: Ground.	Connect external power (7-12V, ≥1.5A) to pin 1 (positive) and pin 3 (negative).

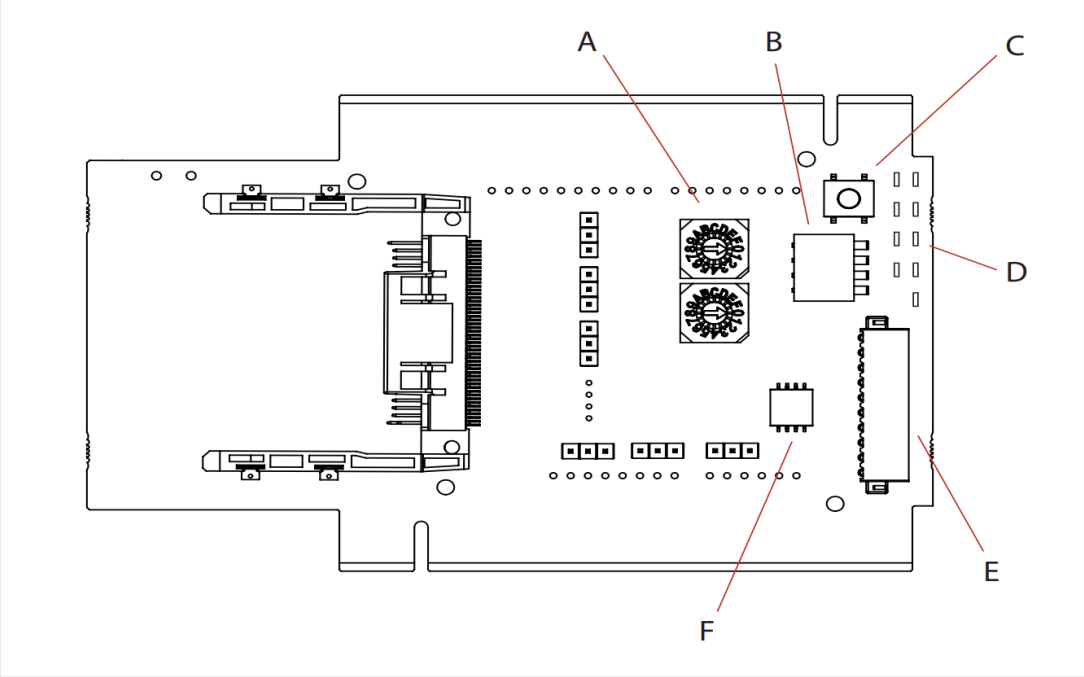

Figure 2. Top view of the adapter board with peripherals marked

The adapter board incorporates numerous I²C peripherals described in Adapter Board Jumper Descriptions. (page 7) that the host application can utilize. The host application example code port for STM32 Nucleo is prepared for this and contains the functions `ABCC_SYS_Refresh_I2C_In()` and `ABCC_SYS_Refresh_I2C_Out()` to refresh the values of the I²C peripherals and stores them in the structs `I2C_InputsTag` and `I2C_OutputsTag`.

Table 2. Adapter Board Jumper Descriptions.

Item	Name	Description
A	2 Hex switches (General Purpose)	These general-purpose rotary switches are read via I²C address 0x27. Hex 1: bit 0-3. Hex 2: bit 4-7.
B	Dip switch (General Purpose)	This general-purpose dip switch is read via I²C address 0x26, bits 0-3.
C	IRQ button	Pressing this button pulls the RESTART_N signal low. In the host application example code, it is used to reset the CompactCom.
D		4 GP (General Purpose) LEDs, addressed via I²C address 0x26, bits 8-11. 2 MI (Module Identification) LEDs, addressed via I²C address 0x26, bits 12-13. 2 MD (Module Detection) LEDs, addressed via I²C address 0x26, bits 14-15. See the Anybus CompactCom 40 Hardware Design Guide for more information about the MI and MD pins. 1 POW (power) LED.
E	IO block	General purpose IO, addressed via I²C address 0x27, bit 8-13.
F	Dip switch (Operating Mode)	This operating mode dip switch is read via I²C address 0x26, bits 4-7. Configure this to OM[3, 2, 1, 0] = [0, 0, 0, 1] to use the SPI host interface.

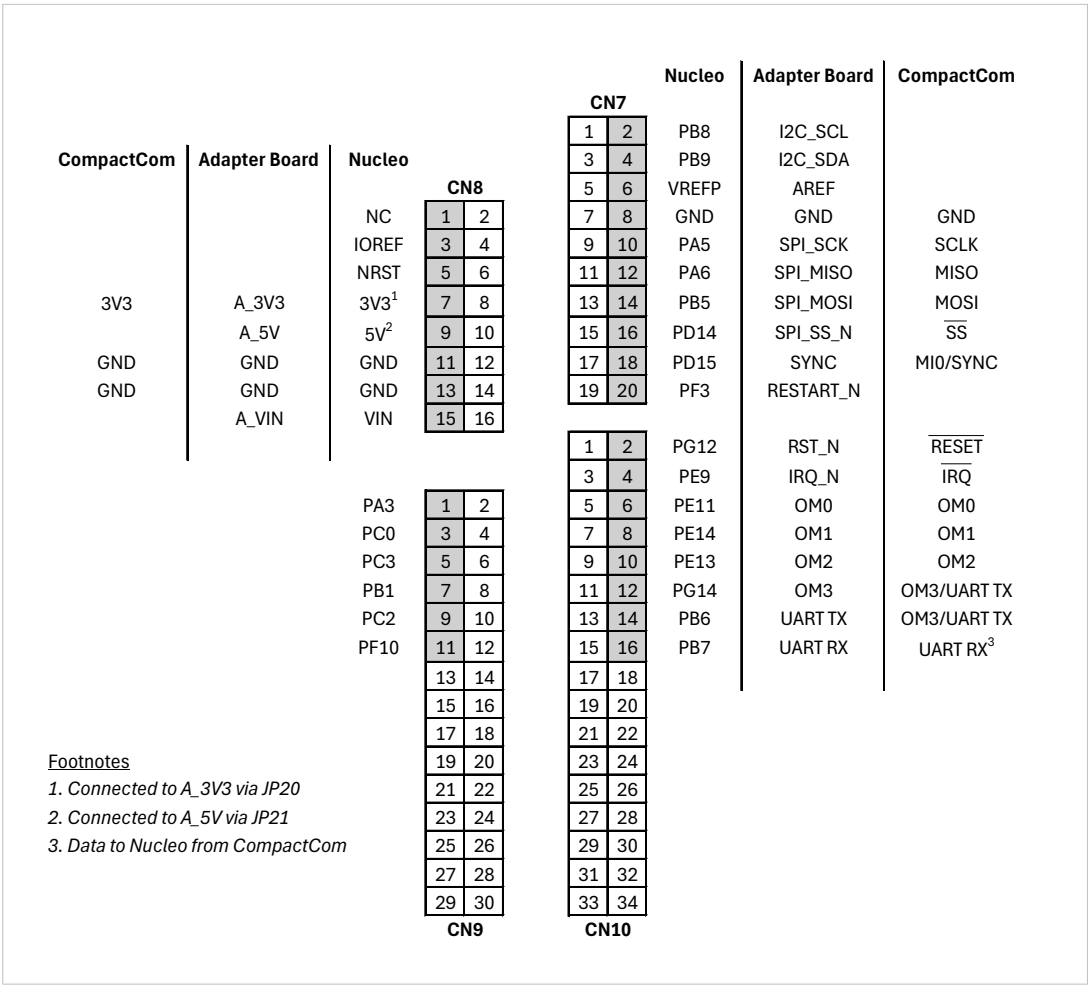

Figure 3. STM32 Nucleo Zio connector pins used by the Anybus CompactCom adapter board

The host application example code port for the STM32 Nucleo board, in combination with the Anybus CompactCom adapter board, uses the pins of the Nucleo's Arduino UNO-type connector as shown in Figure 3. See the schematic in *`Projects/nucleo-h743zi2_m00765_cubeide/Doc/M00765-1_1_1-Sch.pdf`* for further details.

5.2. Assembly

Figure 4. Assembly of adapter board and STM32 Nucleo-H753ZI

An assembled stack of the adapter board and STM32 Nucleo is shown in Assembly of adapter board and STM32 Nucleo-H753ZI (page 9).

5.3. System Setup

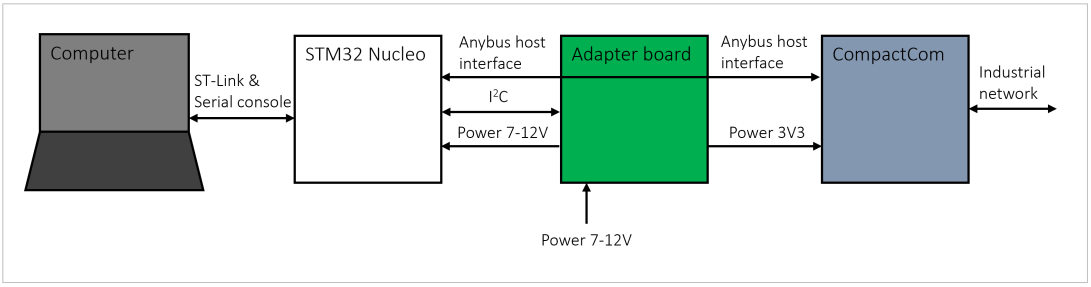

Figure 5. Block diagram of hardware system setup.

A basic block diagram of how the system can be set up is presented in Block diagram of hardware system setup. (page 9).

6. Configuration

6.1. Setting Up the Development Environment

The instructions below are an example of how to set up the development environment. Be advised that in specific circumstances the instructions might not be applicable.

1. Begin with the hardware configurations of the adapter board by:
   a. Bridging pins 1 and 2 on jumper JP21.
   b. Setting OM[0] high and OM[1-3] low on switch S4.
   c. Connecting positive power (7-12V) to pin 1 and ground to pin 3 on jumper JP22. (Do not enable power yet.)
   d. Making sure that pins on jumper JP20 are not bridged.
   e. Setting operating mode to SPI by setting dip switches S4 to OM[0, 1, 2, 3] = [1, 0, 0, 0].

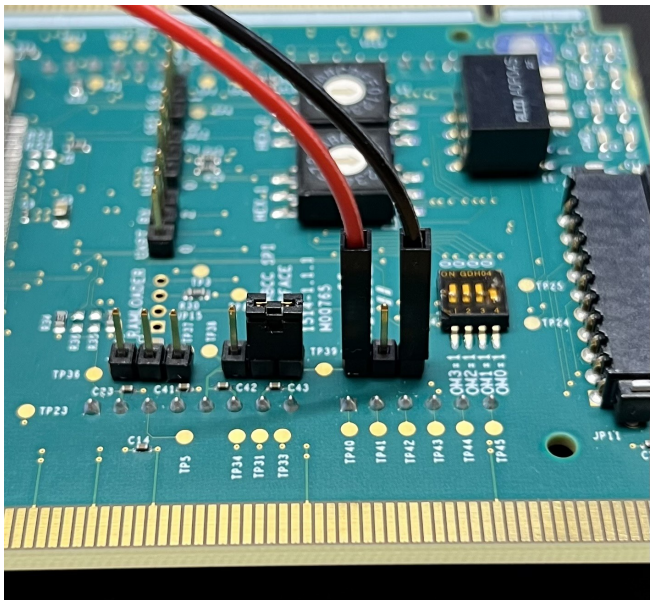

Figure 6. Adapter board hardware configuration example

2. Connect a CompactCom 40 module to the CompactFlash connector on the adapter board.

3. Configure the STM32 Nucleo board's hardware by:
   a. Bridging only pins 3 and 4 on jumper JP2 on the Nucleo board to select VIN as power source. This will make the Nucleo receive power from jumper JP22 on the adapter board.
   b. Bridging pins 1 and 2 on jumper JP5 on the Nucleo board to select VDD as 3V3.
   c. Making sure that all solder bridges are in the default configuration.

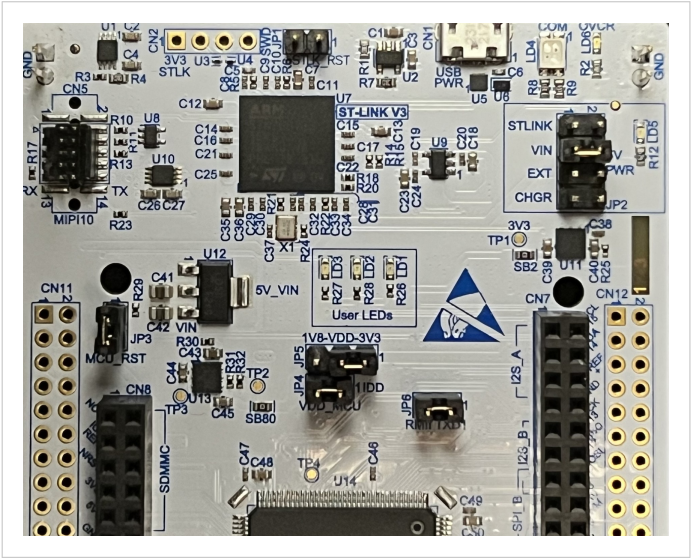

Figure 7. STM32 Nucleo board jumper configuration example

4. Connect the adapter board to the STM32 Nucleo board.
5. Enable power (7-12V) to JP22 on the adapter board, then connect the Nucleo board to the computer via the ST-Link micro USB port (CN1).
6. Run STM32CubeIDE on a computer by opening the *`Projects/nucleo-h743zi2_m00765_cubeide/.project`* file.
7. In STM32CubeIDE, navigate to **Project→Properties→Run/Debug Settings**. Select the project name and press **Edit**. In the **Edit Configuration** window, navigate to **Debugger→Interface** select ST-LINK S/N, then press **Scan**. The serial number of your ST-Link should appear. Press **Apply**.
8. Compile and run the project. The CompactCom should now start up.

7. Host Interfaces

The supported CompactCom host interfaces for the STM32 Nucleo board are SPI and serial (UART). The host interface is chosen by dip switch S4, or in *abcc_adapt/abcc_drv_cfg.h* in the Host Application Example Code, see the Anybus CompactCom 40 Host Application Implementation Guide for more information.

The SPI interface has a higher data rate than the serial interface and supports more CompactCom functionality. The serial interface is not recommended for new implementations.

8. Example Application

8.1. Debug

The host application example code can print debug events over a serial port. The same COM-port used for the ST-Link can be utilized to read these printouts by opening up a serial connection with a tool such as PuTTY with the settings in Serial connection settings for debug printouts (page 13).

Table 3. Serial connection settings for debug printouts

Setting	Value
Speed	115200 baud
Data bits	8
Stop bits	1
Parity	none
Flow control	none

8.2. Develop

For more information on how to customize and extend the simple host application in the host application example code, see the Anybus CompactCom 40 Host Application Implementation Guide.

9. Industrial Network Communication

Communicating on an industrial network requires connecting your device to a network master, when a connection has been established successfully, the Anybus CompactCom will enter PROCESS_ACTIVE state. The course of action differs depending on the network in question and is out of the scope of this document. For more information, see the appropriate Network Guide.