![Danfoss logo]

X-Gate
How to integrate the AK2 over CANbus

This guide focuses at the current moment on the integration of the AK2 controller via CANbus to the X-Gate. For the integration of the X-Gate with a BMS, PLC, SCADA, etc., please refer to the User Guide. This guide also does not cover how to obtain ED3/ED4 or CDF files.

1. Equipment	What is needed

X-Gate + power supply 24V AC/DC

AK-PC 78x family (080Z0192) +
power supply 24 AC/DC

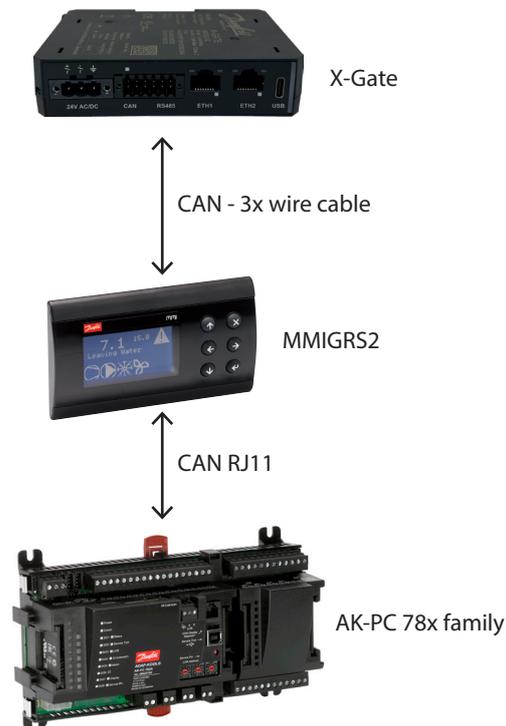Display MMIGRS2 (080G0294) + ACCCBI Cable
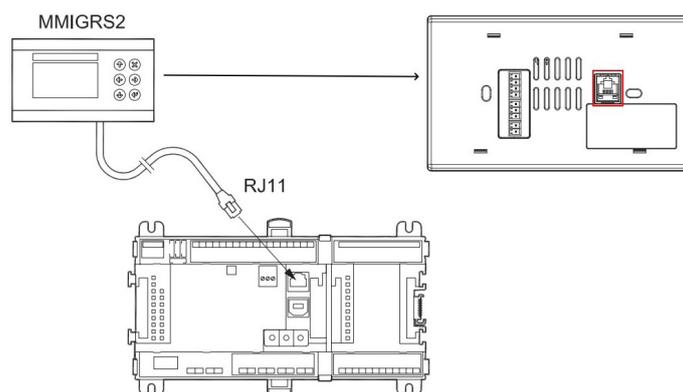Telephone (080G0076)

Cables for the wiring

2. Wiring with the MMIGRS2   General overview

X-Gate

CAN - 3x wire cable
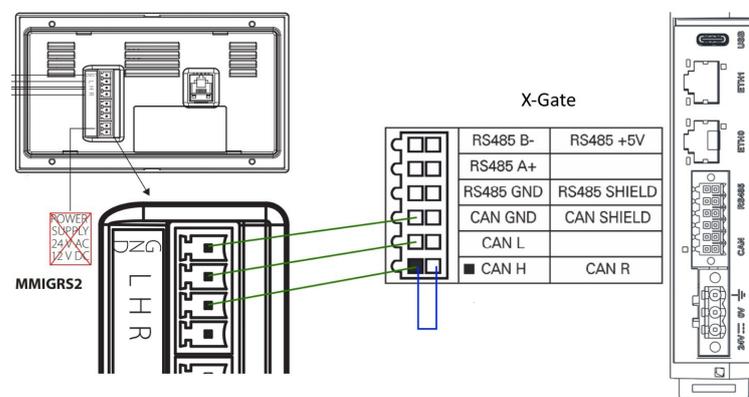
MMIGRS2

CAN RJ11

AK-PC 78x family

2.1 Connection between AK-PC 78x family and MMIGRS2

MMIGRS2

RJ11

CANH-R connection should be done only on the first and last element of the network. AK-PC 78x is terminated internally and the last element of the network will be the X-Gate therefore do **not** terminate the display. Also do **not** connect a separate power supply for the display. Supply comes directly from the controller via cable.

2.2 Connection between MMIGRS2 and X-Gate

Terminate the CANH-R on the X-Gate. Do **not** connect a separate power supply for the display.

X-Gate

RS485 B-	RS485 +5V
RS485 A+	
RS485 GND	RS485 SHIELD
CAN GND	CAN SHIELD
CAN L	
■ CAN H	CAN R

POWER SUPPLY 24 VAC 12 V DC

MMIGRS2

3. Wiring without the MMIGRS2 (direct)

Terminate the CANH-R on the X-Gate. Do **not** connect a separate power supply for the display.

X-Gate

3 wires are used from the RJ11 cable

RJ11

AK-PC 78x family
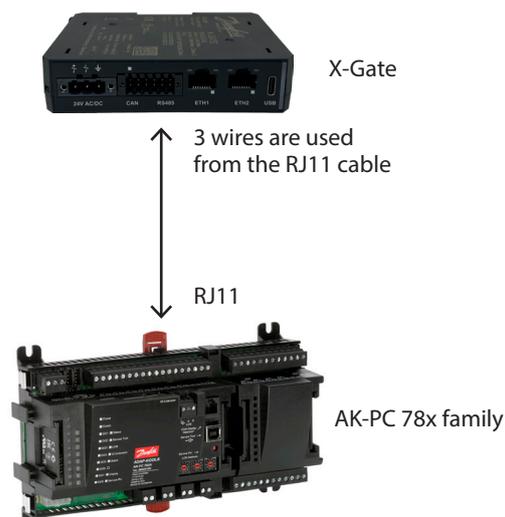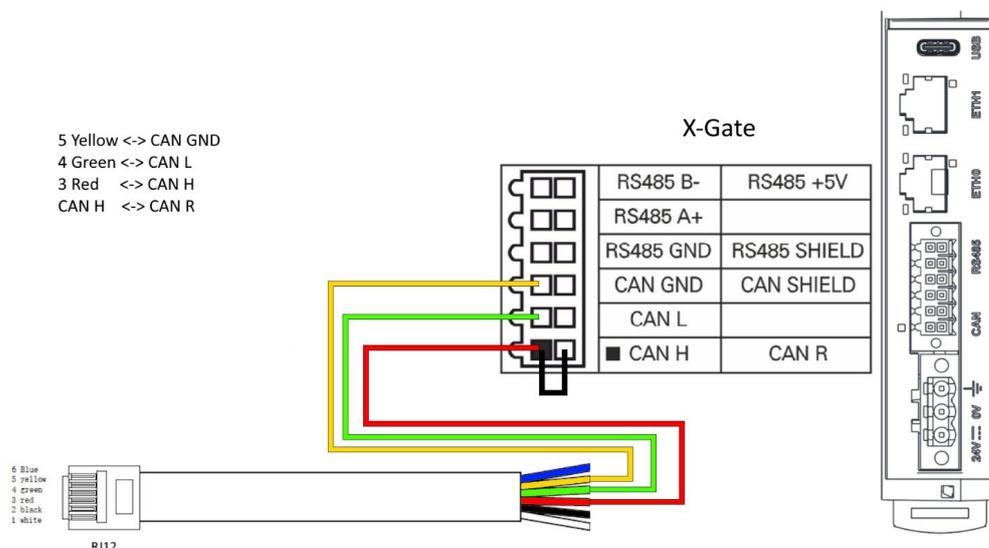
Skip chapter 4 if the MMIGRS2 is not being used.

4. Settings in MMIGRS2

Required App version: 3.29 or higher and BIOS: 1.17 or higher.
Depending on the configuration of AK-PC 78x, the main screen will appear slightly different. To access the MMIGRS2 display settings, simultaneously press ✕ the and the ↵ for a few seconds.

The BIOS displays "MCX:001" in the top right corner, indicating the AK-PC 782A's CAN address. The "50K" displayed represents the CAN baud rate. These are the default settings, and no changes are needed.

If for some reason you are seeing something different you can check the following settings:
• under "COM Selection," choose "CAN" from the available options: CAN, RS232, and RS485

- Back in the BIOS menu: Press the down arrow to access the CAN settings. These settings control various aspects of CAN communication: Node ID, Baud Rate, Active Nodes, Diagnostics, and LSS.

- In Node ID you can select the CAN address for the display itself which is as default 126. In Baudrate we need to select 50K:
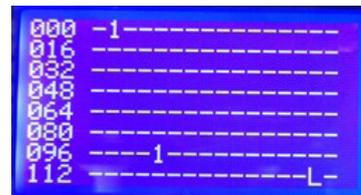

- under "Active Nodes," you can see the connected devices:

<div>

Before the X-Gate configuration   After the X-Gate configuration

</div>

5. Settings in X-Gate

5.1 Connect on the X-Gate

Type on your browser the X-Gate IP address

Ethernet ports are configured as follows:

ETH1: DHCP
By default, X-Gate will be connected to a DHCP router and your PC, for configuration purposes, must be in the same network. Identify which is the IP assigned to the X-Gate and use this IP to access the X-Gate via browser (Edge or Chrome has been recommended).

ETH2: Fixed IP 192.168.2.101
Subnet mask: 255.255.255.0
By default, it allows X-Gate can be connected directly to a PC (without a need for a router).

In case your X-Gate is already configured and its Ethernet ports have different and unknown configuration, you can use a USB-C flash drive and use this quick procedure.

Prepare the USB flash drive type C. It is recommended to have an empty USB flash drive formatted as FAT32.

Create an empty text file named as "*node_info.txt*" in save the root.
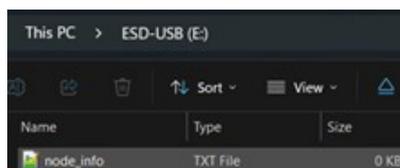
Insert the USB-C flash drive into X-Gate and wait for about minute.

The file "*node_info.txt*" will be populated with all relevant data as well as Ethernet port configuration for each port.

5.2 Logging on the X-Gate

Access your X-Gate (using the port and IP, as explained on the previous step) and log in using your credentials on the browser.

Default credentials are:
Username: admin
Password: PASS

5.3 Ensure that you have software version 5.30 or higher

Go to Settings and check the current software version. In case an older version is installed, upgrade your X-Gate prior the next steps.
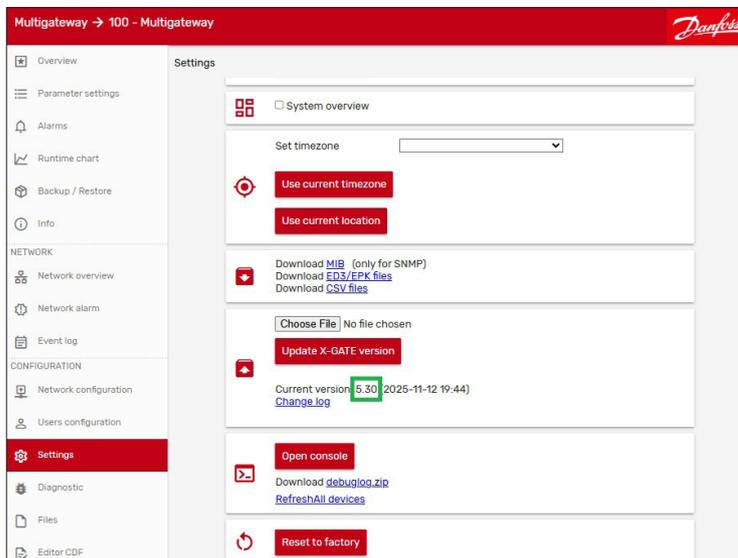
5.4 Load the CDF file for the pack controller required to connect

Identify the Danfoss code of that pack controller and its respective software version, it will be determinant to use the proper CDF file.

For this demonstration, Pack Controller is AK-PC 782B (080Z0202) and software v4.1.

Once the CDF file is available, load the CDF file you saved previously on your PC, as follows.

Go to "Files" menu and click on "UPLOAD" button, select the CDF file and it will load the CDF file into X-Gate. (ED3/ED4 files are also supported and will be converted to CDF files during this process).
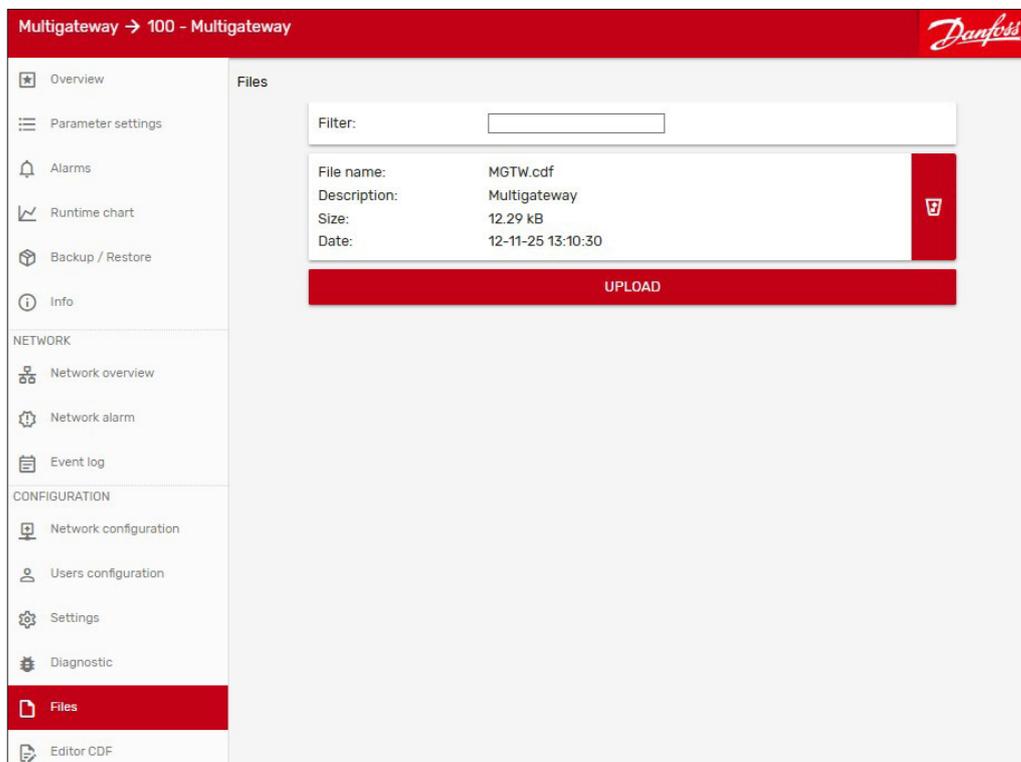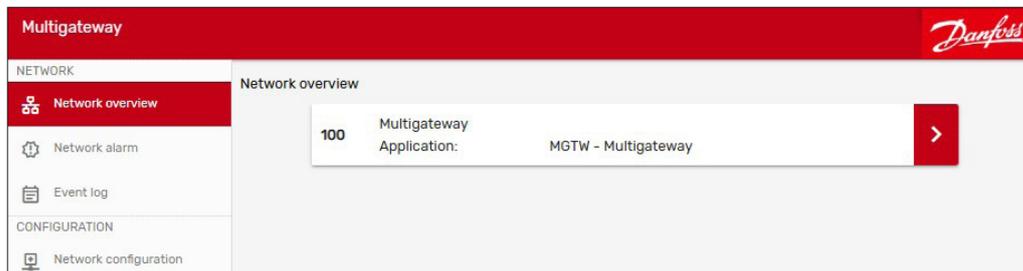

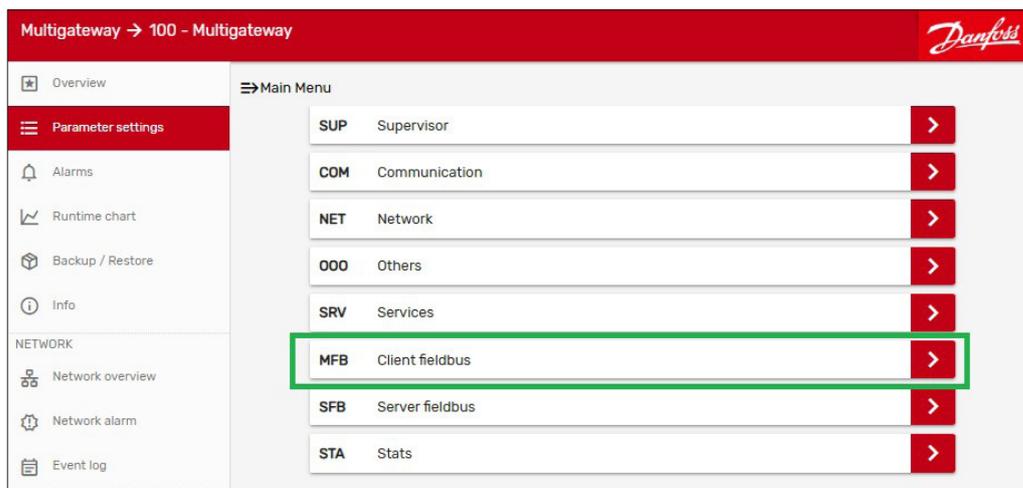Note: now the file CDF uploaded is shown in the Files area.
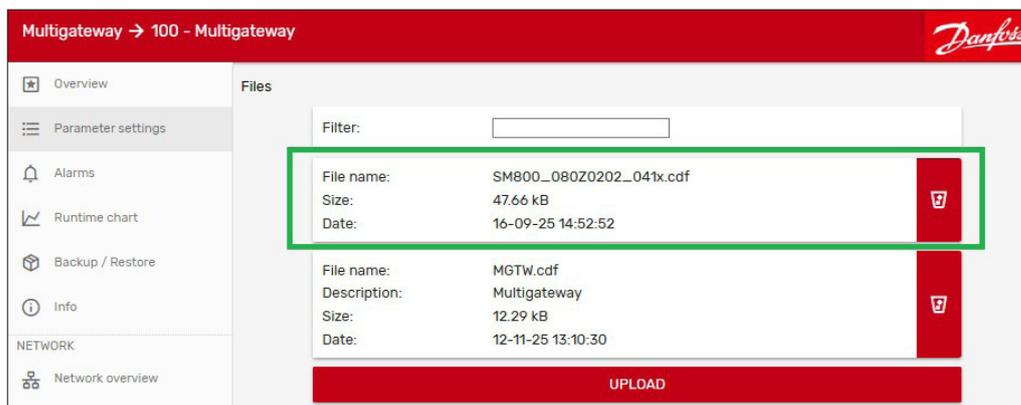
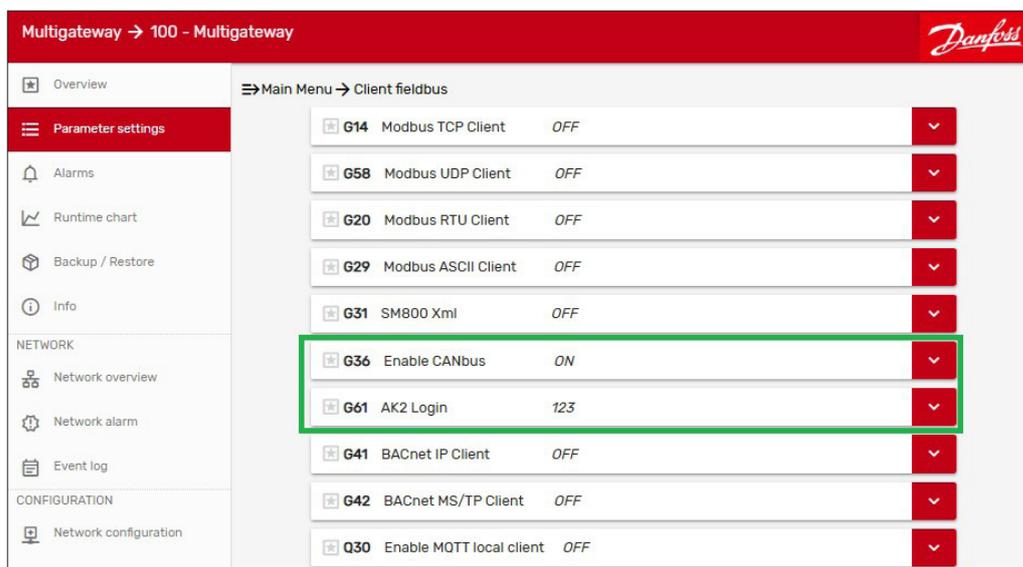**5.5 Configuring the pack controller to be read**

In the "Network Overview", access the X-Gate settings by pressing the arrow next to it.

Its address by default is 100 but it is changeable in case that conflicts with other devices on the protocol converted.

5.6 Go to "Client Fieldbus"
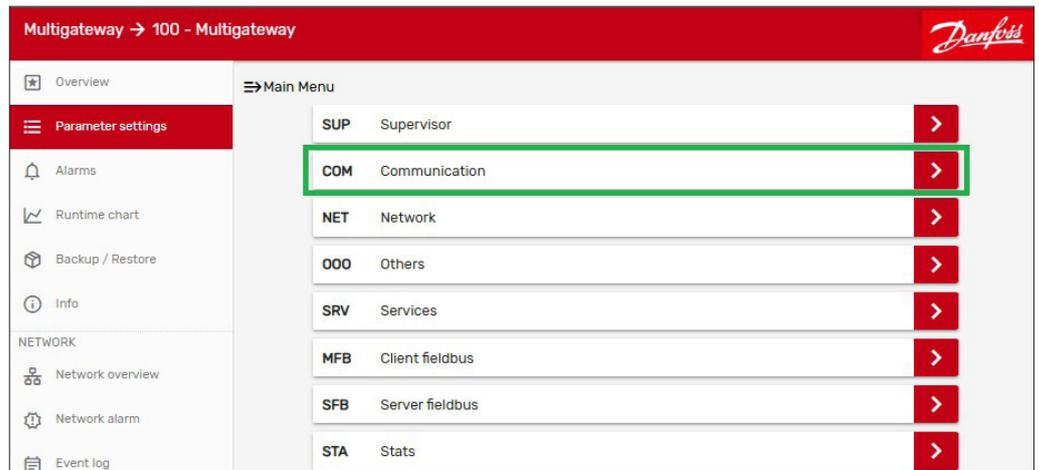

5.7 Keep only "Enable CANbus" as ON, it will enable the CANbus channel to read the pack controller. AK2 login is typically "123".
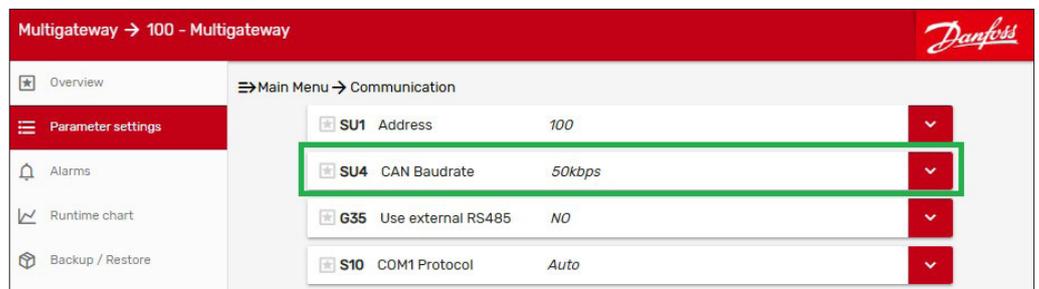
5.8 Ensure CANbus baudrate is set to 50 kpbs
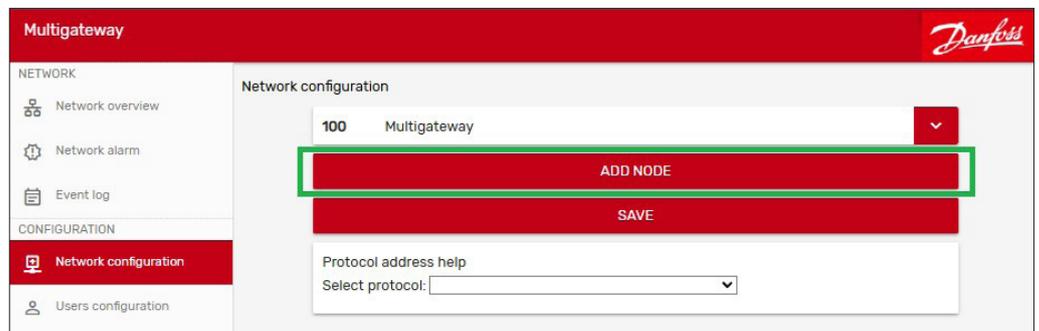
Go to menu "Communication"

Confirm CAN Baudrate is set to 50 kpbs

5.9 Configuring pack controller on X-Gate database to be read

Go to "Network Configuration" and clink on "Add Node" button.

**5.10 How to define the pack controller on the configuration**

Node ID: Can be defined according to destination protocol. For instance, if you need the pack controller with address ID 10, keep as shown on the example below.

Description: Use a description according to your application (it will not affect the configuration and cannot be blank).

Application: Select the pack controller according to the CDF file loaded.

Protocol address: Pack controller over CANbus are fixed with address 01 (it is not changeable on the CANbus side). Nevertheless, as described in the Node ID" configuration, if a different ID on the destination protocol is required, for instance 10, type on this field "CAN:1". It will force this device be read on CANbus ID 01 but exposed as 10 on the destination protocol (Modbus, for instance).
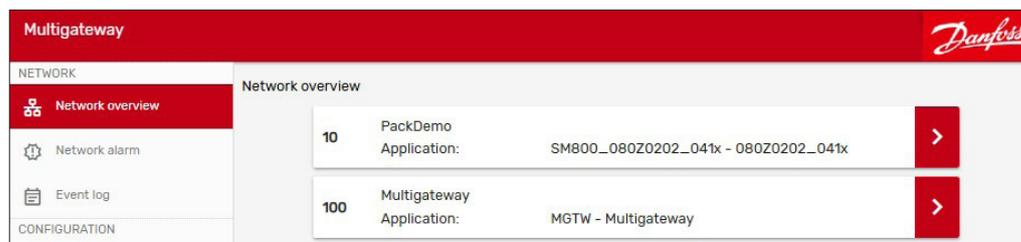
Once configuration is finished, click on "SAVE".
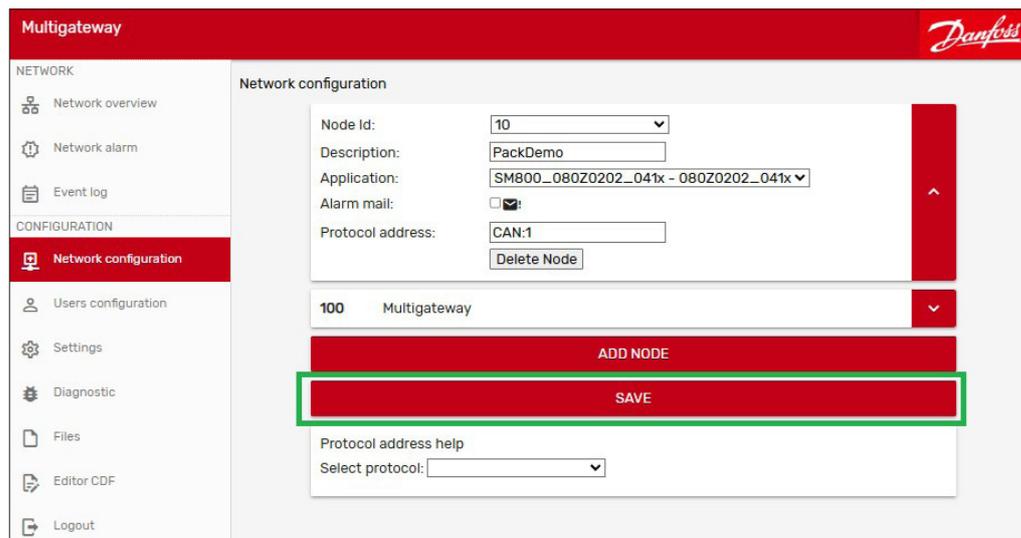

5.11 Checking the readings

By clicking on "Network Overview", the pack controller is visible, click on the pack controller device.

Note: It can take few minutes polling variables over CANbus. The question mark symbol next to the AK-PC 782A should now be replaced with an arrow, indicating a successful connection.

5.12 Menu structure

The same menu structure used on the CDF or ED3/ED4 file will be reproduced, menus can be clicked and variables will be visible or invisible according to pack controller parametrization.
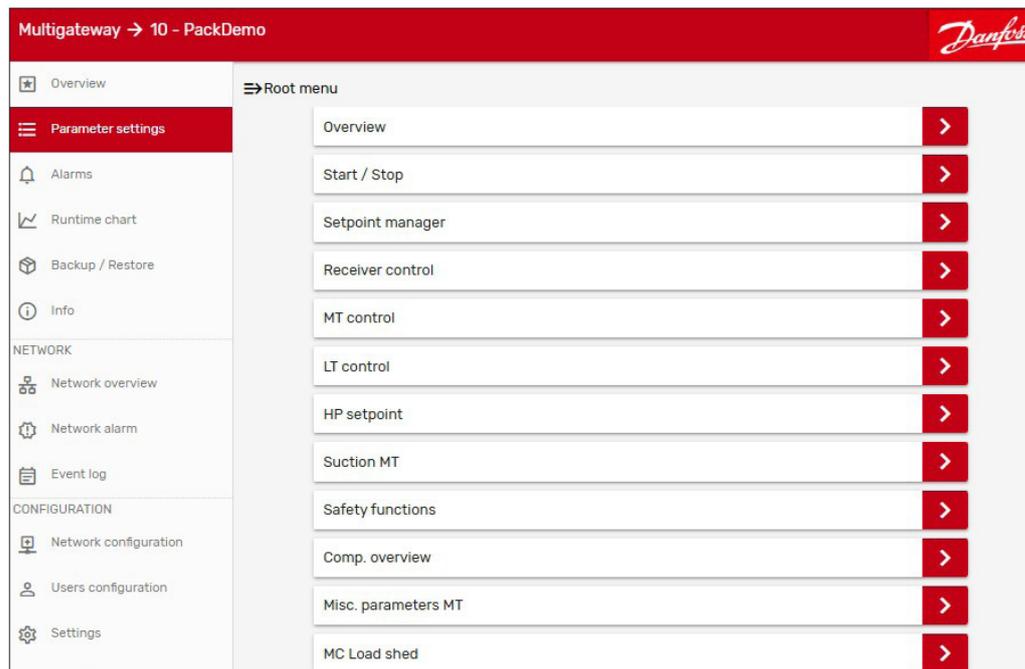
5.13 Example of variable readings when "MT control" menu is clicked

Note: the variables with "down arrow" are the Read/Write ones and others are the Read Only.

In case readings are not being polled, the reading "NaN" will be showed instead and communication, as well as configuration both on pack controller and X-Gate, must be reviewed.
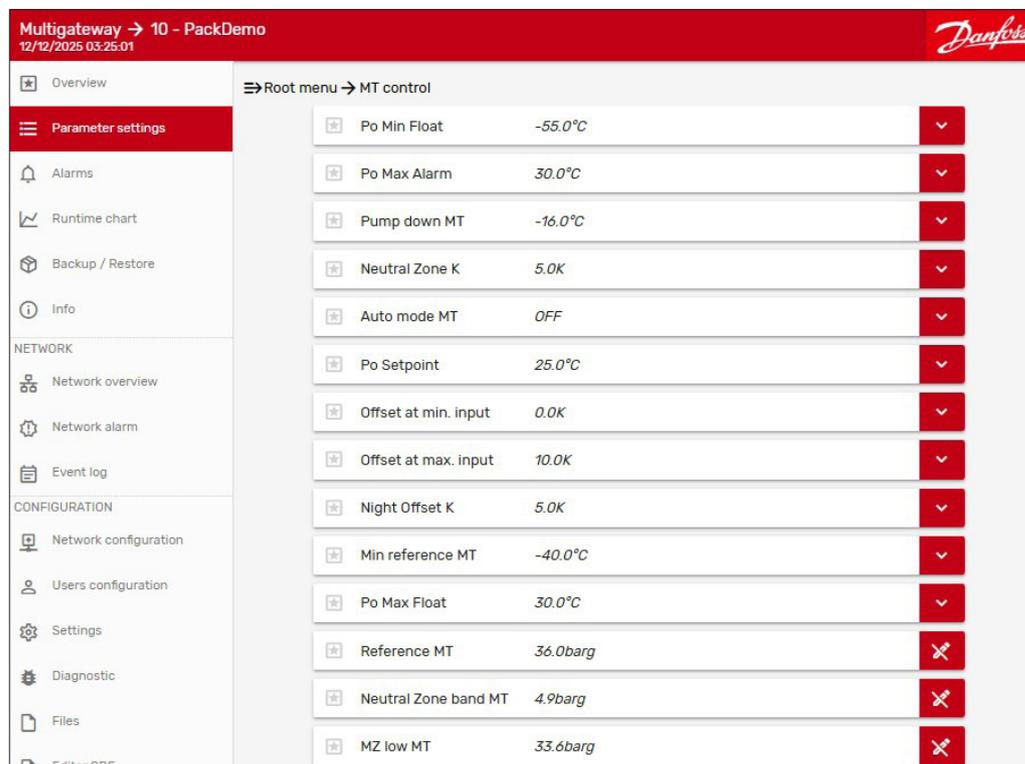
5.14 How to diagnose in case variables from pack are not being polled

Review communication connections: Wiring and termination resistor.

Review CANbus baudrate on both sides (Pack controller and X-Gate).

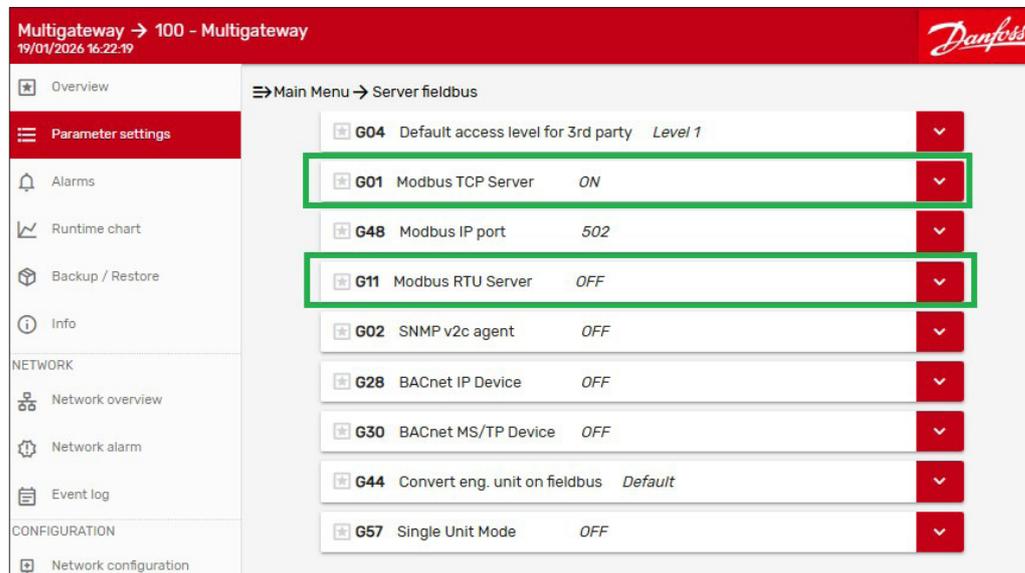## 6. How to read the Modbus server variables

6.1 Configuring the destination protocol Modbus (RTU or TCP)

On "Network Overview", go to "Multigateway" device and click on "Server Fieldbus".

Assign "Modbus TCP Server" or Modbus RTU Server" to ON (Do not enable more than one server).

6.2 Generating Modbus documentation (Device and Variable maps)

To implement any Modbus information on a Client, all the Modbus addresses, registers, ranges, type of variables and functions to be used need to be shared with the integrator which will read these variables from a 3rd party monitoring system.

This relevant information will be present into a pack of CSV files. This is the key file to read all variables from the pack controller on a destination protocol (Modbus RTU or TCP).

6.3 Generating CSV files

Go to "Settings" button and click on the button "Download CSV files".
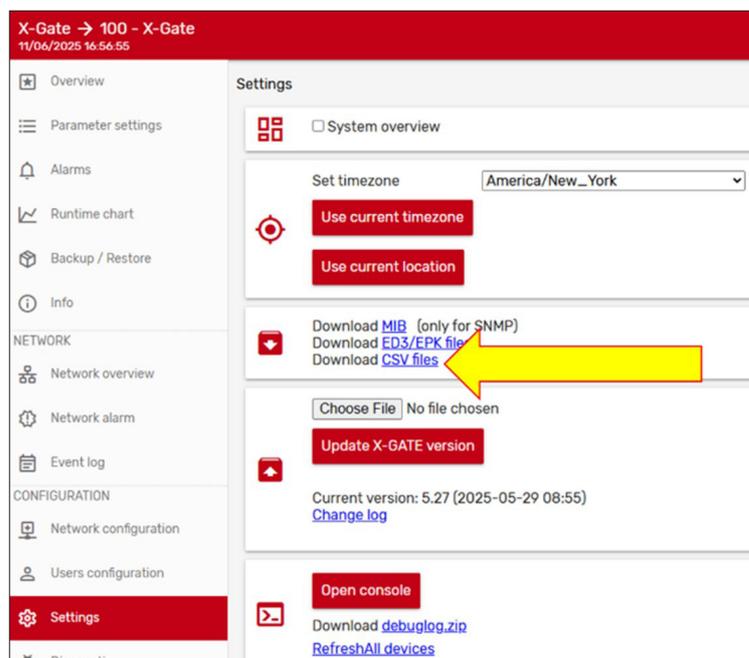
Note there will be a yellow bar in the top with the progress of CSV files generation.

Once finished, a "CSVFiles.zip" file will be in the downloads folder.
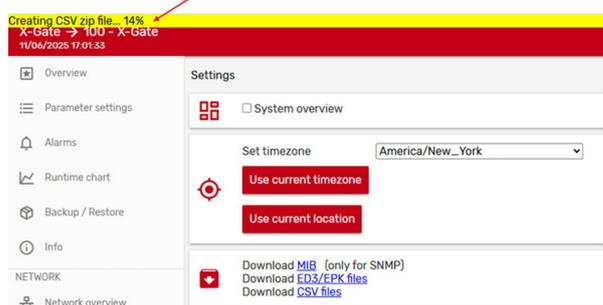

6.4 Unzipping the file "CSVFiles.zip"

When this file is unzipped, all relevant files to the system integrator will be there.

Name	Date modified	Type	Size
devices	1/19/2026 4:31 PM	Microsoft Excel C...	1 KB
MGTW	11/12/2025 6:10 PM	Microsoft Excel C...	12 KB
SM800_080Z0202_041x	9/16/2025 6:52 PM	Microsoft Excel C...	108 KB

6.5 Opening "devices.csv" file

ID	CDFName	Description	ProtocolAddress
10	SM800_080Z0202_041x	PackDemo	CAN:1
100	MGTW	Multigateway	

This file contains the list of devices configured in the database and all modbus variable map files related to.

For instance, to integrate the "PackDemo" controller. This file indicates that it is under Modbus address 10 and the file containing all the variables will be the "SM800_080Z0202_041x.csv" file.

6.6 Opening a specific device file

Following the example for the "PackDemo" controller, by opening the "SM800_080Z0202_041x.csv" file, it will be shown as follows.

Inside the file, there will be all relevant information to a system integrator with all variables available on such device.

Modbus register base 1	Bit	Default	Min	Max	Decimals	Text	R/W	VarType	EngUnit	Enum	Type	Menu	Cid	Vid	VarName	EDFTag
10588		0	0	255	0	Running capacity IT	R	S16	%			Overview	765	21		
10589		-128	-128	127	0	Requested cap. IT	R	S16	%			Overview	765	20		
10693		0	0	23	0	Control status LT	R	S16		0=Standby|1=Norma		Overview	764	6		
10695		0	0	0	1	Suction temp. To-LT	R	F32	°C			Overview	209	7		
10709		0	0	255	0	Running capacity LT	R	S16	%			Overview	764	22		
10710		-128	-128	127	0	Requested cap. LT	R	S16	%			Overview	764	21		
10781		0	0	11	0	Cond. control status	R	S16		0=Power up|1=OFF|	Overview	285	41		
10785		0	0	255	0	Capacity	R	S16	%			Overview	285	40	cond_cap	
10786		0	0	255	0	Cond. requested cap.	R	S16	%			Overview	285	42		
10787		0	0	0	1	Pgc	R	F32	barg			Overview	336	10		
10866		0	0	11	0	HP control status	R	S16		0=Normal|1=Norma		Overview	338	32		
10867		0	0	0	1	Pgc reference	R	F32	barg			Overview	338	33		
10870		0	0	0	1	Vhp OD	R	F32	%			Overview	338	27		
10879		0	0	0	1	Tw pump speed	R	F32	%			Overview	357	32		
10881		0	0	11	0	Tw status	R	S16		0=OFF|1=Idle|2=Star		Overview	357	45		

### 6.7 Testing and troubleshooting Modbus TCP

If communication needs to be tested or troubleshooted, it is strongly recommended the use of an external Modbus TCP reader.

The "Open ModScan" software is only a suggestion used at this point but any other similar application can be applied.

According to document generated by X-Gate on the previous item, "Pgc reference" is available on the F32 (float 32bit) register 10867 using a holding register function as follows.
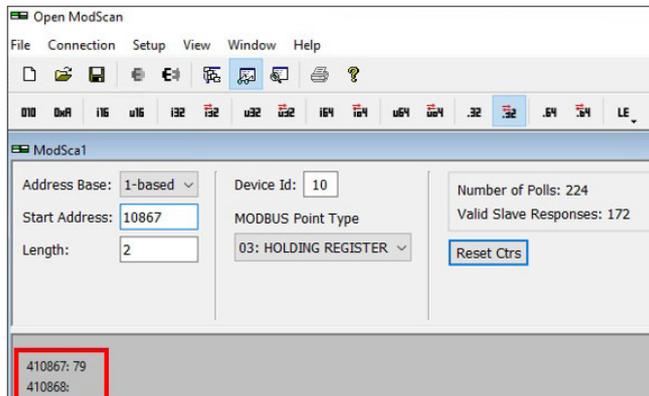
It must match the values being read on the X-Gate interface.
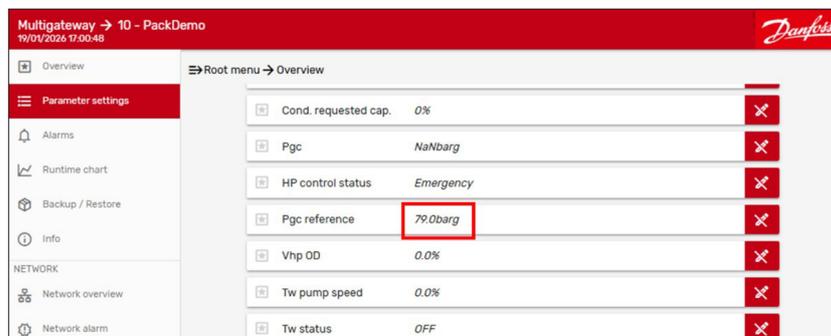
All the exposed variables (read and/or write) can be tested using a generic Modbus Reader.

This analysis is valid for either Modbus TCP or RTU.

7. Glossary of terms

ED3/ED4	These files are used to store configuration settings, and other information for Danfoss devices. They are essential for maintaining and updating Danfoss equipment, ensuring that the devices operate efficiently and according to the latest specifications.
CDF (Configuration Description File)	**CDF** is used to store configuration settings and parameters for controllers.
BMS (Building Management System)	A **BMS**, also known as a Building Automation System (BAS), is a control system used in buildings to manage and monitor the building's mechanical and electrical equipment.
PLC (Programmable Logic Controller)	A **PLC** is an industrial digital computer designed for the control and automation of manufacturing processes, such as assembly lines, robotic devices, or any activity that requires high reliability, ease of programming, and process fault diagnosis.
Scada (Supervisory Control and Data Acquisition)	**Scada** is a system used for remote monitoring and control of industrial processes. It gathers real-time data from remote locations to control equipment and conditions

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