PN/J1939 LINK – Configuring data exchange

TIA Portal V15, SIMATIC S7

https://support.industry.siemens.com/cs/de/en/view/109760972

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Table of contents

Task

1

This application example explains the operation of two PN/J1939 LINKs. During configuration, the following is considered:

- How to use cyclic data communication
- How to use acyclic data communication
- How the events are transmitted

Knowledge required

The following knowledge is required:

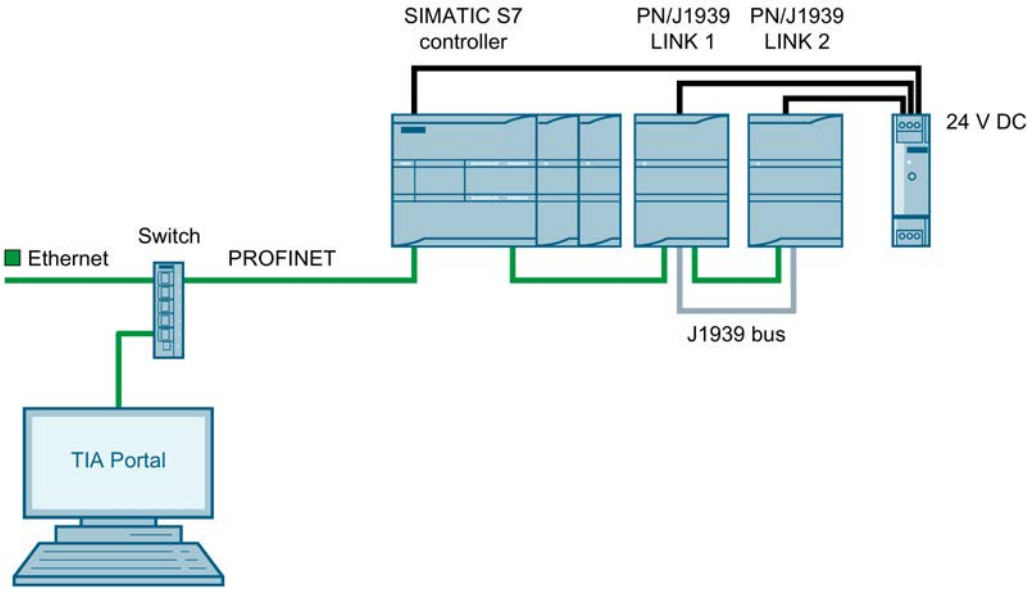
- Knowledge of programming a SIMATIC S7 controller
- Knowledge of configuration with TIA Portal
- Knowledge of working with the PROFINET fieldbus
- Knowledge in the J1939 communication protocol
- General knowledge in the field of automation technology
- General knowledge of communication networks

Solution

2

2.1 System configuration

For the application example use the following configuration:



The PN/J1939 LINKs are connected via PROFINET to the SIMATIC S7 controller.

The configuration takes place on a PC with installed TIA Portal.

2.2 Hardware and software components

The application example was created with the following components:

Hardware components

Component	Number	Article number	Comment
SIMATIC S7 control system	1	6ES7214-1AG40-0XB0	CPU 1214C DC/DC/DC
PN/J1939 LINK	2	6BK1623-0AA00-0AA0	Gateway between PROFINET and J1939 bus
Power supply SIMATIC S7-1200 Power Module PM1207	1	6EP1332-1SH71-4AA0	For power supply of controller and PN/J1939 LINK

Software components

Component	Number	Article number	Comment
TIA Portal V15	1	6ES7822-0AA00-0YL0	–
GSDML file	1	–	GSDML-V2.33-Siemens-PN_J1939_LINK-20181129

Example files and projects

File	Comment
109760972_network_transitions_pnj1939_link_de.pdf	The German version of this document
109760972_network_transitions_pnj1939_link_en.pdf	The English version of this document
PN_J1939_Communication_V15.ap15	The TIA project of the application example

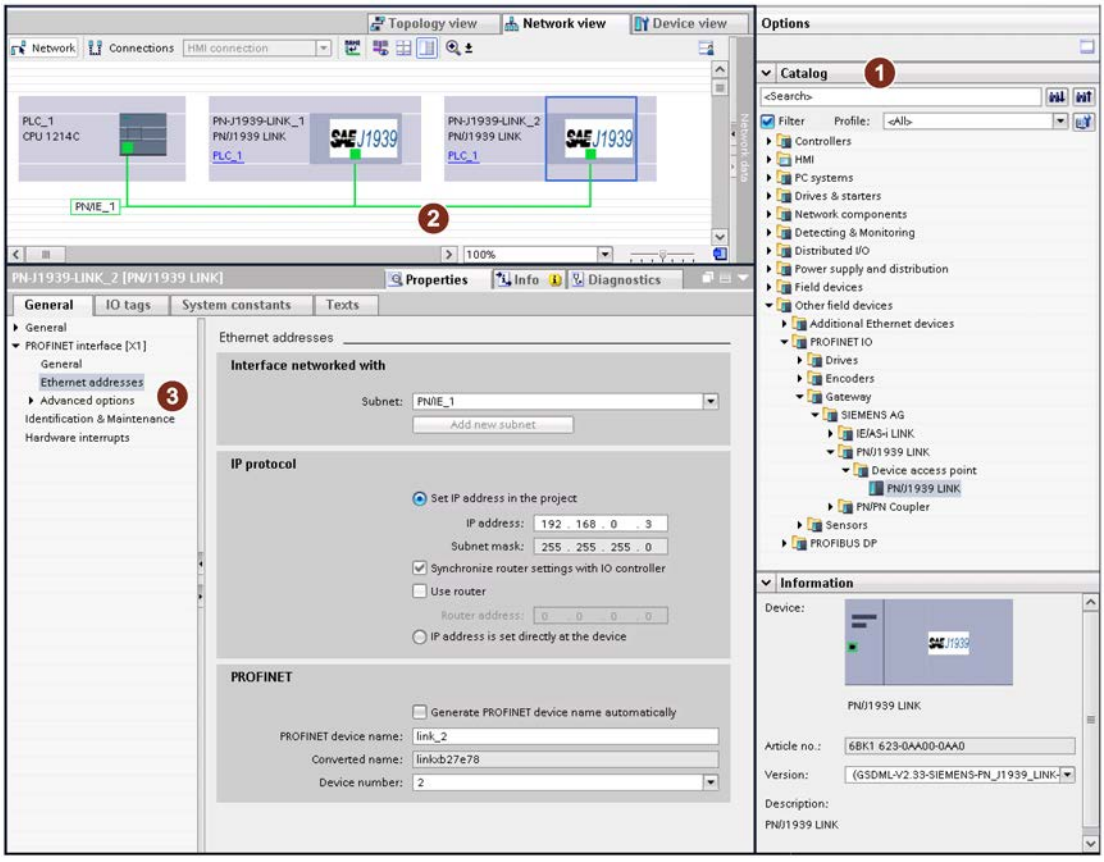
You can find the download link in the section "Internet links (Page 109)".

2.3 General procedure

Proceed as follows:

1. Create a project.
2. Set English as language for the graphical interface.
3. Insert the GSDML file for the PN/J1939 LINK.
4. Click "Catalog" ① and insert the devices according to section "Hardware and software components (Page 8)".
5. Connect the CPU and PN/J1939 via a PROFINET connection.

   CPU and PN/J1939 LINKs are connected via PROFINET ② in the "Network view" window.
6. Assigning parameters for the PROFINET interface ③ for both PN/J939 LINKs based on the conditions of your PROFINET network.



You can track the TIA project "PN/J1939_TIAproj_V15.zip" with the operations described below.

Configuration and parameter assignment of PN/J1939 LINK

3

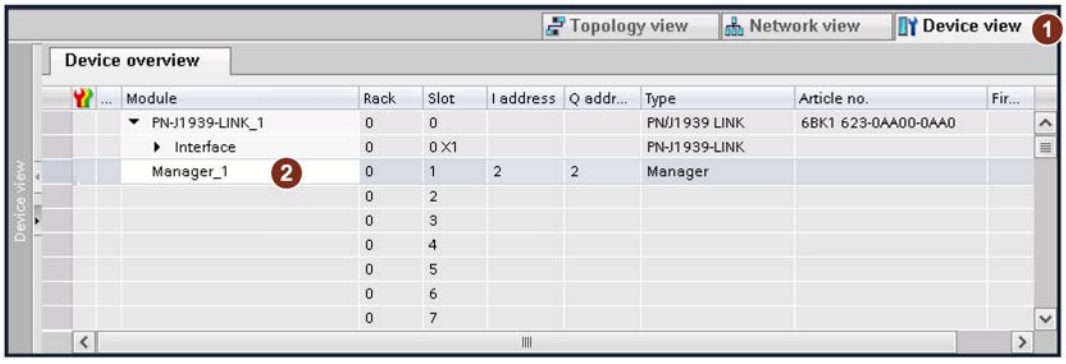
3.1 Insert PN/J1939 LINK and assign parameters for PROFINET

This section describes how to assign parameters for a network transition PN/J1939 LINK and PROFINET. Additional and supplementary information is available in the "SIMATIC Gateways PN/M-Bus LINK" operating instructions.

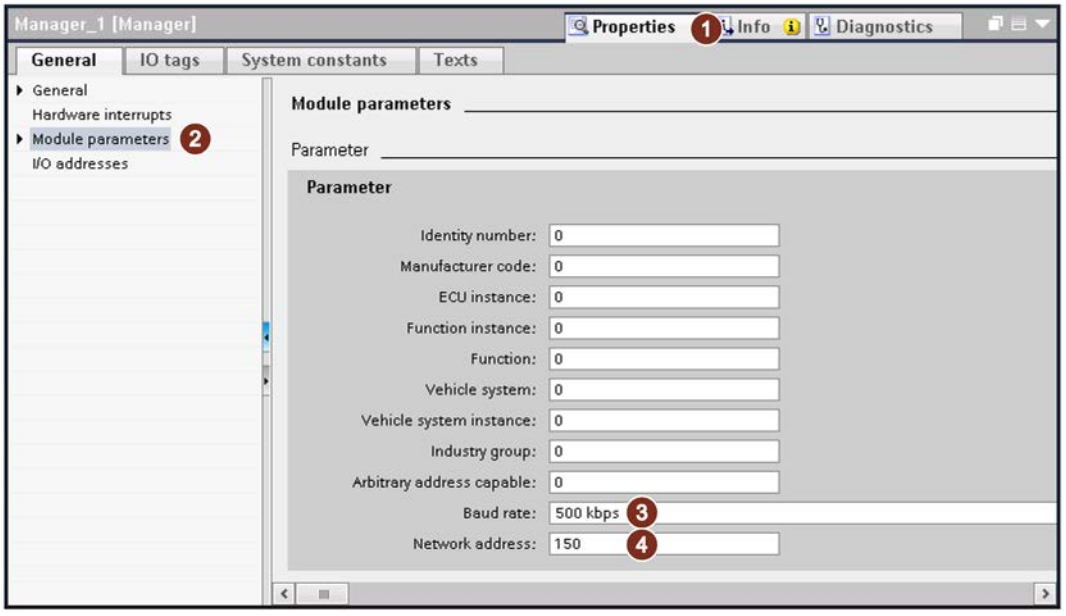
Assigning parameters for PN-J1939-Link_1

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click "Device view ① → Device overview → Manager_1 ②".



3. Click "Properties ① → General → Module parameters ②".

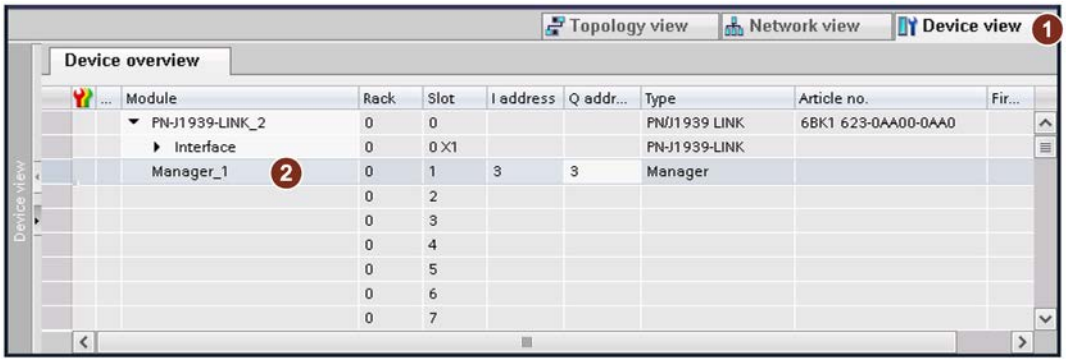


4. Make the following settings:
   - Baud rate "500 kbps" ③
   - Network address at "150" ④

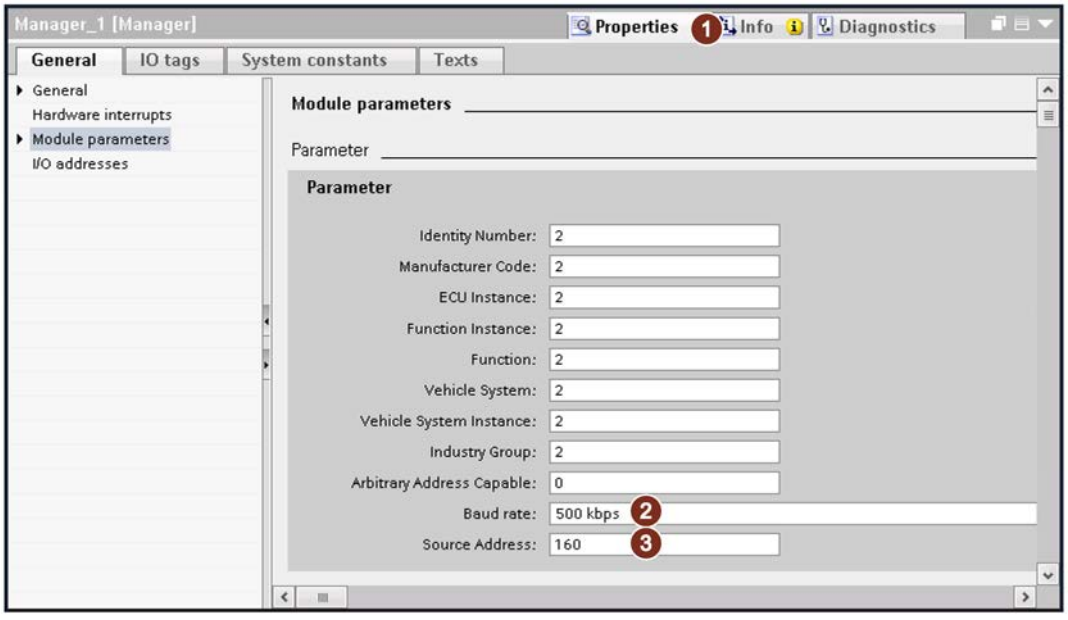
Assigning parameters for PN-J1939-Link_2

Proceed as follows:

1. Click "Network view → PN-J1939-Link_2".
2. Click "Device view ① → Device overview → Manager_1 ②".



3. Click "Properties ① → General → Module parameters ②".

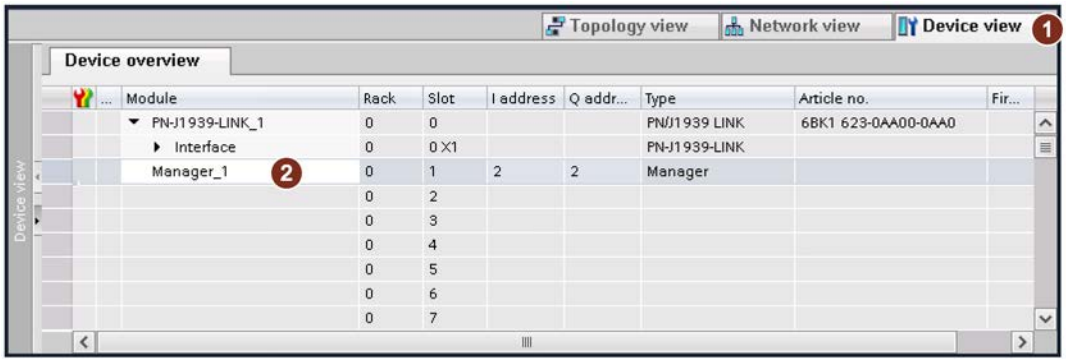


4. Make the following settings:
   - Baud rate "500 kbps" ③
   - Source address to "160" ④

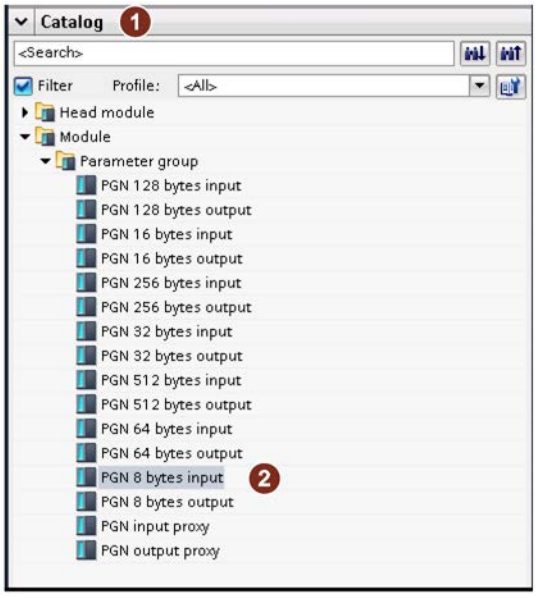
Inserting input module for PN-J1939-Link_1

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click "Device view ① → Device overview → Manager_1 ②".

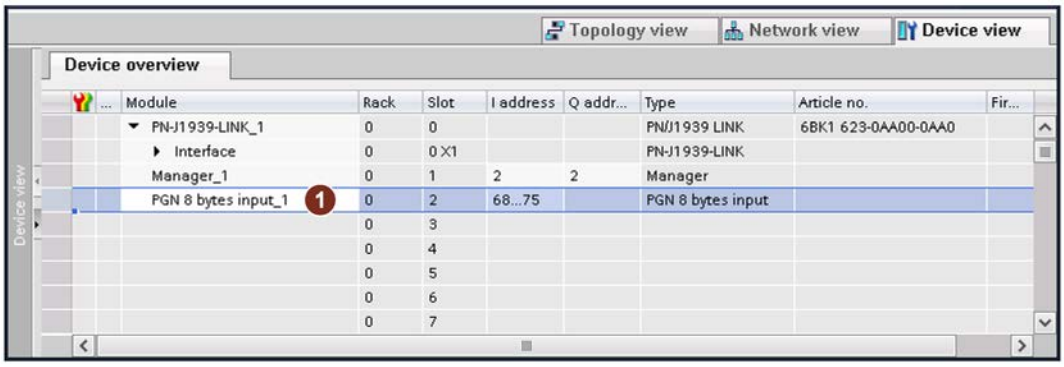


3. Click "Catalog ① → Module → Parameter group".

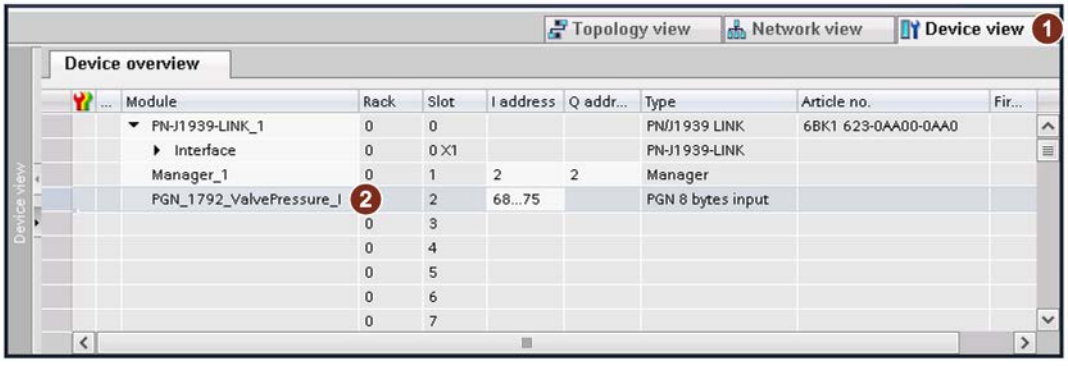


4. Double-click "PGN 8 bytes input" ②.

   The following dialog window with the parameter group "PGN 8 bytes input_1" ① is displayed.



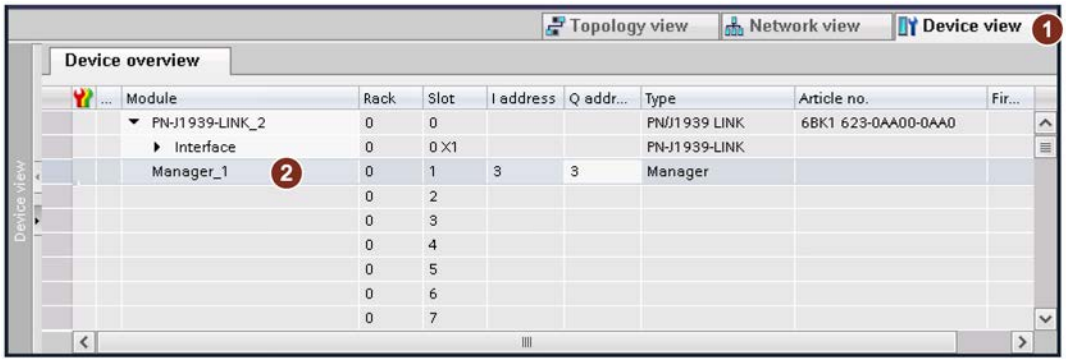
5. Change the component name ② to "PGN_1792_ValvePressure_I".



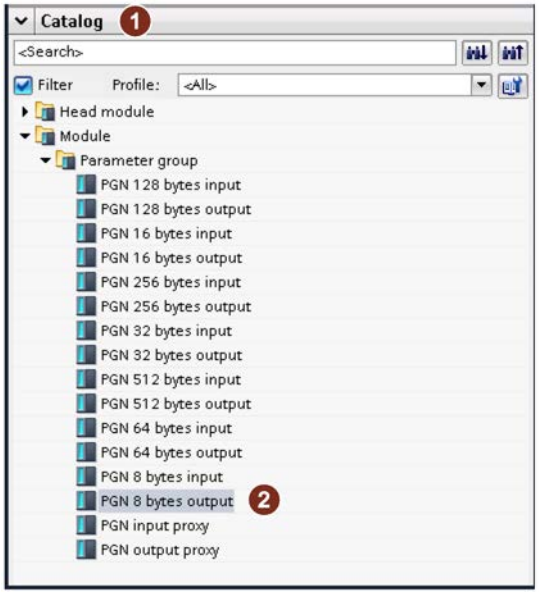
Inserting output module for PN-J1939-Link_2

Proceed as follows:

1. Click "Network view → PN-J1939-Link_2".
2. Click "Device view ① → Device overview → Manager_1 ②".

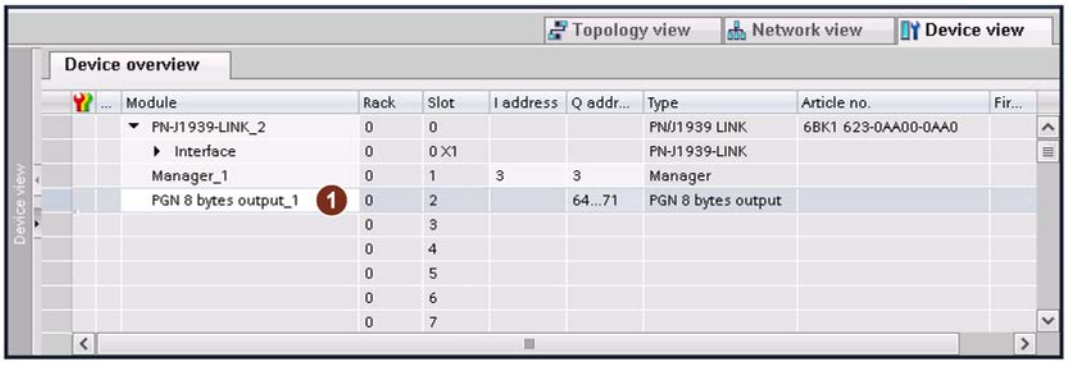


3. Click "Catalog ① → Module → Parameter group".

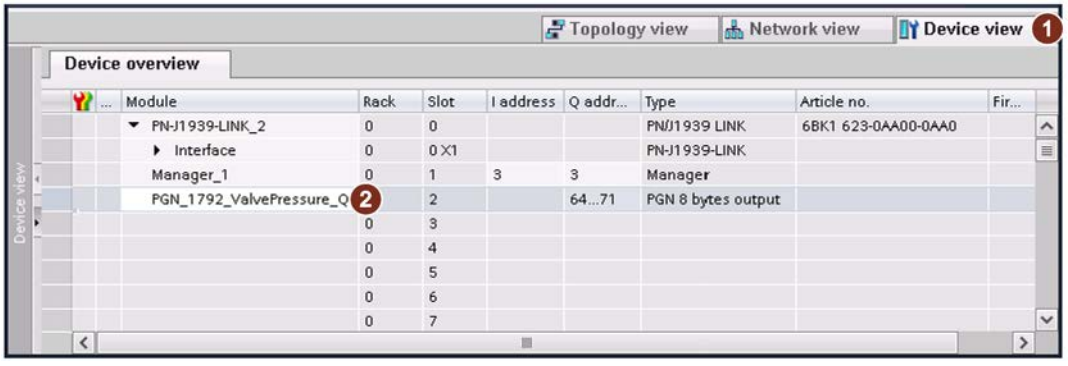


4. Double-click "PGN 8 bytes output" ②.

   The following dialog window with the parameter group "PGN 8 bytes output_1" ① is displayed.



5. Change the component name ② to "PGN_1792_ValvePressure_Q".



See also

Setting up the standard message (Page 21)

3.2 Creating control and status bytes

Control bytes are required for both "PN/J1939 LINK" gateways so that they can change to the operating mode.

Creating control bytes

The control byte is represented by the address of the output byte that is assigned to the manager of the gateway.

Control byte	Meaning
0	The J1939 bus is not in operating mode. CAN communication is not active.
1	The J1939 bus is in operating mode. CAN communication is active.

Creating status bytes

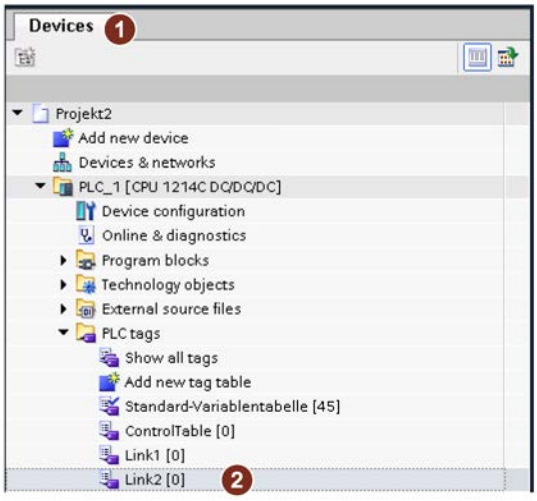
The status byte is represented by the address of the input byte that is assigned to the manager of the gateway.

Status byte	Meaning
0	J1939 LINK-Manager is off
1	J1939 bus is off
2	Error in the "passive" status
3	Error in "active" status, no errors on the J1939 bus

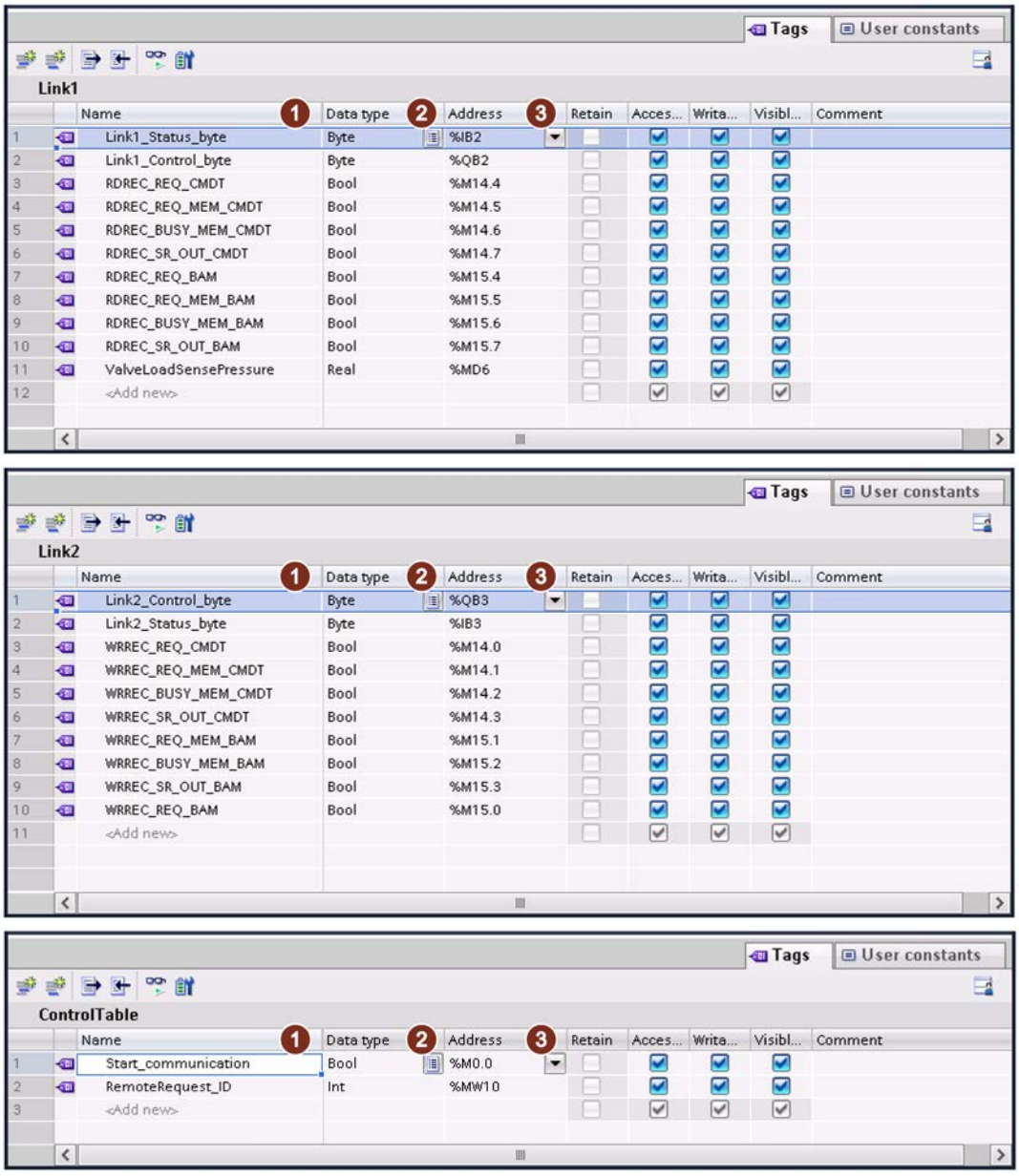
Creating control variables

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices ① → PLC_1 → PLC tags".
3. Double-click "Add new tag table".
4. Insert two additional tag tables.
5. Rename it to "ControlTable", "Link1" and "Link2" ②.



6. Create the following control variables ① in the 3 tables.



Tags | User constants

Link1

	Name ①	Data type ②	Address ③	Retain	Acces...	Writa...	Visibl...	Comment
1	Link1_Status_byte	Byte	%IB2		☑	☑	☑	
2	Link1_Control_byte	Byte	%QB2		☑	☑	☑	
3	RDREC_REQ_CMDT	Bool	%M14.4		☑	☑	☑	
4	RDREC_REQ_MEM_CMDT	Bool	%M14.5		☑	☑	☑	
5	RDREC_BUSY_MEM_CMDT	Bool	%M14.6		☑	☑	☑	
6	RDREC_SR_OUT_CMDT	Bool	%M14.7		☑	☑	☑	
7	RDREC_REQ_BAM	Bool	%M15.4		☑	☑	☑	
8	RDREC_REQ_MEM_BAM	Bool	%M15.5		☑	☑	☑	
9	RDREC_BUSY_MEM_BAM	Bool	%M15.6		☑	☑	☑	
10	RDREC_SR_OUT_BAM	Bool	%M15.7		☑	☑	☑	
11	ValveLoadSensePressure	Real	%MD6		☑	☑	☑	
12	<Add new>				☑	☑	☑	

Tags | User constants

Link2

	Name ①	Data type ②	Address ③	Retain	Acces...	Writa...	Visibl...	Comment
1	Link2_Control_byte	Byte	%QB3		☑	☑	☑	
2	Link2_Status_byte	Byte	%IB3		☑	☑	☑	
3	WRREC_REQ_CMDT	Bool	%M14.0		☑	☑	☑	
4	WRREC_REQ_MEM_CMDT	Bool	%M14.1		☑	☑	☑	
5	WRREC_BUSY_MEM_CMDT	Bool	%M14.2		☑	☑	☑	
6	WRREC_SR_OUT_CMDT	Bool	%M14.3		☑	☑	☑	
7	WRREC_REQ_MEM_BAM	Bool	%M15.1		☑	☑	☑	
8	WRREC_BUSY_MEM_BAM	Bool	%M15.2		☑	☑	☑	
9	WRREC_SR_OUT_BAM	Bool	%M15.3		☑	☑	☑	
10	WRREC_REQ_BAM	Bool	%M15.0		☑	☑	☑	
11	<Add new>				☑	☑	☑	

Tags | User constants

ControlTable

	Name ①	Data type ②	Address ③	Retain	Acces...	Writa...	Visibl...	Comment
1	Start_communication	Bool	%M0.0		☑	☑	☑	
2	RemoteRequest_ID	Int	%MW10		☑	☑	☑	
3	<Add new>				☑	☑	☑	

7. Adapt the data types ② and the addresses ③.

You can use these control variables to change values either via the control program or via the watch table.

Establishing cyclic data communication

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4.1 Setting up the standard message

Configure the module PN-J1939-LINK_2 as output module. The standard message length is ≤ 8 bytes.

Is defined for the module "PGN_1792_ValvePressure_Q" by the following 2 bytes:

- PDU F_{16} = 0x07
- PDU S_{16} = 0x00

Both bytes produce the number of the PGN as follows:

- PGN number$_{16}$ = 0xPDU F_{16} and 0xPDU S_{16}
- PGN number$_{16}$ = 0x**07** and 0x**00** produce 0x**0700**
- PGN number$_{10}$ = 1792

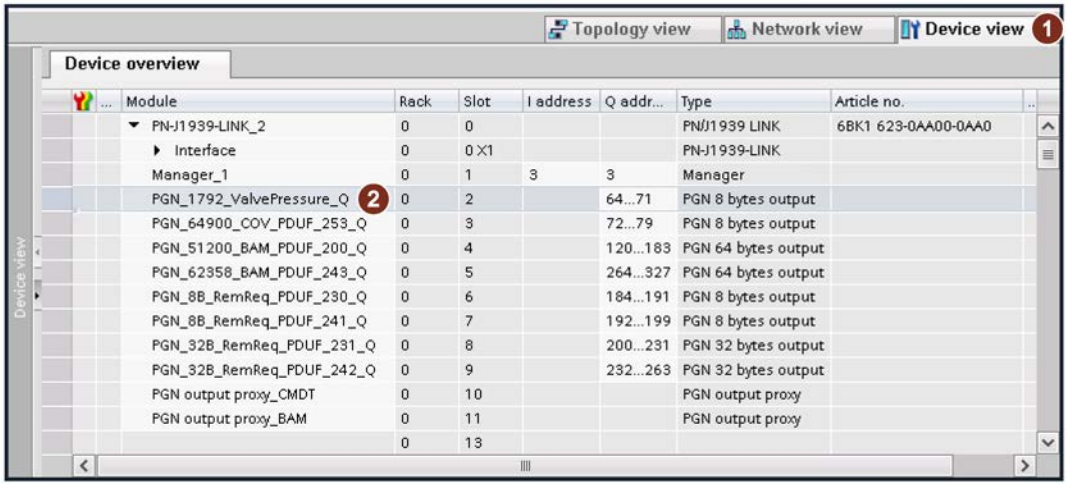
Note

The PGN parameters PDU Format and PDU Specific can thus be converted to a decimal number to be displayed in the PGN list in the DAJ1939_SAE document.

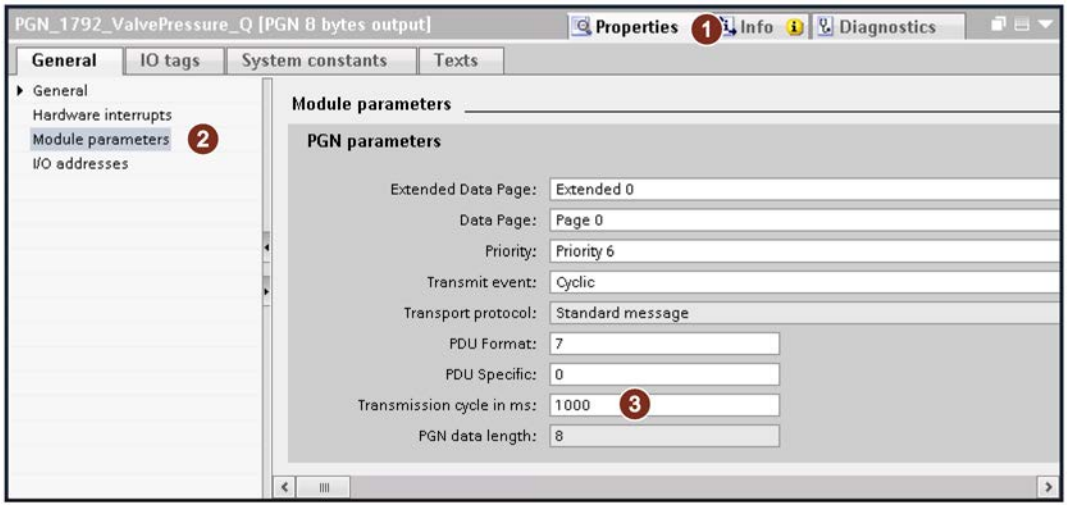
Assigning parameters for PN-J1939-Link_2

Proceed as follows:

1. Click "Network view → PN-J1939-Link_2".
2. Click "Device view ① → Device overview → PGN_1792_ValuePressure_Q ②".



3. Click "Properties ① → General → Module parameters ②".

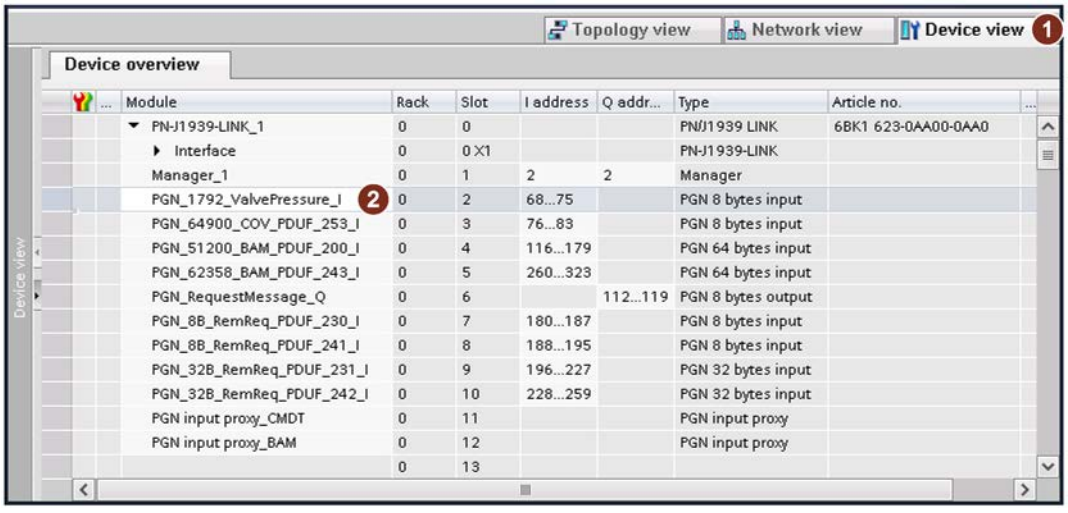


4. Set the transmission rate to "1000" ③.

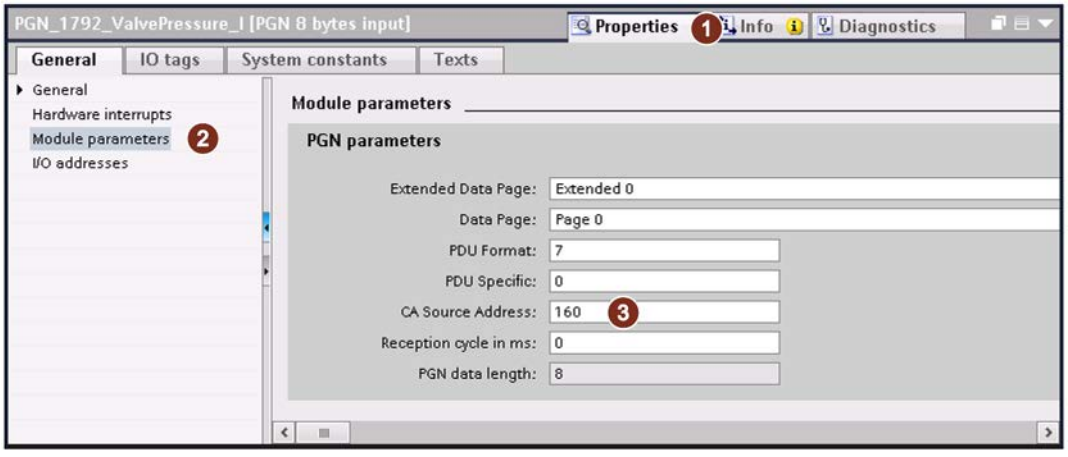
Assigning parameters for PN-J1939-LINK_1

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click "Device view ① → Device overview → PGN_1792_ValuePressure_I ②".



3. Click "Properties ① → General → Module parameters ②".



4. Set the CA Source Address to "160" ③.

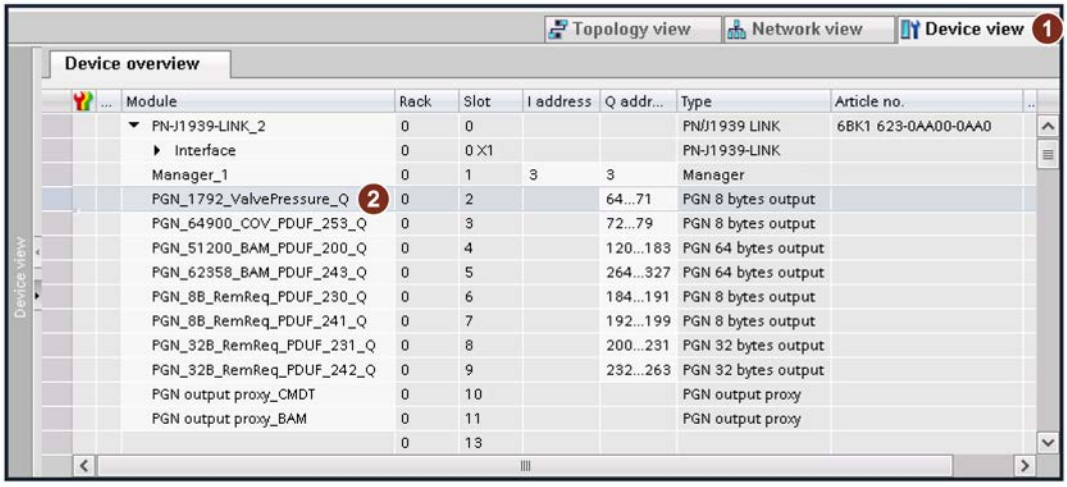
   "160" is the source address of PN-J1939-LINK_2.

Use associated hardware ID as system constant

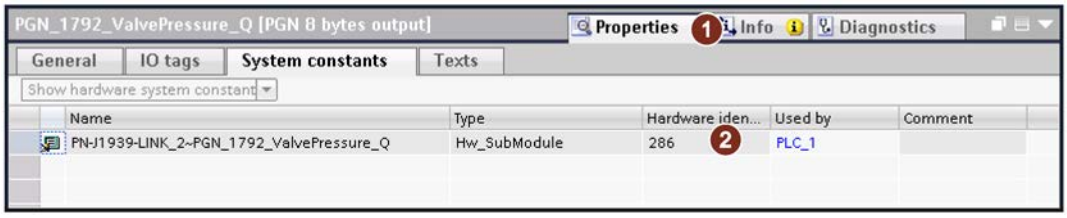
To work with the associated input and output data, the hardware ID of the PN-J1939-LINK_2 must be known. The data to be transferred is written to the output module PN-J1939-LINK_2.

To view the hardware ID, proceed as follows:

1. Click "Network view → PN-J1939-Link_2".
2. Click "Device view ① → Device overview → PGN_1792_ValuePressure_Q ②".



3. Click "Properties ① → System constants".



The hardware ID is displayed at ②.

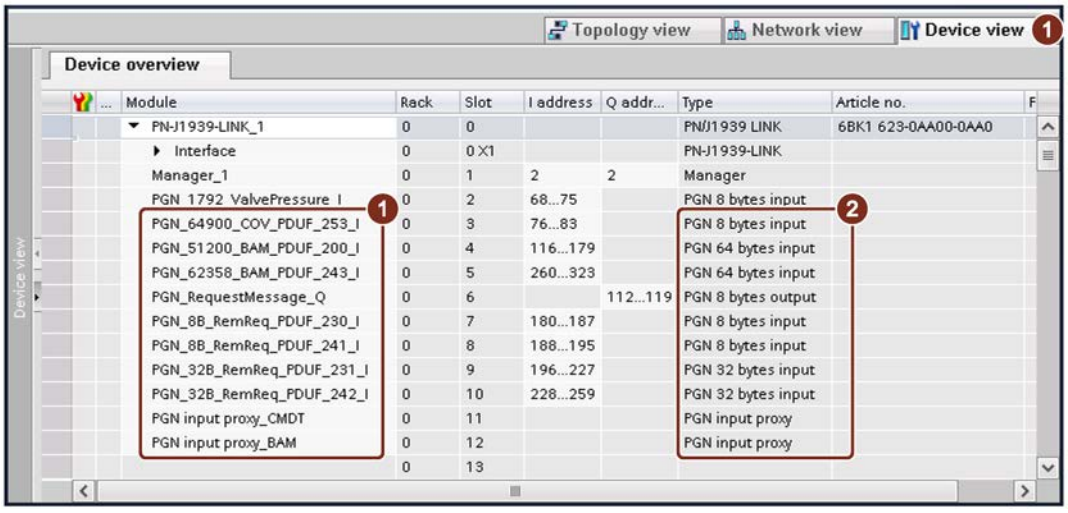
Note

Use the hardware ID as system constant.

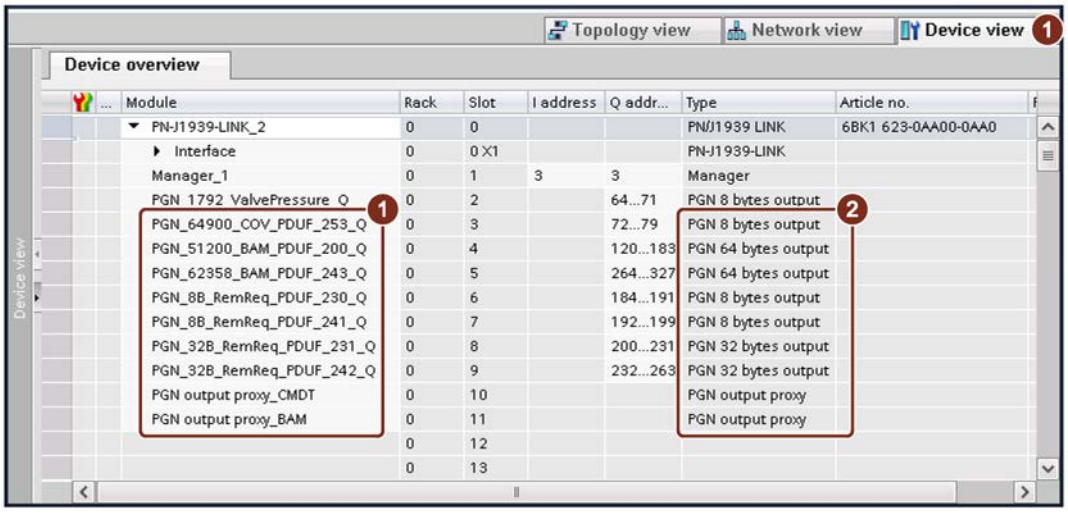
Inserting additional modules for PN-J1939-Link_1 and PN-J1939-Link_2

Proceed as follows:

1. For PN-J1939-Link_1, insert the following modules ② and rename them ① as specified.



2. For PN-J1939-Link_2, insert the following modules ② and rename them ① as specified.



4.2 Creating function block SETIO and assigning parameters for it

If you want to assign values from the output data field "Link_2".PGN_1792_Q to the addresses of the output module, you must call the associated program resource.

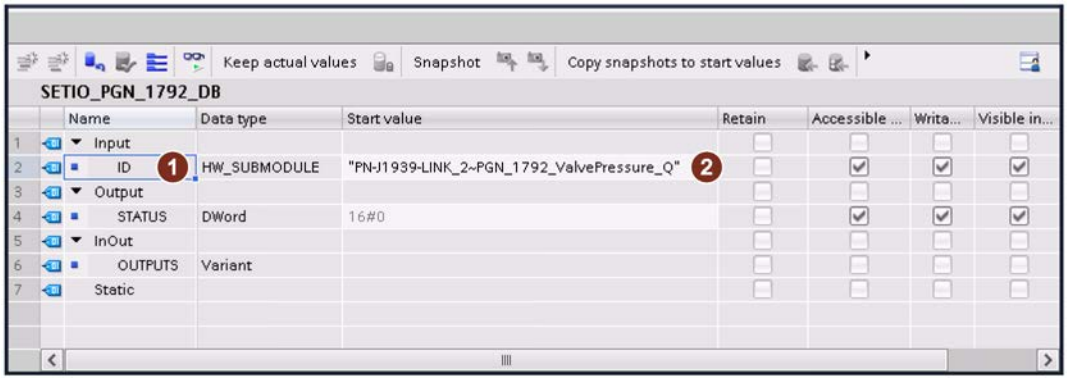
Enter the hardware ID in the program resource SETIO.

Creating program resource SETIO and display hardware ID

Proceed as follows:

1. Click "Network view → PN-J1939-Link_2".
2. Click "Devices → Project → PLC_1 → Program blocks → System blocks → Program resources".
3. Double-click "SETIO_PGN_1792_DB [DB3]".

   The program resource is displayed.



The hardware ID is displayed at ①. The corresponding start value can be found at ②. See section "Setting up the standard message (Page 21)".

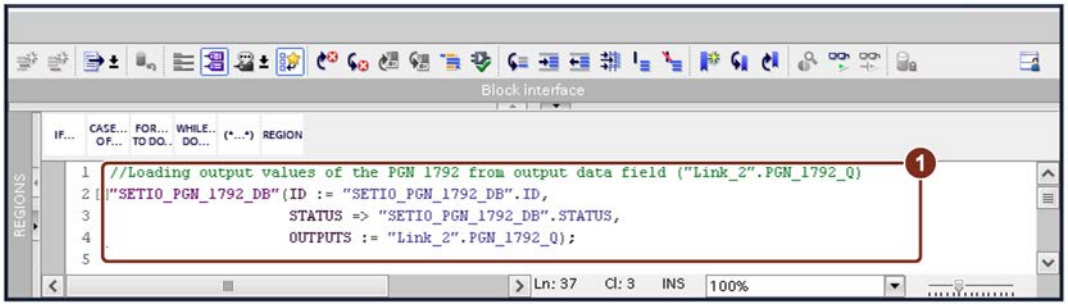
Load output values

Below, the data is defined by the parameter "OUTPUTS" of the program resource SETIO.

Proceed as follows:

1. Click "Network view → PN-J1939-Link_2".
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Send_PGN [FC2]" ②.

   The following dialog box is displayed.



4. Enter the program code ①.

   As a result, the output values are loaded from the output data field.

Note

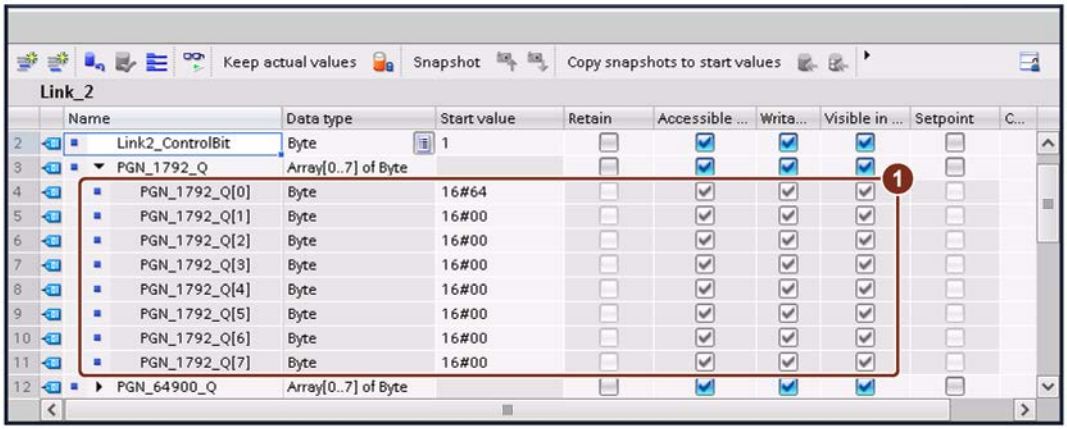
The program code corresponds to the application example "109760972_network_transitions_pnj1939_link_xx".

Entering the structure of the output data field in PN-J1939-Link_2.

Proceed as follows:

1. Click "Network view → PN-J1939-Link_2".
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Link_2 [DB2]" ②.

   The following dialog box is displayed.



4. Insert the output data fields ①.

   This creates the output data fields that the program block "Send_PGN [FC2]" accesses.

4.3 Create and assign parameters for function block GETIO

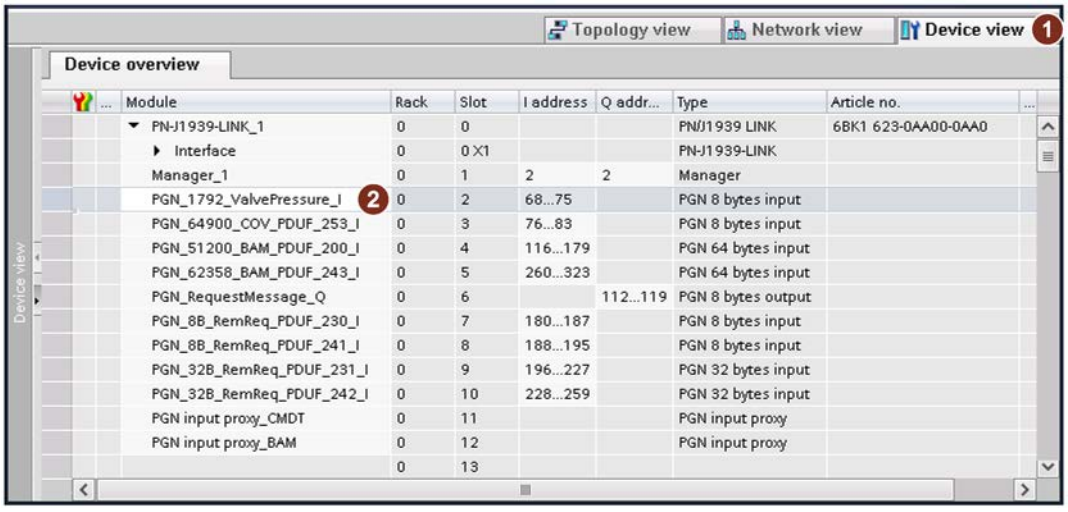
If you want to assign values from the input data field "Link_1".PGN_1792_I to the input module, you must create the program resource GETIO and assign parameters for it.

Enter the hardware ID in the program resource GETIO.

Displaying PN-J1939-Link_1 hardware ID

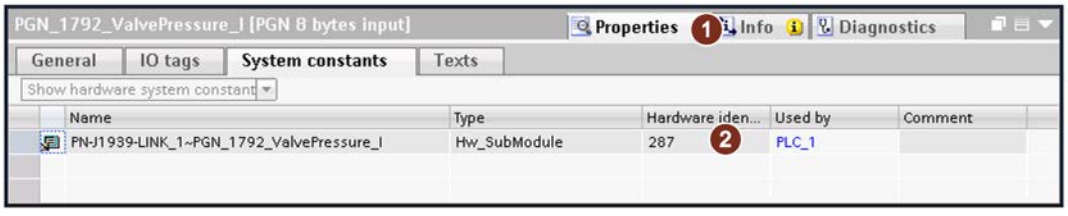
Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click "Device view ① → Device overview → PGN_1792_ValvePressure_I ②".



To work with the required input and output data, the corresponding hardware ID of PGN_1792_ValvePressure_I is required.

3. Click "Properties ① → System constants".



The hardware ID is displayed at ②.

Note

Use the hardware ID as system constant.

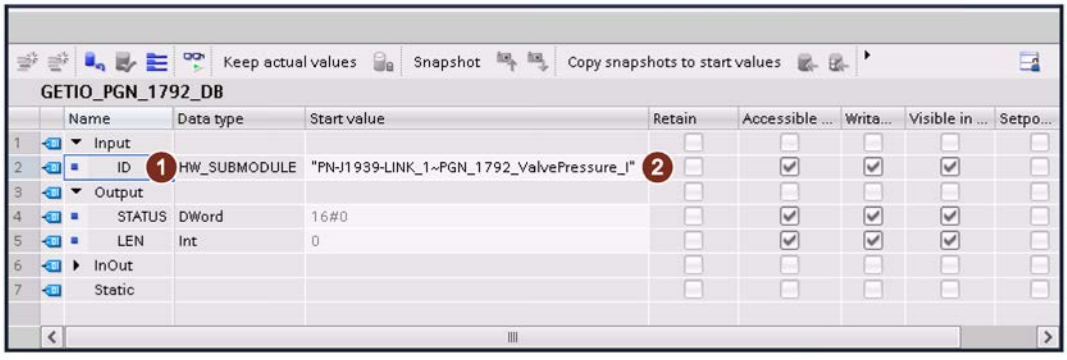
Create program resource GETIO

The program resource GETIO is used to assign values from the input module to the "Link_1".PGN_1792_I data field. The hardware ID must be created as GETIO.ID value.

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click "Devices ① → Project → PLC_1 → Program blocks → System blocks → Program resources".
3. Double-click "GETIO_PGN_1792_DB [DB4]".

   The program resource is displayed.



The hardware ID is displayed at ①. The corresponding start value can be found at ②. See section "Setting up the standard message (Page 21)".

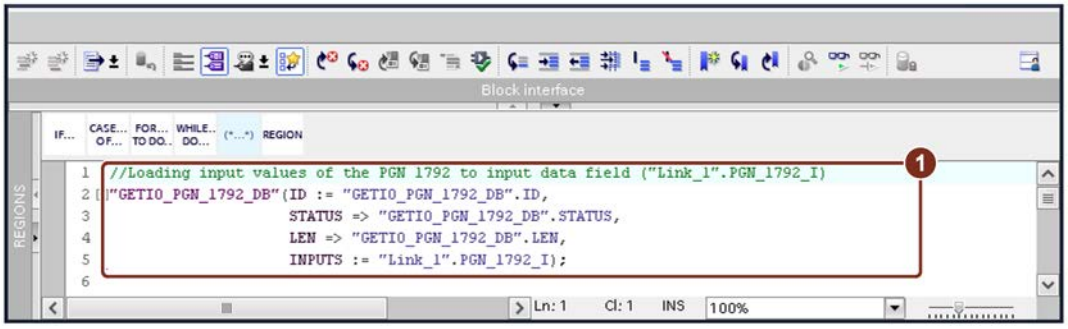
Load input values

The arrangement of data for saving input values is defined below by the "INPUTS" parameter.

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click "Devices ① → Project → PLC_1 → Program blocks".
3. Double-click "Read_PGN [FC3]" ②.

   The following dialog box is displayed.



4. Enter the program code ①.

   The input values are then loaded into the input data field.

Note

The program code corresponds to the application example "109760972_network_transitions_pnj1939_link_xx".

4.4 Displaying the structure of the input data module and starting communication

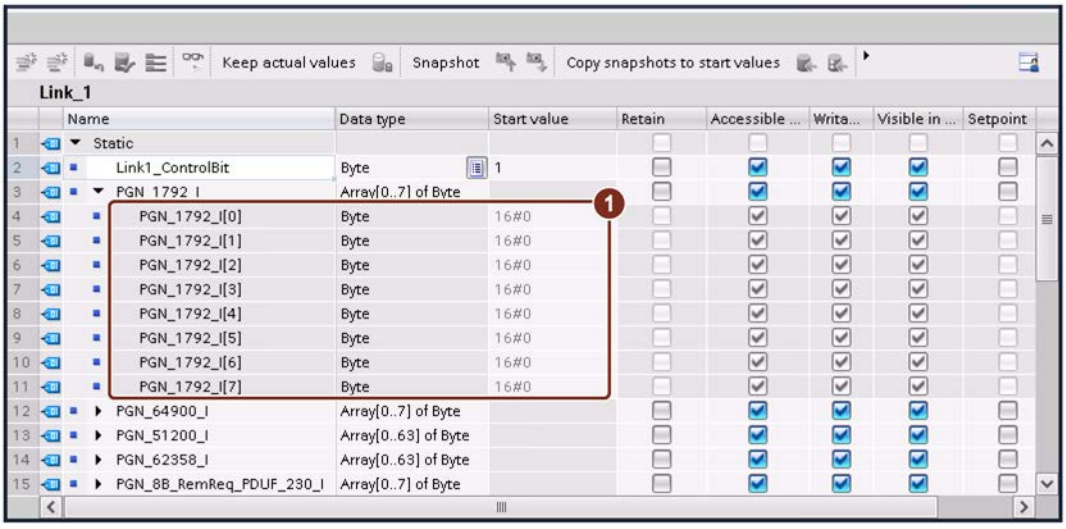
Displaying the structure of the input block "Link_1".PGN_1792_I

The structure of the data block is required to store the received PGN1792 data.

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Link_1 [DB1]" ②.

   The following dialog box is displayed.



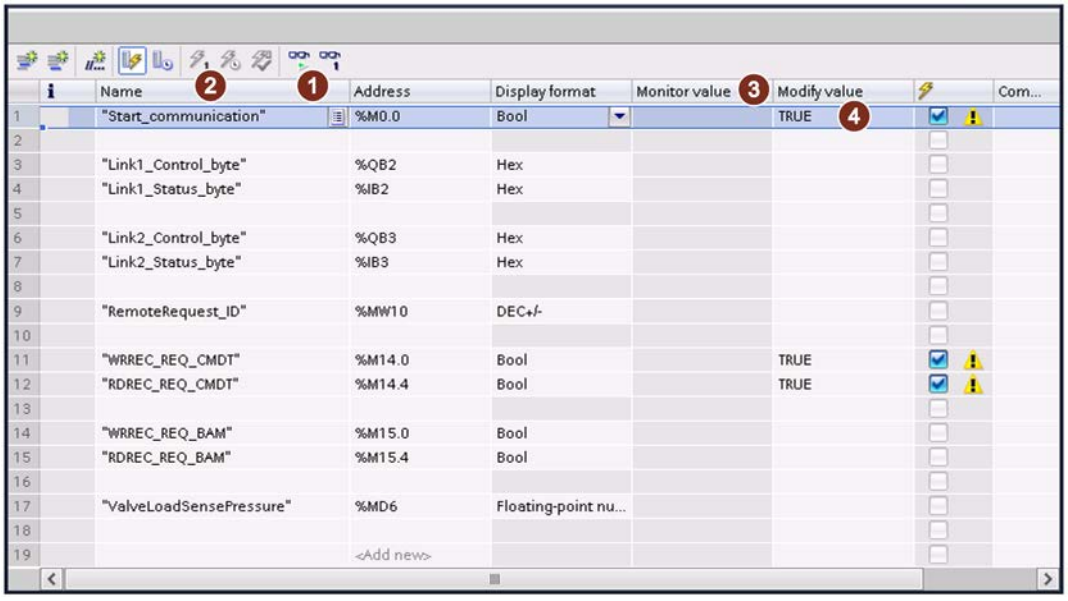
4. Define the data structure ①.

Setting the watch table "Link_1" online

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click "Devices → Project → PLC_1".
3. Double-click "Watch table_1".

   The following dialog box is displayed.



4. Change the value of the "Start_communication" tag to "TRUE" ④.

   This sets the control byte for both PN/J1939 LINKs to 0x01, and PN/J1939 LINK 1 and 2 change to operating mode.

5. Click "Monitor all" ① and then "Modify all selected values once and now" ②.

   The watch table "Watch table_1" goes online. The values in the "Monitor value" column ③ are updated cyclically.

4.5 Assigning parameters for cyclic change of value – Standard message

The transmission cycle can be changed in the properties of the module parameters. Below, it is described, how you have to assign parameters for both modules, so that the transmission only takes place in case of a change of value. This parameter assignment reduces the data traffic.

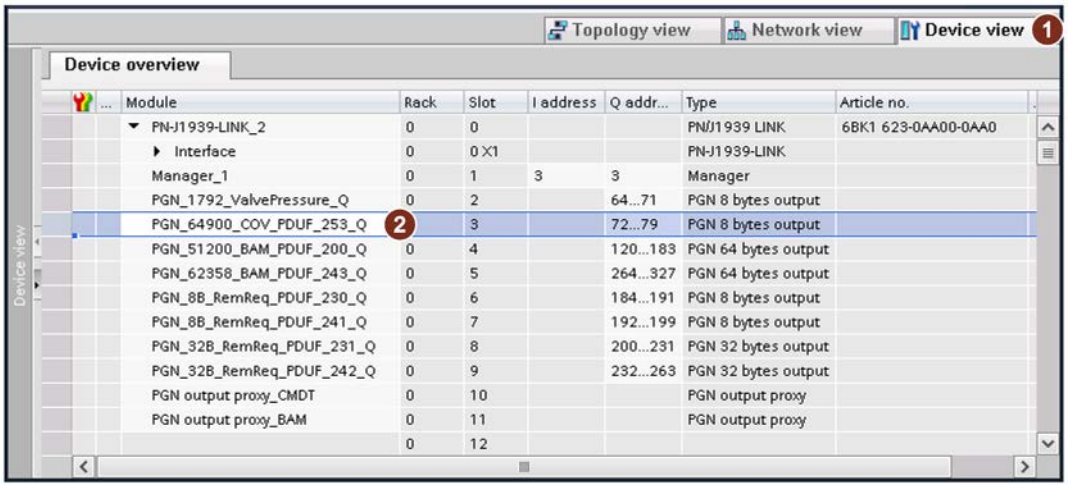
Note

Leave all other settings and procedures as they are given in the example for the cyclic standard message according to section "Establishing cyclic data communication (Page 21)".

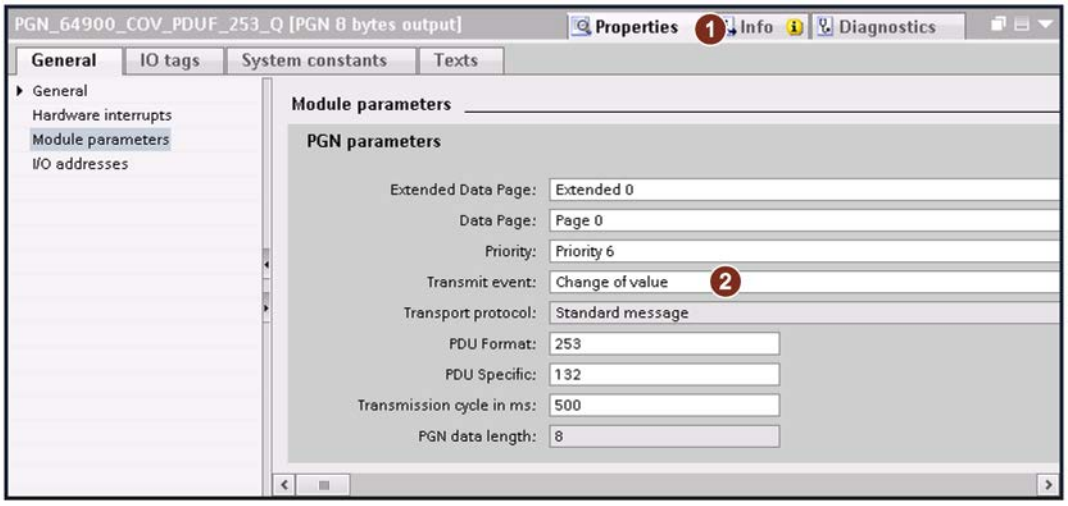
Assigning parameters for output module PGN_64900

Proceed as follows:

1. Click "Network view → PN-J1939-Link_2".
2. Click "Device view ① → Device overview → PGN_64900_COV_PDUF_253_ Q ②".



3. Click "Properties ① → General → Module parameters".

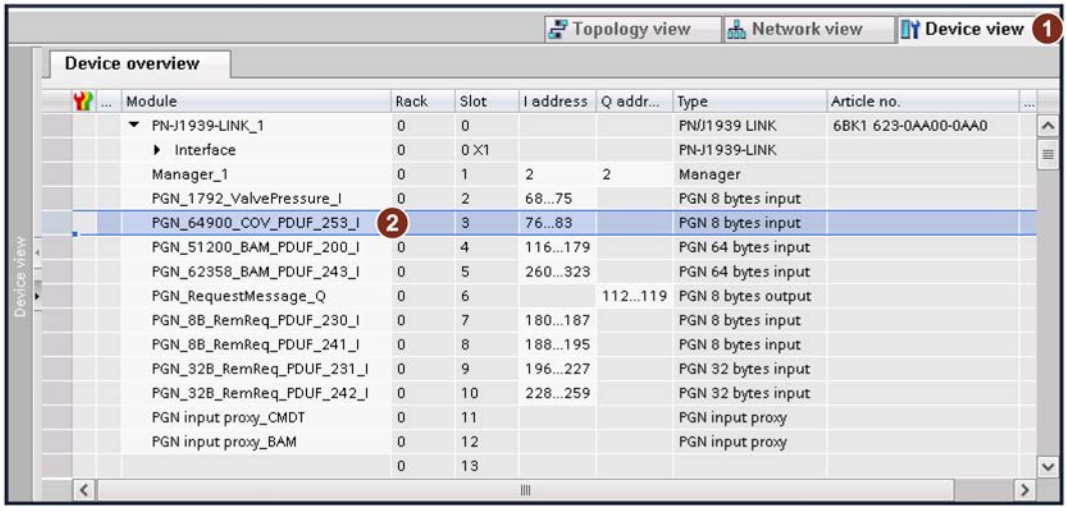


4. Set the transmission cycle to the value "Change of Value" ②.

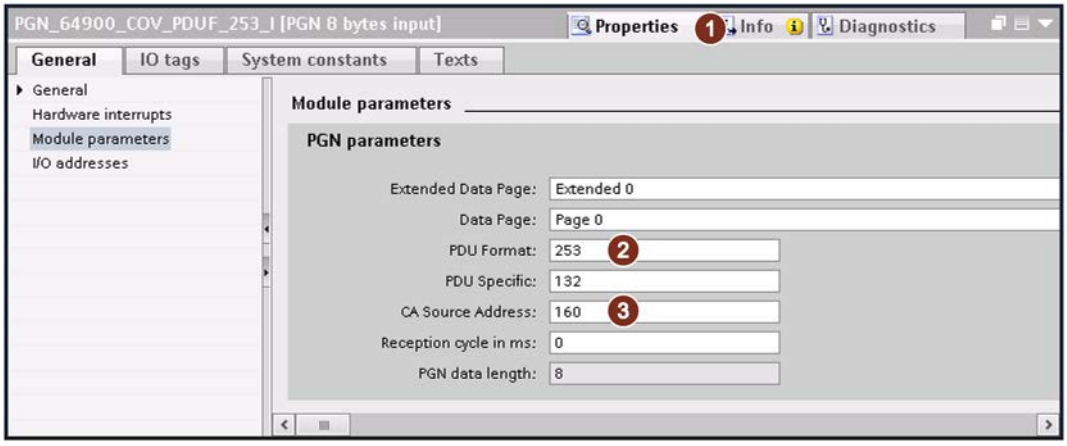
Assigning parameters for input module PGN_64900

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click "Device view ① → Device overview → PGN_64900_COV_PDUF_253_I ②".



3. Click "Properties ① → General → Module parameters".



4. Make the following settings:
   - PDU Format at "253" ②
   - CA Source Address at "160" ③

4.6 Interpreting PGN-1792 data

After the PGN-1792 data has been transferred, it can be interpreted. Information on how this data is to be interpreted is available in SAE J1939. The protocol was defined by the International Society of Automotive Engineers (SAE).

The following applies to this application example:

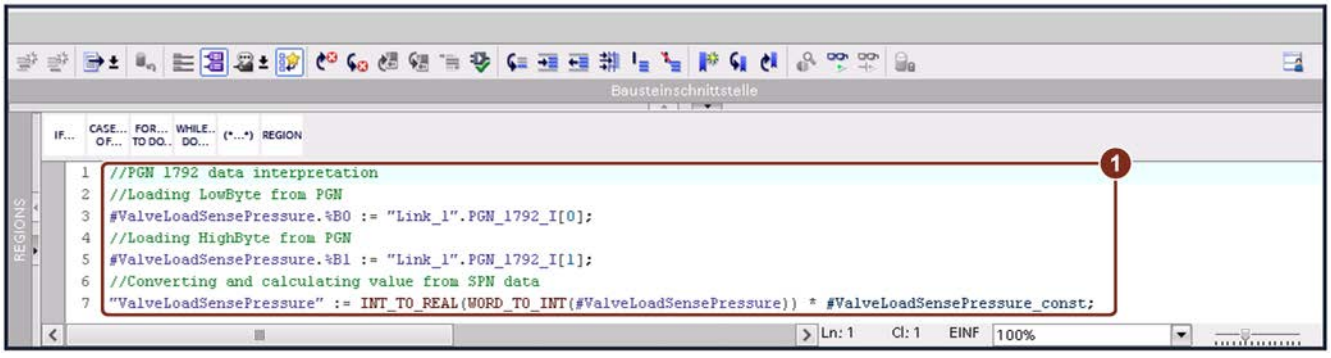
- Bytes 0 to 1: Metric SPN data
- Bytes 2 to 7: Not used
- Unit: kPa
- Measuring range: 0 to 321 275 kPa
- Resolution: 5 kPa/bit

Interpreting PGN-1972 data

Proceed as follows:

1. Select "Project tree → Devices → Project → PLC_1 → Program blocks".
2. Double-click "Process_PGN [FC4]" ②.

   The following dialog box is displayed.



3. Enter the program code ①.

   The required bytes are then loaded. The loaded data is then converted and calculated.

Sample calculation

The metric value for PGN 1792 should be 500 kPa.

Both bytes produce the number of the PGN as follows:

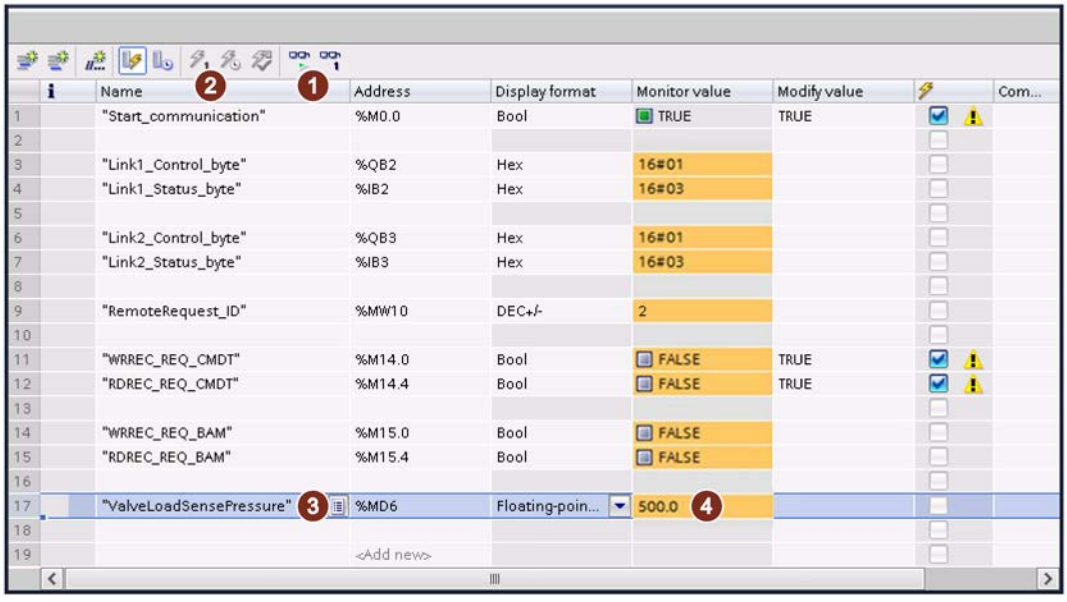
- SPN data$_{16}$ = 0x00 and 0x64
- SPN data$_{16}$ = 0x**0064**
- SPN data$_{10}$ = 100
- 100 × 5 (resolution per bit) = 500 kPa

Set resolution per bit

Proceed as follows:

1. Select "Project tree → Devices → Project → PLC_1 → Watch and force tables".
2. Double-click "Watch table_1".

   The following dialog box is displayed.



3. Click "Monitor all" ① and then "Modify all selected values once and now" ②.

   The watch table "Watch table_1" goes online.

   The row "ValveLoadSensePressure" ③ is updated cyclically with the values calculated from the PGN-1792 data ④.

Assigning parameters for cyclic change of value - Data length > 8 bytes

5

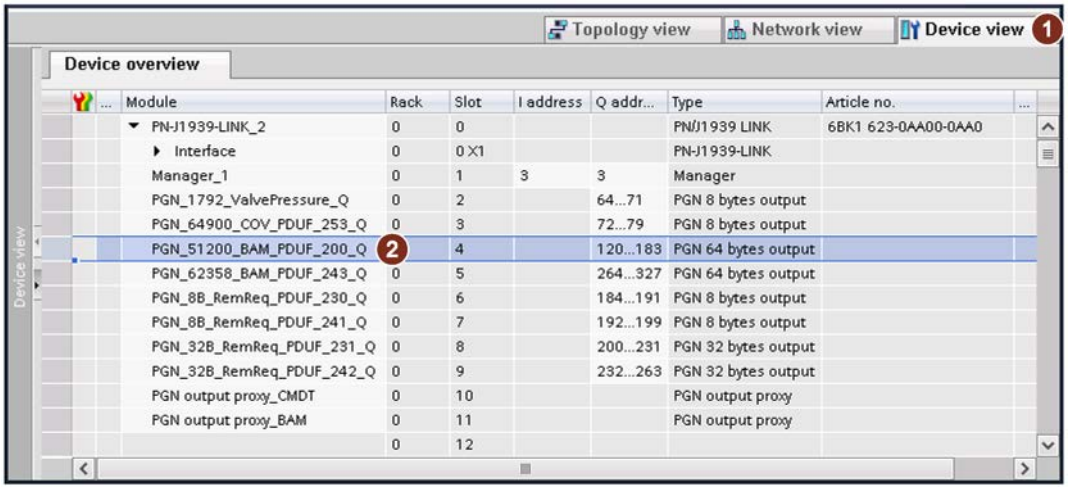
5.1 Cyclic change of value output module - PDU format <= 239

Length of the PGN data: > 8 bytes (BAM)

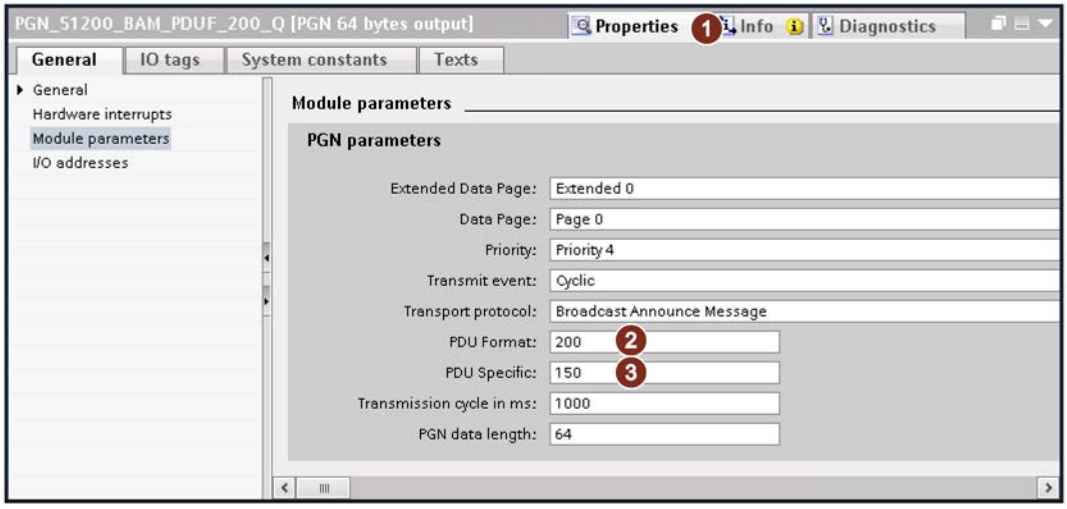
Configuring output module "PGN_51200_BAM_PDUF_200_Q"

Proceed as follows:

1. Click "Network view → PN-J1939-Link_2".
2. Click "Device view ① → Device overview → PGN_51200_BAM_PDUF_200_Q ②".



3. Click "Properties ① → General → Module parameters".



4. Make the following settings:
   - PDU Format at "200" ②
   - PDU Specific at "150" ③

   The other parameters must be set as described in the section "Assigning parameters for cyclic change of value - Standard message (Page 34)".

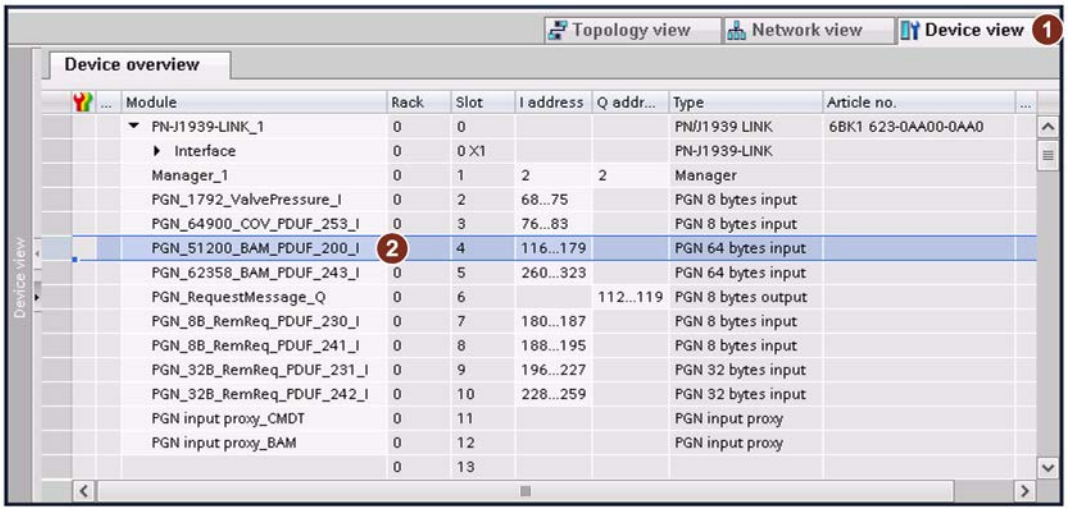
5.2 Cyclic change of value input module - PDU format <= 239

Length of the PGN data: > 8 bytes (BAM)

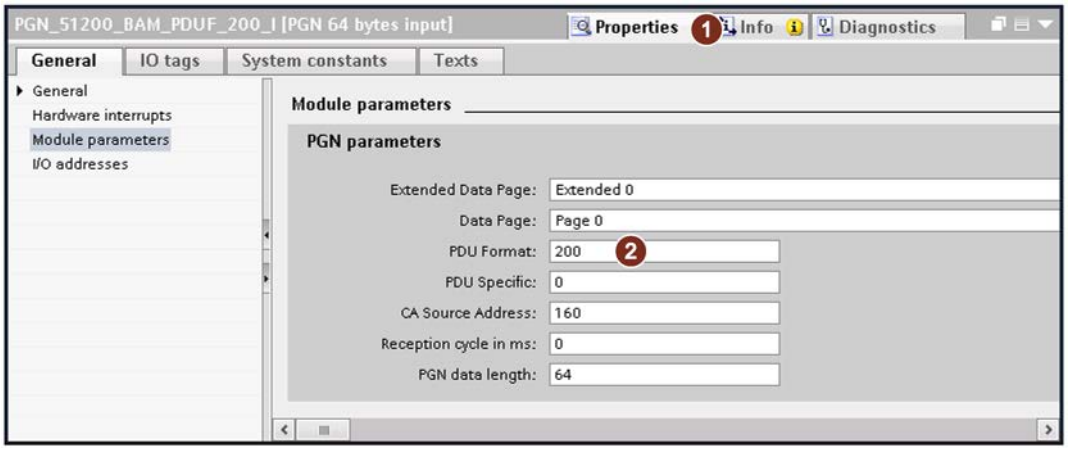
Configuring the input module "PGN_51200_BAM_PDUF_200_I"

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click "Device view ① → Device overview → PGN_51200_BAM_PDUF_200_I ②".



3. Click "Properties ① → General → Module parameters".



4. Set the PDU format to "200" ②.

   The other parameters must be set as described in the section "Assigning parameters for cyclic change of value - Standard message (Page 34)".

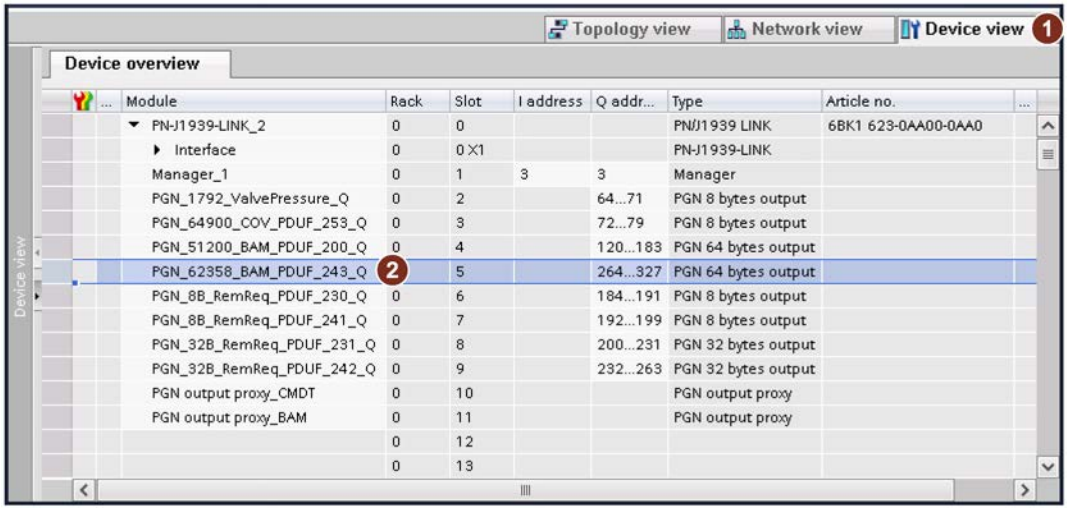
5.3 Cyclic change of value output module - PDU format > 239

In this case, the PGN parameter PDU Specific does not work as known. The PGN parameter PDU Specific is an extension of "PDU Format".

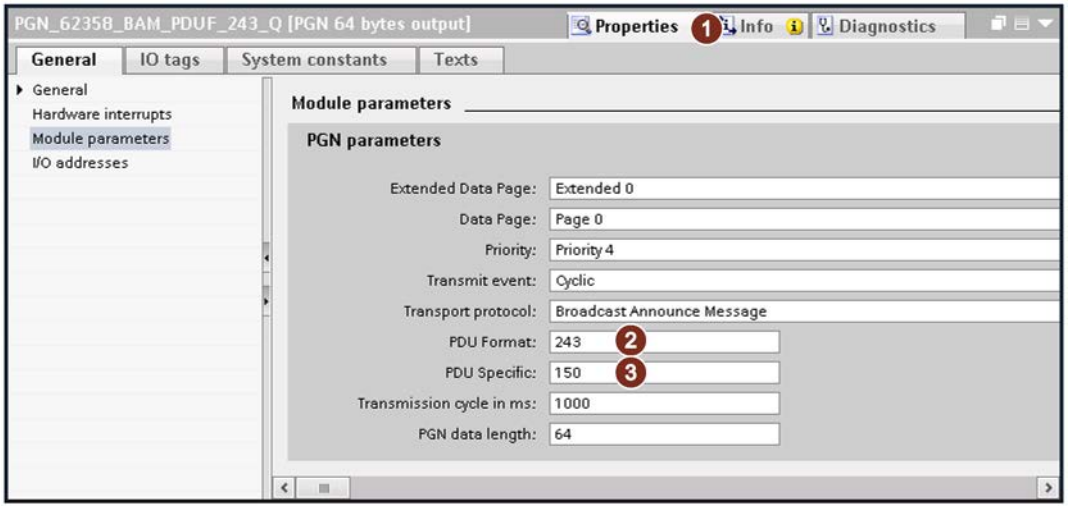
Configuring output module "PGN_62358_BAM_PDUF_243_Q"

Proceed as follows:

1. Click "Network view → PN-J1939-Link_2".
2. Click "Device view ① → Device overview → PGN_62358_BAM_PDUF_243_Q ②".



3. Click "Properties ① → General → Module parameters".



4. Make the following settings:
   - PDU Format to "243" ②
   - PDU Specific at "150" ③

   The other parameters must be set as described in the section "Assigning parameters for cyclic change of value - Standard message (Page 34)".

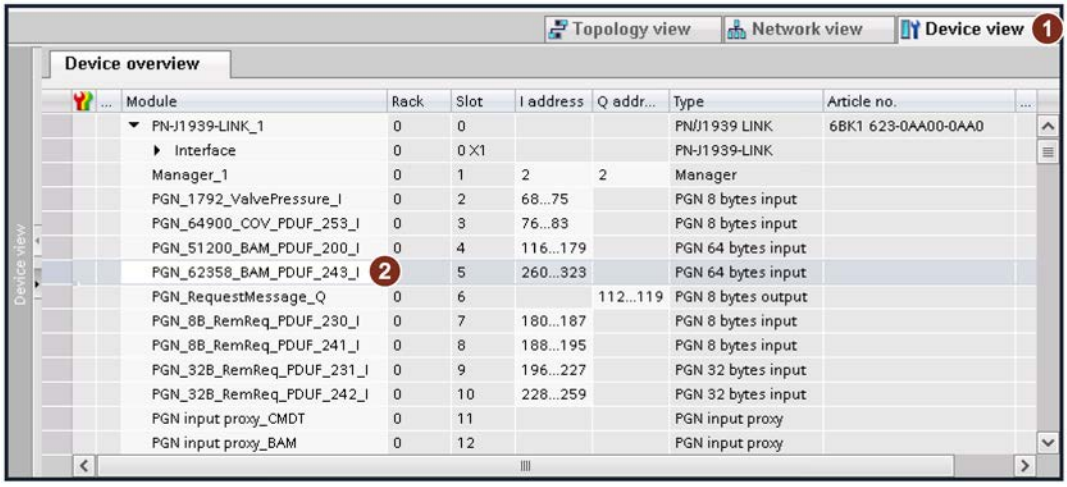
5.4 Cyclic change of value input module - PDU format > 239

Length of the PGN data: > 8 bytes (BAM)

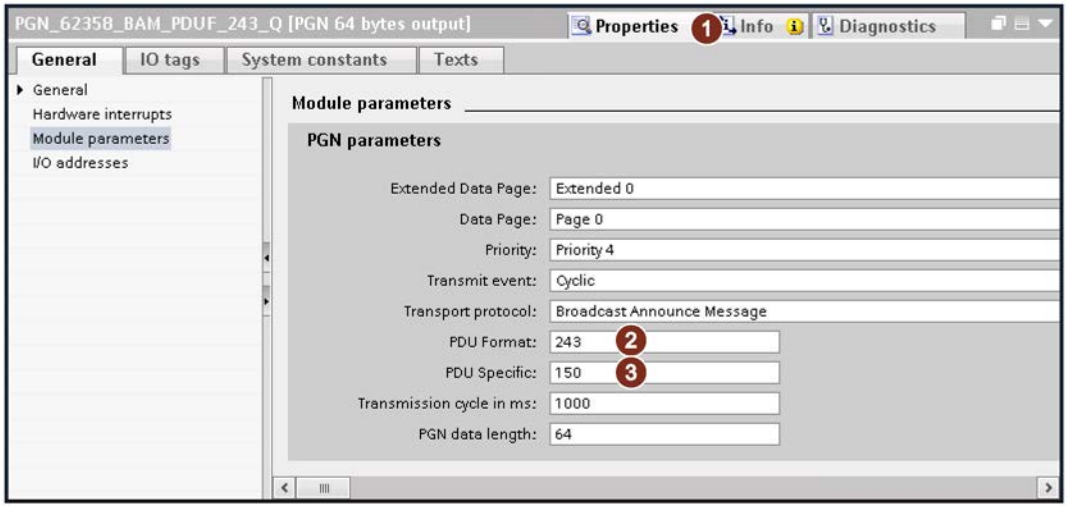
Configuring the input module "PGN_62358_BAM_PDUF_243_I"

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click "Device view ① → Device overview → PGN_62358_BAM_PDUF_243_I ②".



3. Click "Properties ① → General → Module parameters".



4. Make the following settings:
   - PDU Format to "243" ②
   - PDU Specific at "150" ③

   The other parameters must be set as described in the section "Assigning parameters for cyclic change of value - Standard message (Page 34)".

Setting up remote request

6

As a user, you can use remote request to receive the requested data.

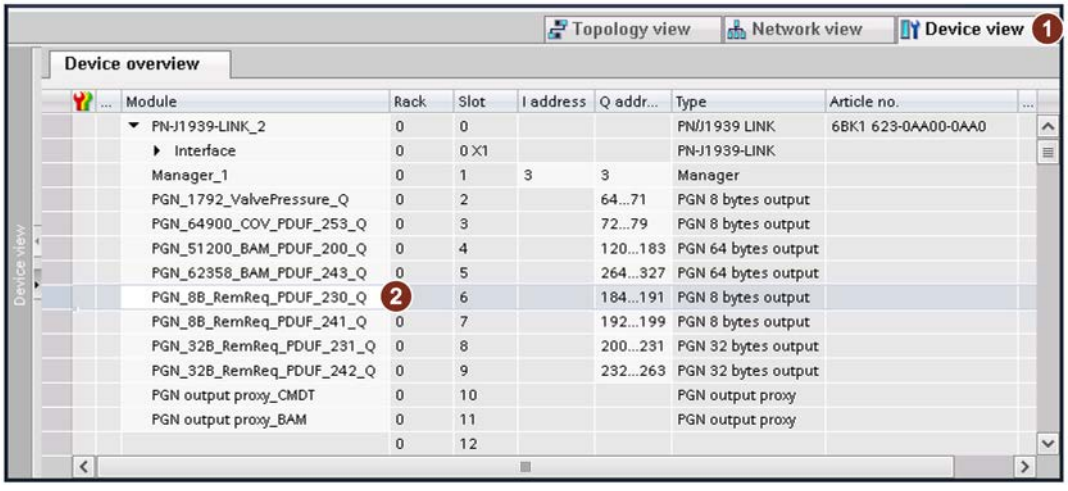
6.1 Standard message – PGN data length <= 8 bytes, PDU format <= 239

6.1.1 Configure Link 2 – PGN_8B_RemReq_PDUF_230_Q

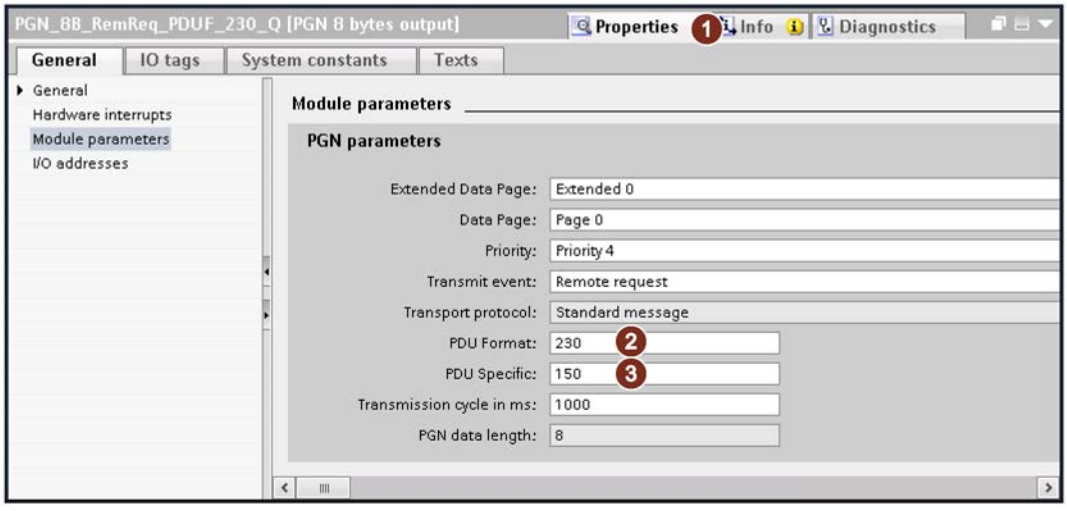
Assigning parameters for PGN_8B_RemReq_PDUF_230_Q

Proceed as follows:

1. Click "Network view → PN-J1939-Link_2".
2. Click "Device view ① → Device overview → PGN_8B_RemReq_PDUF_230_Q ②".



3. Click "Properties ① → General → Module parameters".



4. Make the following settings:
   - PDU Format at "230" ②
   - PGN Specific to "150" ③

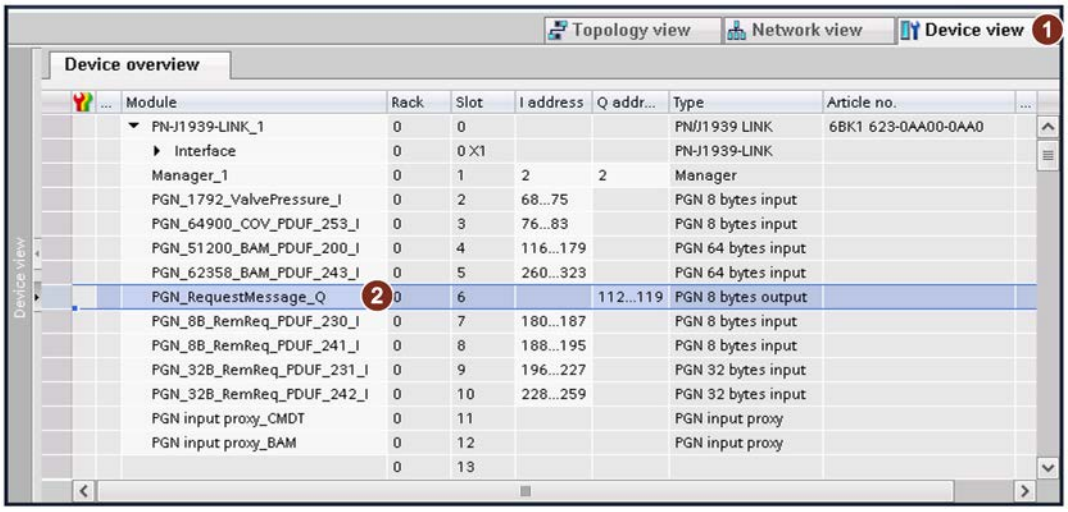
Assign parameters for PGN_RequestMassage_Q

PN/J1939 Link_1 as output PGN sends a request message to specify the requested PGN.

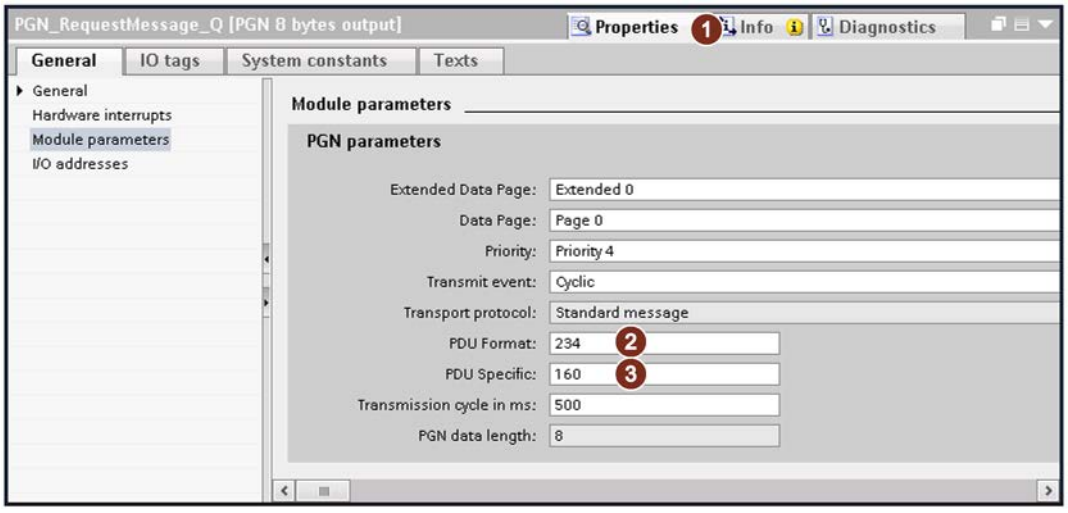
- PDU Format = 234 for the remote request
- PDU Specific = 160 for the source address of Link_2

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click "Device view ① → Device overview → PGN_RequestMassage_Q ②".



3. Click "Properties ① → General → Module parameters".



4. Make the following settings:
   - PDU format to "234" ②
   - PGN Specific to "160" ③

The requested PGN is defined by the assigned output data of the request message.

- PDU F_{16} = 0xE6
- PDU S_{16} = 0x96

The data of the request message are:

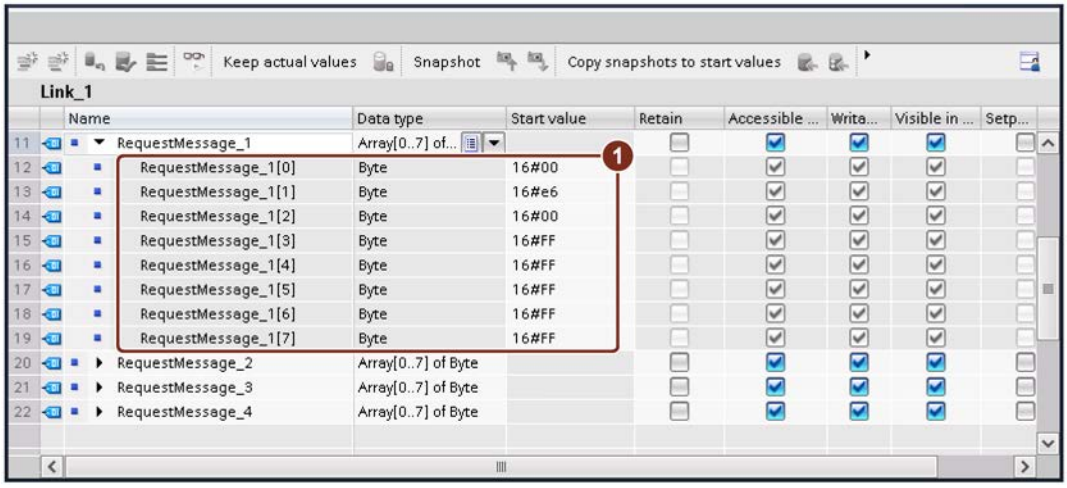
First byte	0x00	PDU Specific
Second byte	0xE6	PDU Format
Third byte	00	Default
Bytes 4 to 7	0xFF	Not used

Enter RequestMessage_1

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Link_1 [DB1]".

   The following dialog box is displayed.



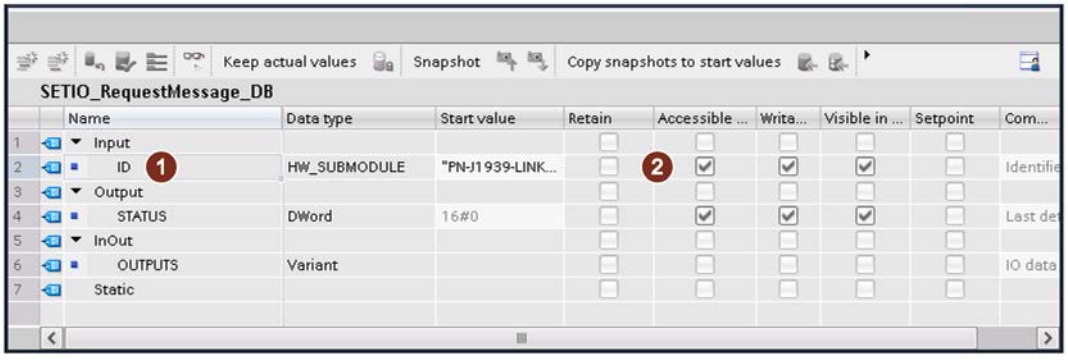
4. Enter the data of the request message ① according to the target PGN.

Assign parameters for SETIO_RequestMessage_DB [DB7]

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks → System blocks → Program resources".
3. Double-click "SETIO_RequestMessage_DB [DB7]".

   The program resource is displayed.



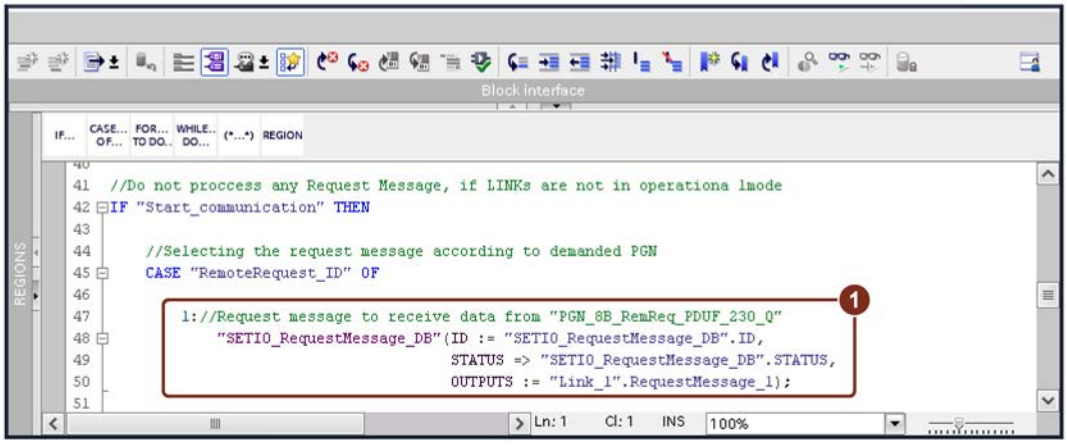
   The hardware ID is displayed at ①. The corresponding start value can be found at ②.

Programming request message

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks → Send_PGN [FC2]".
3. Double-click "Send_PGN [FC2]".

   The following dialog box is displayed.



4. Enter the program code ①.

   The request message for receiving data from "PGN_8B_RemReq_PDUF_230_Q" then has the following properties:

   – ID: The hardware ID
   – STATUS: The result
   – OUTPUTS: Data of the request message

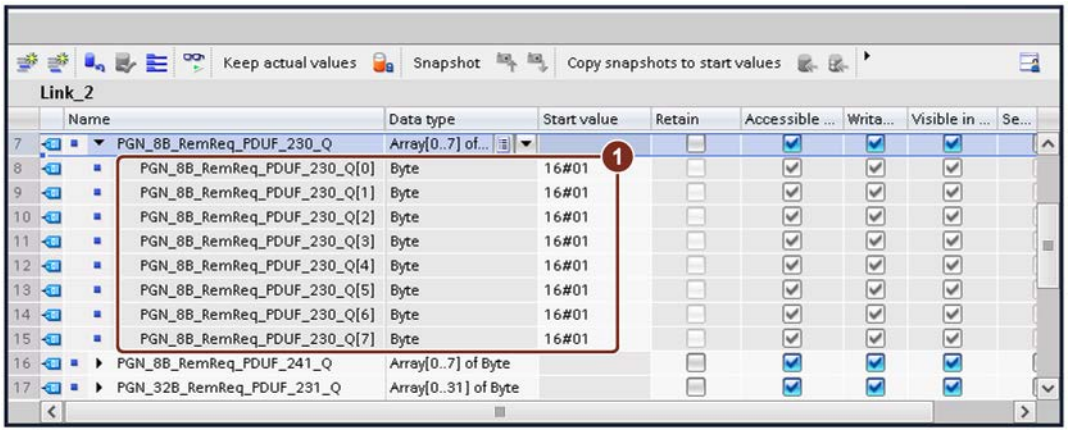
Create output data

The output data that is sent to the request from Link_2 (PGN_32B_RemReq_PDUF_230_Q) is defined below.

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Link_2 [DB2]".

   The following dialog box is displayed.



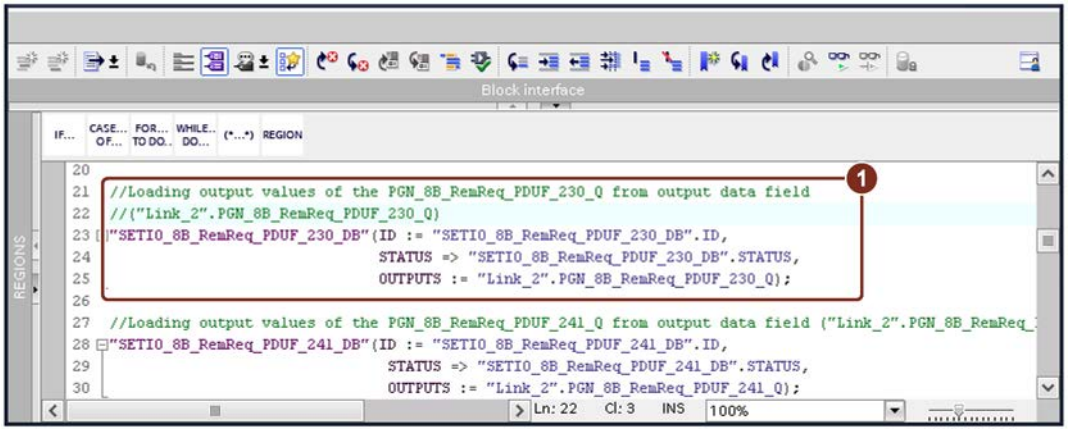
4. Enter the response data for the request message ①.

Assign output data

Use the SETIO function to assign output values from an output data field to the output PGN.

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Send_PGN [FC2]".

   The following dialog box is displayed.



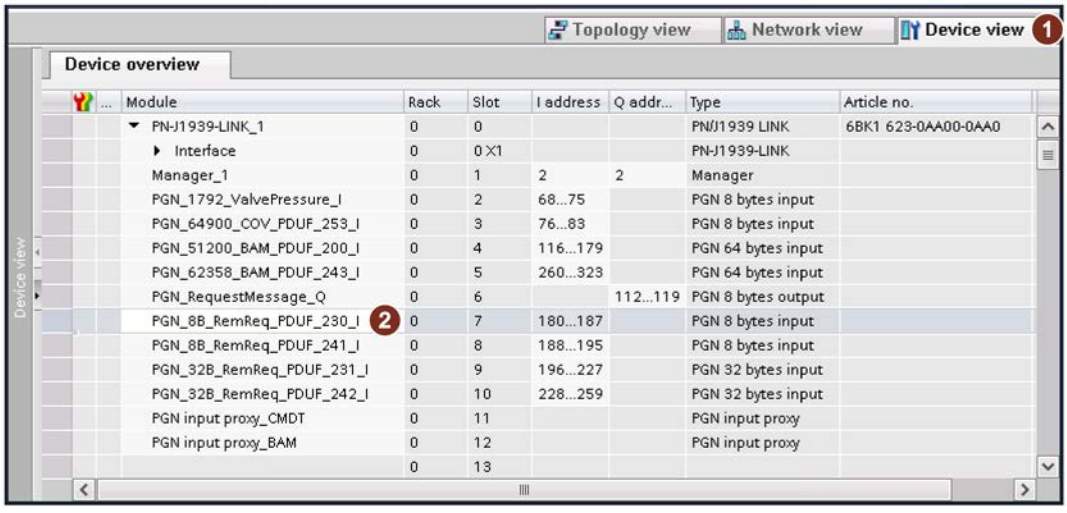
4. Enter the program code ①.

6.1.2 Configure Link 1 – PGN_8B_RemReq_PDUF_230_I

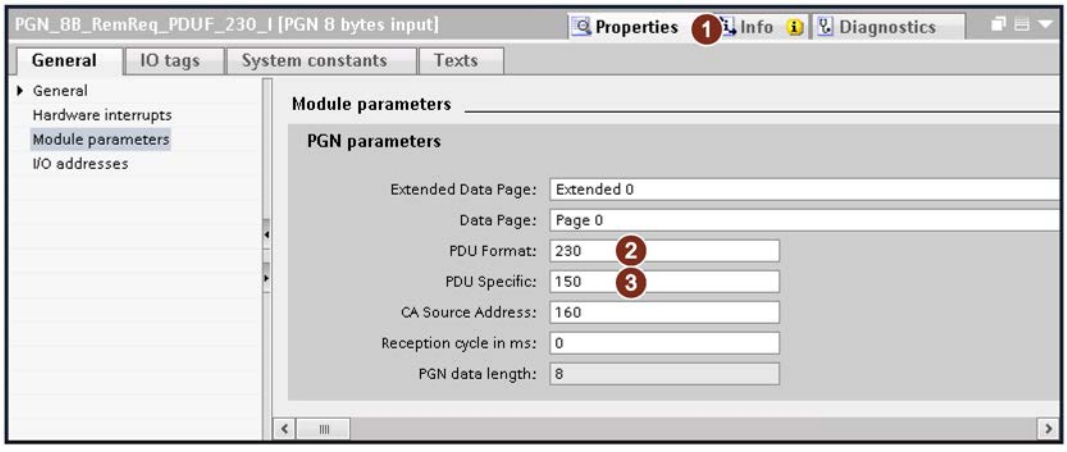
Assigning parameters for PGN_8B_RemReq_PDUF_230_I

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click on "Device view → Device overview → PGN_8B_RemReq_PDUF_230_I".



3. Click "Properties ① → General → Module parameters".

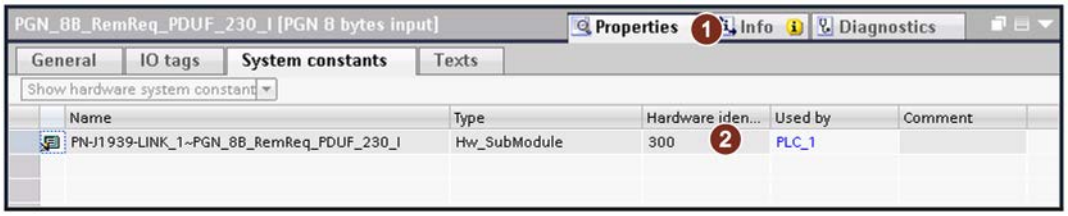


4. Make the following settings:
   - PDU Format at "230" ②
   - PDU Specific "150" ③

Displaying the hardware ID

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click on "Device view → Device overview → PGN_8B_RemReq_PDUF_230_I".
3. Click "Properties ① → System constants".



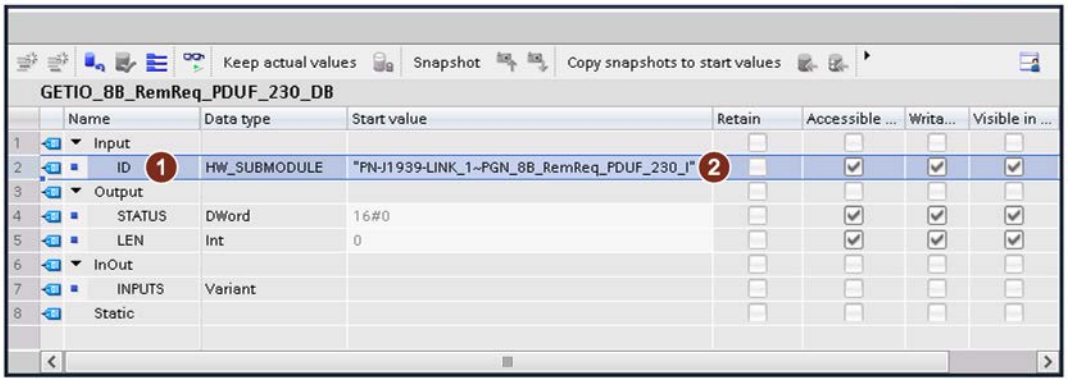
The hardware ID is displayed at ②.

Show start value

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks → System blocks → Program resources".
3. Double-click "GETIO_8B_RemReq_PDUF_230_DB [DB8]".

   The program resource is displayed.



The hardware ID is displayed at ①. The corresponding start value can be found at ②.

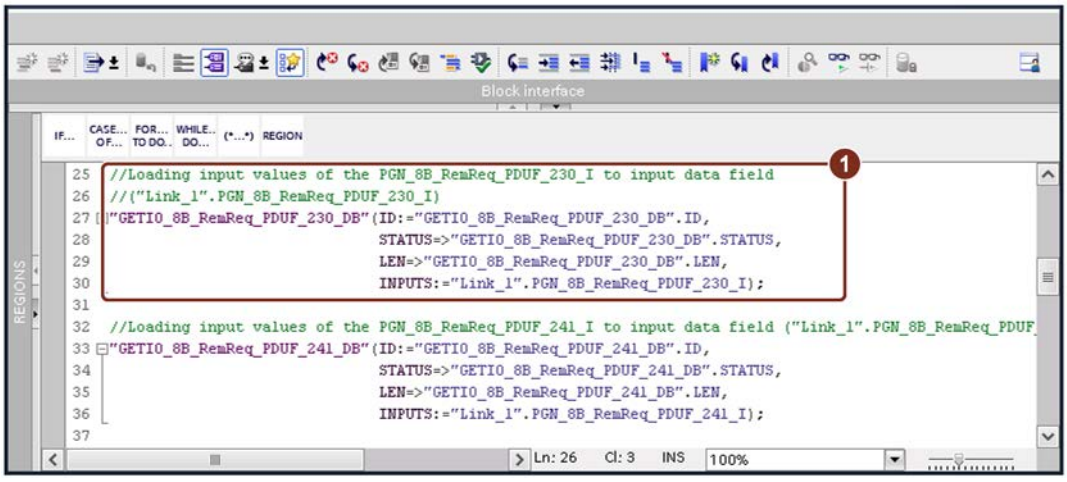
Assign input data

Use the GETIO function to assign data from the input PGN to the byte array.

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Read_PGN [FC3]".

   The following dialog box is displayed.



4. Enter the program code ①.

   The assignment of the input data of the "PGN_8B_RemReq_PDUF_230_I" to the byte array is thus programmed.

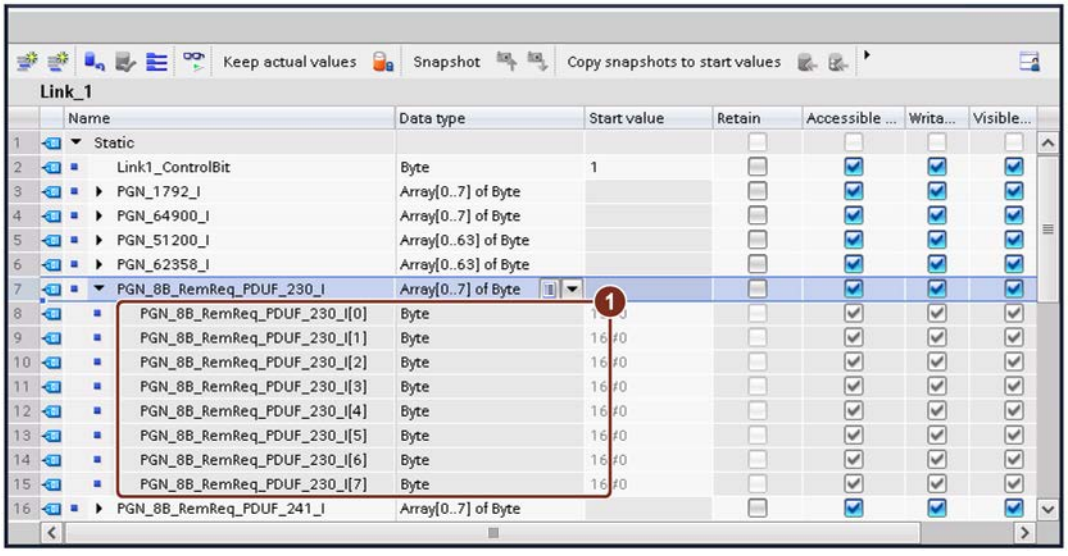
Assigning parameters for PGN_8B_RemReq_PDUF_230_I

Create the structure of the input data block of the PN-J1939-Link_1 that is used for saving receive data of the PGN 59030 (PGN_8B_RemReq_PDUF_230_Q).

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Link_1 [DB1]".

   The following dialog box is displayed.



The result of the remote request is saved here ①.

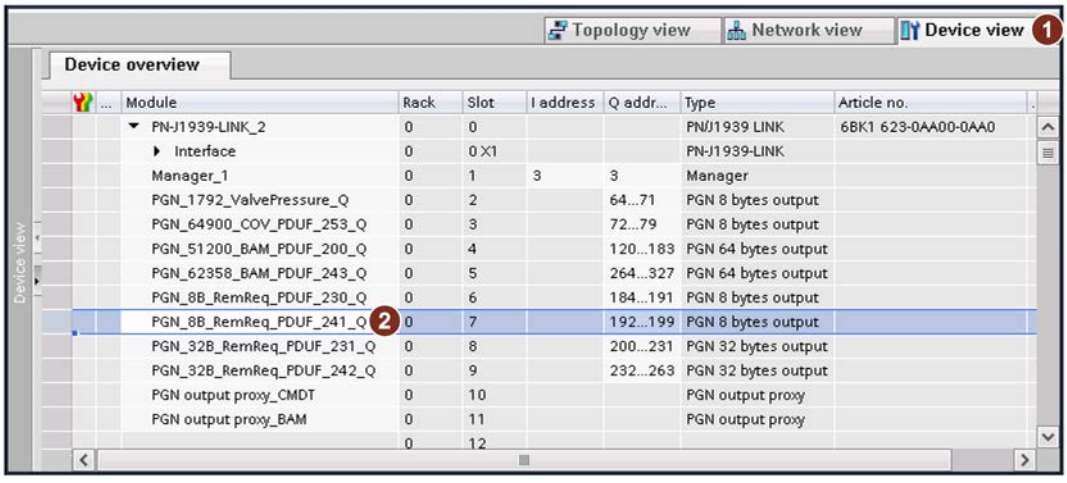
6.2 Standard message – PGN data length <= 8 bytes, PDU format > 239

6.2.1 Configure Link 2 – PGN_8B_RemReq_PDUF_241_Q

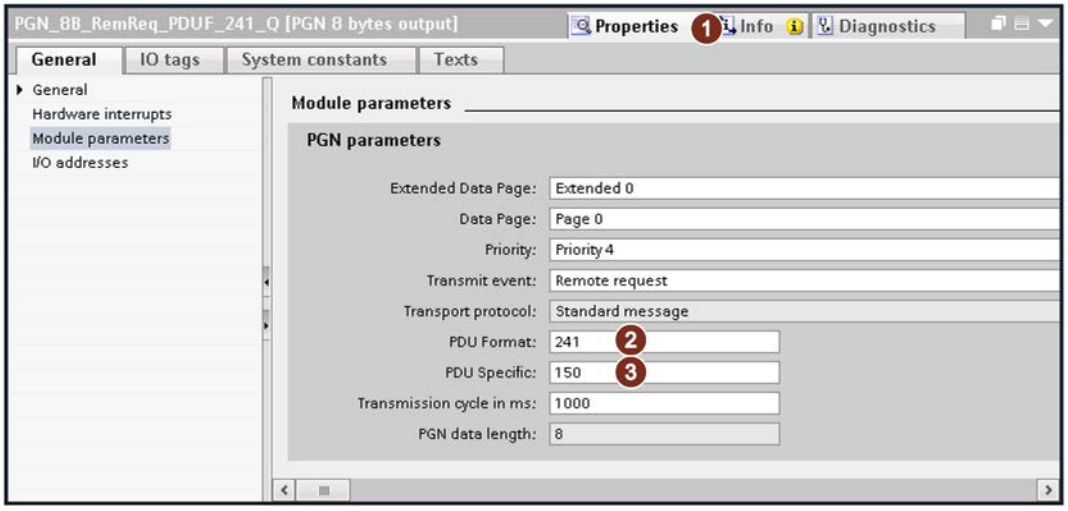
Assigning parameters for PGN_8B_RemReq_PDUF_241_Q

Proceed as follows:

1. Click "Network view → PN-J1939-Link_2".
2. Click "Device view ① → Device overview → PGN_8B_RemReq_PDUF_241_Q ②".



3. Click "Properties ① → General → Module parameters".



4. Make the following settings:
   - PDU Format at "241" ②
   - PDU Specific at "150" ③

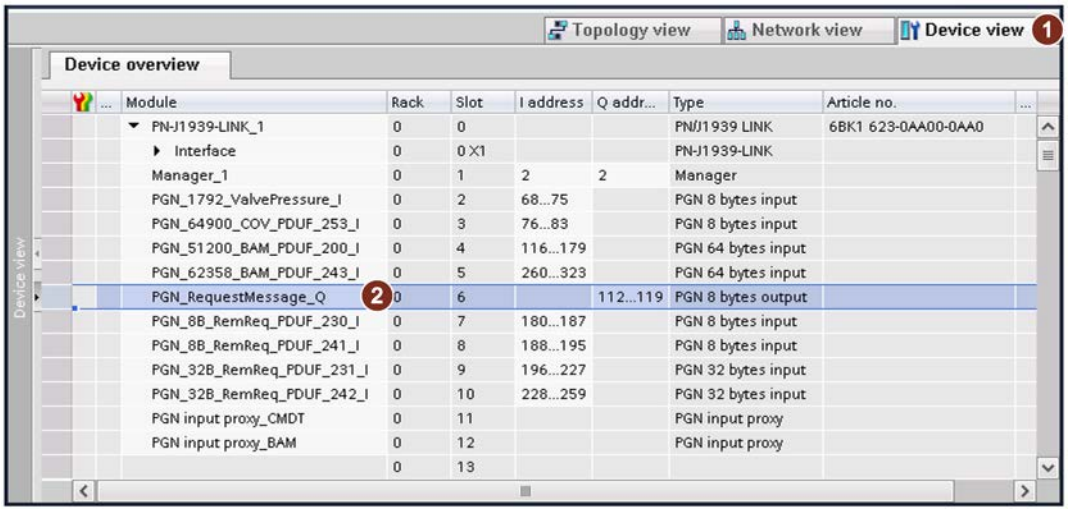
Assign parameters for PGN_RequestMassage_Q

In the application example, the same PGN is used for all remote requests. The data assigned to the output, on the other hand, is different.

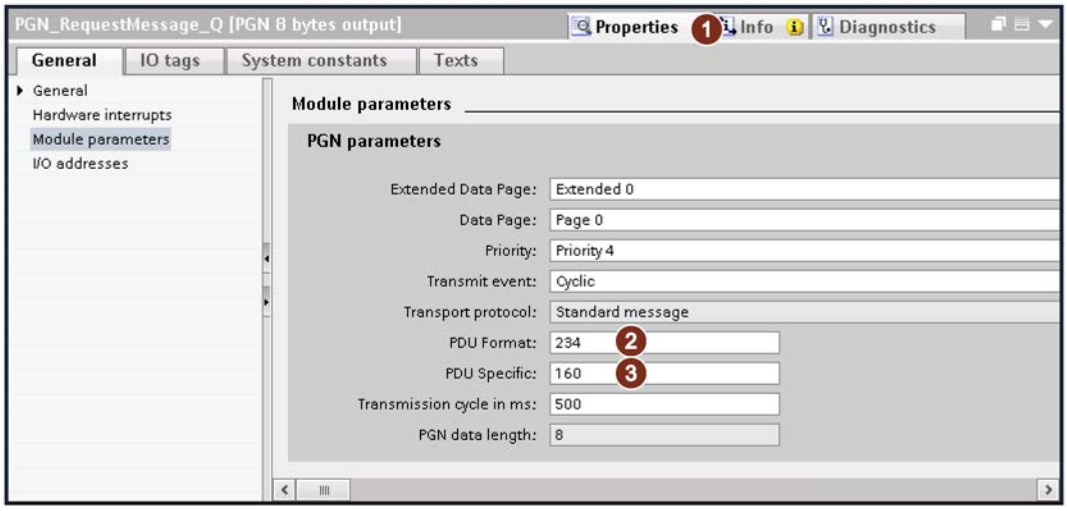
- PDU Format = 234 for the remote request
- PDU Specific = 160 for the source address of Link_2

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click "Device view ① → Device overview → PGN_RequestMassage_Q ②".



3. Click "Properties ① → General → Module parameters".



4. Make the following settings:
   - PDU format to "234" ②
   - PDU Specific to "160" ③

The requested PGN is defined by the assigned output data of the request message.

The requested PGN 61846 (Link_2: PGN_8B_RemReq_PDUF_241_Q) = 0xF196

- PDU F_{16} = 0xF1
- PDU S_{16} = 0x96

The data of the request message are:

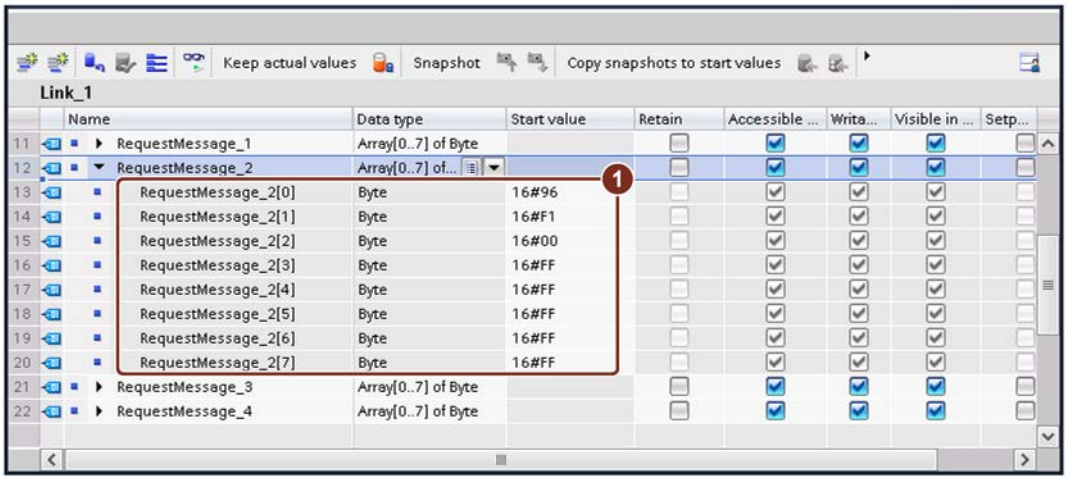
First byte	0x96	PDU Specific
Second byte	0xF1	PDU Format
Third byte	00	Default
Bytes 4 to 7	0xFF	Not used

Enter RequestMessage_2

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Link_1 [DB1]".

   The following dialog window shows the data of the request message.



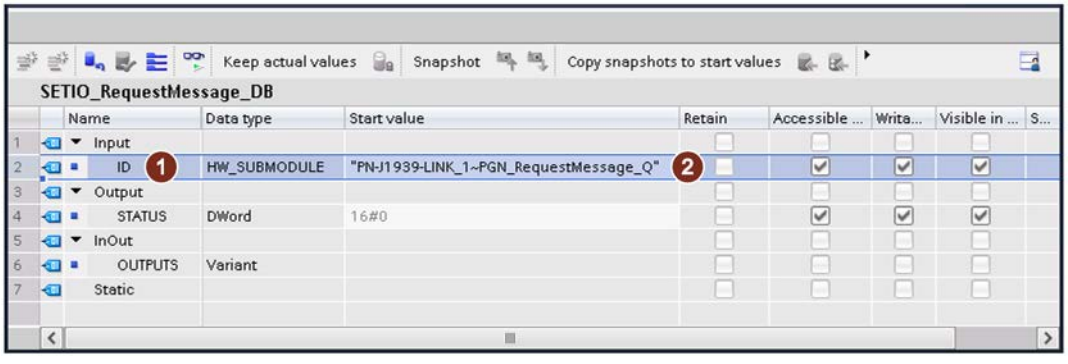
4. Add the data of the request message ① according to the target PGN.

Assign parameters for SETIO_RequestMessage_DB [DB7]

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks → System blocks → Program resources".
3. Double-click "SETIO_RequestMessage_DB [DB7]".

   The program resource is displayed.



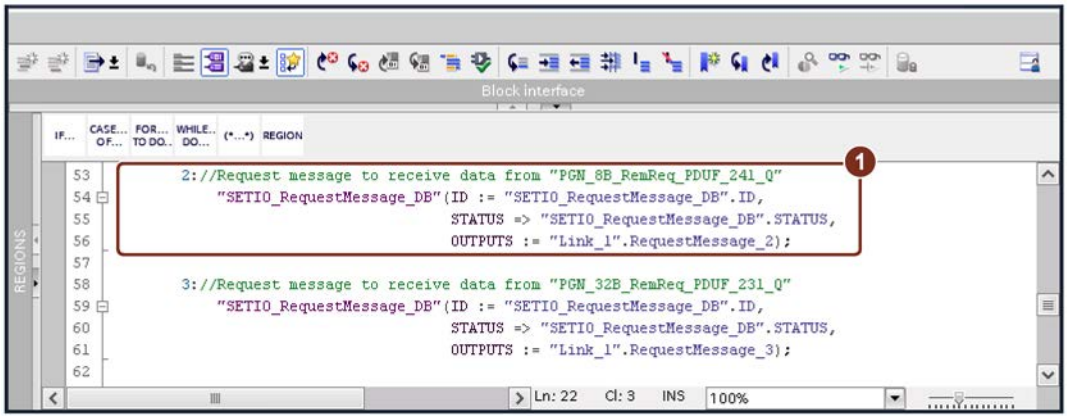
The ID is displayed at ①. The corresponding start value can be found at ②.

Programming request message

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Send_PGN [FC2]".

   The following dialog box is displayed.



4. Enter the program code ①.

   The request message is now programmed to assign data from "PGN_8B_RemReq_PDUF_241_Q".

Create output data

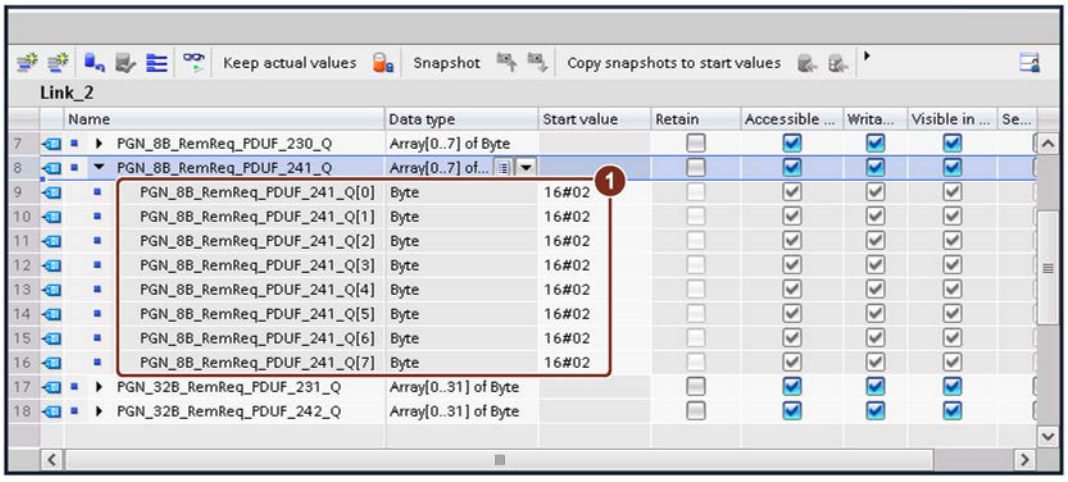
The output data that is sent to the request from Link_2 (PGN_32B_RemReq_PDUF_241_Q) is defined below.

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".

3. Double-click "Link_2 [DB2]".

   The following dialog box is displayed.



4. Enter the response data for the request message ①.

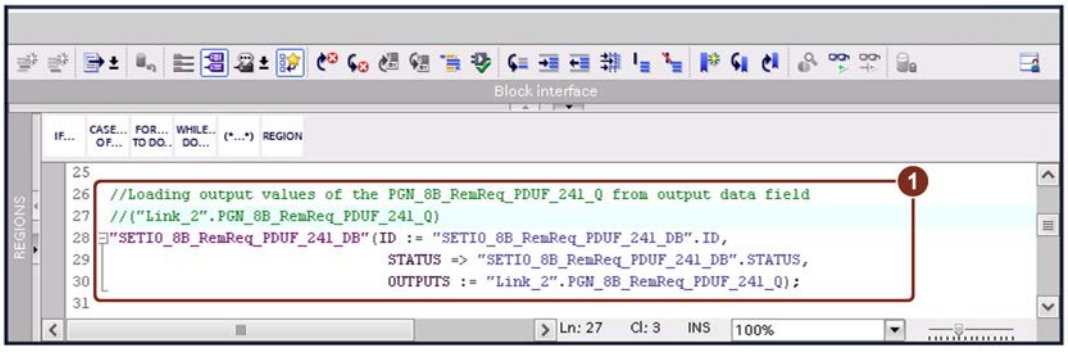
Assign output data

Use the SETIO function to assign output data from a byte set to the requested PGN.

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Send_PGN [FC2]".

   The following dialog box is displayed.



4. Enter the program code ①.

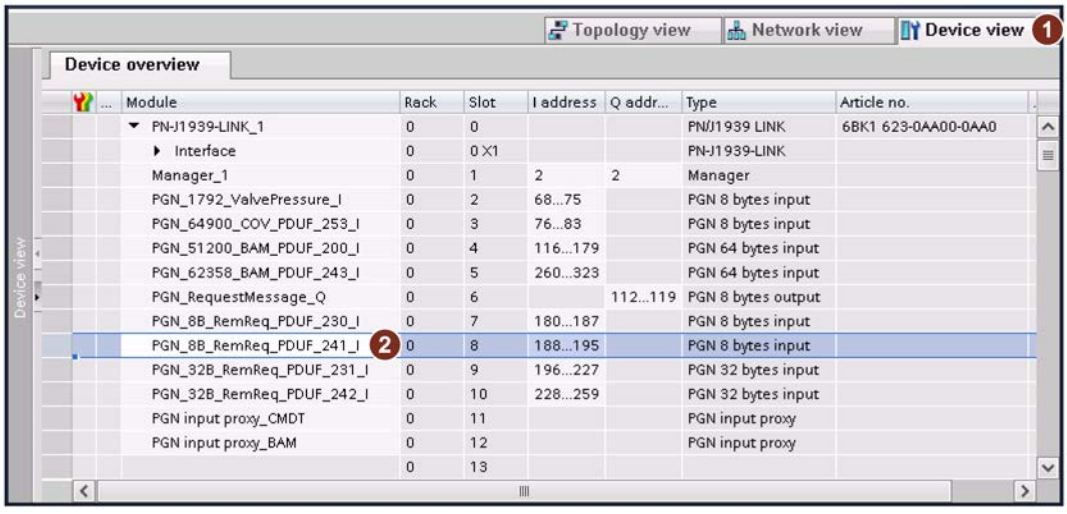
   The assignment of the output data of the "PGN_8B_RemReq_PDUF_241_Q" is thus programmed.

6.2.2 Configure Link 1 – PGN_8B_RemReq_PDUF_241_I

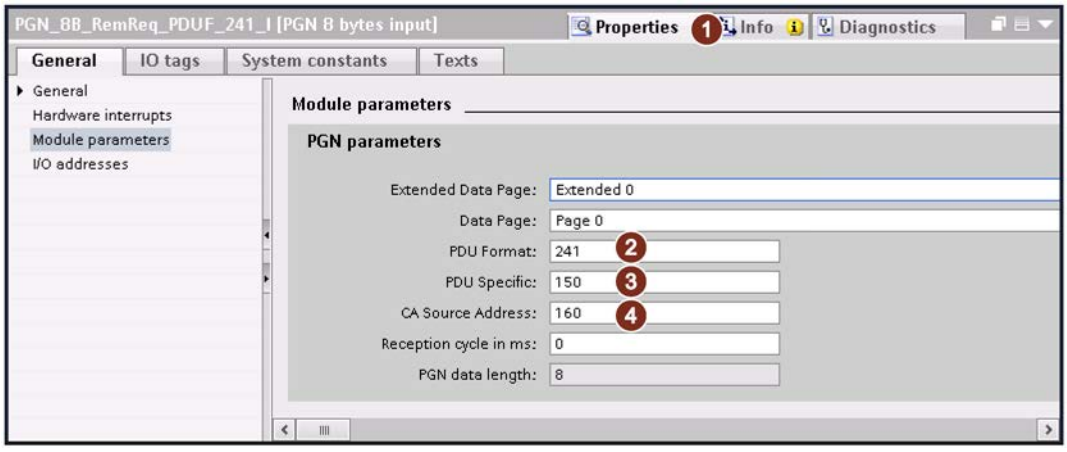
Assigning parameters for PGN_8B_RemReq_PDUF_241_I

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click "Device view ① → Device overview → PGN_8B_RemReq_PDUF_241_I ②".



3. Click "Properties ① → General → Module parameters".

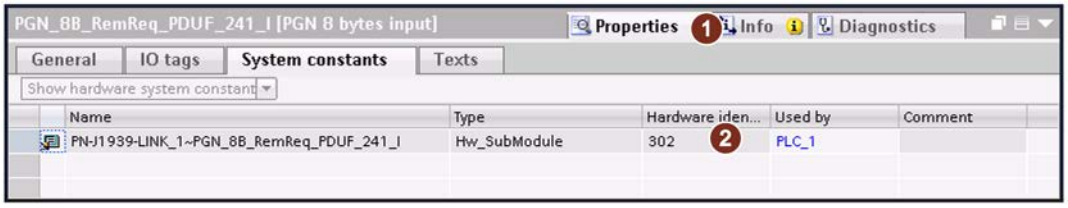


4. Make the following settings:
   - PDU Format at "241" ②
   - PDU Specific at "150" ③
   - CA source address at "160" ④

Displaying the hardware ID

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click on "Device view → Device overview → PGN_8B_RemReq_PDUF_241_I".
3. Click "Properties ① → System constants".



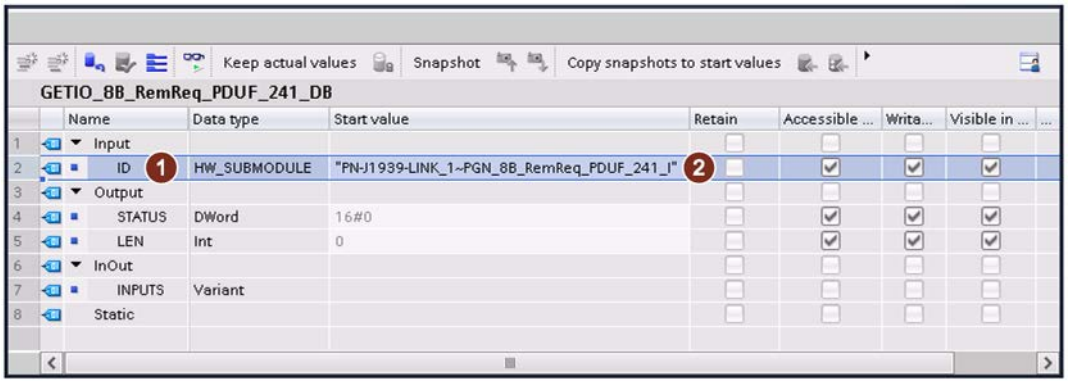
The hardware ID is displayed at ②.

Show start value

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks → System blocks → Program resources".
3. Double-click "GETIO_8B_RemReq_PDUF_241_DB [DB21]".

   The program resource is displayed.



The hardware ID is displayed at ①. The corresponding start value can be found at ②.

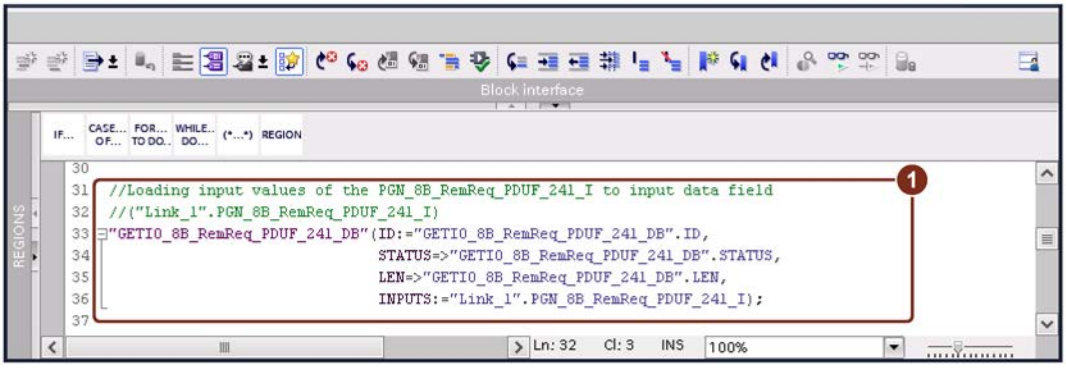
Assign input data

Use the GETIO function to assign data from the input PGN to the byte array.

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Read_PGN [FC3]".

   The following dialog box is displayed.



4. Enter the program code ①.

   The assignment of the input data of the "PGN_8B_RemReq_PDUF_241_I" to the byte array is thus programmed.

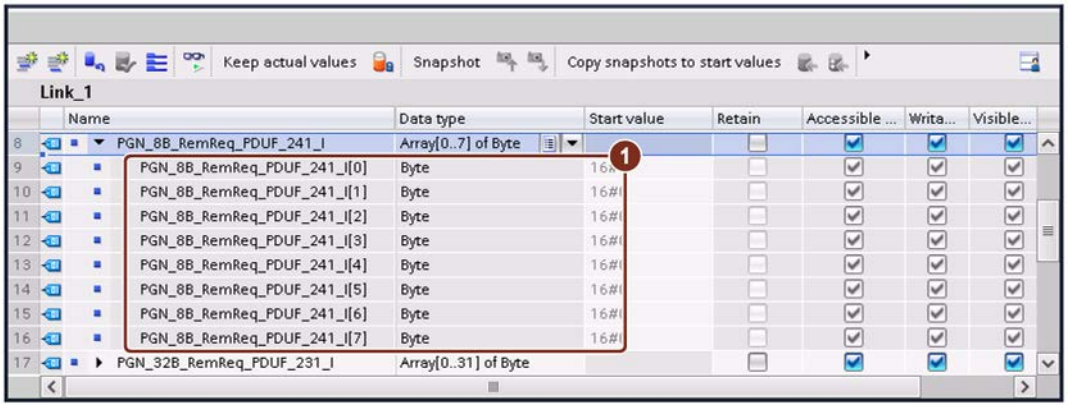
Assigning parameters for PGN_8B_RemReq_PDUF_241_I

Create the structure of the input data block of the PN-J1939-Link_1 that is used for saving receive data of the PGN 61846 (Link_2: PGN_8B_RemReq_PDUF_241_I).

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Link_1 [DB1]".

   The following dialog box is displayed.



The result of the remote request is saved here ①.

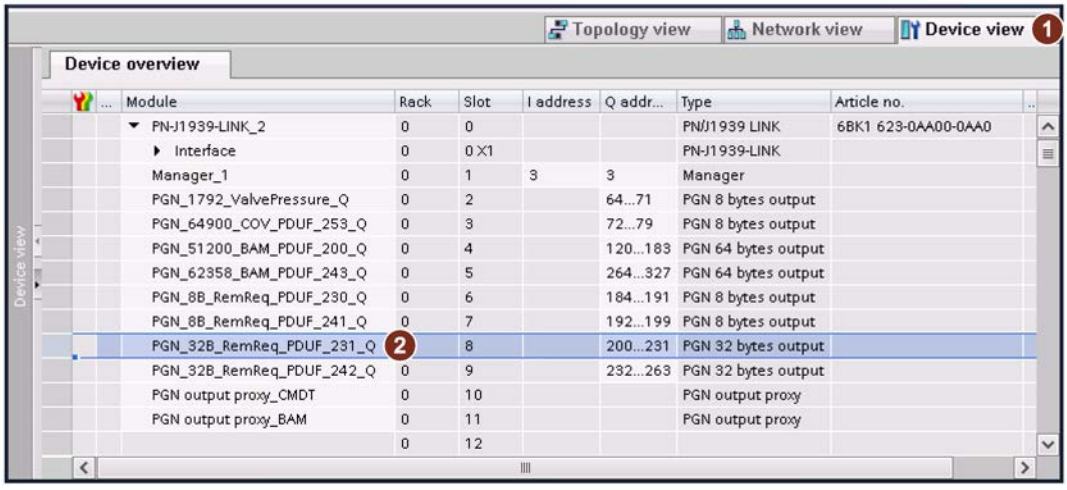
6.3 Standard message – PGN data length > 8 bytes, PDU format <= 239

6.3.1 Configure Link 2 – PGN_32B_RemReq_PDUF_231_Q

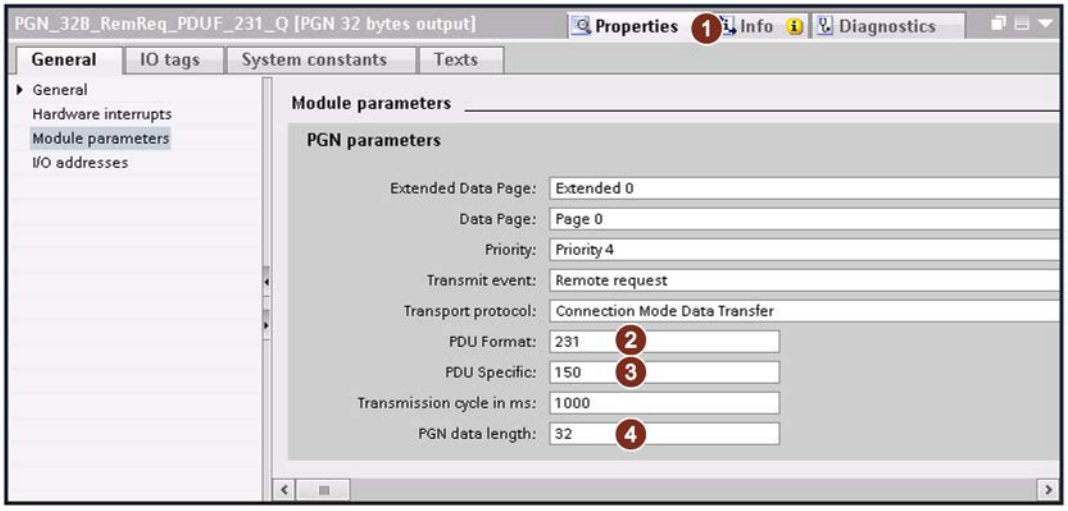
Assigning parameters for PGN_32B_RemReq_PDUF_231_Q

Proceed as follows:

1. Click "Network view → PN-J1939-Link_2".
2. Click "Device view ① → Device overview → PGN_32B_RemReq_PDUF_231_Q ②".



3. Click "Properties ① → General → Module parameters".



4. Make the following settings:
   - PDU Format to "231" ②
   - PDU Specific at "150" ③
   - PGN data length at "32" ④

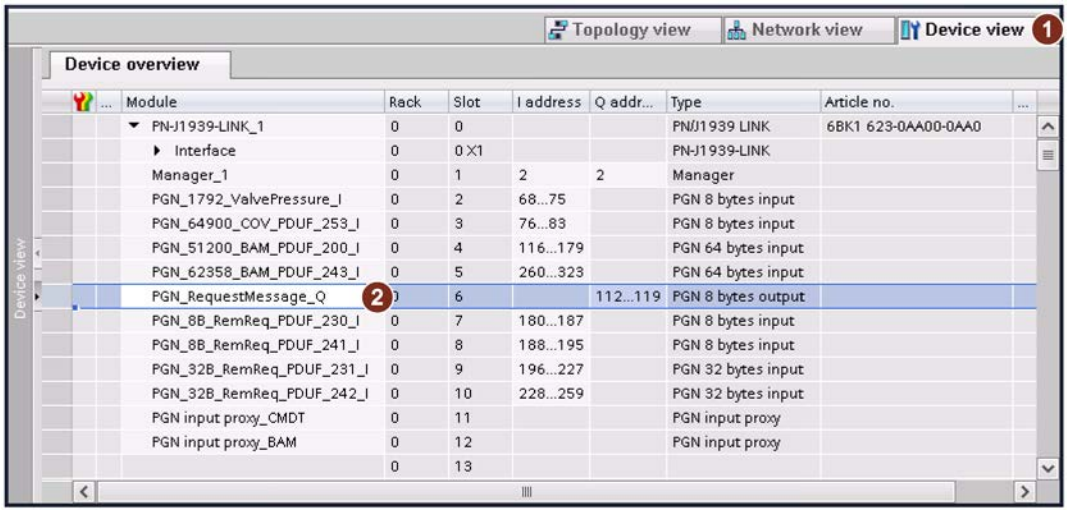
Assign parameters for PGN_RequestMassage_Q

In the application example, the same PGN is used for all remote requests. The data assigned to the output, on the other hand, is different.

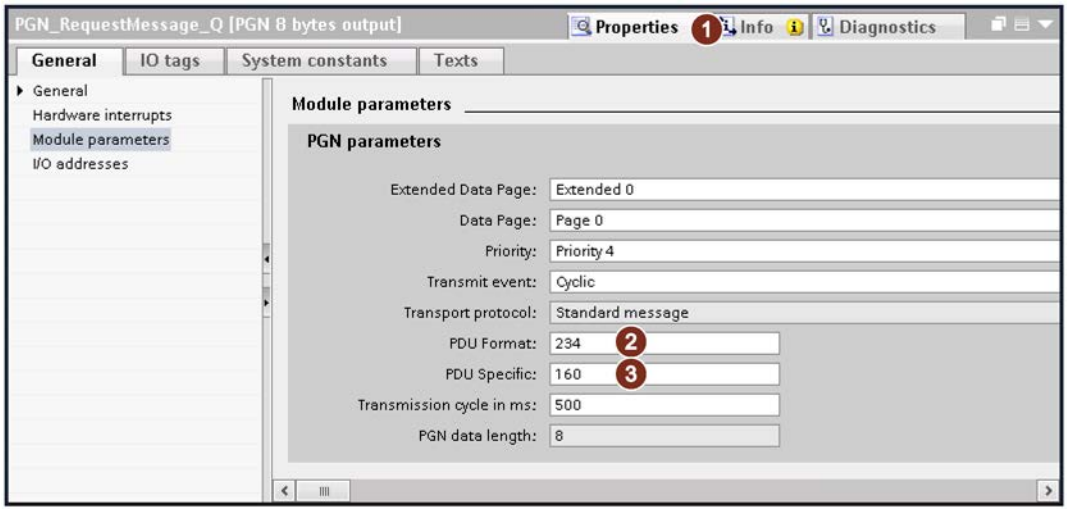
- PDU Format = 234 for the remote request
- PDU Specific = 160 for the source address of Link_2

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click "Device view ① → Device overview → PGN_RequestMassage_Q ②".



3. Click "Properties ① → General → Module parameters".



4. Make the following settings:
   - PDU format to "234" ②
   - PDU Specific to "160" ③

The requested PGN is defined by the assigned output data of the request message.

The requested PGN 59286 (PGN_32B_RemReq_PDUF_231_Q) = 0xE796

- PDU F_{16} = 0xE7 (231)
- PDU S_{16} = 0x96 (150)

The data of the request message are:

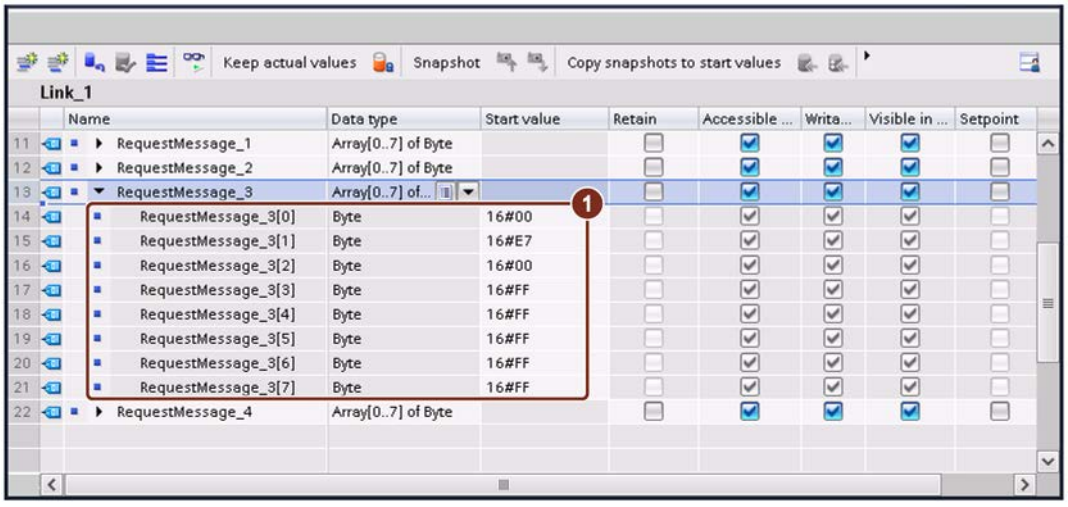
First byte	0x00 (in this case 0x00)	PDU Specific
Second byte	0xE7	PDU Format
Third byte	00	Default
Bytes 4 to 7	0xFF	Not used

Enter RequestMessage_3

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Link_1 [DB1]".

   The following dialog box is displayed.



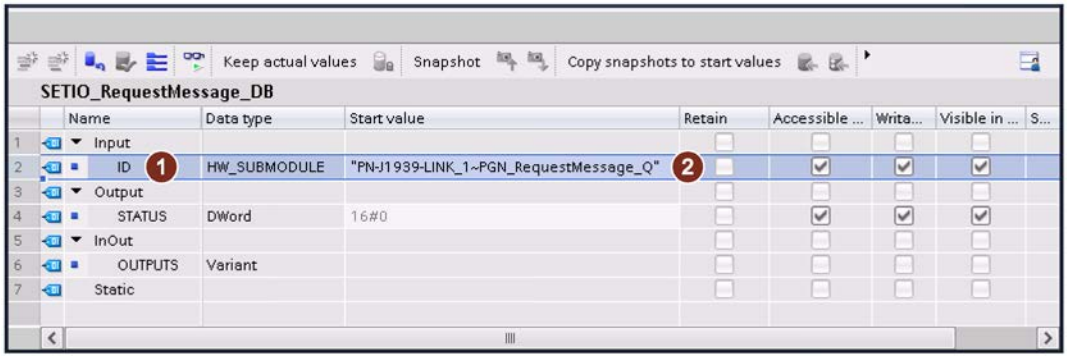
4. Add the data of the request message ① according to the target PGN.

Assign parameters for SETIO_RequestMessage_DB [DB7]

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks → System blocks → Program resources".
3. Double-click "SETIO_RequestMessage_DB [DB7]".

   The program resource is displayed.



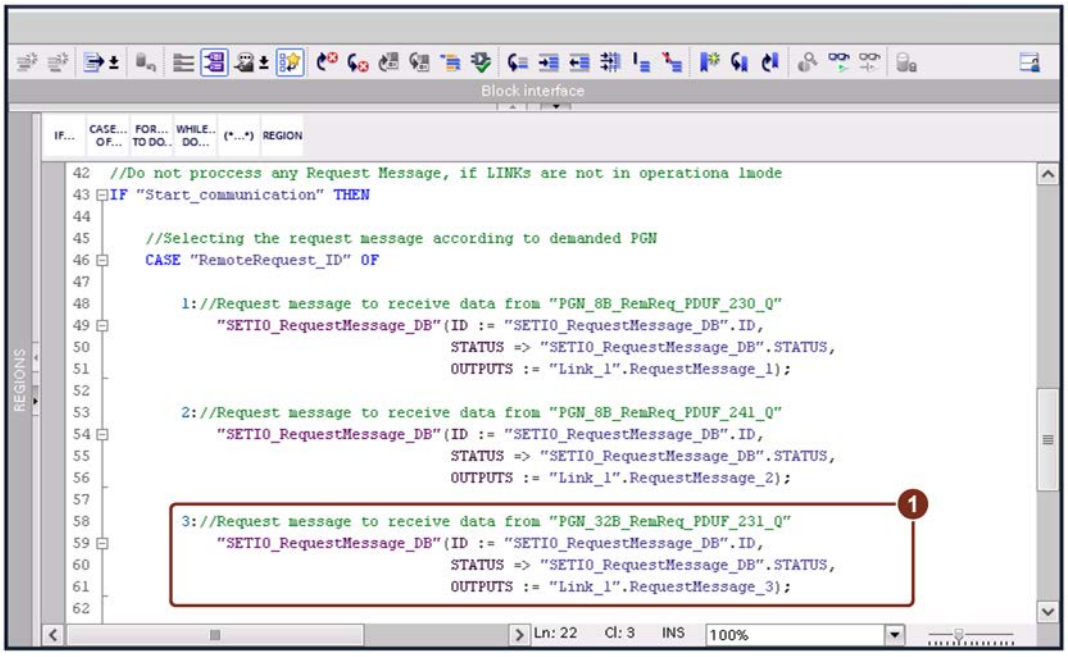
The ID is displayed at ①. The corresponding start value can be found at ②.

Programming request message

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Send_PGN [FC2]".

   The following dialog box is displayed.



4. Enter the program code ①.

   The request message is now programmed to receive data from "PGN_32B_RemReq_PDUF_231_Q".

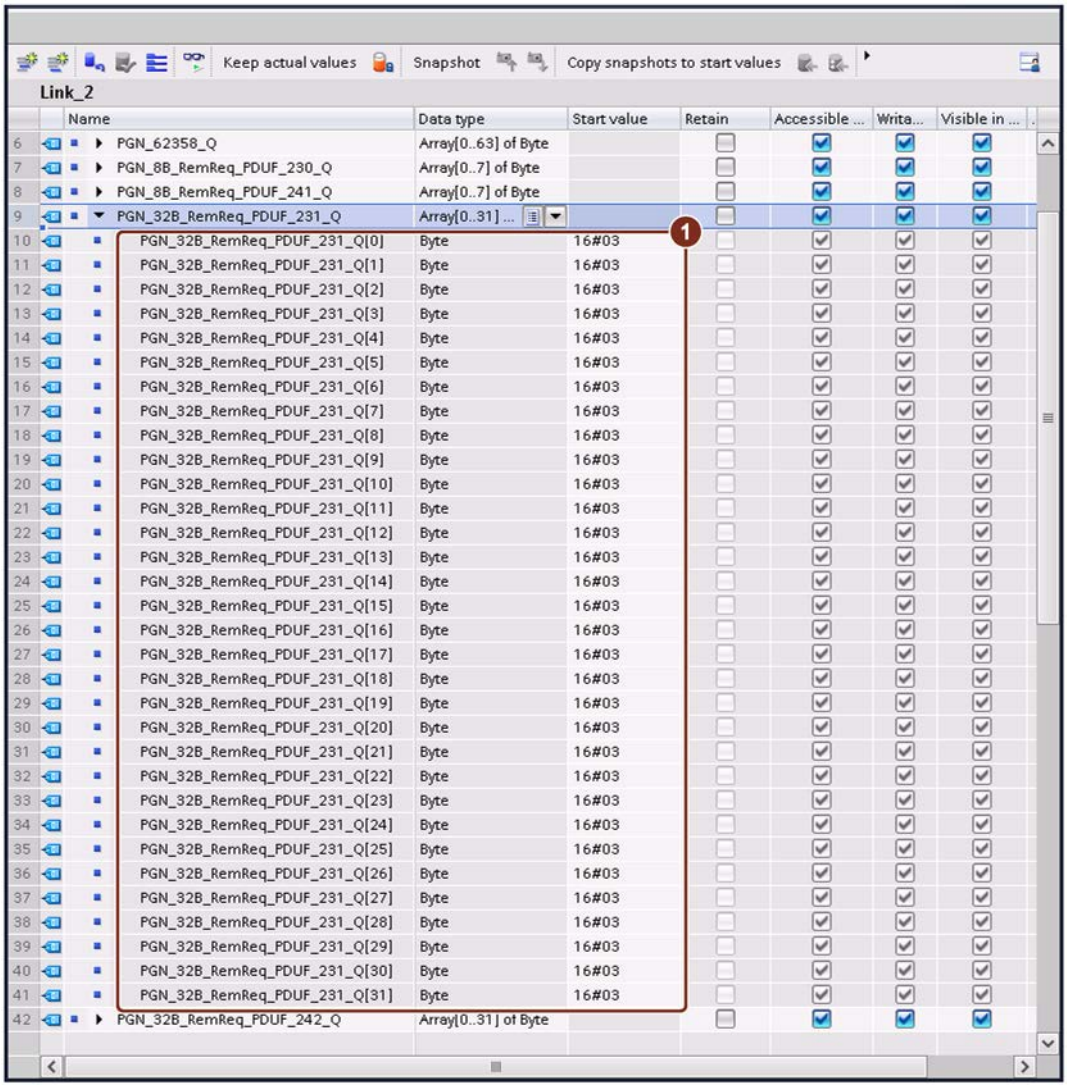
Create output data

The output data that is sent to the request from Link_2 (PGN_32B_RemReq_PDUF_231_Q) is defined below.

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Link_2 [DB2]".

   The following dialog box is displayed.



4. Insert the output data ①.

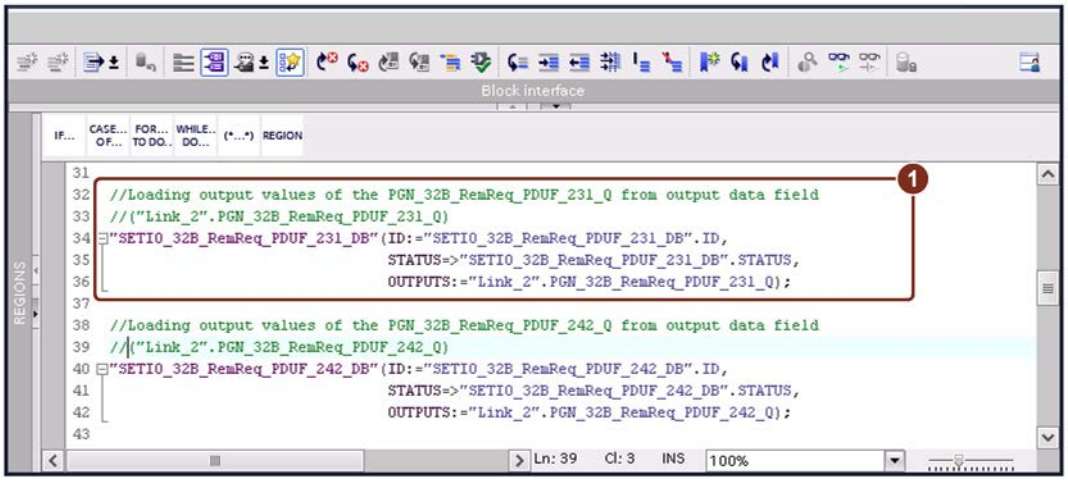
Assigning output data

Use the SETIO function to assign output data from a byte array to the output PGN.

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks → Send_PGN [FC2]".
3. Double-click "Send_PGN [FC2]".

   The following dialog box is displayed.



4. Enter the program code ①.

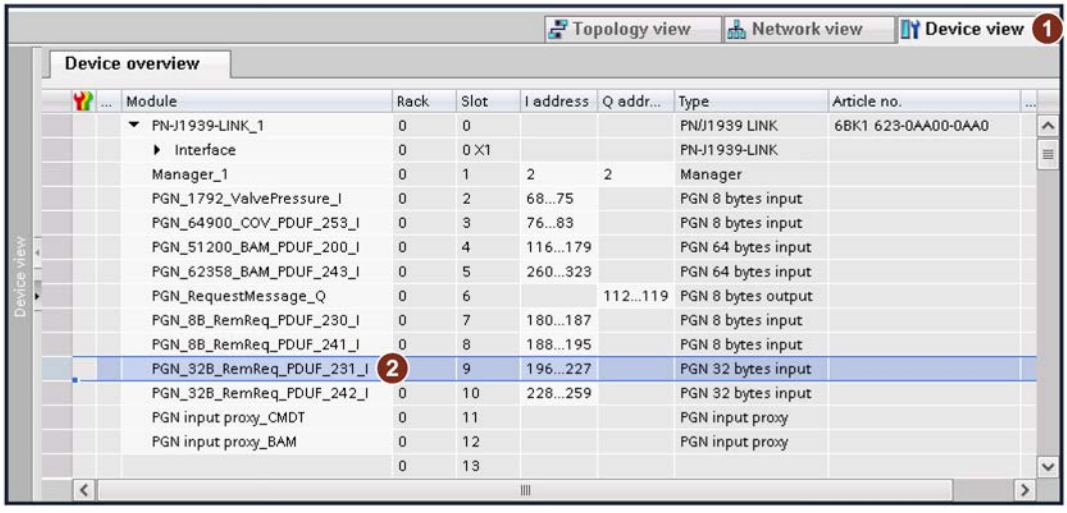
   The assignment of the output data of the "PGN_32B_RemReq_PDUF_231_Q" is thus programmed.

6.3.2 Configure Link 1 – PGN_32B_RemReq_PDUF_231_I

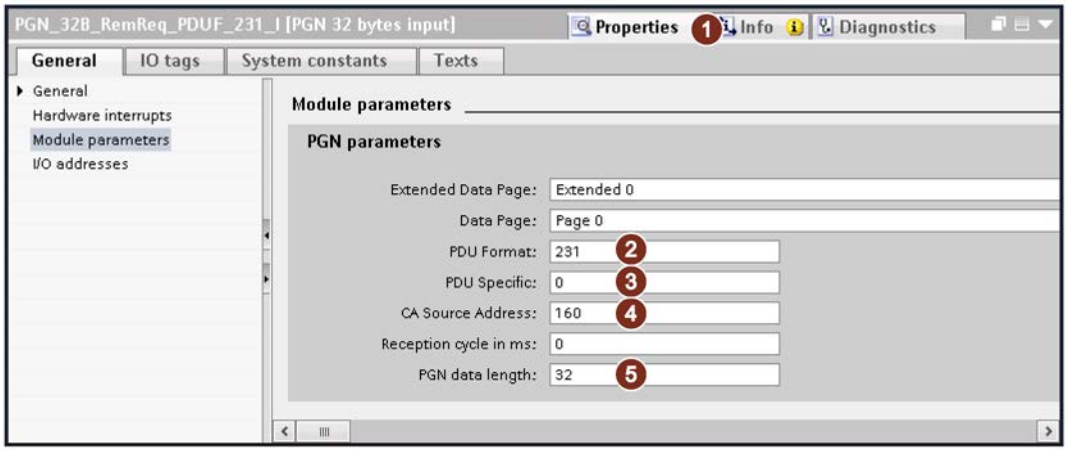
Assigning parameters for PGN_32B_RemReq_PDUF_231_I

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click "Device view ① → Device overview → PGN_32B_RemReq_PDUF_231_I ②".



3. Click "Properties ① → General → Module parameters".

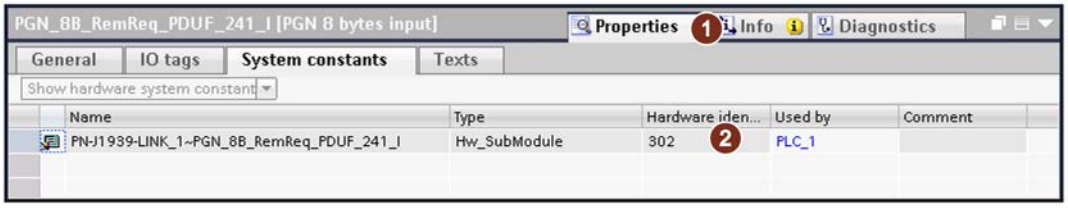


4. Make the following settings:
   - PDU Format "231" ②
   - PDU Specific to "0" ③
   - CA source address at "160" ④
   - PGN data length to "32" ⑤

Displaying the hardware ID

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click on "Device view → Device overview → PGN_8B_RemReq_PDUF_241_I".
3. Click "Properties ① → System constants".



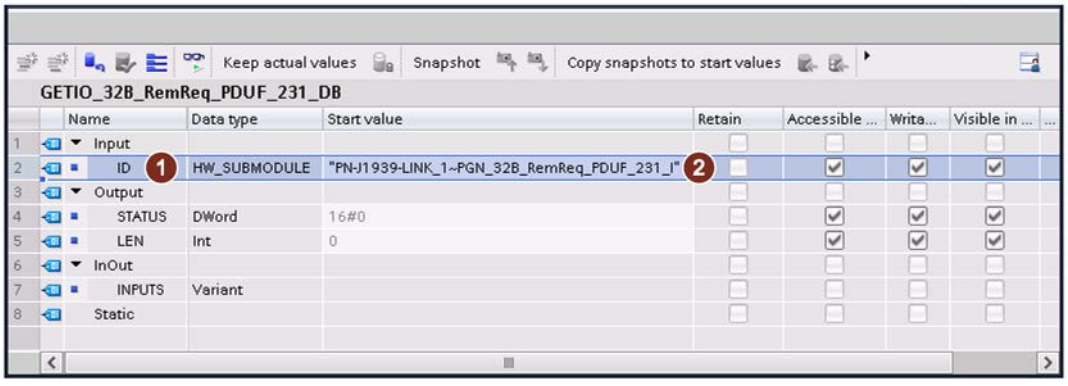
The hardware ID is displayed at ②.

Show start value

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks → System blocks → Program resources".
3. Double-click "GETIO_32B_RemReq_PDUF_231_DB [DB8]".

   The program resource is displayed.



The hardware ID is displayed at ①. The corresponding start value can be found at ②.

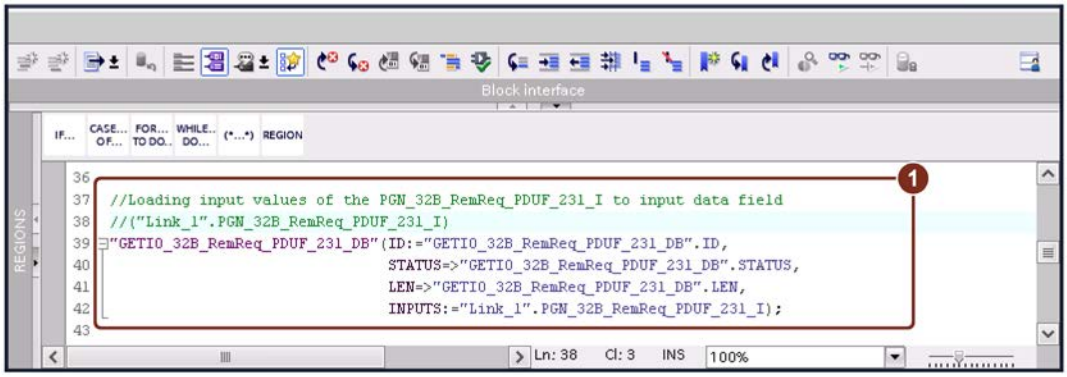
Assign input data

Use the GETIO function to assign data from the input PGN to the byte array.

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Read_PGN [FC3]".

   The following dialog box is displayed.



4. Enter the program code ①.

   The assignment of the input data of the "PGN_32B_RemReq_PDUF_231_I" to the byte array is thus programmed.

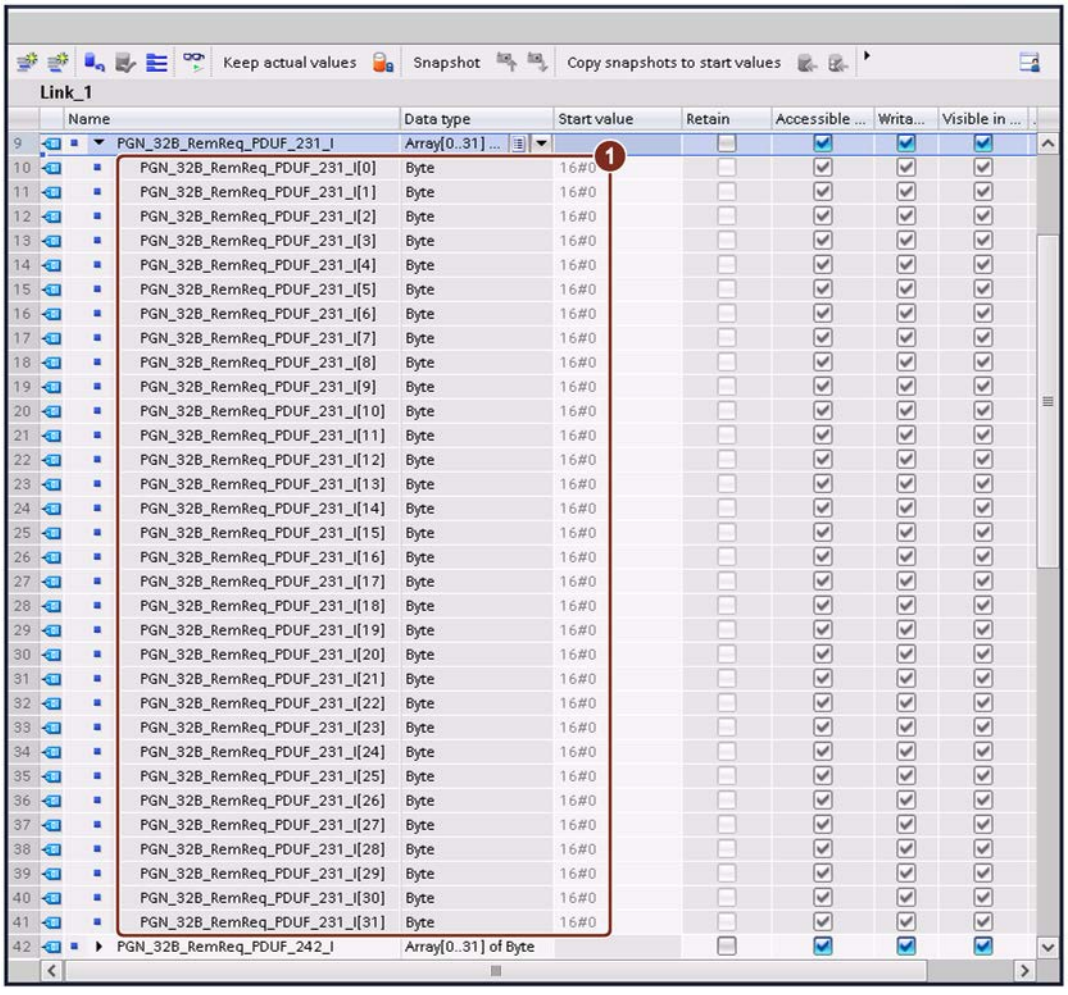
Assigning parameters for PGN_32B_RemReq_PDUF_231_I

Create the structure of the input data block of the PN-J1939-Link_1, which is used to store receive data of the PGN_32B_RemReq_PDUF_231_Q.

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Link_1 [DB1]".

   The following dialog box is displayed.



The result of the remote request is saved here ①.

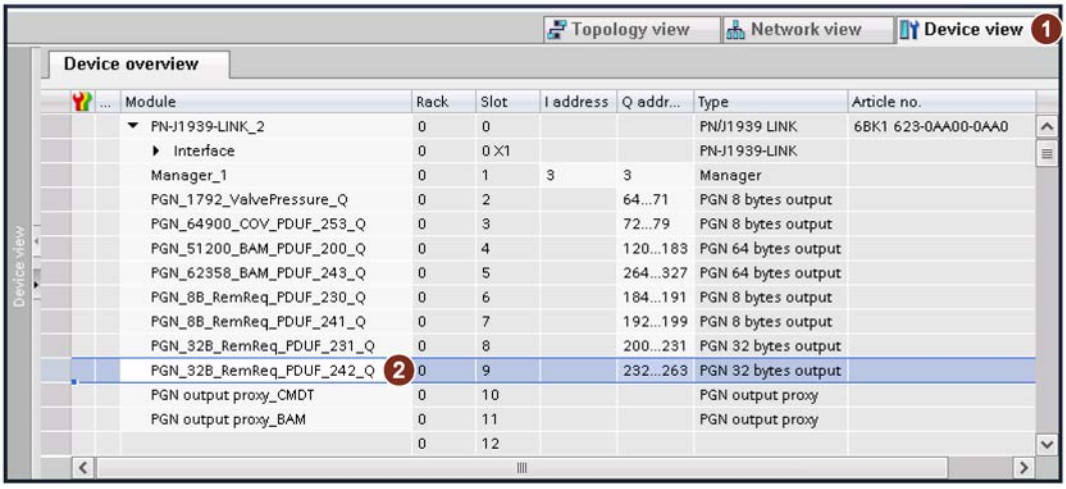
6.4 Standard message – PGN data length > 8 bytes, PDU format > 239

6.4.1 Configure Link 2 – PGN_32B_RemReq_PDUF_242_Q

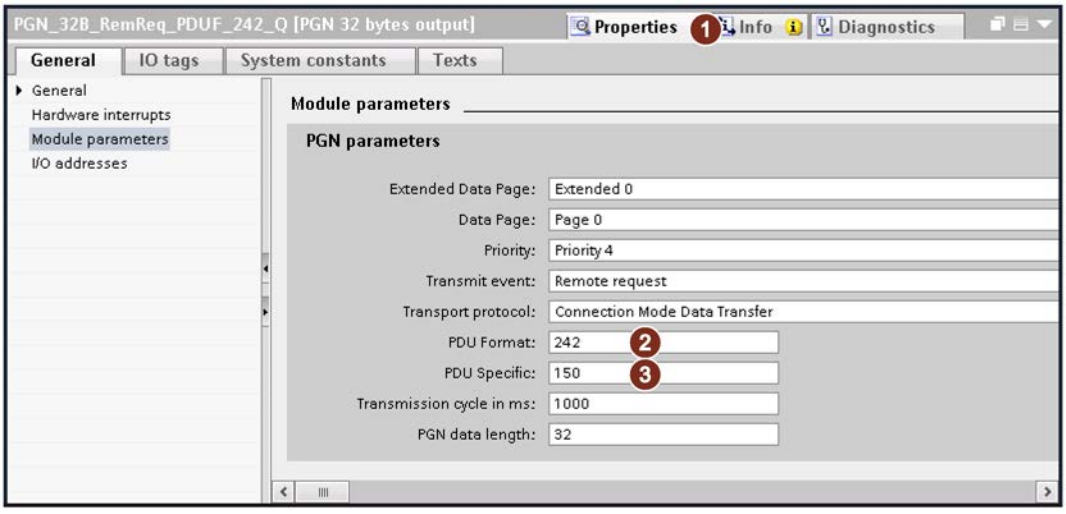
Assigning parameters for PGN_32B_RemReq_PDUF_242_Q

Proceed as follows:

1. Click "Network view → PN-J1939-Link_2".
2. Click "Device view ① → Device overview → PGN_32B_RemReq_PDUF_242_Q ②".



3. Click "Properties ① → General → Module parameters".



4. Make the following settings:
   - PDU Format at "242" ②
   - PDU Specific at "150" ③

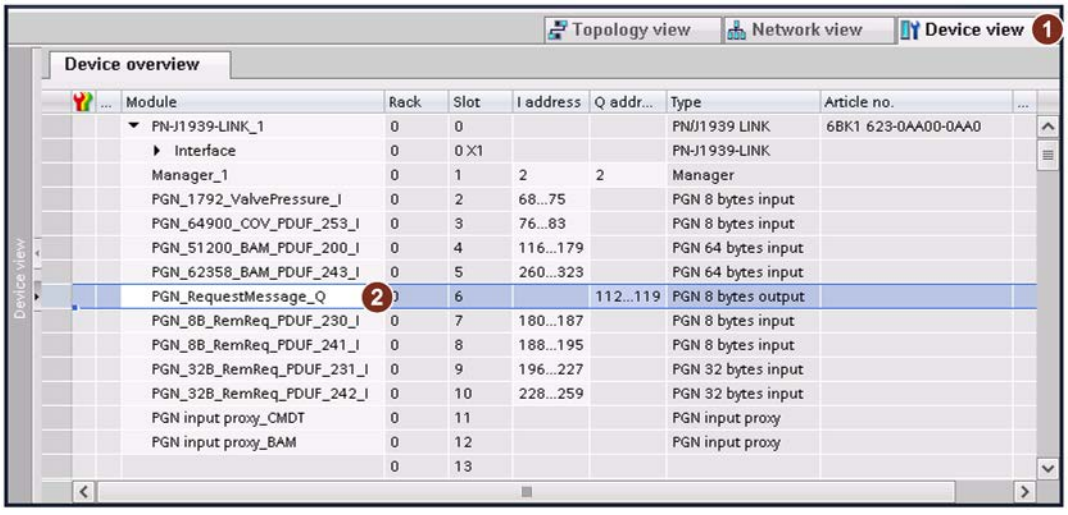
Assign parameters for PGN_RequestMassage_Q

In the application example, the same PGN is used for all remote requests. The data assigned to the output, on the other hand, is different.

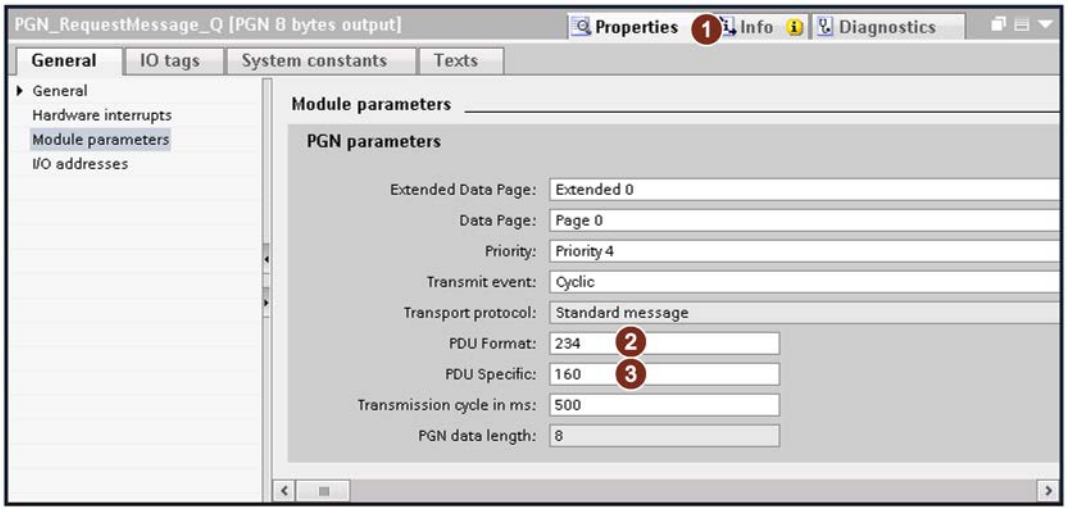
- PDU Format = 234 for the remote request
- PDU Specific = 160 for the source address of Link_2

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click "Device view ① → Device overview → PGN_RequestMassage_Q ②".



3. Click "Properties ① → General → Module parameters".



Make the following settings:

- PDU format to "234" ②
- PDU Specific to "160" ③

The requested PGN is defined by the assigned output data of the request message.

The requested PGN 62102 (PGN_32B_RemReq_PDUF_242_Q) = 0xF296

- PDU F_{16} = 0xF2
- PDU S_{16} = 0x96

The data of the request message are:

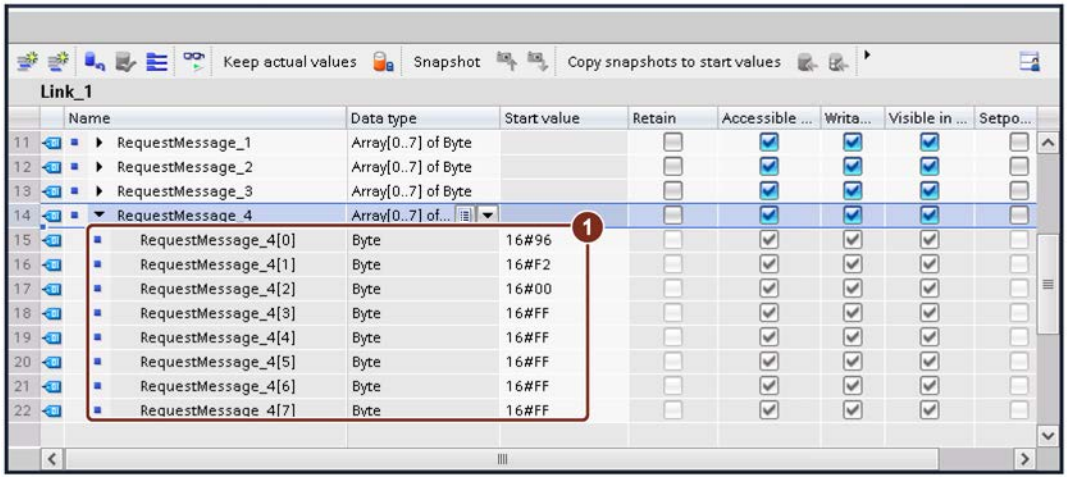
First byte	0x96	PDU Specific
Second byte	0xF2	PDU Format
Third byte	00	Default
Bytes 4 to 7	0xFF	Not used

Enter RequestMessage_4

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Link_1 [DB1]".

   The following dialog box is displayed.



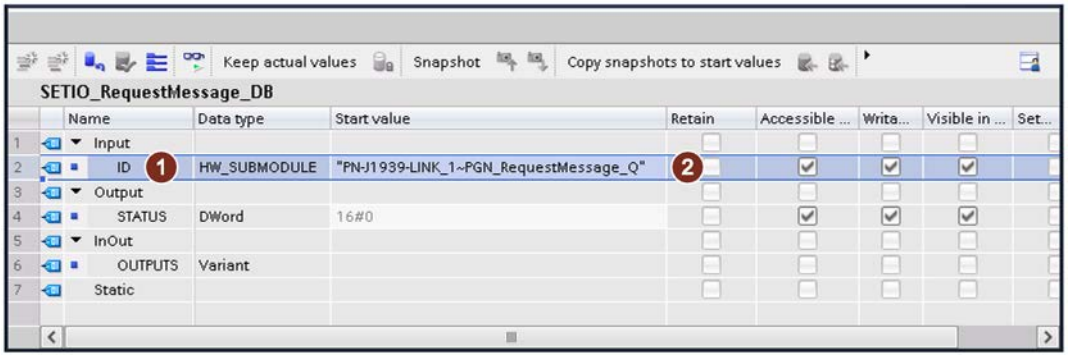
4. Add the data of the request message ① according to the target PGN.

Assign parameters for SETIO_RequestMessage_DB [DB7]

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices ① → Project → PLC_1 → Program blocks → System blocks → Program resources".
3. Double-click "SETIO_RequestMessage_DB [DB7]".

   The program resource is displayed.



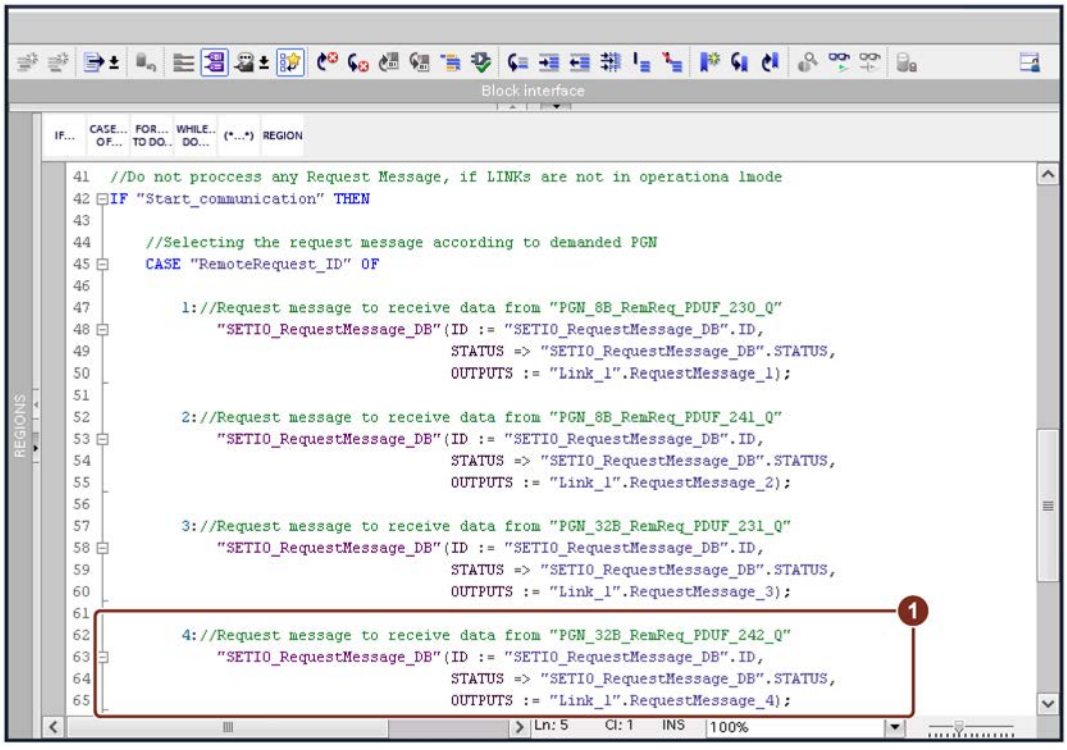
The ID is displayed at ①. The corresponding start value can be found at ②.

Programming request message

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Send_PGN [FC2]".

   The following dialog box is displayed.



4. Enter the program code ①.

   The request message is now programmed to assign data from "PGN_32B_RemReq_PDUF_242_Q" to the byte array.

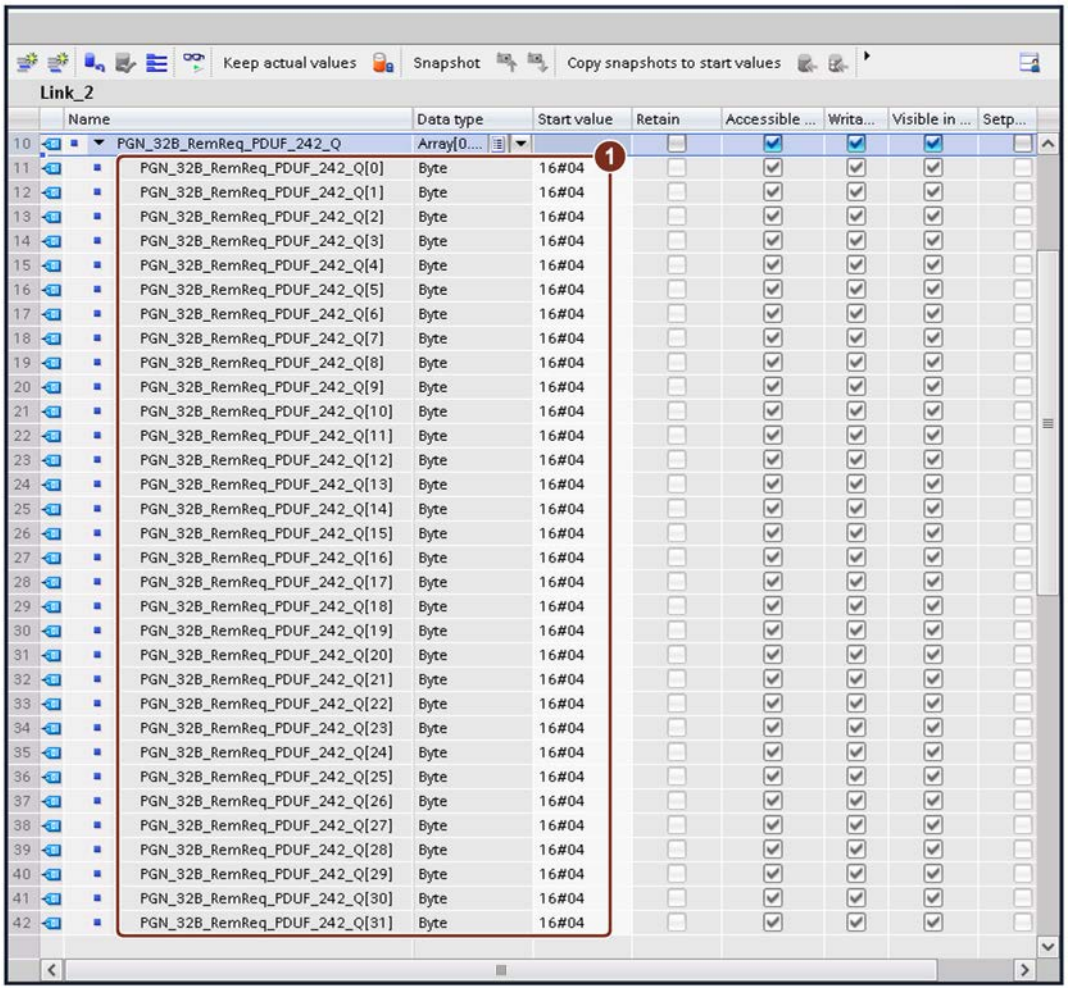
Create output data

The output data that is sent to the request from Link_2 (PGN_32B_RemReq_PDUF_242_Q) is defined below.

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Link_2 [DB2]".

   The following dialog box is displayed.



4. Insert the output data ①.

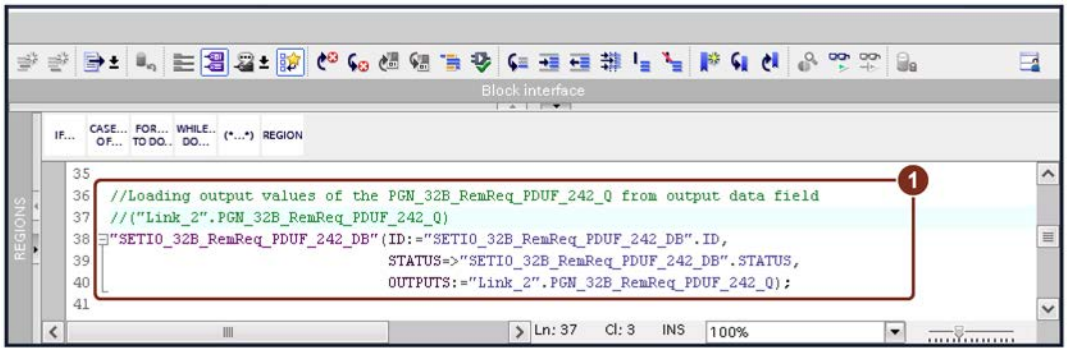
Assigning output data

Use the SETIO function to assign output data from a byte array to the output PGN.

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Send_PGN [FC2]".

   The following dialog box is displayed.



4. Enter the program code ①.

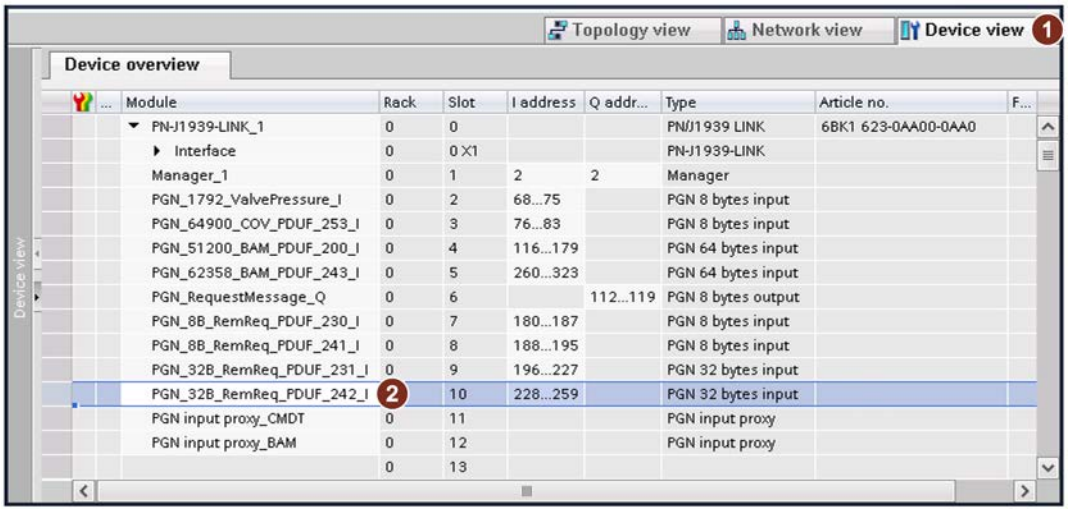
   The assignment of the output data of the "PGN_32B_RemReq_PDUF_242_Q" is thus programmed.

6.4.2 Configure Link 1 – PGN_32B_RemReq_PDUF_242_I

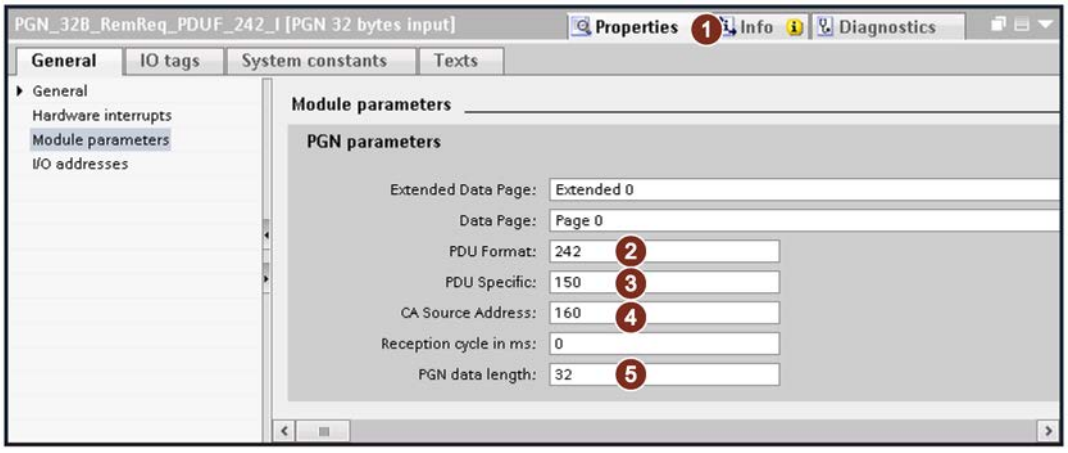
Assigning parameters for PGN_32B_RemReq_PDUF_242_I

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click "Device view ① → Device overview → PGN_32B_RemReq_PDUF_242_I ②".



3. Click "Properties ① → General → Module parameters".

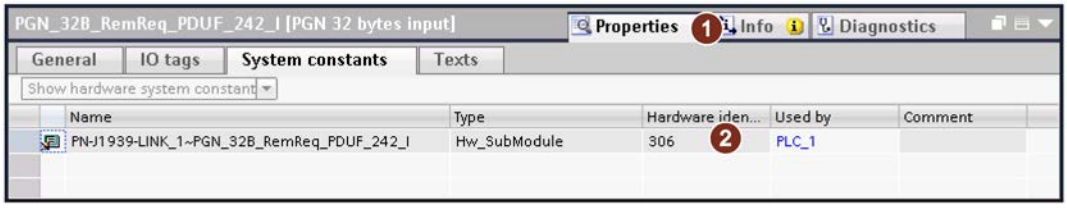


4. Make the following settings:
   - PDU Format at "242" ②
   - PDU Specific at "150" ③
   - CA source address at "160" ④
   - PGN data length to "32" ⑤

Displaying the hardware ID

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click on "Device view → Device overview → PGN_32B_RemReq_PDUF_242_I".
3. Click "Properties ① → System constants".



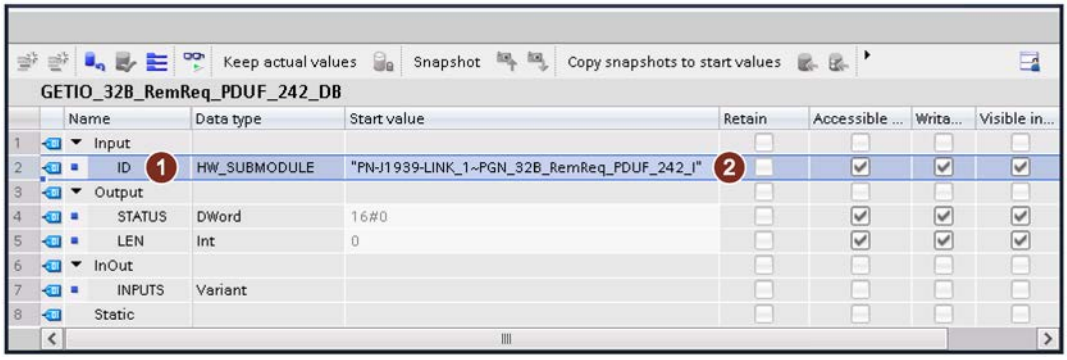
The hardware ID is displayed at ②.

Show start value

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks → System blocks → Program resources".
3. Double-click "GETIO_32B_RemReq_PDUF_242_DB [DB25]".

   The program resource is displayed.



The hardware ID is displayed at ①. The corresponding start value can be found at ②.

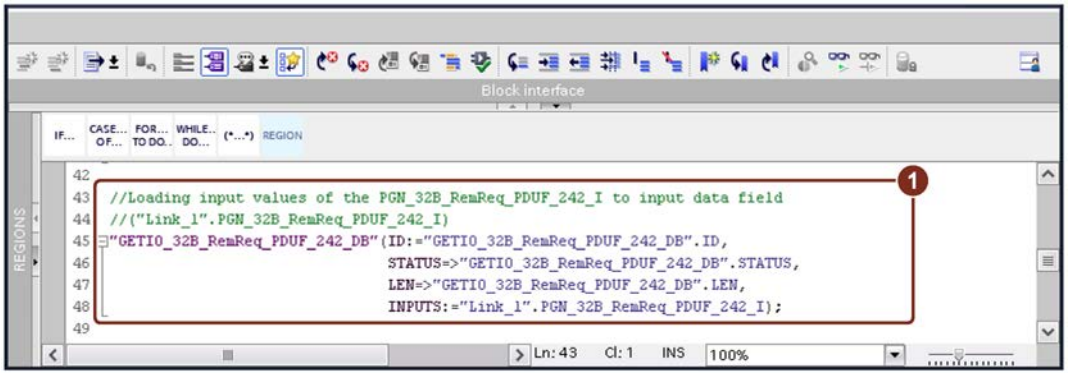
Assign input data

Use the GETIO function to assign data from the input PGN to the byte array.

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices ① → Project → PLC_1 → Program blocks".
3. Double-click "Read_PGN [FC3]".

   The following dialog box is displayed.



4. Enter the program code ①.

   The assignment of the input data of the "PGN_8B_RemReq_PDUF_242_I" to the byte array is thus programmed.

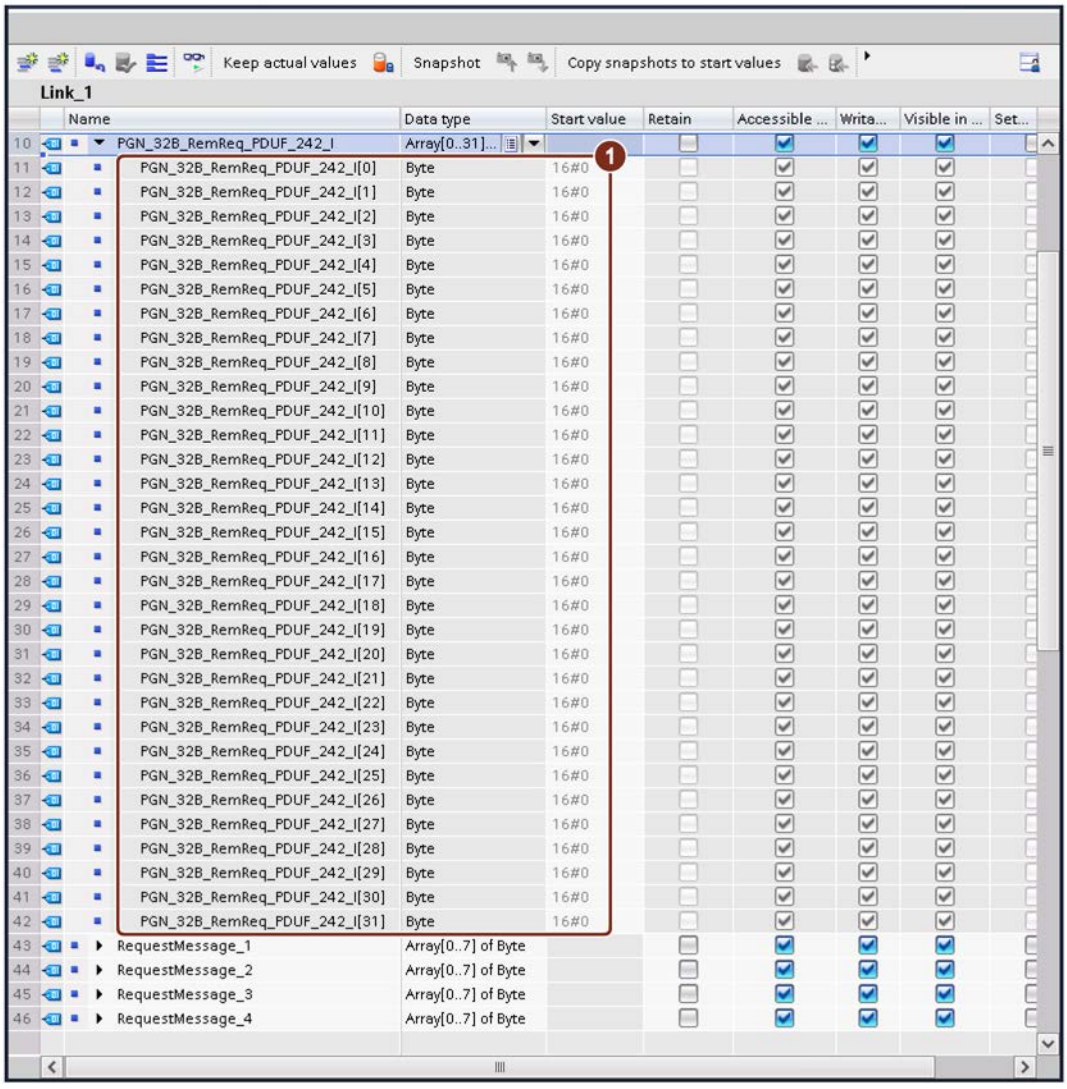
Assigning parameters for PGN_32B_RemReq_PDUF_242_I

Create the structure of the input data block of the PN-J1939-Link_1, which is used to store receive data of the PGN 59030.

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Link_1 [DB1]".

   The following dialog box is displayed.



The result of the remote request is saved here ①.

Establish acyclic data communication

7

7.1 Configuring WRREC - PGN output proxy_CMDT

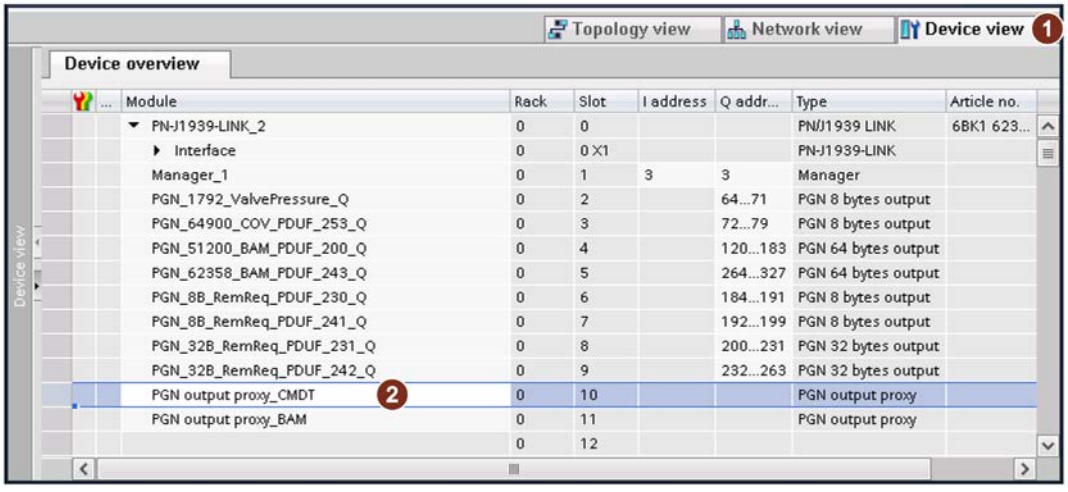
The following description applies to:

- Module PGN output proxy_CMDT
- PDU Format ≤ 239

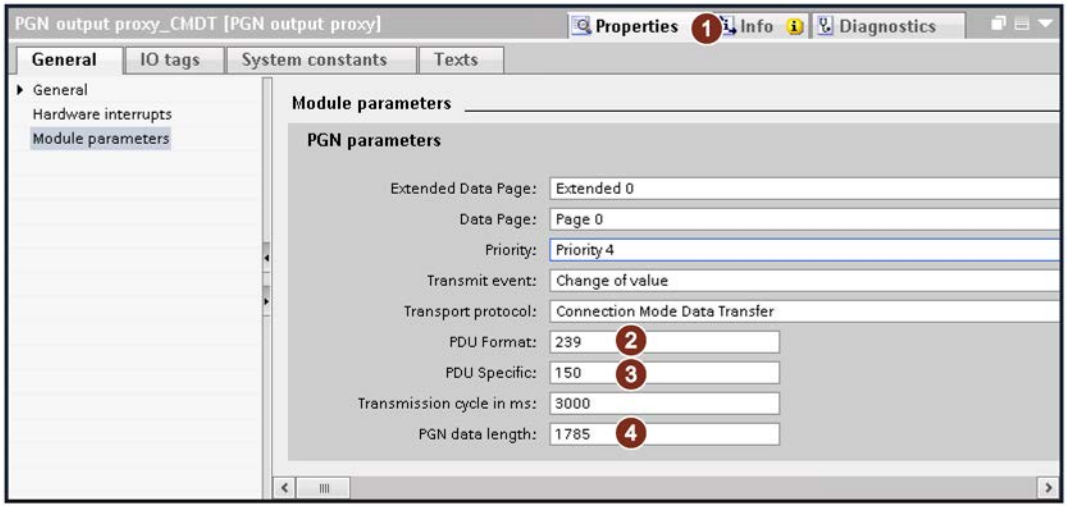
Inserting and assigning parameters PGN output proxy_CMDT

Proceed as follows:

1. Click "Network view → PN-J1939-Link_2".
2. Click "Device view ① → Device overview".
3. Insert the module "PGN output proxy_CMDT" ②.



4. Click "Properties ① → General → Module parameters".



5. Make the following settings:
   - PDU Format at "239" ②
   - PDU Specific at "150" ③
   - PGN data length at "1785" ④

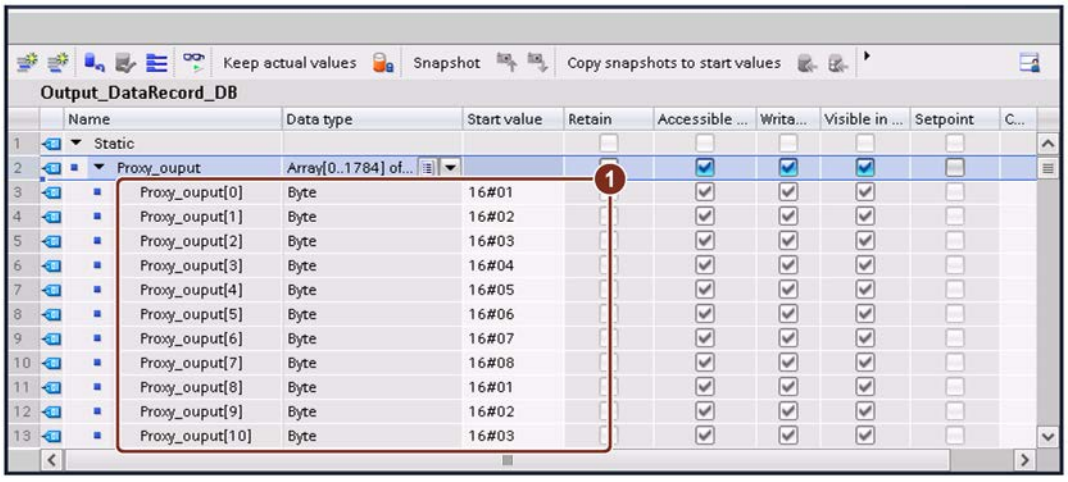
Assigning parameters for "Output_DataRecord_DB"

Use the following steps to assign parameters for the "Output_DataRecord_DB" program block for the values to be transferred.

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Output_DataRecord_DB [DB13]".
4. Open the data block "Proxy_output".

   The following dialog box is displayed.



5. Insert the output proxies 0 to 1784 ①.

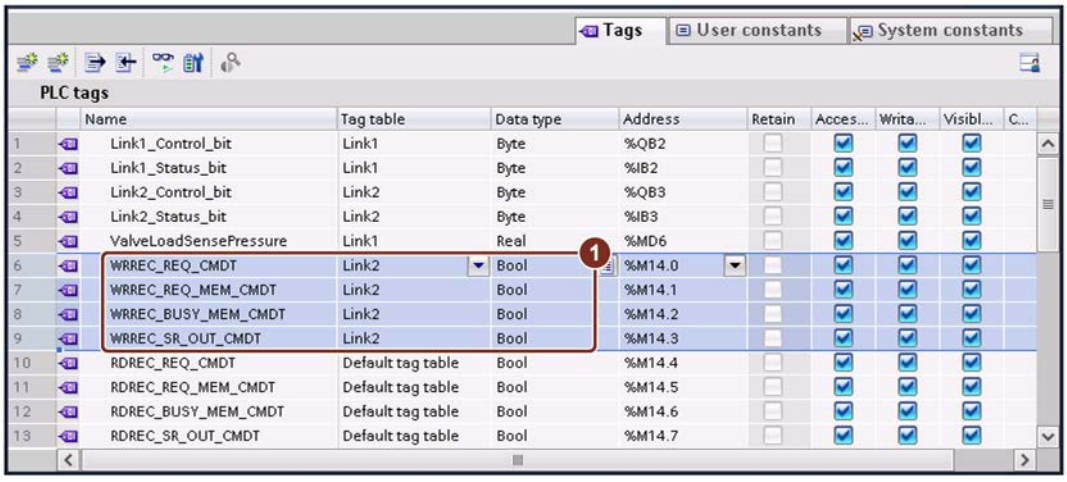
Controlling the WRREC program resource

To control the program resource WRREC, you must create the following PLC tags.

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → PLC tags".
3. Double-click "Show all tags".

   The following dialog box is displayed.



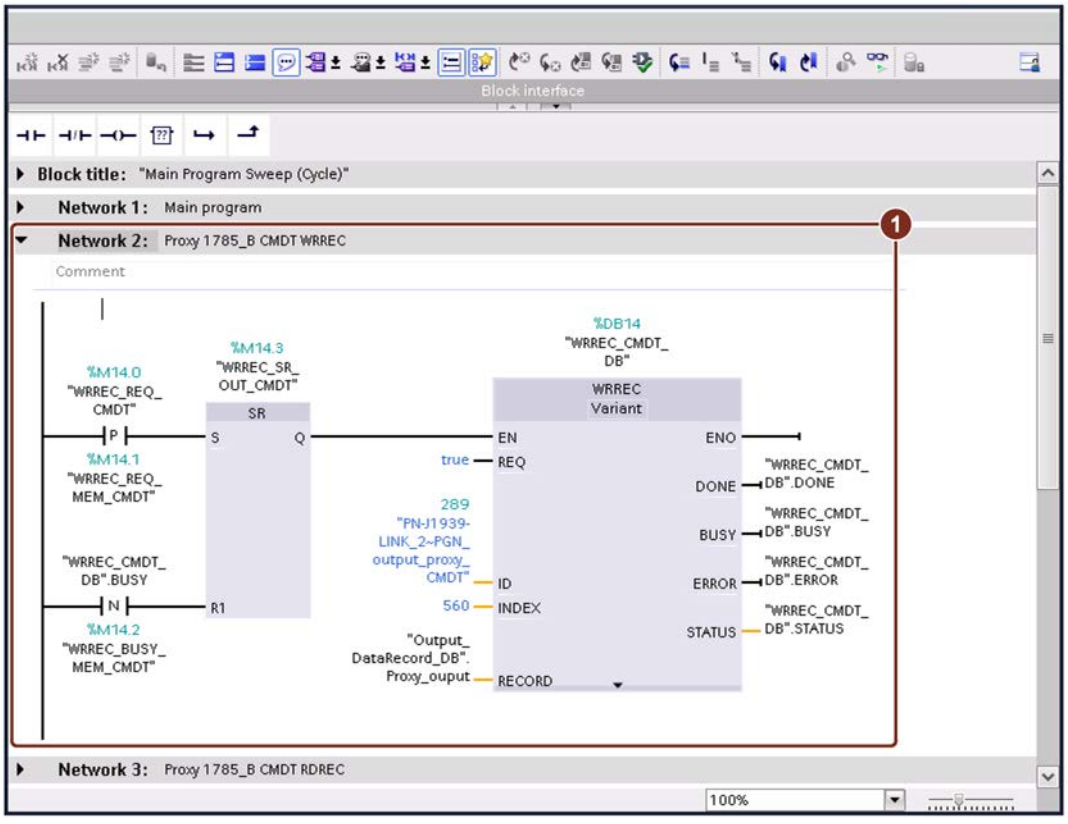
4. Create the marked PLC tags ①.

Integrating and configuring program blocks in the S7 program

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Main [OB1]".

   The "Block interface" window is displayed.



4. Switch to "Network 2".

   The figure shows how you have to implement the application example in the S7 program.

   Meaning of the tags:

ID	System constant or hardware ID of the "Proxy output" module.
INDEX	Defines the data record for writing data. "560" = Write data record
RECORD	Storage of the output data to be transferred via WRREC_REQ_CMDT

Start write operation

Proceed as follows:

1. If you want to start the write operation, change the value of the PLC tag "WRREC_REQ_CMDT" to "1".

   Data is only written if its value has changed. As soon as the write operation is completed, the value of the PLC tag automatically changes to "0". The goal is to write the data only once. This process is managed in the program block "DataRecord_StopRequest [FC5]".

   The write operation of the PLC tag "WRREC_REQ_CMDT" takes approx. 4 s with a PGN data length of 1785 bytes and 500 kbps.

7.2 Configure RDREC – PGN input proxy_CMDT

The following description applies to:

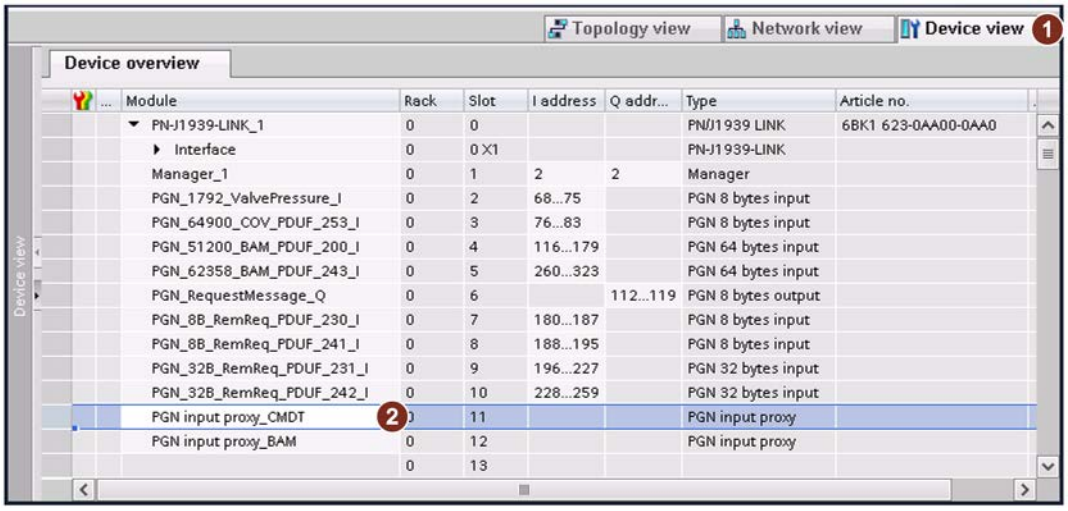
- Module PGN input proxy_CMDT
- PDU Format ≤ 239

The PDU Specific must always be set to 0. Only messages of the destination address of the source of Link_1 can be received - other destination addresses are not received. Messages are only received if the destination address is the same as the source address of Link_1.

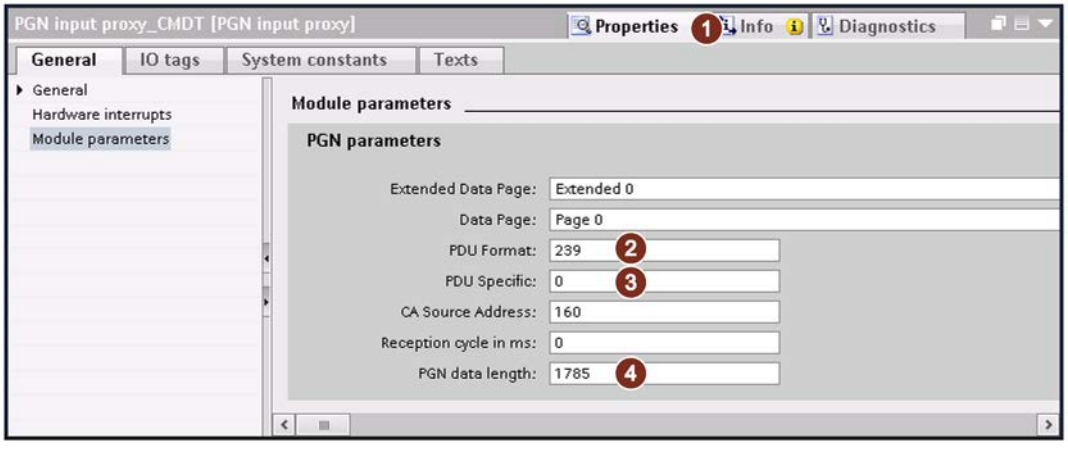
Inserting and assigning parameters PGN input proxy_CMDT

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click "Device view → Device overview".
3. Insert the module "PGN input proxy_CMDT" ②.



4. Click "Properties ① → General → Module parameters".



5. Make the following settings:
   - PDU Format at "239" ②
   - PDU Specific to "0" ③
   - PGN data length at "1785" ④

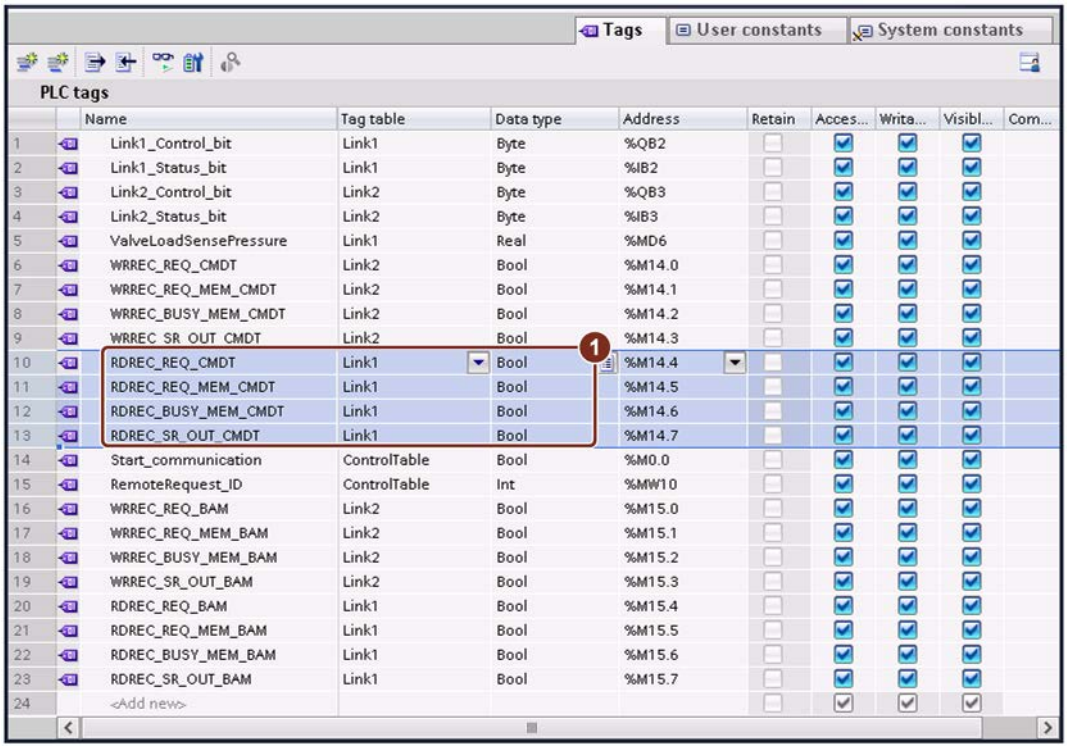
Controlling the RDREC program resource

To control the program resource RDREC, you must create the following PLC tags.

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → PLC tags".
3. Double-click "Show all tags".

   The following dialog box is displayed.



	Name	Tag table	Data type	Address	Retain	Acces...	Writa...	Visibl...	Com...
1	Link1_Control_bit	Link1	Byte	%QB2		☑	☑	☑	
2	Link1_Status_bit	Link1	Byte	%IB2		☑	☑	☑	
3	Link2_Control_bit	Link2	Byte	%QB3		☑	☑	☑	
4	Link2_Status_bit	Link2	Byte	%IB3		☑	☑	☑	
5	ValveLoadSensePressure	Link1	Real	%MD6		☑	☑	☑	
6	WRREC_REQ_CMDT	Link2	Bool	%M14.0		☑	☑	☑	
7	WRREC_REQ_MEM_CMDT	Link2	Bool	%M14.1		☑	☑	☑	
8	WRREC_BUSY_MEM_CMDT	Link2	Bool	%M14.2		☑	☑	☑	
9	WRREC_SR_OUT_CMDT	Link2	Bool	%M14.3		☑	☑	☑	
10	RDREC_REQ_CMDT	Link1	Bool	%M14.4		☑	☑	☑	
11	RDREC_REQ_MEM_CMDT	Link1	Bool	%M14.5		☑	☑	☑	
12	RDREC_BUSY_MEM_CMDT	Link1	Bool	%M14.6		☑	☑	☑	
13	RDREC_SR_OUT_CMDT	Link1	Bool	%M14.7		☑	☑	☑	
14	Start_communication	ControlTable	Bool	%M0.0		☑	☑	☑	
15	RemoteRequest_ID	ControlTable	Int	%MW10		☑	☑	☑	
16	WRREC_REQ_BAM	Link2	Bool	%M15.0		☑	☑	☑	
17	WRREC_REQ_MEM_BAM	Link2	Bool	%M15.1		☑	☑	☑	
18	WRREC_BUSY_MEM_BAM	Link2	Bool	%M15.2		☑	☑	☑	
19	WRREC_SR_OUT_BAM	Link2	Bool	%M15.3		☑	☑	☑	
20	RDREC_REQ_BAM	Link1	Bool	%M15.4		☑	☑	☑	
21	RDREC_REQ_MEM_BAM	Link1	Bool	%M15.5		☑	☑	☑	
22	RDREC_BUSY_MEM_BAM	Link1	Bool	%M15.6		☑	☑	☑	
23	RDREC_SR_OUT_BAM	Link1	Bool	%M15.7		☑	☑	☑	
24	<Add new>					☑	☑	☑	

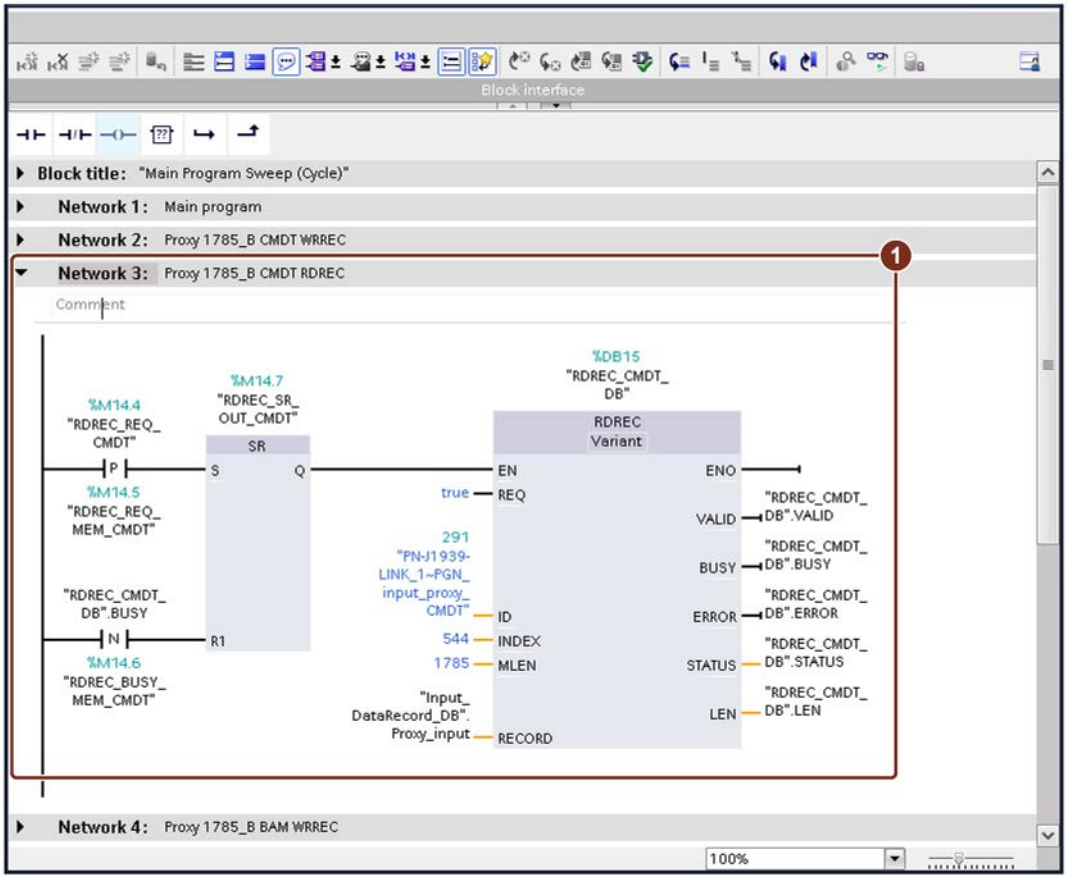
4. Create the marked PLC tags ①.

Integrating and configuring program blocks in the S7 program

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Main [OB1]".

   The "Block interface" window is displayed.



4. Switch to "Network 3".

   The figure shows how you have to implement the application example in the S7 program.

   Meaning of the tags:

ID	System constant or hardware ID of the "Proxy output" module.
INDEX	Defines the data record for reading data. "544" = Read data record
MLEN	Data volume which is read
RECORD	Storage of the output data to be transferred via WRREC_REQ_CMDT

Start read operation

Proceed as follows:

1. If you want to start the read process, change the value of the PLC tag "RDREC_REQ_CMDT" to "1".

   As soon as the write operation is completed, the value of the PLC tag automatically changes to "0". This means that the value is read only once. This process is managed in the program block "DataRecord_StopRequest [FC5]".

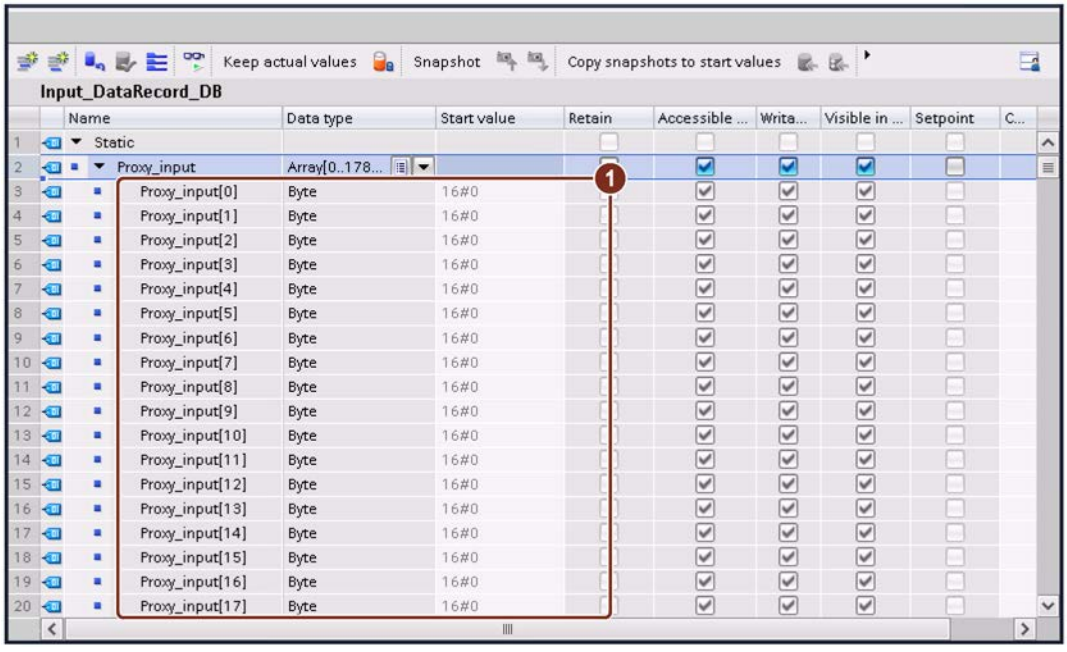
   The result is stored in the "Input_DataRecord_DB" program block.

Show program block "Input_DataRecord_DB"

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Input_DataRecord_DB [DB12]".

   The read values are displayed in the "Monitor value" column.



7.3 Configuring WRREC - PGN output proxy_BAM

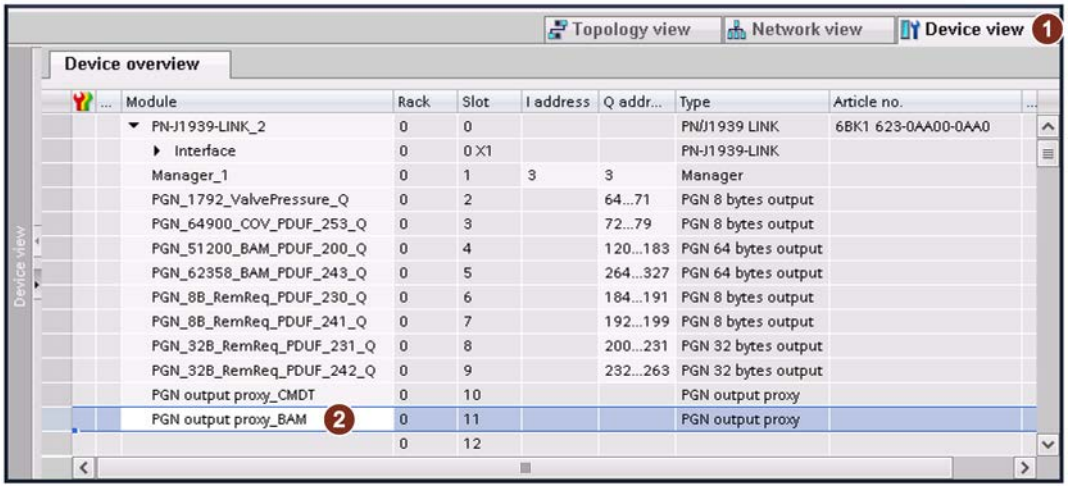
The following description applies to:

- Module PGN output proxy_BAM
- PDU Format > 239

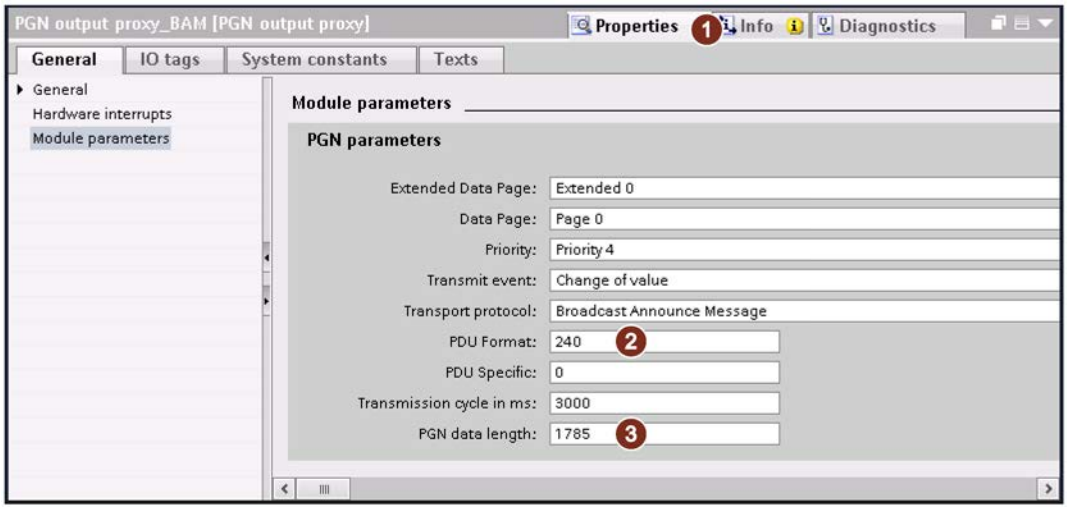
Inserting and assigning parameters PGN output proxy_BAM

Proceed as follows:

1. Click "Network view → PN-J1939-Link_2".
2. Click "Device view → Device overview".
3. Insert the module "PGN output proxy_BAM" ②.



4. Click "Properties ① → General → Module parameters".



5. Make the following settings:
   - PDU Format "240" ②
   - PGN data length on "1785" ③

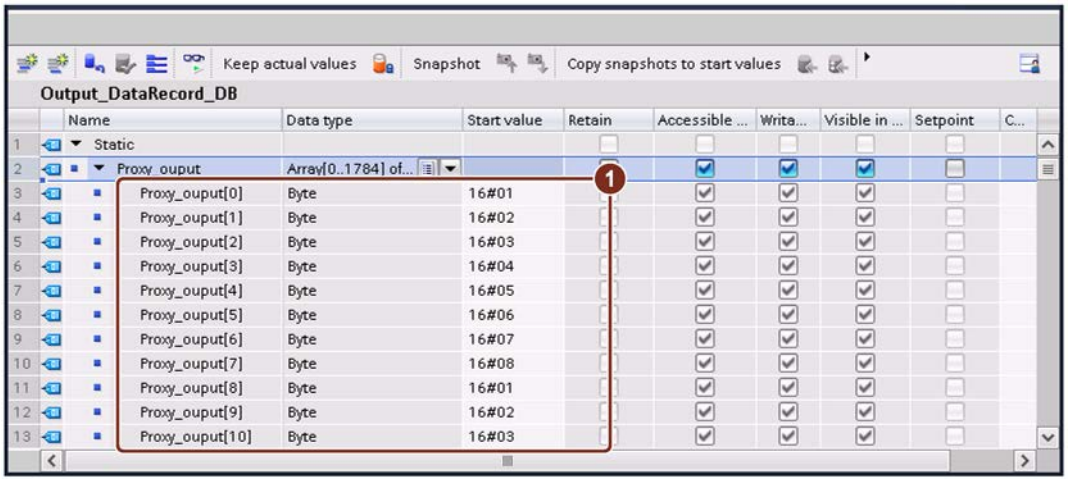
Assigning parameters for "Output_DataRecord_DB"

Use the following steps to assign parameters for the "Output_DataRecord_DB" program block for the values to be transferred.

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Output_DataRecord_DB [DB13]".
4. Open the data block "Proxy_output".

   The following dialog box is displayed.



5. Insert the output proxies 0 to 1784 ①.

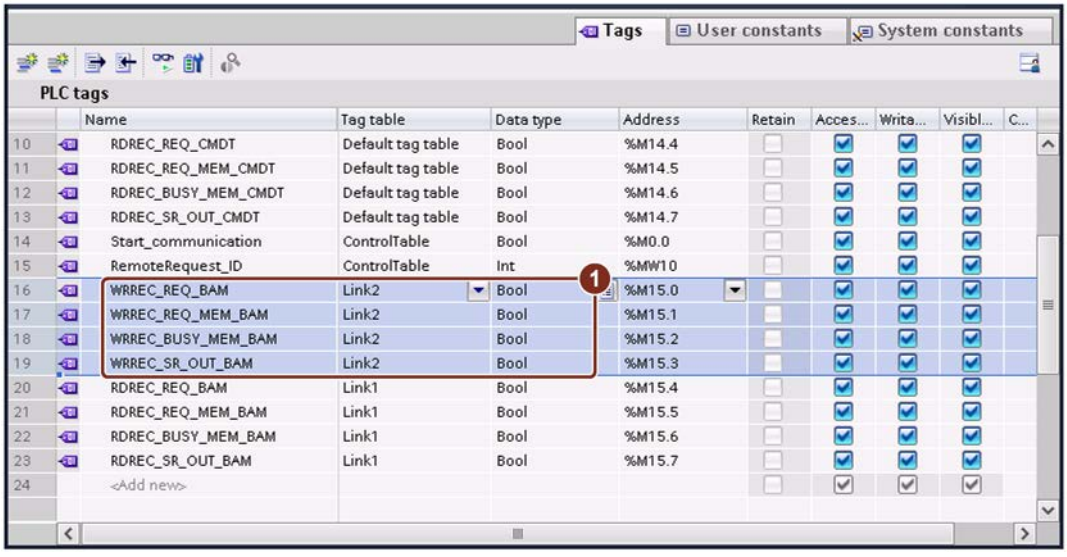
Controlling the WRREC program resource

To control the program resource WRREC, you must create the following PLC tags.

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → PLC tags".
3. Double-click "Link_2".

   The following dialog box is displayed.



4. Create the marked PLC tags ①.

Integrating and configuring program blocks in the S7 program

Proceed as follows:

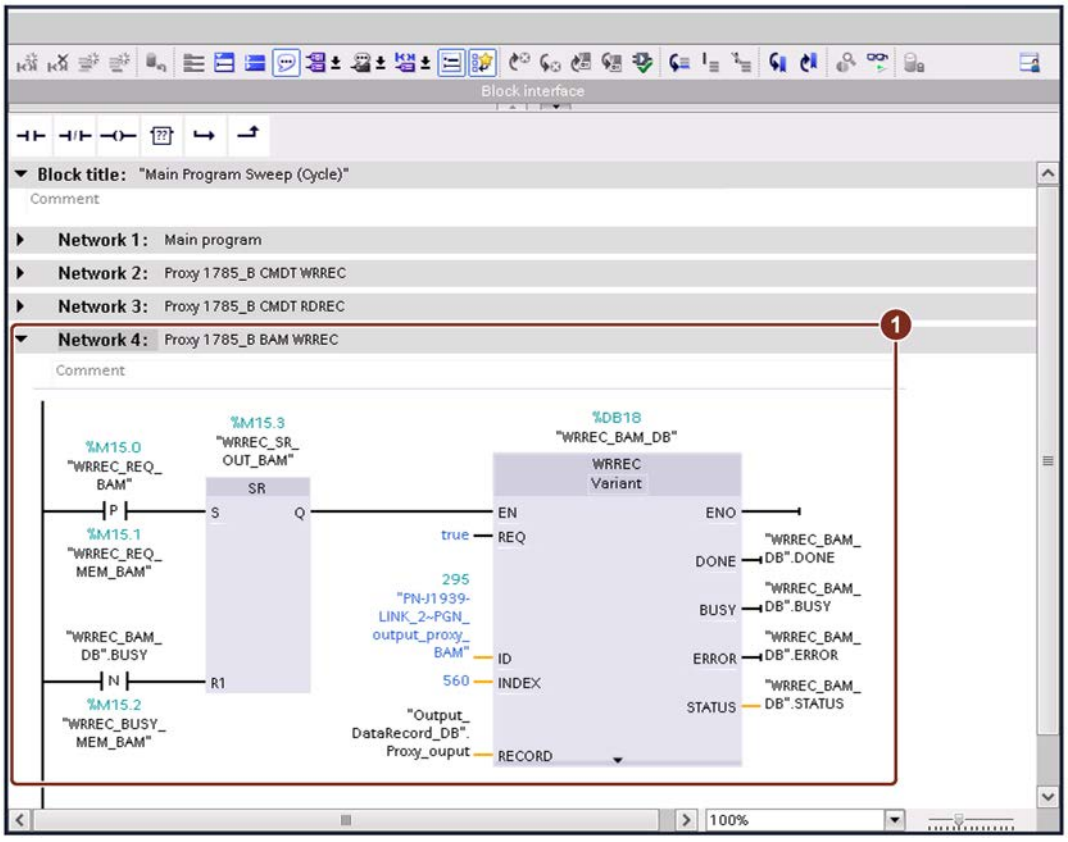
1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".

3. Double-click "Main [OB1]".

   The "Block interface" window is displayed.

4. Switch to "Network 2".

   The figure shows how you have to implement the application example in the S7 program.



Meaning of the tags:

ID	System constant or hardware ID of the "Proxy output" module.
INDEX	Defines the data record for writing data. "560" = Write data record
RECORD	Storage of the output data to be transferred via WRREC_REQ_BAM

Start write operation

Proceed as follows:

1. If you want to start the write operation, change the value of the PLC tag "WRREC_REQ_BAM" to "1".

   Data is only written if its value has changed. As soon as the write operation is completed, the value of the PLC tag automatically changes to "0". The goal is to write the data only once. This process is managed in the program block "DataRecord_StopRequest [FC5]".

   The write operation of the PLC tag "WRREC_REQ_BAM" takes about 14 s for a PGN data length of 1785 bytes and 500 kbps.

7.4 Configure RDREC – PGN input proxy_BAM

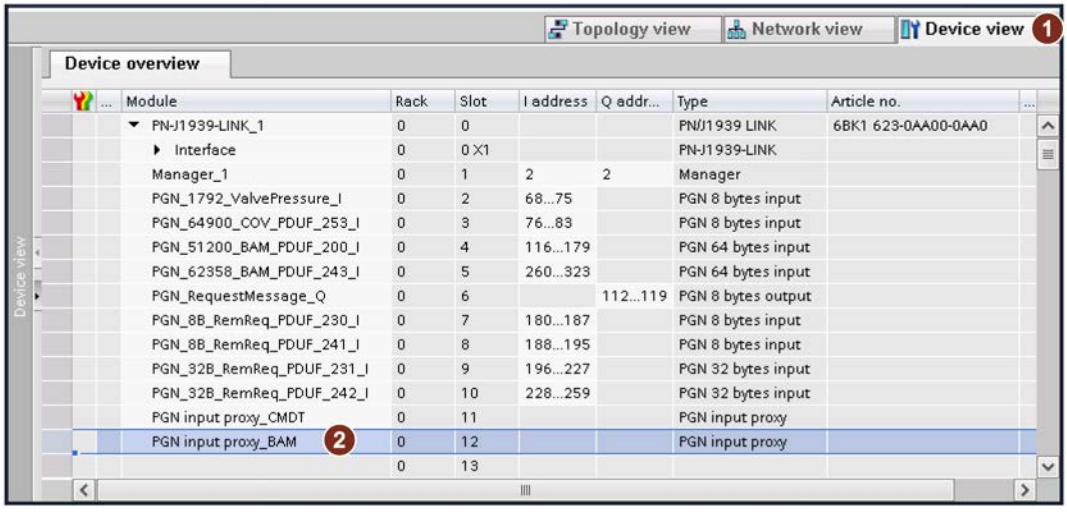
The following description applies to:

- Module PGN input proxy_BAM
- PDU Format > 239

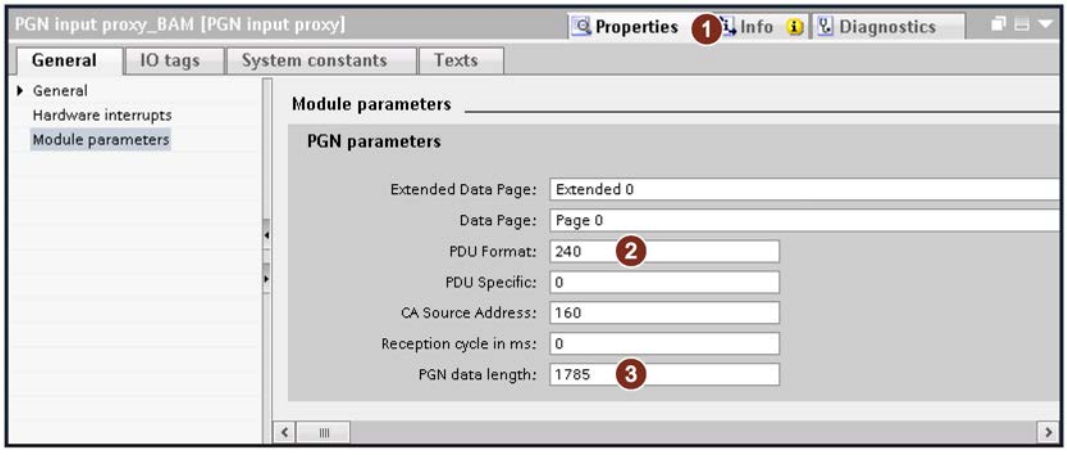
Inserting und assigning parameters PGN input proxy_BAM

Proceed as follows:

1. Click "Network view → PN-J1939-Link_1".
2. Click "Device view → Device overview".
3. Insert the module "PGN input proxy_BAM" ②.



4. Click "Properties → General → Module parameters".



5. Make the following settings:
   - PDU Format at "240" ②
   - PGN data length on "1785" ③

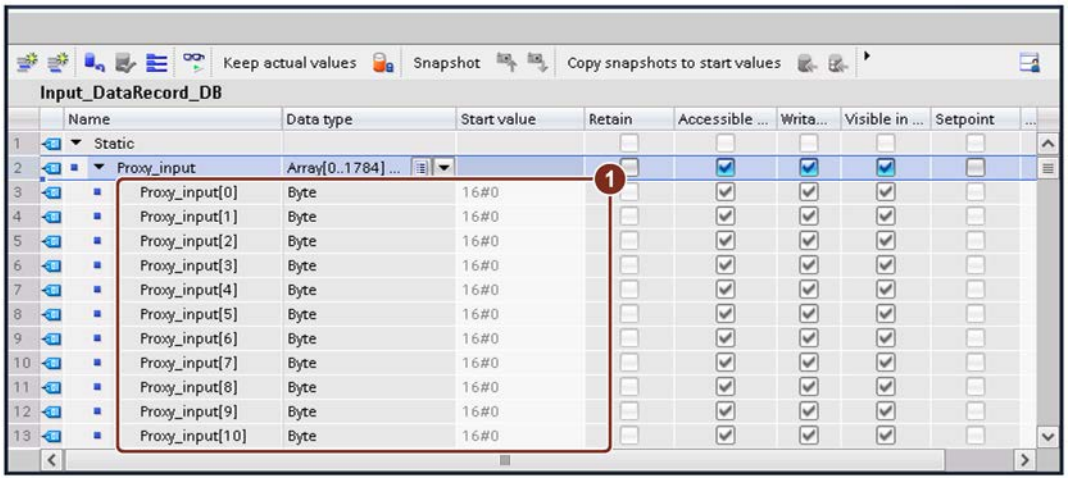
Create Input_DataRecord_DB

Create a DB for values that are to be transferred by data recording.

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Input_DataRecord_DB [DB12]".

   The following dialog box is displayed.



4. Create the input proxies 0 to 1784 ①.

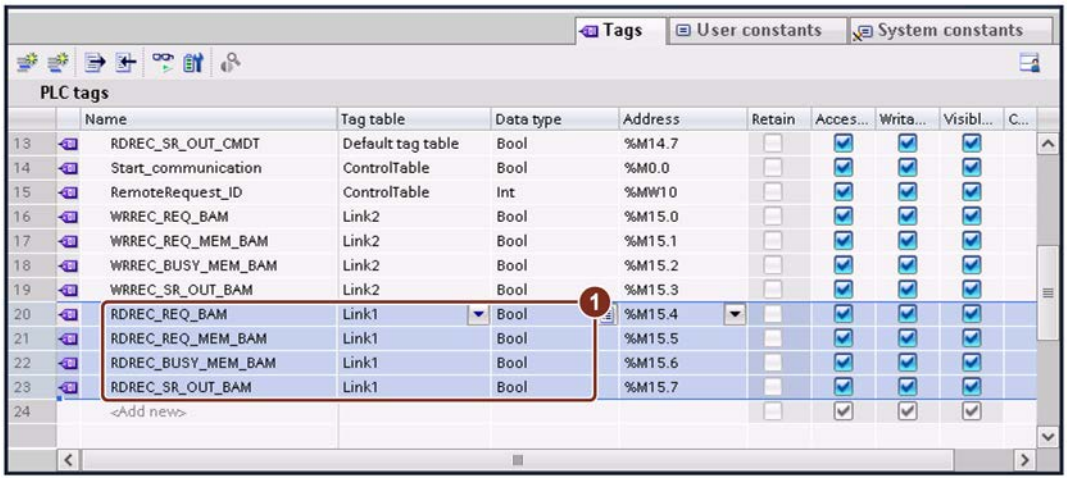
Controlling the RDREC program resource

To control the program resource RDREC, you must create the following PLC tags.

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → PLC tags".
3. Double-click "Link_1".

   The following dialog box is displayed.



4. Create the marked PLC tags ①.

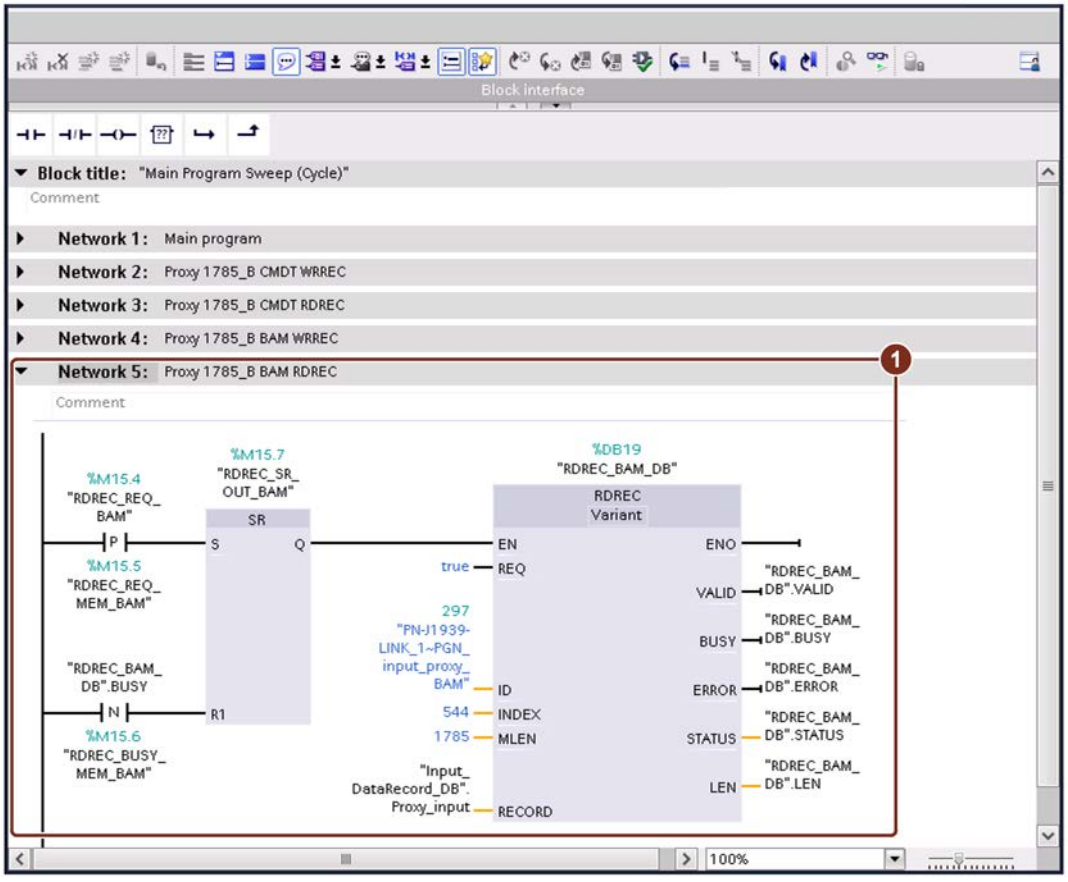
Integrating and configuring program blocks in the S7 program

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Main [OB1]".

   The "Block interface" window is displayed.
4. Switch to "Network 4".

   The figure shows how you have to implement the application example in the S7 program.



Meaning of the tags:

ID	System constant or hardware ID of the "Proxy output" module.
INDEX	Defines the data record for reading data. "544" = Read data record
MLEN	Data volume which is read
RECORD	Storage of the output data to be transferred via WRREC_REQ_BAM

Start read operation

Proceed as follows:

1. If you want to start the read process, change the value of the PLC tag "RDREC_REQ_BAM" to "1".

   As soon as the write operation is completed, the value of the PLC tag automatically changes to "0". This means that the value is read only once. This process is managed in the program block "DataRecord_StopRequest [FC5]".

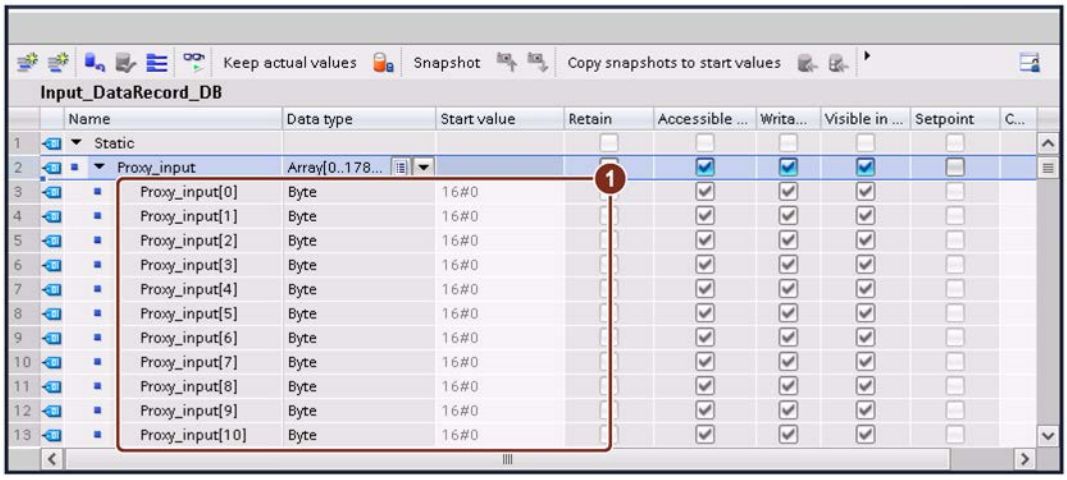
   The result is stored in the "Input_DataRecord_DB" program block.

Show program block "Input_DataRecord_DB"

Proceed as follows:

1. Switch to the project tree.
2. Click "Devices → Project → PLC_1 → Program blocks".
3. Double-click "Input_DataRecord_DB".

   The read values are displayed in the "Monitor value" column.



Appendix A

A

A.1 Internet links

No.	Subject area
1	Entry – SIMATIC PN/J1939 LINK – Configure data communication (https://support.industry.siemens.com/cs/ww/en/view/109760972)
2	SIMATIC gateways SIMATIC PN/J1939 LINK (https://support.industry.siemens.com/cs/de/en/view/109763436)
3	Industry Online Support (https://support.industry.siemens.com/cs/start?lc=en-WW)
4	Mall (https://mall.industry.siemens.com/mall/en/WW/Catalog/Products/10140445?activeTab=ProductInformation&tree=CatalogTree)
5	Industrial communication (https://w3.siemens.com/mcms/automation/en/industrial-communications/Pages/Default.aspx)
6	Your personal contact (https://w3.siemens.com/aspa_app/?cntryid=DE&lang=en)

A.2 History

Edition	Comment
02/2019	First edition

A.3 List of abbreviations

BAM	Broadcast Announce Message
bps	Bits per second
CAN	Controller Area Network
CMDT	Connection Mode Data Transfer
CPU	Central Processor Unit
DB	Data block
DC	Direct Current
FC	Function
GSDML	General Station Description Markup Language
ID	Identifier
PDU	Protocol Data Unit
PDUF	PDU Format
PGN	Parameter Group Number
PLC	Programmable Logic Controller
PM	Power Module
PN	PROFINET
TIA	Totally Integrated Automation
SAE	Society of Automotive Engineers
SPN	Single Path Network