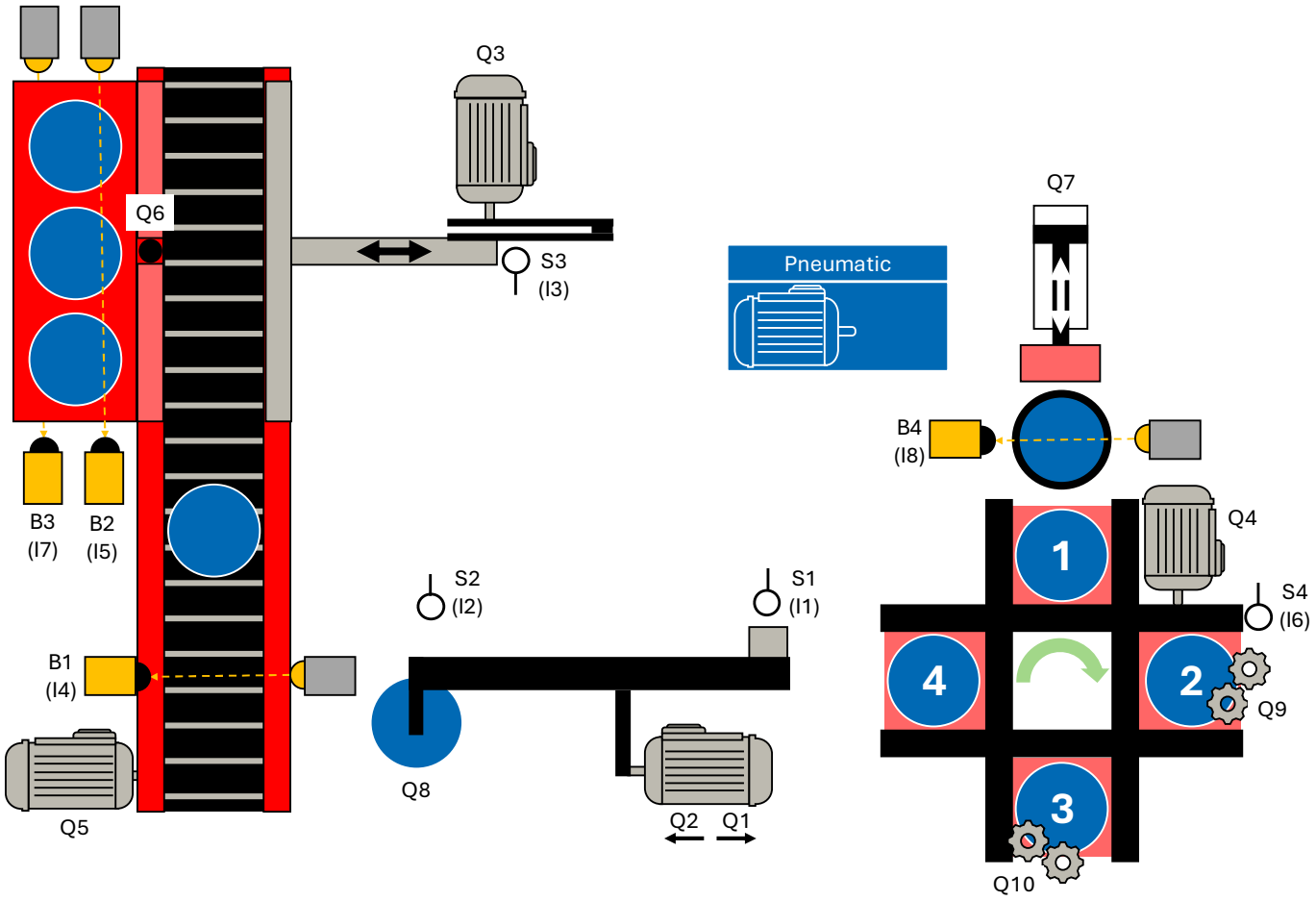
fischertechnik

GROLLMUS

KNOWLEDGE | SOFTWARE | AUTOMATION

# 24V production line

## Data blocks



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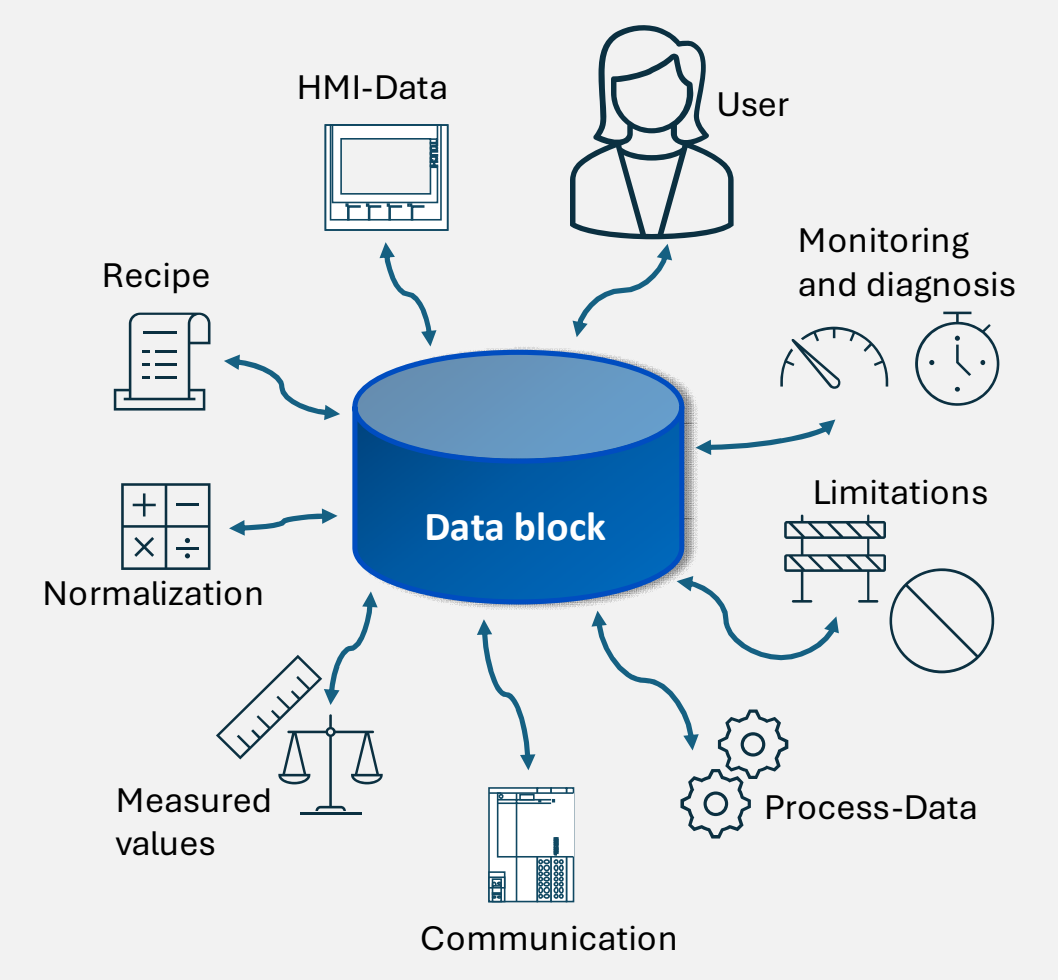
# 6 Data blocks

## 6.1 Introduction

Data blocks can be used in the TIA project to store data. Unlike flags, data can be stored in the data block in a structured manner and made available for processing. Variables of different data types can be stored in any order. The following image shows examples of data to be stored:




Picture 1 Structured data management

Unlike functions and function blocks, data blocks do not contain any program code information, i.e. no executable program.

They offer the following advantages:

- Order and structure in the project
- Better overview of system data
- Faster access in the PLC thanks to optimized access (no absolute addressing)
- Flag variables can be dispensed with
- Reusability in different projects without conflicts with addresses
- DB variables can be pre-assigned with start values
- Monitoring of variables directly in the DB possible
- Simple backup of actual values

## Data block types

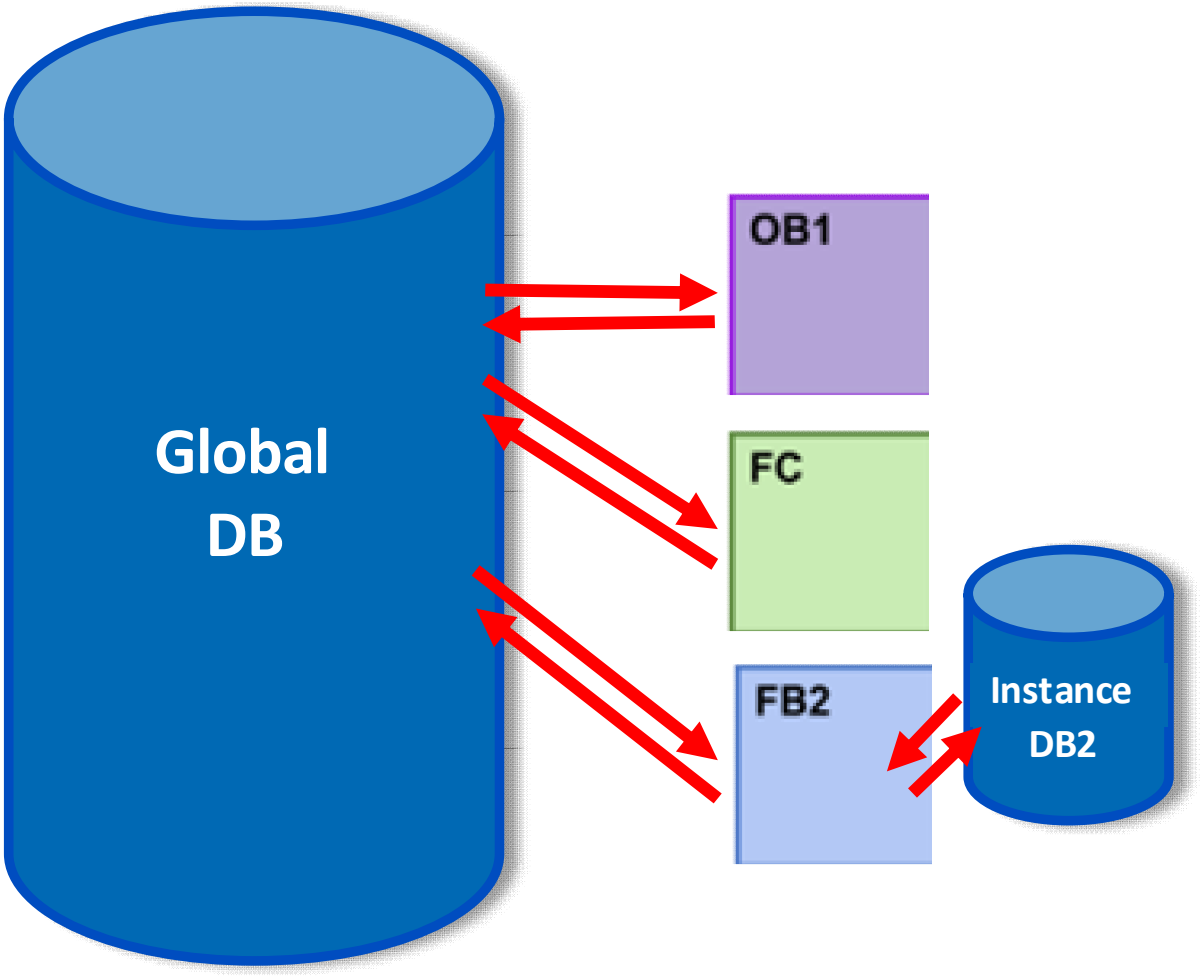
There are basically two types of DB.

## Global data blocks

- The content and data structure are defined by the user.
- The data can be addressed globally by the user.

## Instance data blocks

- The content and the data structure are defined by the calling function module through its interface.
- The instance data block is generated automatically when the FB is called.
- The FB instance (call) accesses the data of its instance DB directly via local interfaces.




Picture 2 Data block types

## 6.2 Global data blocks

Global data blocks are used to store user data (variables) that can be used by all code blocks. The data structure within a global data block is defined by the programmer.

### Global data blocks in the user program

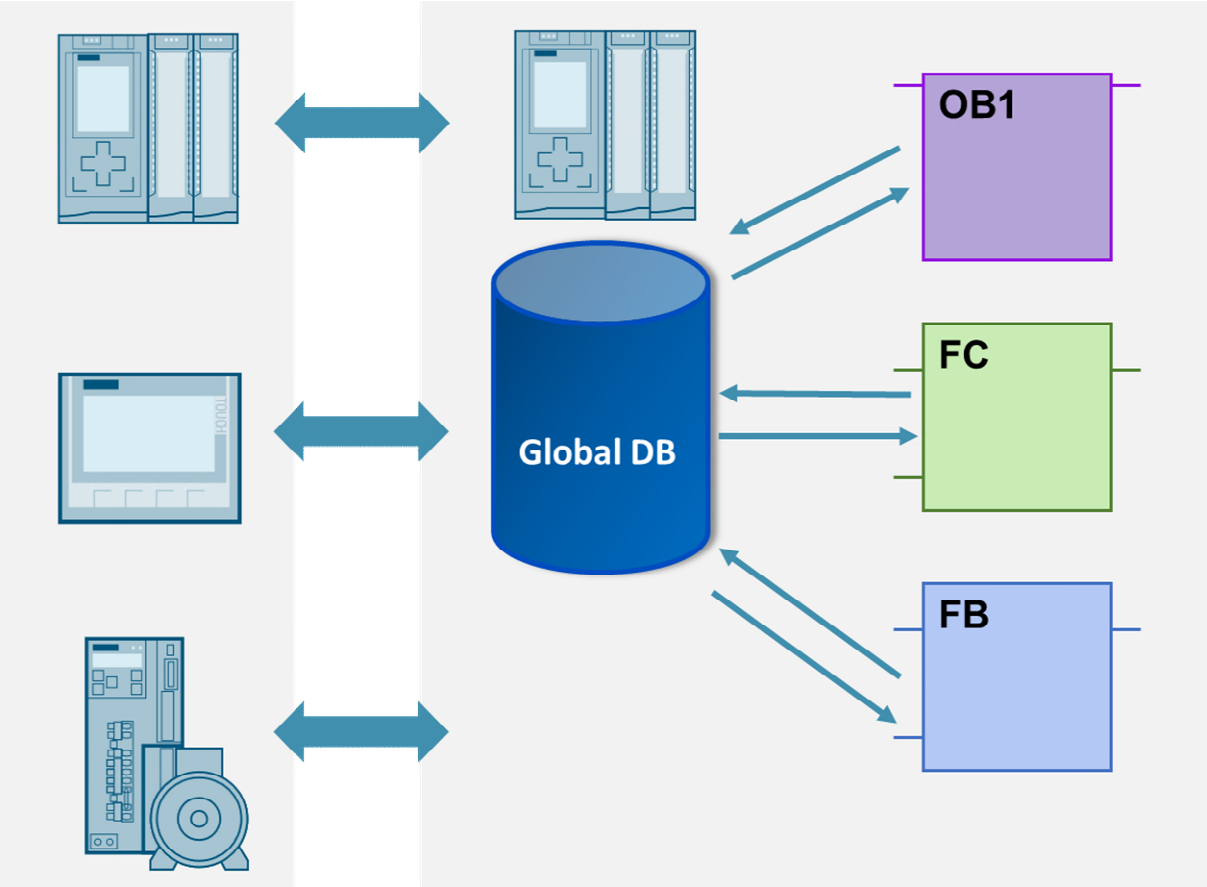
Each FB, FC or OB can read data from a global DB or write data to a global DB.

Examples of data to be stored are

- Setpoint or parameter values
- Data area for error messages
- Interface data
- Material tracking data
- Time specifications for timer modules

The use of data blocks is recommended for data traffic between different systems:

- Frequency inverter control
- CPU-CPU communication
- HMI connection



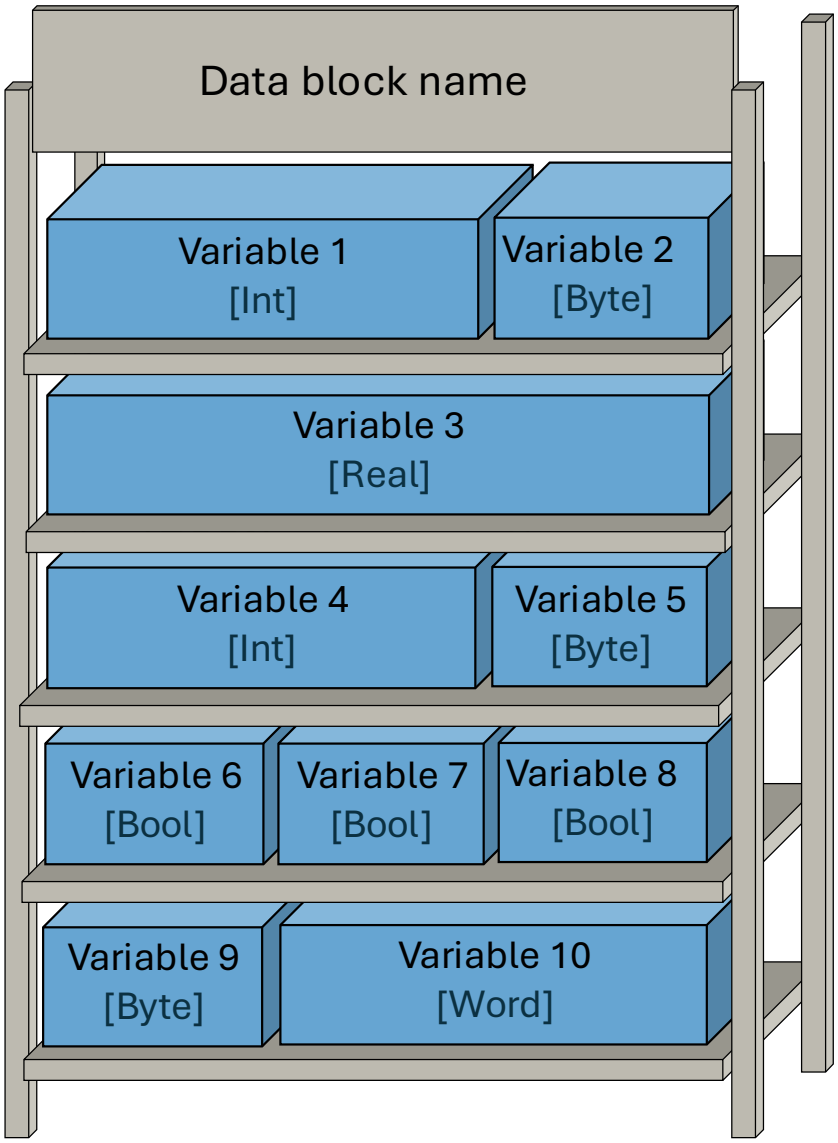

Picture 3 Access to data of a global DB

## 6.3 Schematic structure of a data block

You can think of a data block as a shelf. The shelf has a name, the data block name. You can create compartments (variables) of different sizes on this shelf (data type). The size is defined by the data type. Each compartment is also given a name.

The data is then accessed via:

Shelf name and subject name → "Datenbausteinname". Variable name




Picture 4 Schematic structure of a data block

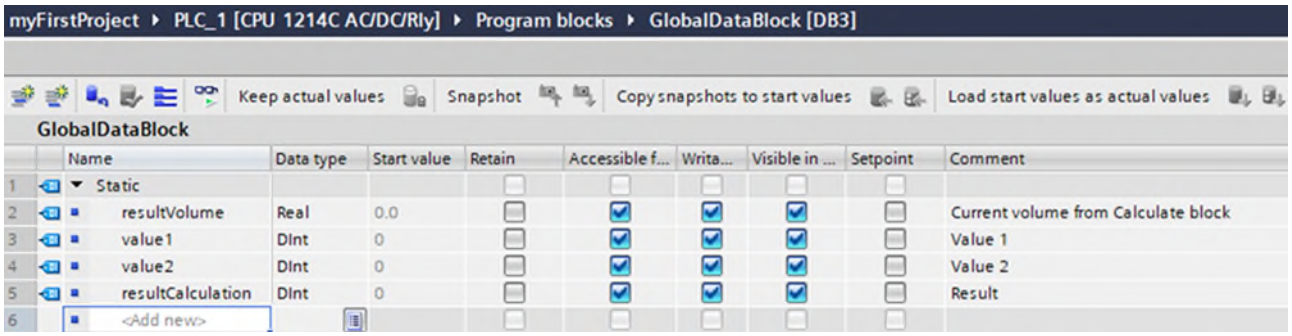
The length of a data block can be up to 16 MB.

In the standard definition, the data is automatically stored by the system in the data module. This is an optimized data block.

The maximum number of data blocks is limited by the PLC's memory.

### Structure of the data block in the editor

The following figure shows the structure of a data block in the declaration view.




Picture 5 Structure of a data block

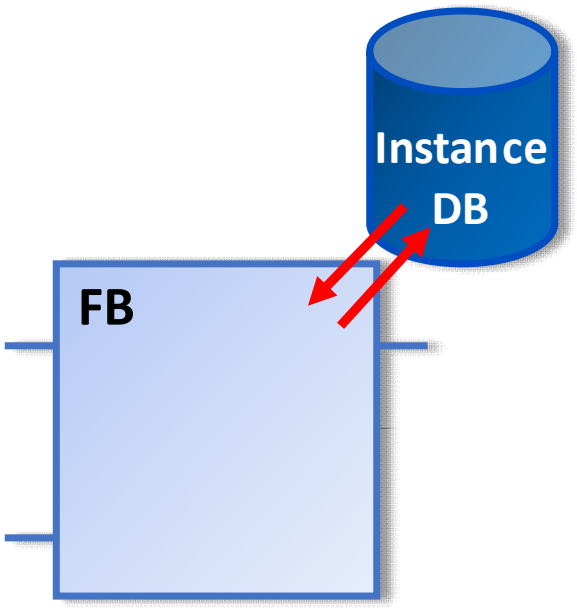
The meaning of the individual columns is shown in the following table:

| Column | Meaning |
|---|---|
| Name | Name of the variable |
| Data type | Data type of the variables |
| Start value | Value that the variable should assume during PLC start-up |
| Remanence | Marks the variables as retentive. |
| Accessible from HMI/OPC UA | Indicates whether these variables can be accessed at runtime by HMI/OPC UA. |
| Writable from HMI/OPC UA | Indicates whether the variable can be written to by HMI/OPC UA at runtime . |
| Visible in HMI Engineering | Indicates whether the variable is visible in the operand selection of the HMI by default. |
| Setting value | Values that will probably need to be fine-tuned during commissioning. After commissioning, the actual values can be adopted as start values in . |
| Comment | Commentary on variables |

Picture 6 Columns in the declaration view

## 6.4 Instance data block

Instance data modules are data modules that are automatically generated when a system function module or a function module is called.

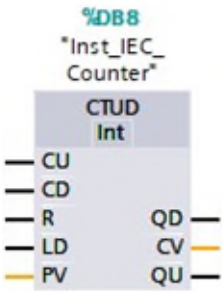



Picture 7 Instance data block

The data of the module is saved in these instance data modules. They are assigned directly to the function block. A new instance data block must be created each time a function block is called.

The instance blocks created are stored under System blocks→ Program resources or Program blocks in general.

The data structure depends on the programming of the function block used. The following figure shows an instance data module of the system function module of a counter.



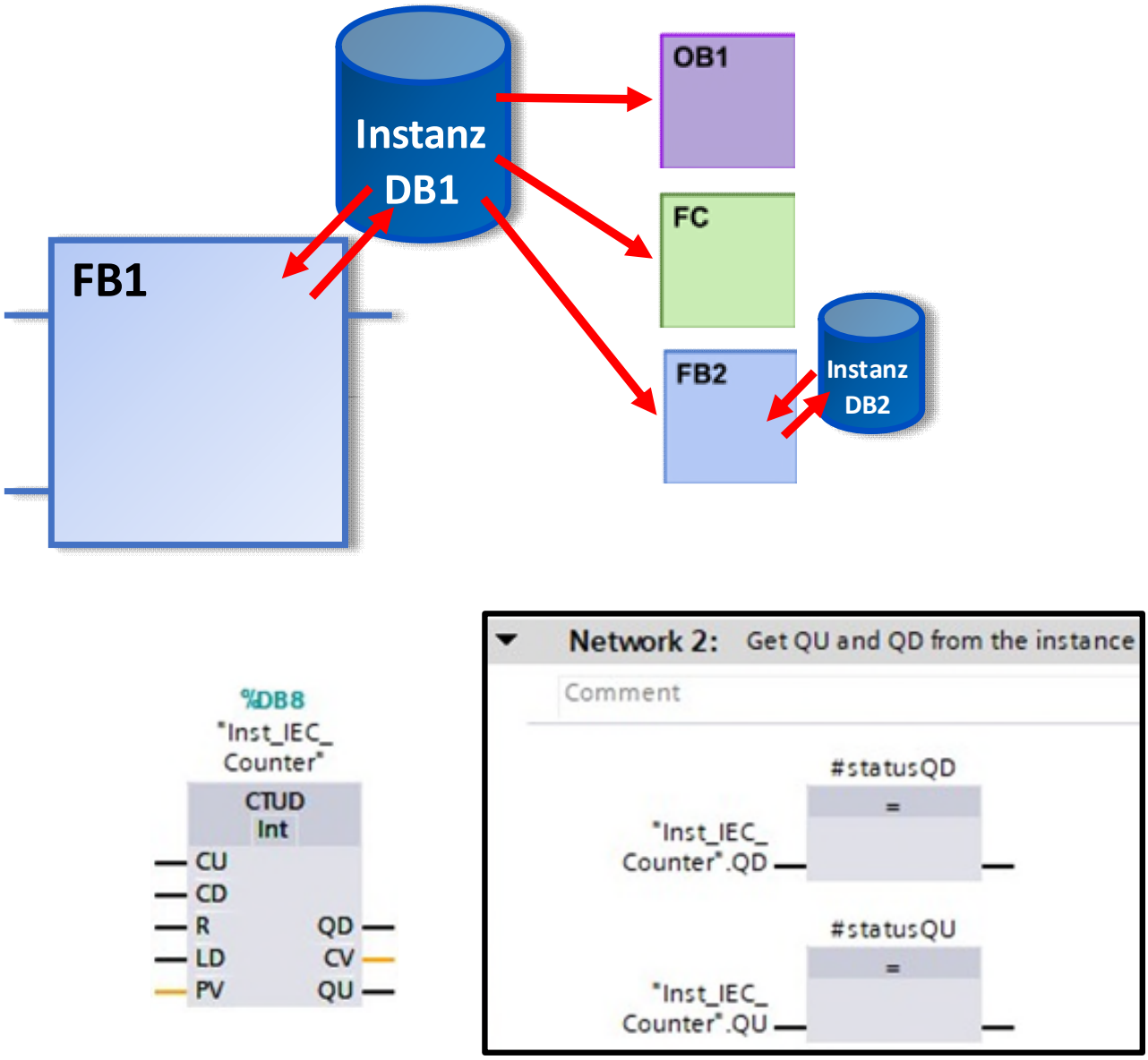

Inst_IEC_Counter

| | | Name | Data type | Start value | Monitor value |
|---|---|---|---|---|---|
| 1 | | Static | | | |
| 2 | | CU | Bool | false | FALSE |
| 3 | | CD | Bool | false | FALSE |
| 4 | | R | Bool | false | FALSE |
| 5 | | LD | Bool | false | FALSE |
| 6 | | QU | Bool | false | TRUE |
| 7 | | QD | Bool | false | FALSE |
| 8 | | PV | Int | 0 | 6 |
| 9 | | CV | Int | 0 | 8 |

Picture 8 Instance data block of an IEC meter

Instance data blocks can also be created manually using the "Add new block → data block" function and selecting the corresponding function block.

Variables of an instance DB can be accessed both read and write by FC, FB and OB. The following figure shows access to QU and QD of a meter.




Picture 9 Access to instance data

Read-only access is recommended, **not** write access. The program can become confusing, especially with write access, as no cross-references are displayed.

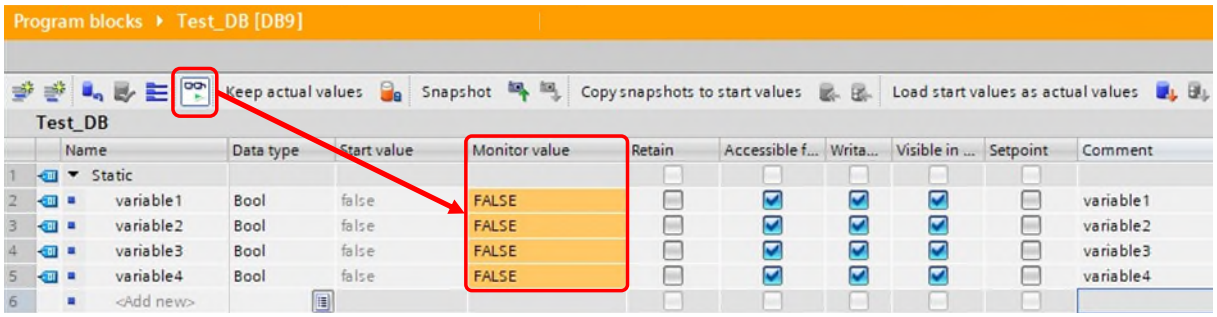
## 6.5 Testing data blocks

To test the values of a data block, you can monitor and control the variables via an existing online connection directly in the open data block or via an observation table.

### 6.5.1 Monitoring in the data module

To do this, activate the "Monitor all" button in the function bar of the declaration table. A new column "Observation value" is added to the declaration table, in which the current actual value can be observed.

Button: "Watch all" 
All variables are displayed with the current value of the PLC as an "observed value" and are constantly updated.

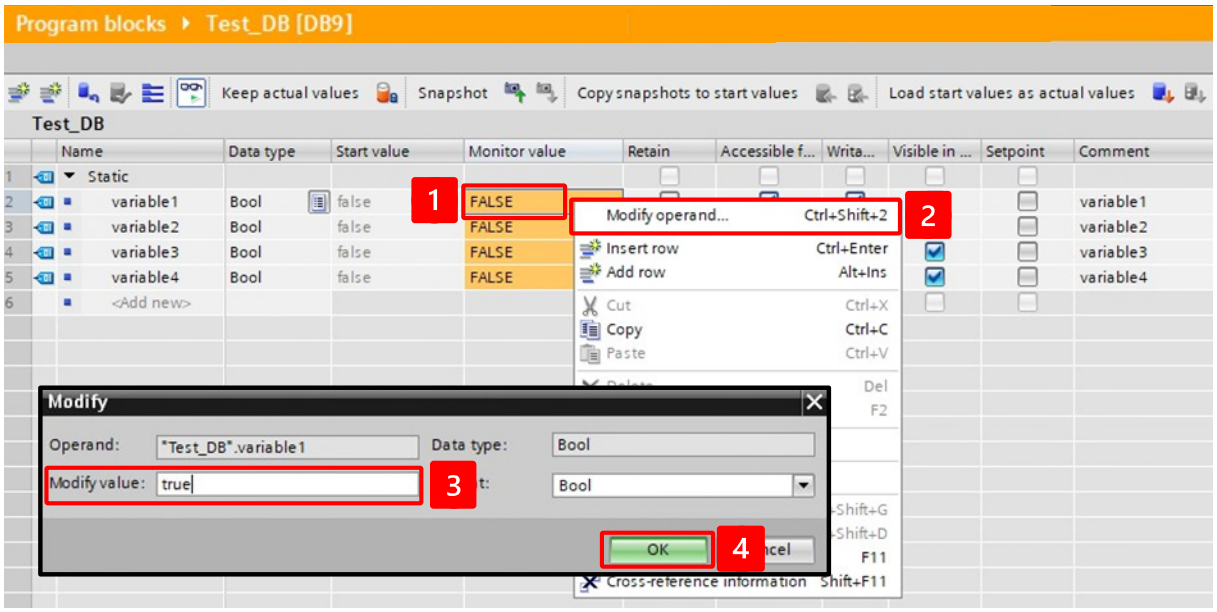



Picture 10 Data block in the observation function

### 6.5.2 Control operands in the data block

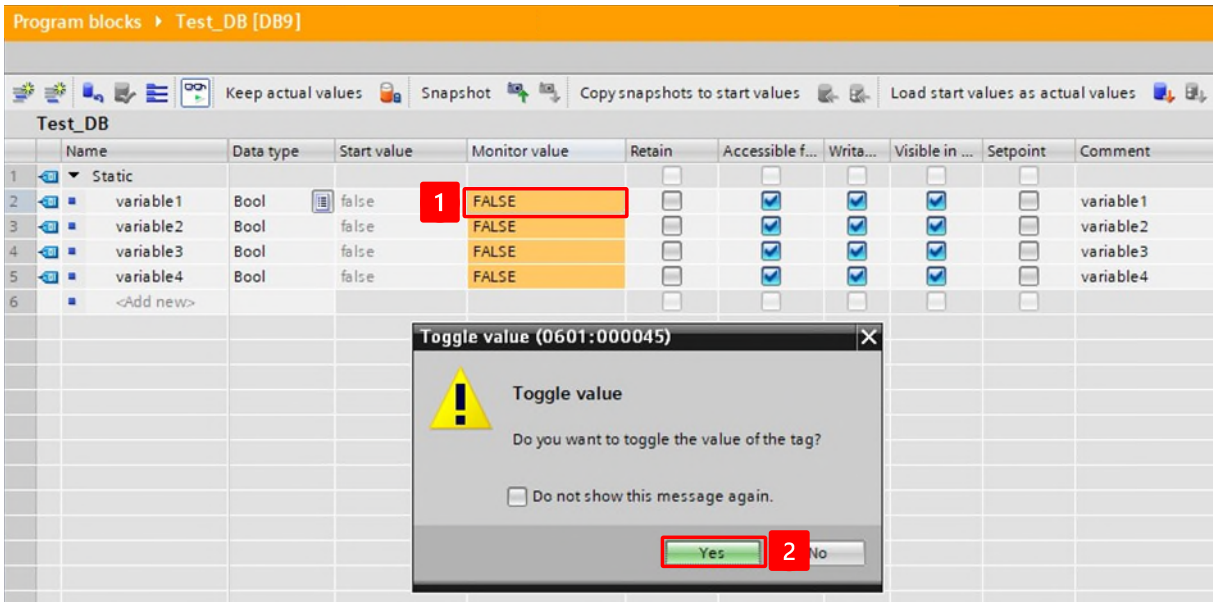
In the data module, you have the option of changing the observation value by right-clicking on a variable with the "Control operand..." function.

In the following "Control" window, enter the control value. Click on "OK" to adopt this as the new observation value; the start value remains unchanged.




Picture 11 Control value data block

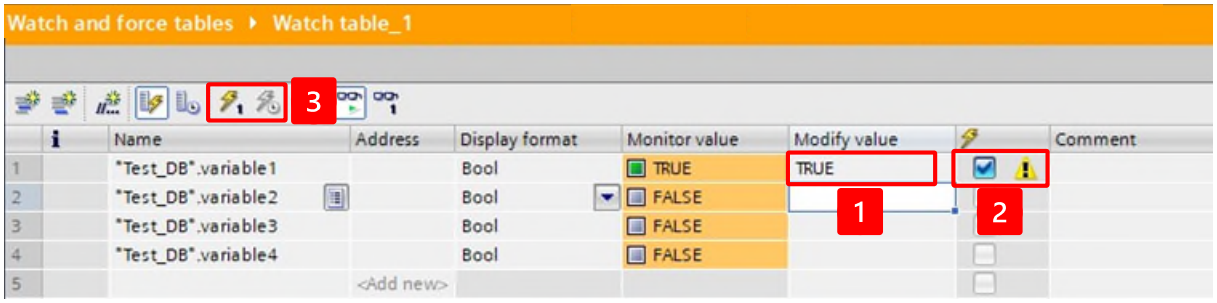
It is also possible to control binary variables in this way.
Boolean variables can also be switched directly by double-clicking on their observation value.




Picture 12 Switch data block boolean variable

### 6.5.3 Observing in an observation table

You can enter and monitor the variables of the data block in an observation table.
From here, you can also change the value of the variable via the control value.




Picture 13 Observation table

You can open a data block,
copy the desired variables
from the Windows clipboard and paste them into the observation table.

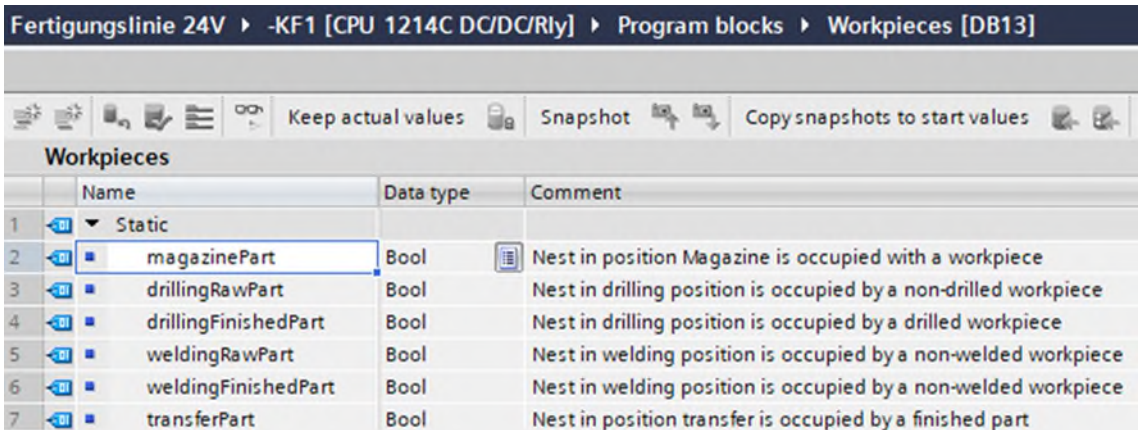
## 6.6 Exercise: Declaring workpiece management

Target:

I can declare variables in a global data block.

Task:

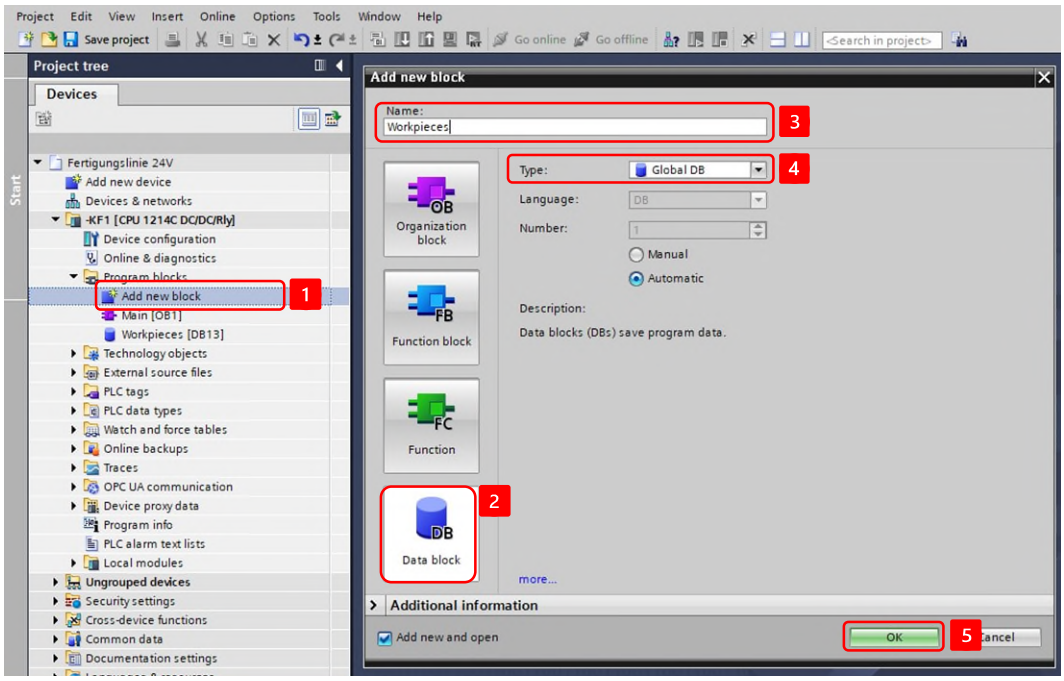
Create a global data block that serves as workpiece management so that the statuses from the system description can be mapped in the controller. The variables are described and evaluated at a later stage from the function blocks of the individual system components.



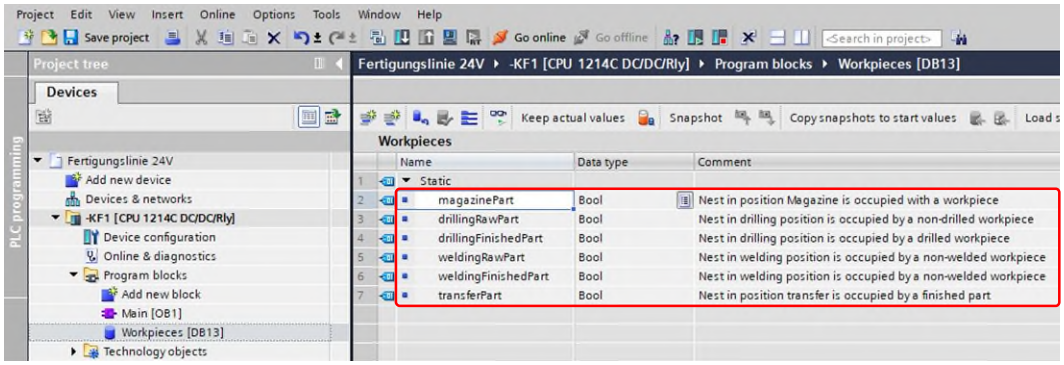

Picture 14 Example of workpiece management

Procedure:

1. Create a new global data block and assign a meaningful name:




2. Declare the variables:



Solution

Solution:

The solution can be found in the TIA Portal project "Fertigungslinie_01_Werstueckverw.zap17".