

SRF/SCR Diagnostic

IO-Link module description

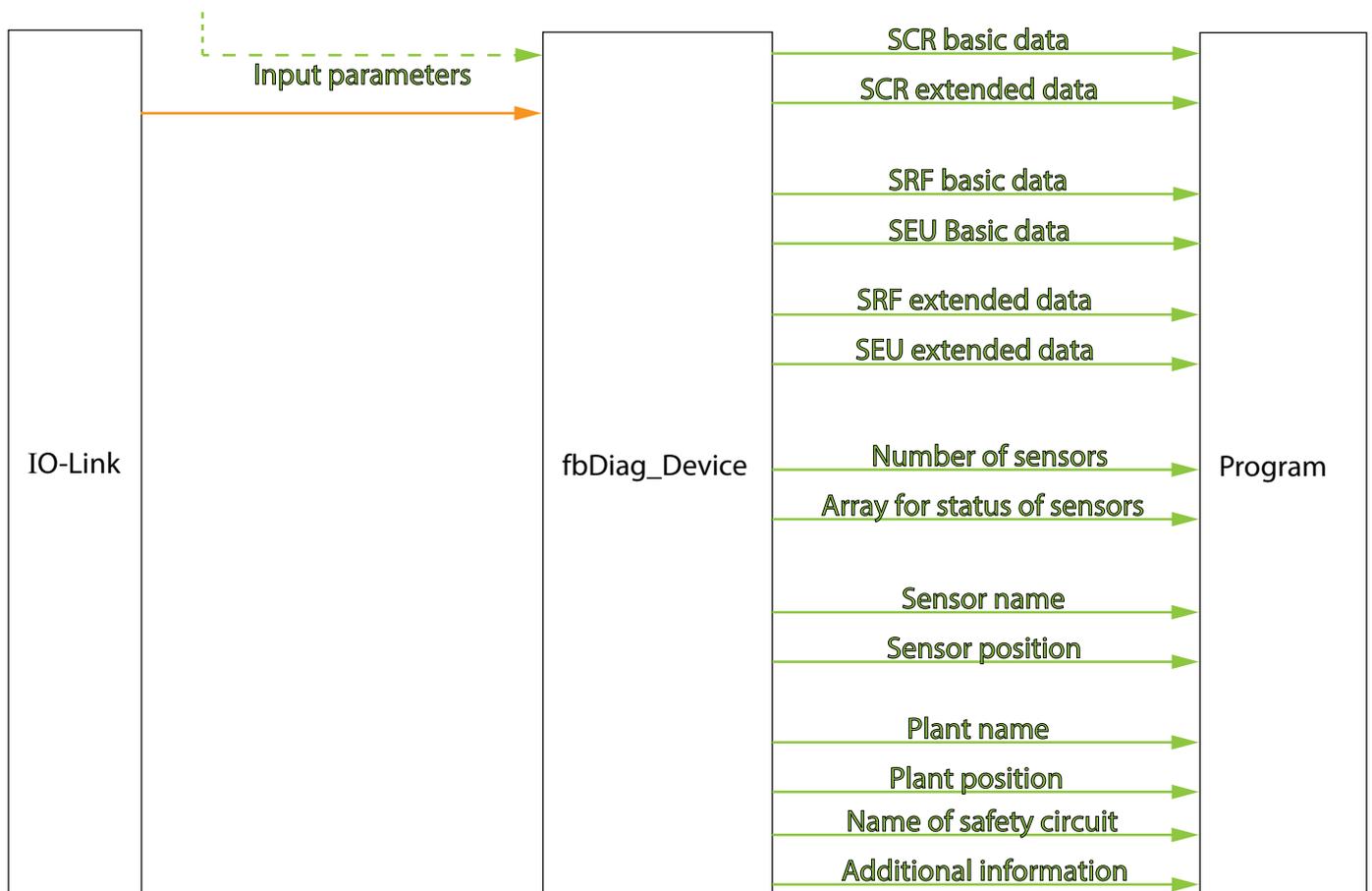
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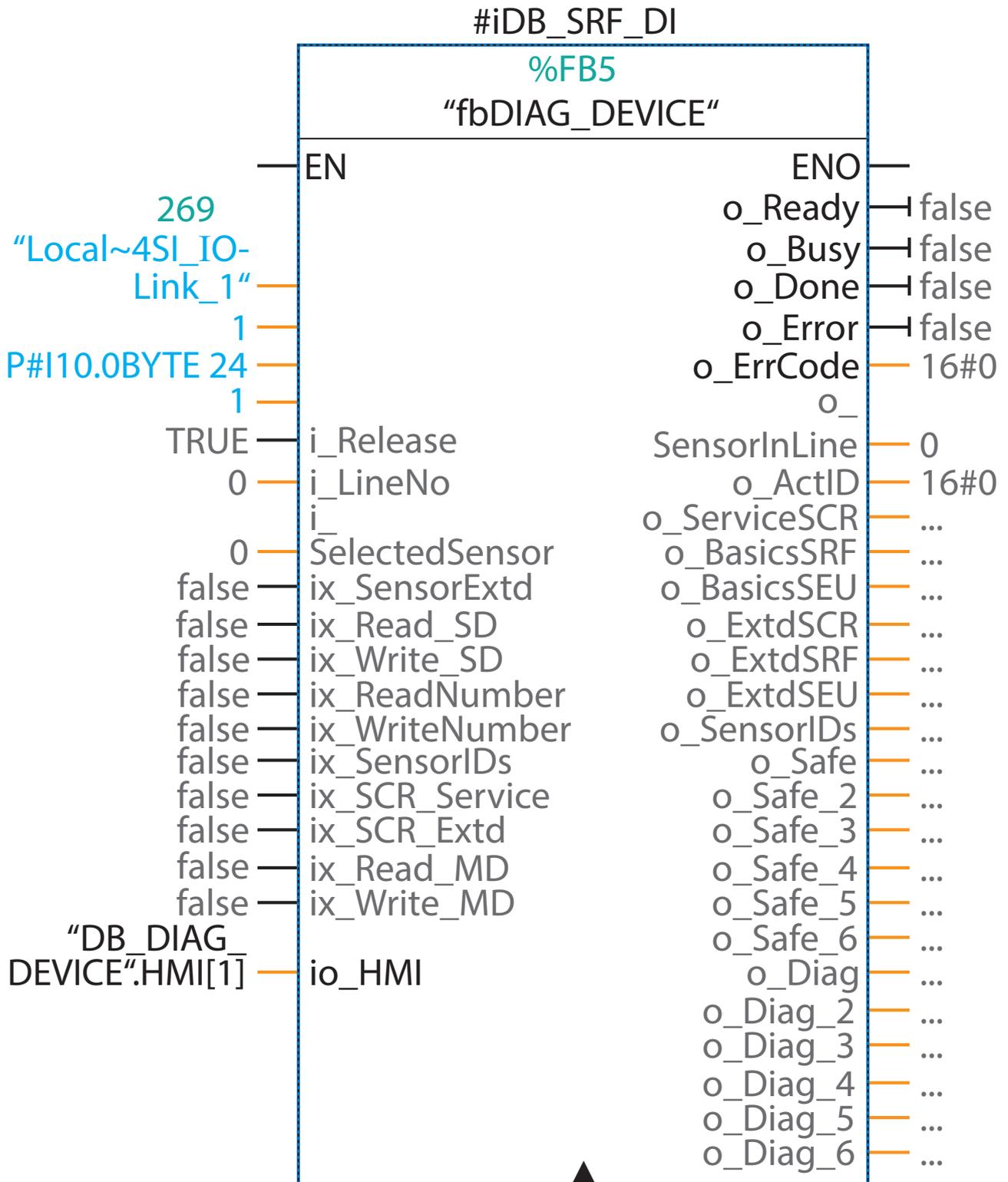
1 | Diagnostic module

1.1 | General

The "Diag_Device" module in the example project enables the PLC to communicate with the IO-Link devices SRF DI and SCR DI. This module provides all the diagnostic information of the evaluation devices and the connected sensors. This module can be called up directly in the user program. A data module must also be created in which a variable of type "typeDiagVisu" is created. This structure facilitates easy connection between the user program and the visualisation. The variable must be created at the corresponding input of the functional module. Once a corresponding variable with a connection to the data module has been created on the visualisation, all the necessary information is available on the HMI.



1.2 | fbDiag_Device



Inputs

i_HW_ID	Hardware ID from the HW configuration of IO-Master
i_PORT	Connected port on the IO-Link master
i_SyncData	Pointer to the synchronous data area of the IO-Link user
i_DeviceType	Selects the IO-Link device (1= SRF DI;2=SCR DI)
i_LineNo	Number of the chain to be read out (always 1 for SCR)
i_SelectedSensor	Number of the selected sensor
ix_SensorExtd	Triggers the reading of the extended data
ix_Read_SD	Triggers the reading of the sensor names
ix_Write_SD	Triggers the writing of the sensor names
ix_Read_Number	Triggers the reading of the number of sensors
ix_Write_Number	Triggers the writing of the number of sensors
ix_SensorIDs	Triggers the reading of the sensor IDs
ix_SCR_Service	Triggers the reading of the service data of the SCR
ix_SCR_Extd	Triggers the reading of the extended data of the SCR
ix_Read_MD	Triggers the reading of the machine data
ix_Write_MD	Triggers the writing of the machine data

Inputs/outputs

io_Release	Release of the IO-Link communication (1 = communication free)
io_HMI	Interface to the HMI structure

Outputs

o_Ready	Module waits for the trigger
o_Busy	Module is reading/writing data out/in of the IO-device
o_Done	The reading/writing of the data was completed successfully
o_Error	Error during transmission
o_ErrCode	Error code of the Siemens communication module IO_LINK_DEVICE
o_SensorsInLine	Read out data; Number of sensors in the chain
o_ActID	Outputs the sensor ID of the selected sensor
o_ServiceSCR	Outputs the service data of the SCR as PLC data type (typeScrService) (see data types)
o_BasicSRF	Outputs the basic data of an SRF as PLC data type (typeSrfBasic) (see data types)
o_BasicSEU	Outputs the basic data of an SEU as PLC data type (typeSeuBasic) (see data types)
o_ExtdSRF	Outputs the extended data of the SCR as PLC data type (typeScrExtd) (see data types)
o_ExtdSRF	Outputs the extended data of an SRF as PLC data type (typeSrfExtd) (see data types)
o_ExtdSEU	Outputs the extended data of an SEU as PLC data type (typeSeuExtd) (see data types)
o_SensorIDs	Outputs the SensorIDs of the selected sensor chain
o_Safe	Status bits of the sensors in chain 1 (data type: array of bool)
o_Safe_2	Status bits of the sensors in chain 2 (data type: array of bool)
o_Safe_3	Status bits of the sensors in chain 3 (data type: array of bool)
o_Safe_4	Status bits of the sensors in chain 4 (data type: array of bool)
o_Safe_5	Status bits of the sensors in chain 5 (data type: array of bool)
o_Safe_6	Status bits of the sensors in chain 6 (data type: array of bool)
o_Diag	Diagnosis bits of the sensors in chain 1 (data type: array of bool)
o_Diag_2	Diagnosis bits of the sensors in chain 2 (data type: array of bool)
o_Diag_3	Diagnosis bits of the sensors in chain 3 (data type: array of bool)
o_Diag_4	Diagnosis bits of the sensors in chain 4 (data type: array of bool)
o_Diag_5	Diagnosis bits of the sensors in chain 5 (data type: array of bool)
o_Diag_6	Diagnosis bits of the sensors in chain 6 (data type: array of bool)

Function

The functional module is used for IO-Link communication between a Siemens PLC and the Bernstein evaluation devices (SRF DI/ SCR DI). This module can be used to read out all diagnostic data that is provided by the evaluation device and the connected sensors. The diagnostic data includes:

- Sensor basic data
- Sensor extended data
- Number of sensors in a chain
- Sensor IDs
- Safety relay service data
- Safety relay extended data
- Machine description
- Sensor descriptions

A detailed description of the data can be found in the document "IO Link_Konfiguration".

The sensor basic data is automatically read out by the functional module as soon as there is a change in the basic data. The change is signalled using the process data of the IO-Link device. As soon as there is a change in the basic data of a sensor, the corresponding bit in the process data is set to "true". The module reads out the basic data of the sensor via asynchronous data communication and makes this available in the PLC program. The corresponding bit in the process data is automatically deleted again.

The process data are structured in such a way that a data area of 4 bytes is reserved for each diagnostic circuit (line) (4 bytes = 32 bits = 32 sensors). For example, if the basic data of the 5th sensor in line 1 change, then the 5th bit in the first 4 bytes is set to "true". In the case of the SCR DI, the process data always comprises 4 bytes, because a max. of one diagnostic circuit is present. Whereas, since the SRF DI can monitor 6 diagnostic circuits, 6 x 4 bytes of process data are reserved here.

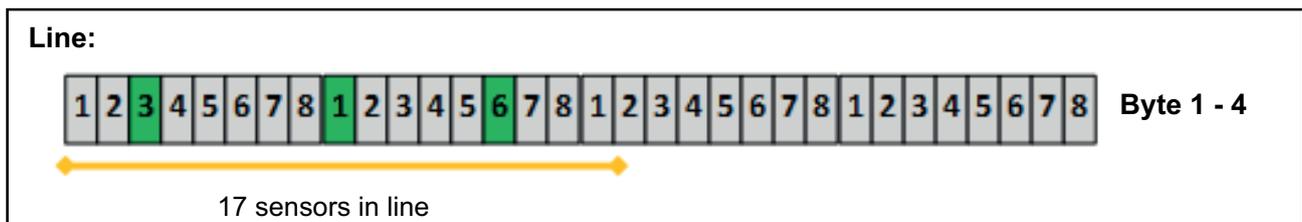


Figure 1.1: Process data of a diagnostic circuit

The number of lines, the number of sensors per line and the IDs of the sensors in a line are automatically read out the first time the functional module is run.

The remaining diagnostic data can be requested using the corresponding input of the module interface. If the data of a sensor is to be requested, it must first be selected using the inputs "i_LineNo" and "i_SelectedSensor".

The outputs Safe(1..6) and Diag(1..6) can be used to clearly request the status of the sensors in the program. Each output represents the status of an entire line (Safe and Diag).

The output o_Safe describes the status of the sensors in line 1. If the bit corresponding to the sensor (Bit[1] = sensor 1, ff.) of the array has the status "true", then this sensor is "safe", i.e., the corresponding door is correctly closed (SRF) or the EMERGENCY STOP has not been triggered and is ready (SEU). Bit[0] of the array describes the collection of signals. If all sensors of the line are "safe", Bit[0] has the status "true".

The output o_Diag describes the diagnostic status of the sensors in line 1. If the bit corresponding to the sensor (Bit[1] = sensor 1, ff.) of the array has the status "true", there is at least one diagnostic message from this sensor. The exact diagnostic status can then be requested using the basic data of the corresponding sensor. Bit[0] of the array describes the collection of signals. If at least one of the sensors of the line has a diagnostic status, Bit[0] has the status "true".

1.3 Visualisation

In the template project, there is an exemplary visualisation also included alongside the modules. The visualisation can be used to request the diagnostic data of the evaluation devices and to edit the descriptions of the machine data and sensors.

1.3.1 Layout



Figure 1.2: Layout visualisation

The layout extends over the entire visualisation template. The control elements of the layout can be accessed from any page of the template.

The navigation bar in the top area of the display can be used to access the start page and scroll back one page. The language can be switched and the setting page can be accessed in the right area of the bar. If a fault message is active, it will be displayed in the middle of the bar.

The upper left area of the template displays the status of the IO-Link communication. The existing diagnostic circuits can be selected below this.

1.3.2 Overview

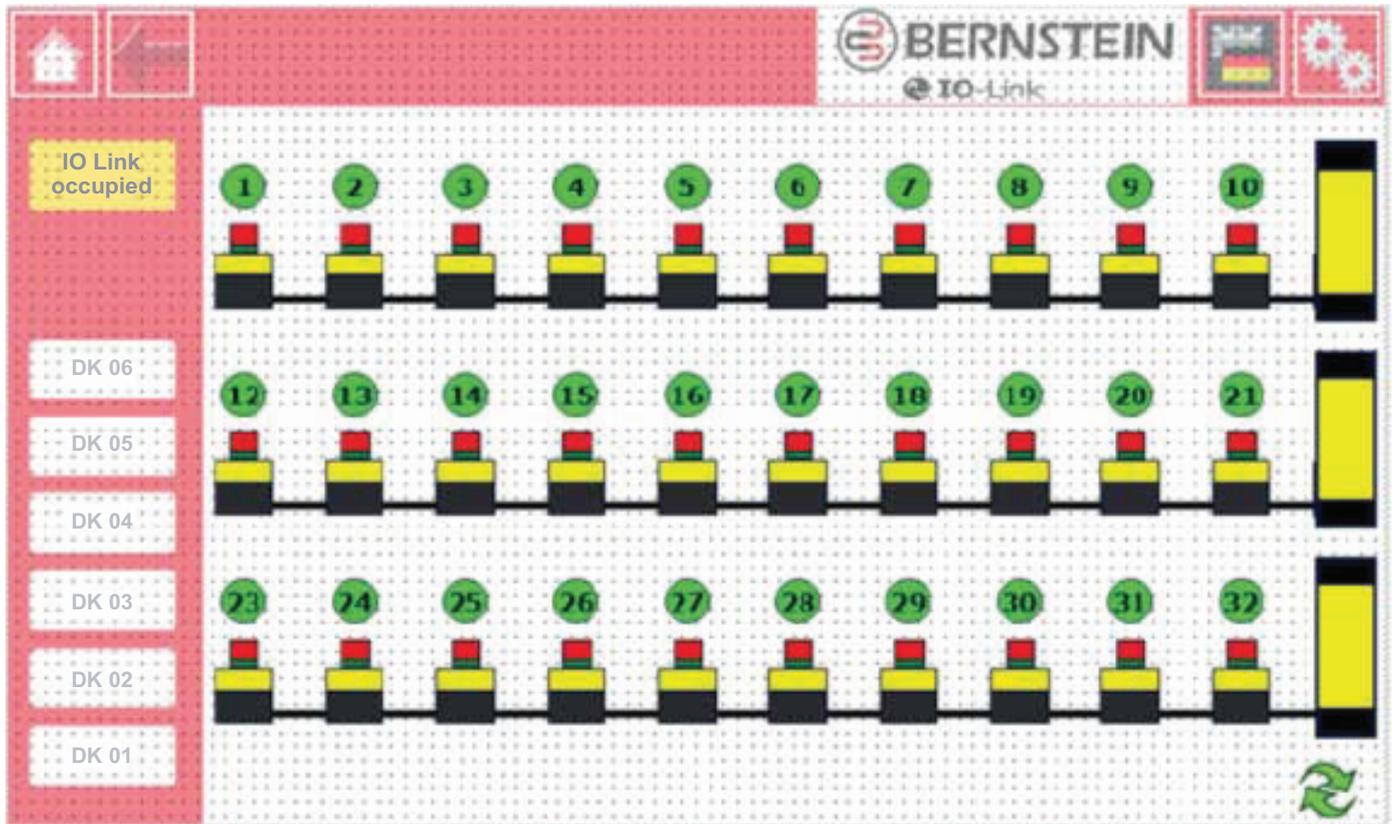


Figure 1.3: Visualisation overview

The topology of the selected diagnostic circuit is displayed on the overview page. Available sensors are displayed and the unavailable ones are hidden. Actuating the evaluation device opens the safety relay data page. Actuating a sensor takes you to the overview page of the sensors.

1.3.3 Data of the safety relay

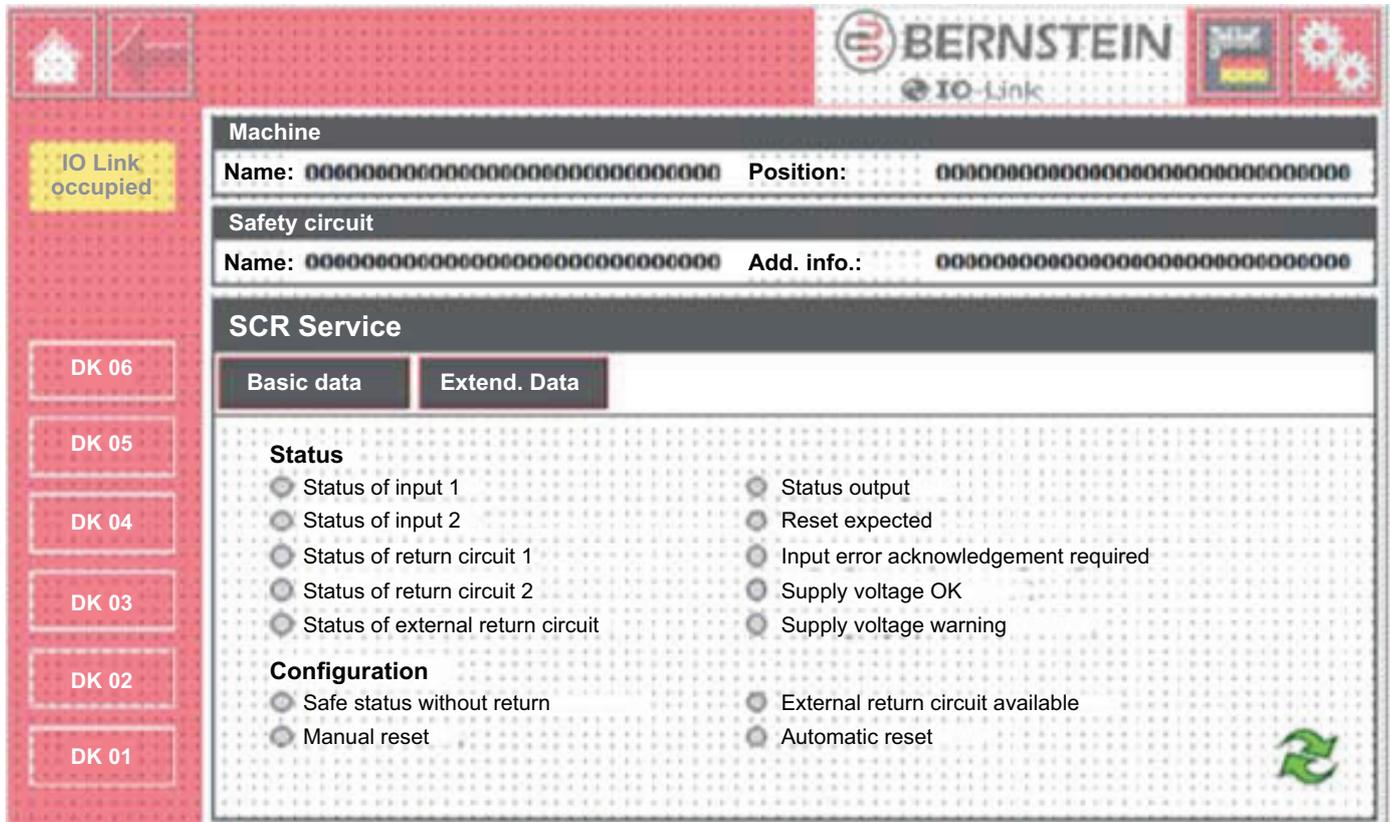


Figure 1.4: Visualisation of the safety relay

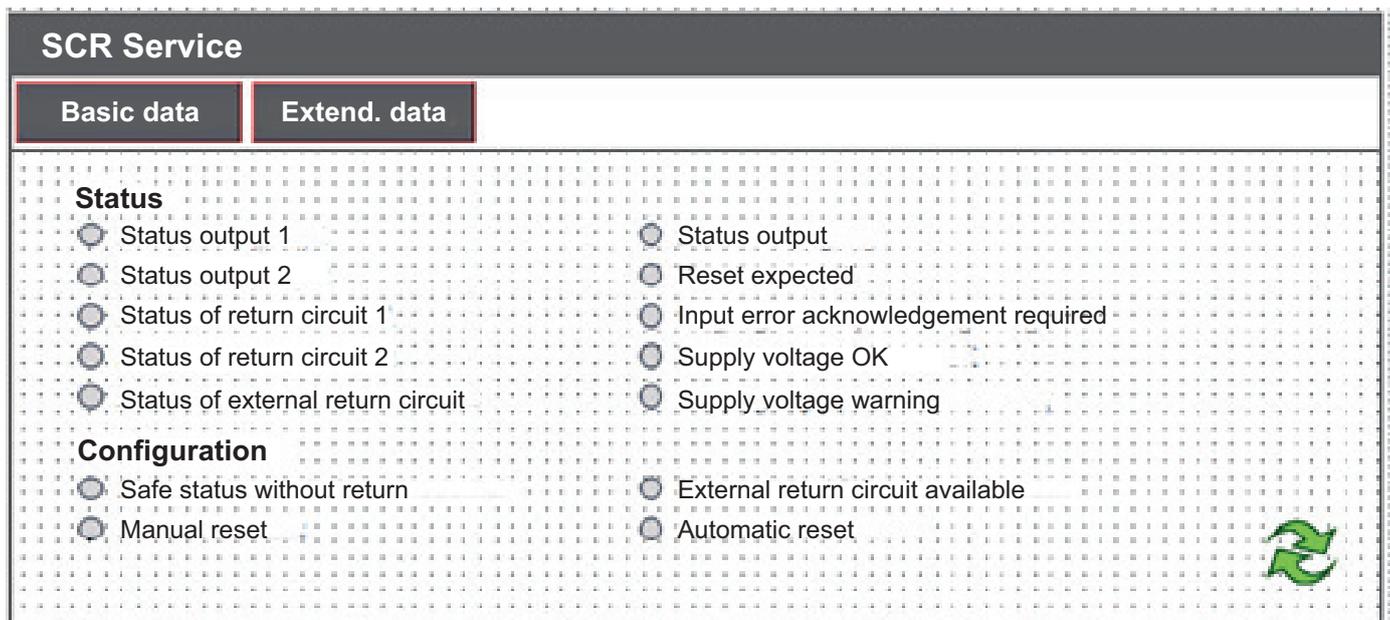


Figure 1.5: Visualisation of SCR service

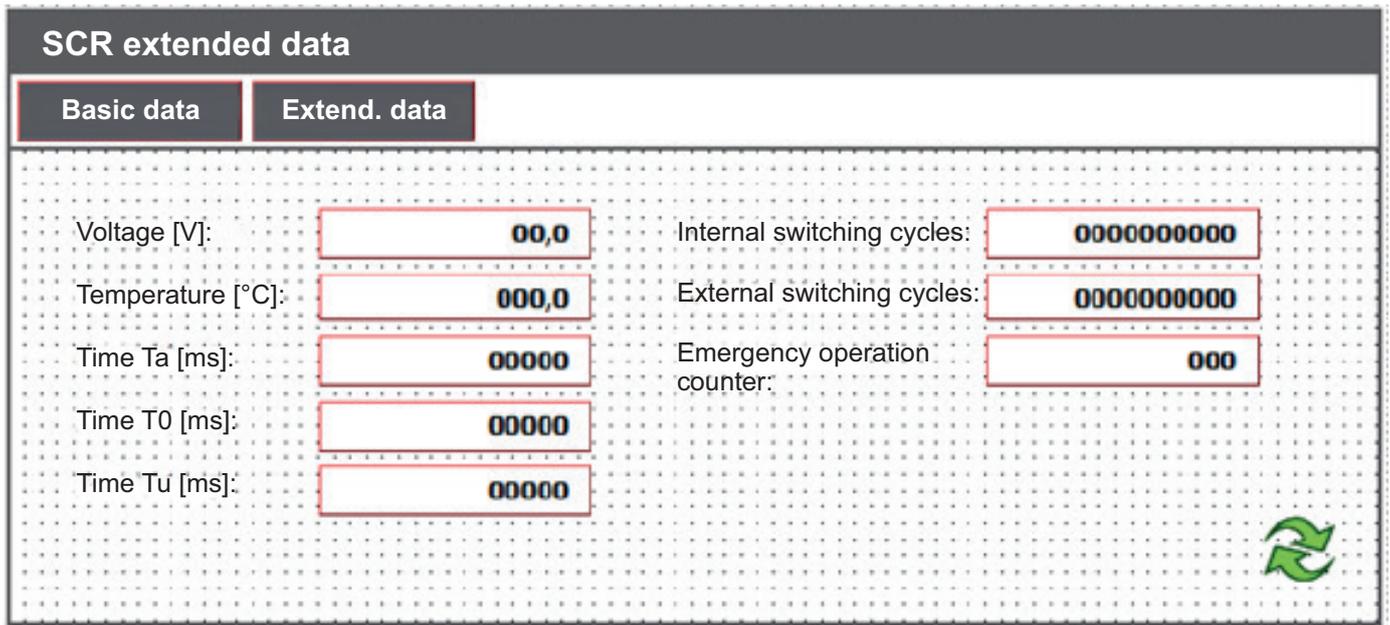
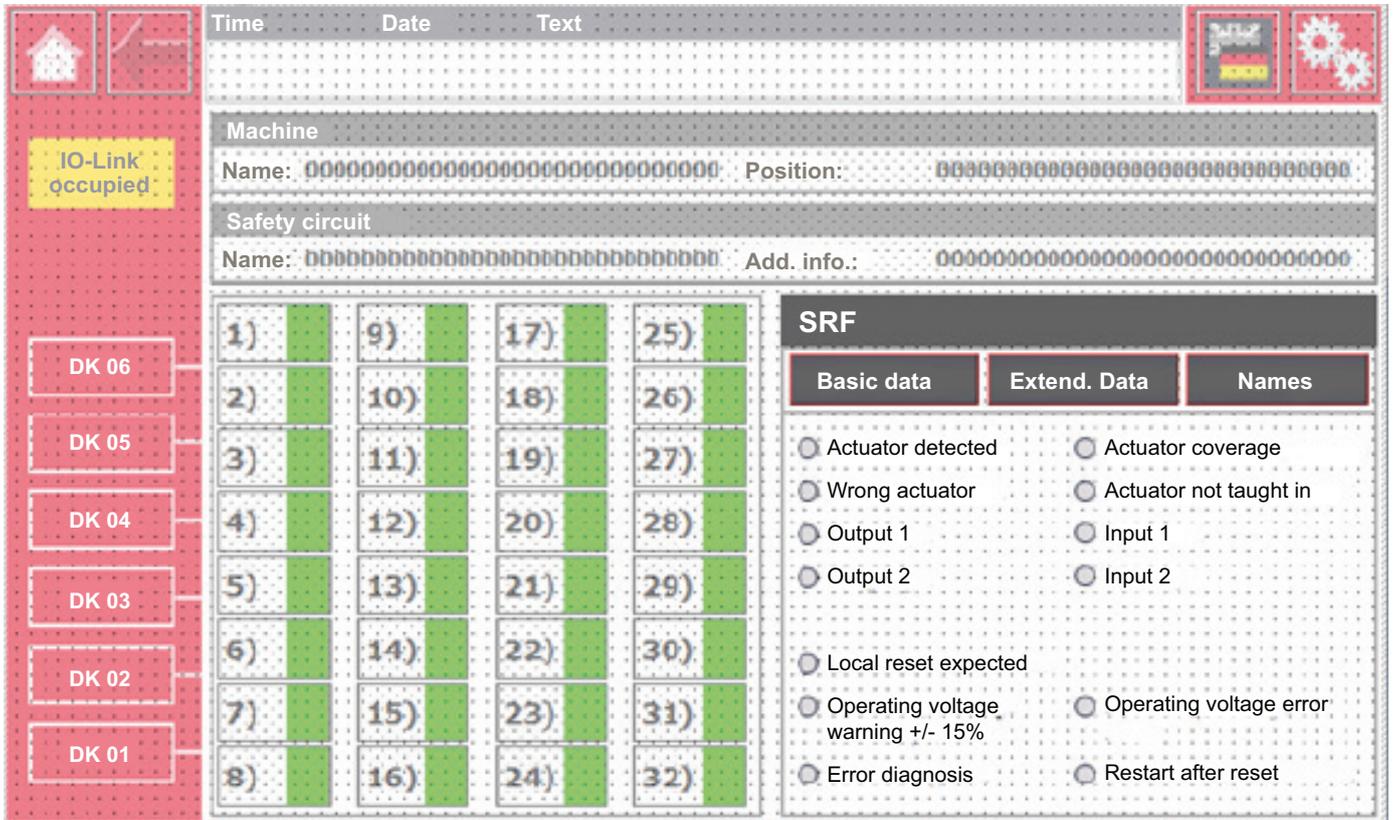


Figure 1.6: Visualisation of SCR Extended

All the relevant data for the safety relay is displayed on the safety relay page. Switching between service data and extended data is done using the buttons in the picture Pressing the green arrows at the bottom right of the screen updates the data.

1.3.4 | Sensor data



Time Date Text

Machine
Name: 00000000000000000000000000000000 Position: 00000000000000000000000000000000

Safety circuit
Name: 00000000000000000000000000000000 Add. info.: 00000000000000000000000000000000

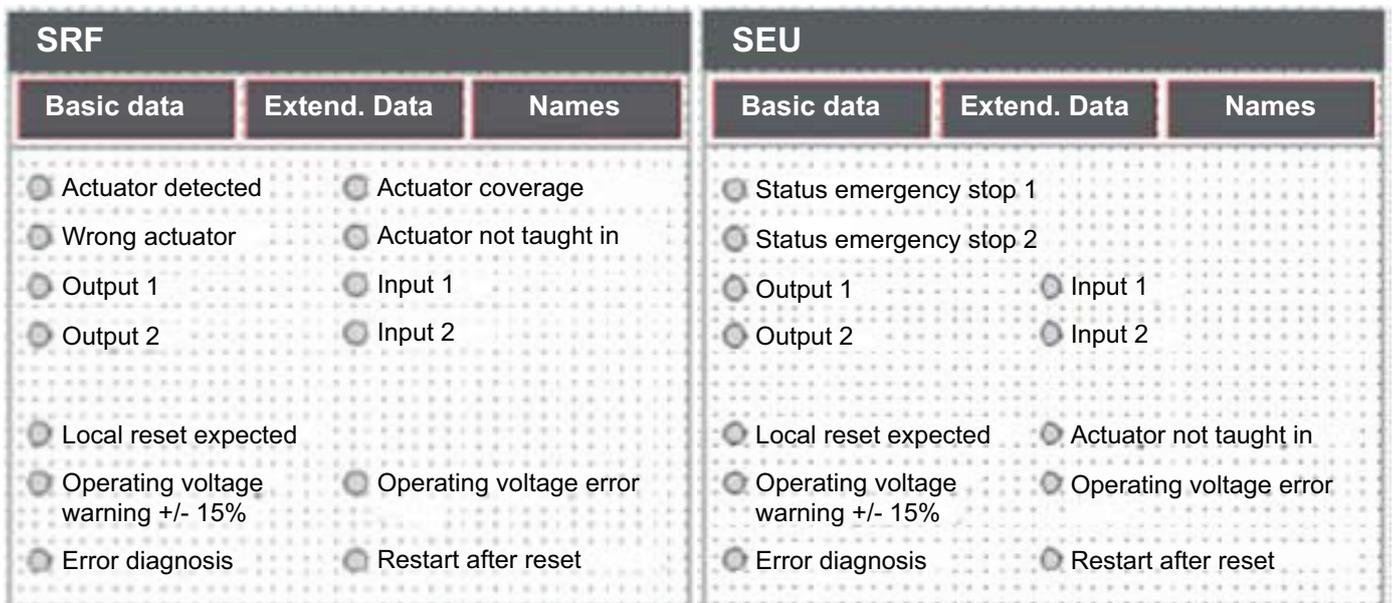
1)	9)	17)	25)
2)	10)	18)	26)
3)	11)	19)	27)
4)	12)	20)	28)
5)	13)	21)	29)
6)	14)	22)	30)
7)	15)	23)	31)
8)	16)	24)	32)

SRF

Basic data Extend. Data Names

- Actuator detected
- Wrong actuator
- Output 1
- Output 2
- Local reset expected
- Operating voltage warning +/- 15%
- Error diagnosis
- Actuator coverage
- Actuator not taught in
- Input 1
- Input 2
- Operating voltage error
- Restart after reset

Figure 1.7: Visualisation of sensor data



SRF

Basic data Extend. Data Names

- Actuator detected
- Wrong actuator
- Output 1
- Output 2
- Local reset expected
- Operating voltage warning +/- 15%
- Error diagnosis
- Actuator coverage
- Actuator not taught in
- Input 1
- Input 2
- Operating voltage error
- Restart after reset

SEU

Basic data Extend. Data Names

- Status emergency stop 1
- Status emergency stop 2
- Output 1
- Output 2
- Input 1
- Input 2
- Local reset expected
- Actuator not taught in
- Operating voltage warning +/- 15%
- Operating voltage error
- Error diagnosis
- Restart after reset

Figure 1.8: Visualisation of SRF Basic

Figure 1.9: Visualisation of SEU Basic

SRF		
Basic data	Extend. Data	Names
Device ID	0000	
Received code	0x0000	
Expected code	0x0000	
Remaining teach-in processes	000	
Switch-off time [min]	000	
Actuator warning time [h]	000	
Operating voltage warning	000	
Supply voltage [V]	00,0	
Temperature [°C]	+000	
Distance [%]	000	

Figure 1.10: Visualisation of SRF Extended

SEU		
Basic data	Extend. Data	Names
Device ID	000	
Switch-off time [min]	000	
Actuator warning time [h]	000	
Operating voltage warning	000	
Supply voltage [V]	00,0	
Temperature [°C]	+000	

Figure 1.11: Visualisation of SEU Extended

SRF		
Basic data	Extend. Data	Names
Name:	<input type="text" value="00(0000000000000000)"/>	
Position:	<input type="text" value="00(0000000000000000)"/>	
<input type="button" value="Read"/> <input type="button" value="Write"/>		

Figure 1.12: Visualisation of SRF Labelling

SEU		
Basic data	Extend. Data	Names
Name:	<input type="text" value="00(0000000000000000)"/>	
Position:	<input type="text" value="00(0000000000000000)"/>	
<input type="button" value="Read"/> <input type="button" value="Write"/>		

Figure 1.13: Visualisation SEU Labelling

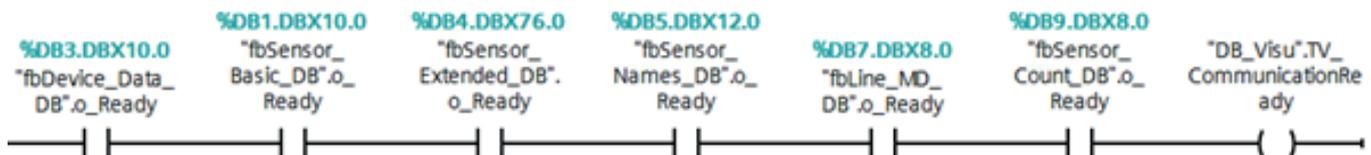
All data relevant for a SRF or SEU are displayed on the sensors page. Switching between basic data, extended data and labelling is done using the buttons in the picture. Pressing the green arrows at the bottom right of the screen updates the data.

2 | Subfunctions

2.1 | General

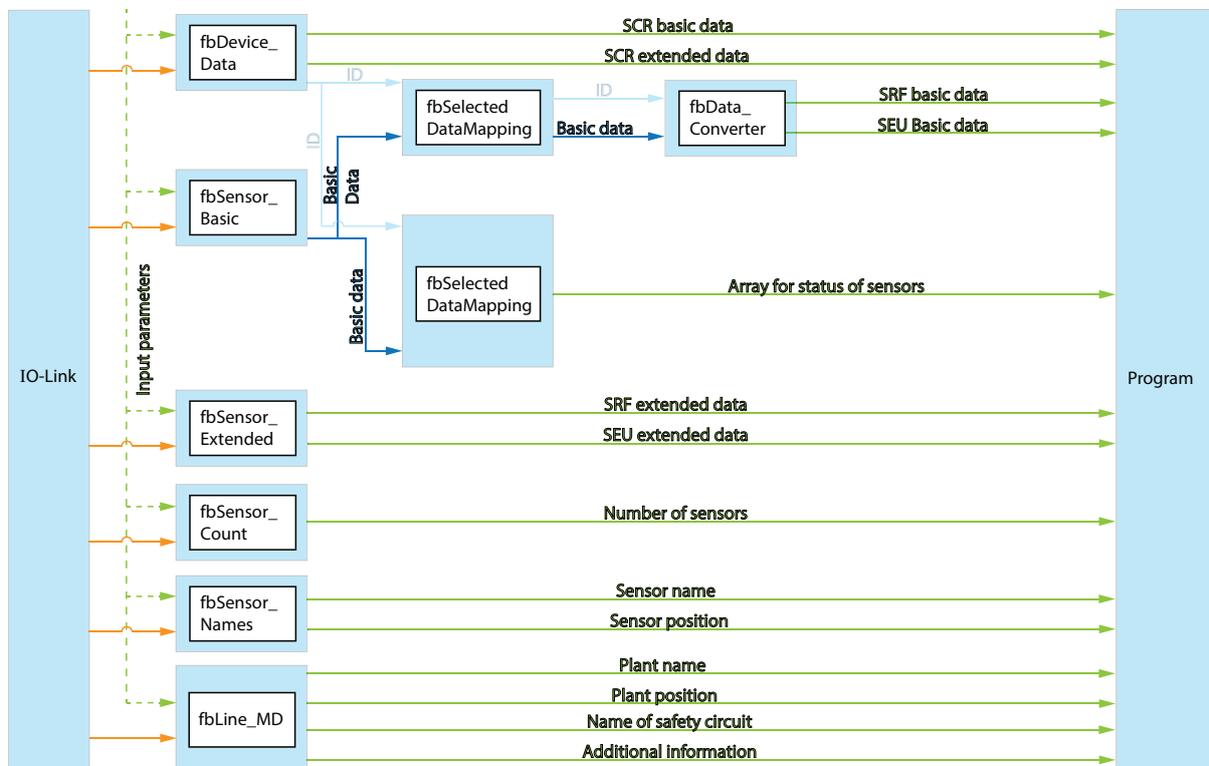
The subfunction modules in the example project enable systematic communication of the PLC with the IO-Link devices SRF DI and SCR DI. In contrast to the Diag_Device functional module, the following modules can be used to request the dedicated diagnostic data of a device. All information provided by the Diag device functional module can also be requested decentrally from different points in the user program.

When using the functional modules, ensure that the communication is only used by one of the modules concurrently. For this, it is recommended that the output status (o_Ready) of each module be routed to a flag that is applied to all release inputs (i_Release) of the individual modules.

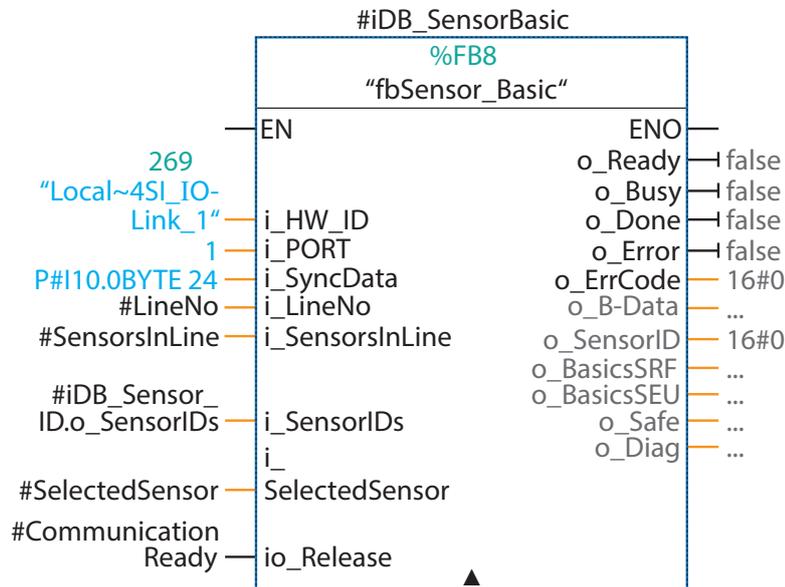


The communication of a module only starts with a "true" at the release input (i_Release) and can then neither be paused nor aborted.

"DB_Visu".TV_BasicDataSEU1 schematic overview of the communication structure:



2.2 | fbSensor_Basic



Inputs

<code>i_HW_ID</code>	Hardware ID from the HW configuration of IO-Master
<code>i_PORT</code>	Connected port on the IO-Link master
<code>i_SyncData</code>	Pointer to the synchronous data area of the IO-Link user
<code>i_LineNo</code>	Number of the chain to be read out (always 1 for SCR)
<code>i_SensorsInLine</code>	Number of sensors in the selected chain
<code>i_SensorIDs</code>	Sensor IDs of all sensors of the selected chain (1=SRF, 7=SEU)
<code>i_SelectedSensor</code>	Number of the selected sensor
<code>io_Release</code>	Release of the IO-Link communication (1 = communication free)

Inputs/outputs

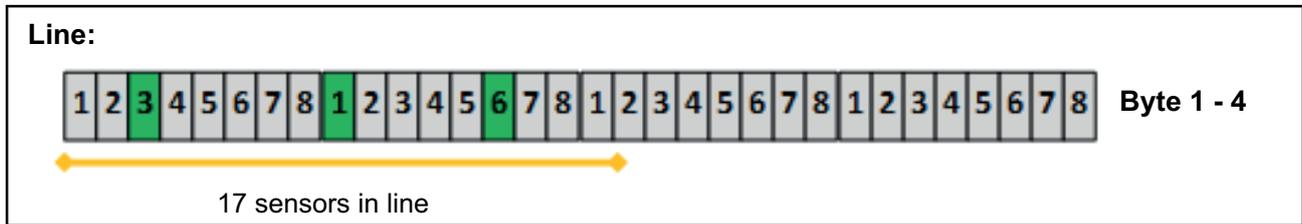
<code>io_Release</code>	Release of the IO-Link communication (1 = communication free)
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Outputs

<code>o_Ready</code>	Module waits for changes in the synchronous data
<code>o_Busy</code>	Module is reading changes from the sensors
<code>o_Done</code>	Not used
<code>o_Error</code>	Error during transmission
<code>o_ErrCode</code>	Error code of the Siemens communication module IO_LINK_DEVICE
<code>o_B-Data</code>	Basic data of all sensors of the selected chain (data type: Word)
<code>o_SensorID</code>	Sensor ID of the selected sensor (1=SRF, 7=SEU)
<code>o_BasicSRF</code>	Outputs the basic data of an SRF as PLC data type (typeSrfBasic) (see data types)
<code>o_BasicSEU</code>	Outputs the basic data of an SEU as PLC data type (typeSeuBasic) (see data types)
<code>o_Safe</code>	Status bits of the sensors in chain 1 (data type: array of bool)
<code>o_Diag</code>	Diagnosis bits of the sensors in chain 1 (data type: array of bool)

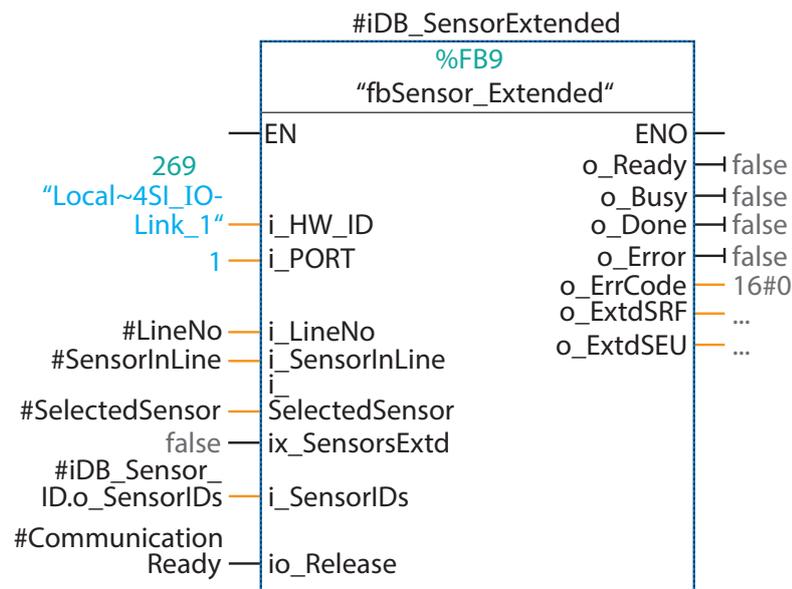
Function

24-byte synchronous data area for the sensors



This module checks the synchronous data of the IO-Link communication for changes. The check is limited to the specified number of sensors in the selected line. Each bit represents one sensor. If the bit has the value '1', the basic data of the sensor is read out. The bit automatically resets after being read out. The module stores the changes in a circular buffer so that all sensors are read out in a fixed order.

2.3 fbSensor_Extended



Inputs

i_HW_ID	Hardware ID from the HW configuration of IO-Master
i_PORT	Connected port on the IO-Link master
i_LineNo	Number of the chain to be read out (always 1 for SCR)
i_SensorsInLine	Number of sensors in the selected chain
i_SelectedSensor	Number of sensors to be read out
ix_SensorExtd	Triggers the reading of the extended data
i_SensorIDs	Sensor IDs of all sensors of the selected chain (1=SRF, 7=SEU)

Inputs/outputs

io_Release	Release of the IO-Link communication (1 = communication free)
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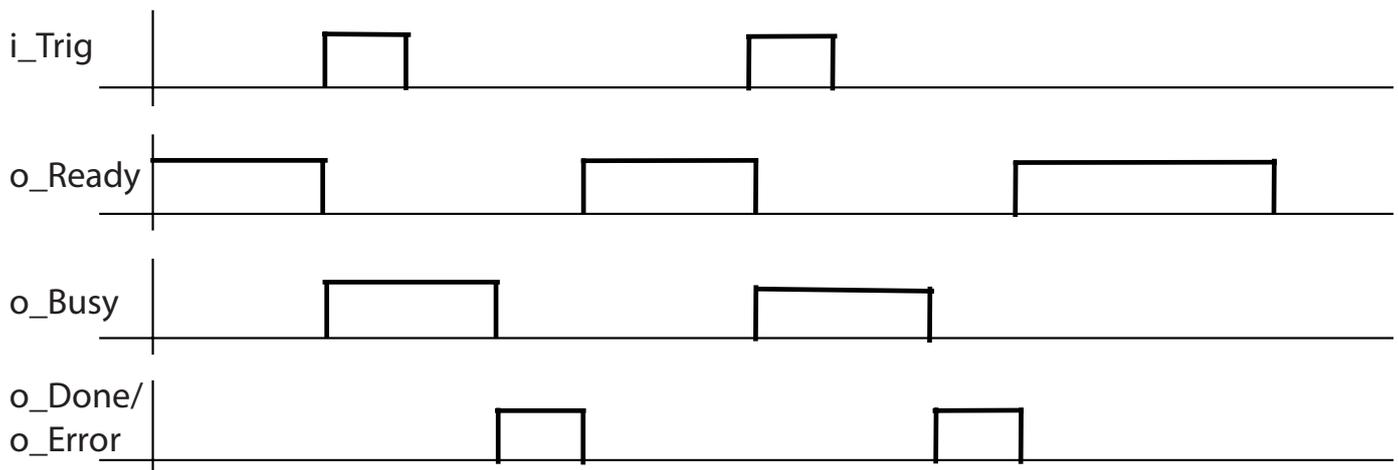
Outputs

o_Ready	Module waits for the trigger
o_Busy	Module is reading changes from the sensors
o_Done	The reading out of the data was completed successfully
o_Error	Error during transmission
o_ErrCode	Error code of the Siemens communication module IO_LINK_DEVICE
o_ExtdSRF	Read-out data of type "typeSrfExtended" (see data types)
o_ExtdSEU	Read-out data of type "strSeuExtended" (see data types)

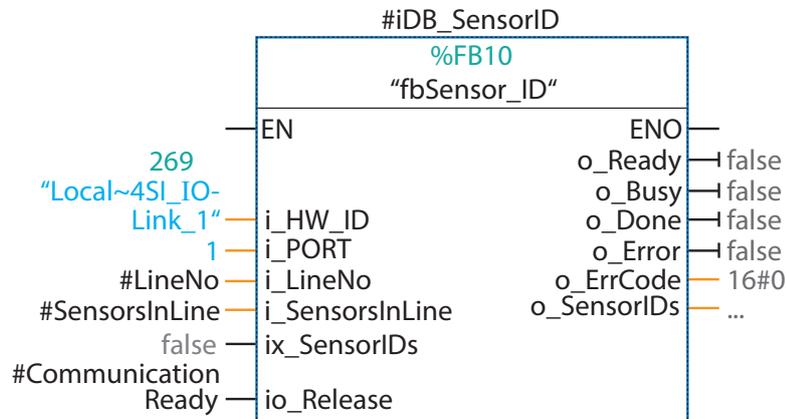
Function

The module reads out the extended data of a sensor. To do this, the number of sensors in the chain, the number of the sensor and the line in which the sensor is located is required by the module at the inputs "i_SensorsInLine", "i_SelectedSensor" and "i_LineNo". The number of sensors per line is used to check if the requested sensor is available. The ID of the selected sensor is used to output the extended data to the corresponding output.

Actuation



2.4 | fbSensor_ID



Inputs

i_HW_ID	Hardware ID from the HW configuration of IO-Master
i_PORT	Connected port on the IO-Link master
i_LineNo	Number of the chain to be read out (always 1 for SCR)
i_SensorsInLine	Number of sensors in the selected chain
ix_SensorIDs	Triggers the reading of the sensor IDs

Inputs/outputs

io_Release	Release of the IO-Link communication (1 = communication free)
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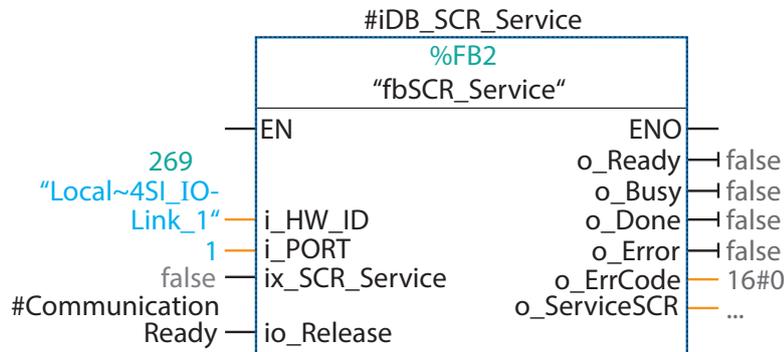
Outputs

o_Ready	Module waits for the trigger
o_Busy	Module is reading changes from the sensors
o_Done	The reading out of the data was completed successfully
o_Error	Error during transmission
o_ErrCode	Error code of the Siemens communication module IO_LINK_DEVICE
o_SensorIDs	Array of sensor IDs (data type: Word)

Function

This functional module is used to read out the IDs of the sensors of a chain. The inputs "i_LineNo" and "i_SensorsInLine" must be connected with the line number and the number of sensors of the line to be read out.

2.5 | fbSCR_Service



Inputs

i_HW_ID	Hardware ID from the HW configuration of IO-Master
i_PORT	Connected port on the IO-Link master
i_LineNo	Number of the chain to be read out (always 1 for SCR)
i_SensorsInLine	Number of sensors in the selected chain
ix_SCR_Service	Triggers the reading of the service data of the SCR

Inputs/outputs

io_Release	Release of the IO-Link communication (1 = communication free)
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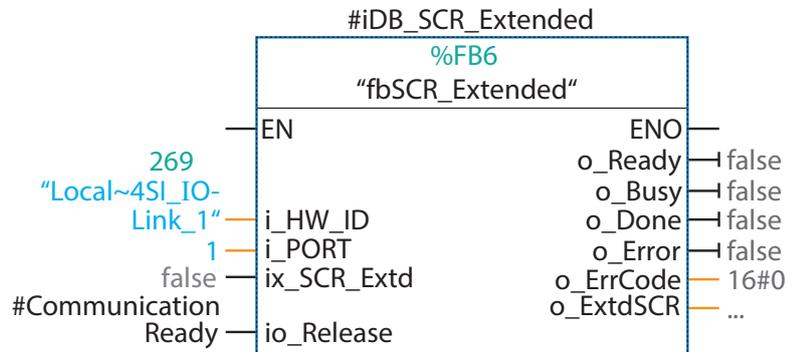
Outputs

o_Ready	Module waits for the trigger
o_Busy	Module is reading changes from the sensors
o_Done	The reading out of the data was completed successfully
o_Error	Error during transmission
o_ErrCode	Error code of the Siemens communication module IO_LINK_DEVICE
o_ServiceSCR	Read-out data of type "typeScrService" (see data types)

Function

This functional module is used to read out the service data of an SCR DI. The read process is started via the "ix_SCR_Service" input. The received data is provided via the "o_ServiceSCR" output. The functional module cannot be used together with a SRF DI!

2.6 | fbSCR_Extended



Inputs

i_HW_ID	Hardware ID from the HW configuration of IO-Master
i_PORT	Connected port on the IO-Link master
i_LineNo	Number of the chain to be read out (always 1 for SCR)
i_SensorsInLine	Number of sensors in the selected chain
ix_SCR_Extd	Triggers the reading of the extended data of the SCR

Inputs/outputs

io_Release	Release of the IO-Link communication (1 = communication free)
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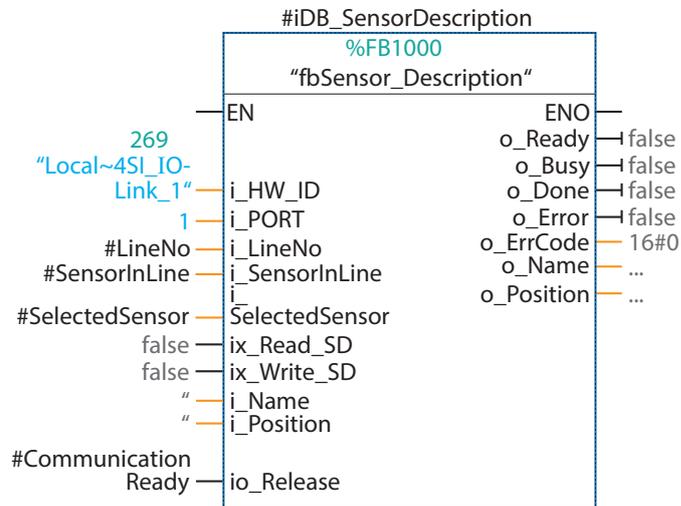
Outputs

o_Ready	Module waits for the trigger
o_Busy	Module is reading changes from the sensors
o_Done	The reading out of the data was completed successfully
o_Error	Error during transmission
o_ErrCode	Error code of the Siemens communication module IO_LINK_DEVICE
o_Extd_SCR	Read-out data of type "typeScrExtended" (see data types)

Function

This functional module is used to read out the extended data of an SCR DI. The read process is started via the "ix_SCR_Extd" input. The received data is provided via the "o_ExtdSCR" output. The functional module cannot be used together with a SRF DI!

2.7 | fbSensor_Description



Inputs

i_HW_ID	Hardware ID from the HW configuration of IO-Master
i_PORT	Connected port on the IO-Link master
i_LineNo	Number of the chain to be read out (always 1 for SCR)
i_SensorsInLine	Number of sensors in the selected chain
i_SelectedSensor	Number of sensors to be read out/written
i_Read_SD	Triggers the reading process for name and position
i_Write_SD	Triggers the writing process for name and position
i_Name	User input; Name of the sensor (data type: string)
i_Position	User input; Position of the sensor (data type: string)

Inputs/outputs

io_Release	Release of the IO-Link communication (1 = communication free)
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Outputs

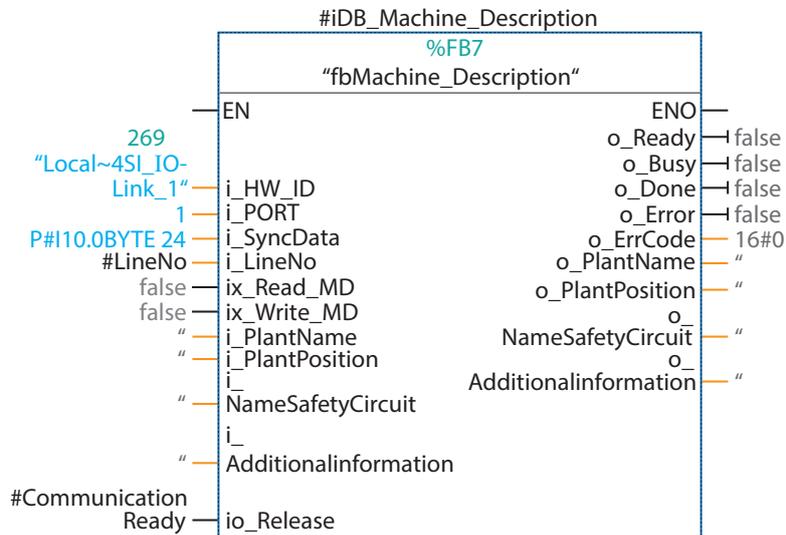
o_Ready	Module waits for the trigger
o_Busy	Module is reading changes from the sensors
o_Done	The reading out of the data was completed successfully
o_Error	Error during transmission
o_ErrCode	Error code of the Siemens communication module IO_LINK_DEVICE
o_Name	Read-out name of the sensor
o_Position	Read-out position of the sensor

Function

This module describes or reads the name and position of the selected sensor. To read out the data, it needs the corresponding information at the inputs "i_LineNo", "i_SensorsInLine" and "i_SelectedSensor". The "i_name" and "i_Position" inputs with the strings to be written are also required for the writing process.

The two trigger inputs must be connected in such a way that simultaneous triggering of various functions is excluded.

2.8 fbMachine_Description



Inputs

i_HW_ID	Hardware ID from the HW configuration of IO-Master
i_PORT	Connected port on the IO-Link master
i_LineNo	Number of the chain to be read out (always 1 for SCR)
i_Read_MD	Triggers the reading of the basic data of the SCR
i_Write_MD	Triggers the reading of the extended data of the SCR
i_PlantName	User input; Plant name of the chain (data type: string)
i_PlantPosition	User input; Plant position of the chain (data type: string)
i_NameSafetyCircuit	User input; Name of the safety circuit of the chain (data type: string)
i_AdditionalInformation	User input; Additional chain information (data type: string)

Inputs/outputs

io_Release	Release of the IO-Link communication (1 = communication free)
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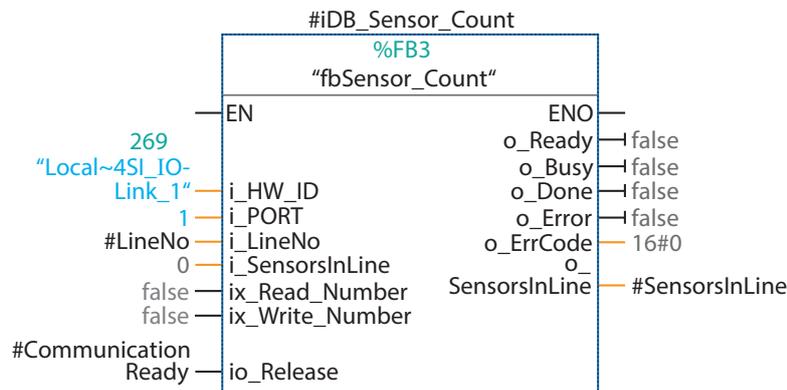
Outputs

o_Ready	Module waits for the trigger
o_Busy	Module is reading changes from the sensors
o_Done	The reading/writing of the data was completed successfully
o_Error	Error during transmission
o_ErrCode	Error code of the Siemens communication module IO_LINK_DEVICE
o_PlantName	Read out data; Plant name of the chain (data type: string)
o_PlantPosition	Read out data; Plant position of the chain (data type: string)
o_NameSafetyCircuit	Read out data; Name of the safety circuit of the chain (data type: string)
o_AdditionalInformation	Read out data; Additional chain information (data type: string)

Function

This module describes or reads the machine definition of the selected chain, consisting of the plant name, plant position, name of the safety circuit and additional information. Writing the data to the device requires the strings to the corresponding inputs.

2.9 | fbSensor_Count



Inputs

i_HW_ID	Hardware ID from the HW configuration of IO-Master
i_PORT	Connected port on the IO-Link master
i_LineNo	Number of the chain to be read out (always 1 for SCR)
i_SensorsInLine	User input; Number of sensors in the selected chain
i_ReadNumber	Triggers the reading of the basic data of the SCR
i_WriteNumber	Triggers the writing of the extended data of the SCR

Inputs/outputs

io_Release	Release of the IO-Link communication (1 = communication free)
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Outputs

o_Ready	Module waits for the trigger
o_Busy	Module is reading changes from the sensors
o_Done	The reading/writing of the data was completed successfully
o_Error	Error during transmission
o_ErrCode	Error code of the Siemens communication module IO_LINK_DEVICE
o_SensorsInLine	Read out data; Number of sensors in the chain

Function

This module describes or reads the number of sensors in the selected chain. To describe the number of sensors, a user input is required at input "i_SensorsInLine", this input is not required for read out. The two trigger inputs must be connected in such a way that simultaneous triggering of various functions is excluded.

3 | Data types

3.1 | typeScrService

OperatingVoltageLimit	Data type: Bool; Operating voltage warning (yes: 1, no: 0)
OperatingVoltage	Data type: Bool; Operating voltage OK (yes: 1, no: 0)
ExternLoopConnected	Data type: Bool; External return circuit available (yes: 1, no:0)
Reset function	Data type: Bool; Reset function (auto: 1, man: 0)
ResetExpected	Data type: Bool; Reset expected (yes: 1, no: 0)
ExternLoop	Data type: Bool; Status of external RFK
RFK2	Data type: Bool; Status of RFK2
RFK1	Data type: Bool; Status of RFK1
InputError	Data type: Bool; Input error acknowledgement required
SafeCondition	Data type: Bool; Safe status without return (yes:1, no:0)
Output	Data type: Bool; Status of output
Input2	Data type: Bool; Status of input 2
Input1	Data type: Bool; Status of input 1

3.2 | typeScrExtended

Voltage	Data type: Real; Voltage
Temperature	Data type: Real; Temperature
Time-Ta	Data type: Word; Time Ta
Time T0	Data type: Word; Time T0
Time Tu	Data type: Word; Time Tu
SwitchCycles_internal	Data type: DWord; Internal switching cycles
SwitchCycles_external	Data type: DWord; External switching cycles
EmergencyCouter	Data type: Byte; Emergency counter

3.3 | typeSeuBasic

Restart	Data type: Bool; Restart after reset
SafetyOutput_1	Data type: Bool; Status output 1
SafetyOutput_2	Data type: Bool; Status output 2
OperatingVoltage	Data type: Bool; Operating voltage OK
OperatingVoltageLimit	Data type: Bool; Operating voltage warning
LocalReset	Data type: Bool; Local reset
Input_1	Data type: Bool; Status of input 1
Input_2	Data type: Bool; Status of input 2
Condition_EMS1	Data type: Bool; Status emergency stop 1
Condition_EMS2	Data type: Bool; Status emergency stop 2
NotTeached	Data type: Bool; Actuator not taught in
OSSDDiagnosis	Data type: Bool; Cross-circuit detected
SCR_Condition	Data type: Bool; SCR condition violated

3.4 | typeSeuExtended

CounterVu	Data type: Byte; Vu counter
CounterQ	Data type: Byte; Q counter
CounterBB	Data type: Byte; BB counter
OperatingVoltage	Data type: Real; Supply voltage
Temperature	Data type: Real; Temperature
DeviceID	Data type: Word; Device ID
Configuration	Data type: Byte; Product description

3.5 | typeSrfBasic

Restart	Data type: Bool; Restart after reset
SafetyOutput_1	Data type: Bool; Status output 1
SafetyOutput_2	Data type: Bool; Status output 2
OperatingVoltage	Data type: Bool; Operating voltage OK
OperatingVoltageLimit	Data type: Bool; Operating voltage warning
LocalReset	Data type: Bool; Local reset
Input_1	Data type: Bool; Status of input 1
Input_2	Data type: Bool; Status of input 2
ActuatorDetected	Data type: Bool; Actuator detected
DetectionZone	Data type: Bool; Actuator in the edge area
WrongActuator	Data type: Bool; Wrong actuator
NotTeached	Data type: Bool; Actuator not taught in
OSSDDiagnosis	Data type: Bool; Cross-circuit detected
SCR_Condition	Data type: Bool; SCR condition violated

3.6 | typeSrfExtended

CounterVu	Data type: Byte; Vu counter
CounterQ	Data type: Byte; Q counter
CounterBB	Data type: Byte; BB counter
TeachingRemain	Data type: Byte; Number of remaining teach-in processes
OperatingVoltage	Data type: Real; Supply voltage
Manufacture	Data type: Byte; Received manufacturer
ExpectedManufacture	Data type: Byte; Expected manufacturer
Temperature	Data type: Real; Temperature
Distance	Data type: Real; Distance
ExpectedID	Data type: Word; Expected ID
ID	Data type: Word; Received ID
DeviceID	Data type: Word; Device ID
Configuration	Data type: Byte; Product description
SCR_Condition	Data type: Bool; SCR condition violated

3.7 | typeDiagFromVisu

SelectedLinoNo	Data type: Int; Selected line number
SelectedSensor	Data type: Int; Selected sensor
NoOfLines	Data type: Int; Number of existing lines
SensorsInLine	Data type: Int; Number of sensors in line
Command	Data type: Struct; Visualisation commands
ReloadScrService	Data type: Bool; Command for reading out SCR service data
ReloadScrExtd	Data type: Bool; Command for reading out SCR extended data
ReloadIDData	Data type: Bool; Command for reading out sensor IDs
ReloadSensorExtd	Data type: Bool; Command for reading out sensor extended data
ReadSensorName	Data type: Bool; Command for reading out sensor names
WriteSensorName	Data type: Bool; Command for writing sensor names
ReadSensorNo	Data type: Bool; Command for reading out the number of sensors (circuit)
ReadSensorNoAll	Data type: Bool; Command for reading out the number of all sensors
WriteSensorNo	Data type: Bool; Command for writing the number of sensors
ReadLineInformation	Data type: Bool; Command for reading out the machine description
WriteLineInformation	Data type: Bool; Command for writing the machine description

3.8 | typeDiagToVisu

CommunicationReady	Data type: Bool; IO-Link communication ready
SensorsInLine	Data type: Int; Number of sensors in line
DeviceType	Data type: Int; Type of IO-Link device (1= SRF DI;2=SCR DI)
MachineDescription	Data type: Struct; Machine description
PlantName	Data type: String; Plant name
PlantPosition	Data type: String; Plant position
NameSafetyCircuit	Data type: String; Name of safety circuit
AdditionalInformation	Data type: String; Additional information
SensorDescription	Data type: Struct; Sensor description
SensorName	Data type: String; Sensor name
SensorPosition	Data type: String; Sensor position
SCR_ServiceData	Data type: typeScrService;
SCR_ExtendedData	Data type: typeScrExtended;
SRF_BasicData	Data type: typeSrfBasic;
ReadLineInformation	Data type: Bool; Command for reading out the machine description
WriteLineInformation	Data type: Bool; Command for writing the machine description
SRF_ExtendedData	Data type: typeSrfExtended;
SEU_BasicData	Data type: typeSeuBasic;
SEU_ExtendedData	Data type: typeSeuExtended;
SensorIDs	Data type: Array of Word; Sensor IDs of the selected line
SensorSafeCondition	Data type: Array of Bool; Status bits of sensors in the chain
Error	Data type: typeError;

3.9 | typeDiagVisu

ToHMI	Data type: typeDiagToVisu;
FromHMI	Data type: typeDiagFromVisu;