

# IO-Link CLV61x\_IOL PLC Integration

IO-Link service data function block for Siemens S7-1200/S7-1500 (TIA-Portal V14) PLC systems in combination with a PROFINET / PROFIBUS IO-Link Master

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# 1. About this document

Please read this chapter carefully before working with this documentation and the SICK IO-Link device.

## 1.1. Function of this document

These instructions have been designed for the technical personnel for the use of the IO-Link PLC blocks.

These instructions do not provide instructions for operating the machine, the system or the vehicle on which IO-Link devices are, or will be, integrated. Information on this is to be found in the appropriate operating instructions of the machine, the system or the vehicle.

## 1.2. Target group

These instructions are addressed to programming engineers and the operators of machines and systems which are operated by one or several IO-Link devices. They also address people, who connect the IO-Link device via an IO-Link-Master-Gateway to a PLC-Control for data exchange.

## 1.3. Scope

These function blocks are device type-specific and only suitable for the following SICK IO-Link devices.

**Device family: Identification solutions**

**Device ID: 8389257**



-CLV61x IO-Link (see Index 219)

**The function block "FB\_SICK\_CLV61x\_IOL"** handles the communication of the acyclic service data.

The functionality of these PLC blocks depends on the IO-Link parameter set described by the IODD. This means, that these blocks also may be used for other SICK devices (e.g. new device variants) with identical IO-Link parameter sets.

## 2. Service data function block

The function block "FB\_SICK\_CLV61x\_IOL" simplifies the usage of SICK IO-Link devices on Siemens S7-1200/S7-1500 (TIA-Portal V14) PLC controls. This FB supports IO-Link Masters which can be connected via PROFINET / PROFIBUS to the PLC system.

The function block is device type-specific and thus only suitable for the appropriate SICK IO-Link devices. The FB interprets the call-up of the acyclic service data between the PLC and the IO-Link device.

The IO-Link function block can only be used in combination with the listed helper functions / libraries.

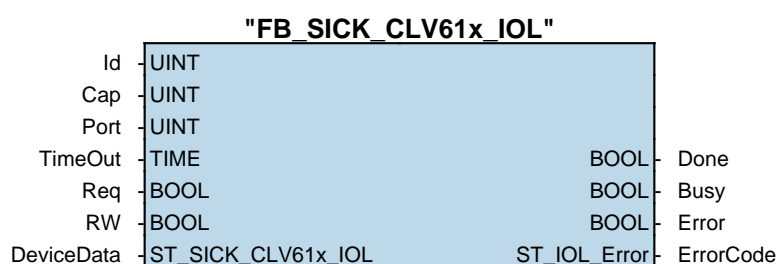
### 2.1. Block specifications

Block name:	FB_SICK_CLV61x_IOL
Version:	1.0
Used blocks:	FB_IOL_Call_PNDP F_IOL_Internal11 F_IOL_Internal12 F_IOL_Internal14 F_IOL_Internal16 F_IOL_Internal17 F_IOL_Internal2 F_IOL_Internal3 F_IOL_Internal4 F_IOL_Internal5 F_IOL_Internal6 F_IOL_Internal7 F_IOL_Internal8
Used structures:	ST_SICK_CLV61x_IOL ST_IOL_Error
Call up:	Cyclic
Programming language:	Structured text (ST)
IODD:	SICK-CLV61x-IO-Link-20220420-IODD1.1.xml
Generation-ID:	448728917



#### Please note!

The library is compatible with TIA-Portal V14.



## 2.2. Method of function

The block uses the data structure "ST\_SICK\_CLV61x\_IOL" for the parameter selection and for storing the parameter values. Before use, a variable of the this type must be created and passed to the block parameter "DeviceData". The following describes which actions must be performed to read or write IO-Link service data parameters.

### 2.2.1. Parameter read:

- Selection of the parameters to be read (ST\_SICK\_CLV61x\_IOL.Selection).
- Clear the block parameter "RW" = FALSE (read).
- A rising edge at the "Req" input starts the read request.
- As long as no valid response data has been received, the parameter "Busy" = TRUE is displayed.
- The reading process was successful if the output parameter "Done" = TRUE. The parameter values that are read out are available for further processing in the corresponding (ST\_SICK\_CLV61x\_IOL.Data) structure.
- If the request is terminated with "Error" = TRUE, further error information is available at the "Errorcode" output parameter (see error codes).
- The status messages of the device keep their values until a read/write request is started again.

### 2.2.2. Parameter write:

- Selection of the parameters to be written (ST\_SICK\_CLV61x\_IOL.Selection).
- The parameter values to be written must be set in the (ST\_SICK\_CLV61x\_IOL.Data) structure.
- Block parameter "RW" = TRUE (write parameters).
- A positive edge at the "Req" input starts the write request.
- As long as no valid response has been received, the parameter "Busy" = TRUE.
- Writing was successful if the output parameter "Done" = TRUE.
- If the request is terminated with "Error" = TRUE, further error information is available at the "Errorcode" output parameter (see error codes).
- The status messages of the device keep their values until a read/write request is started again.

## 2.3. Block features

The block supports the following features

### 2.3.1. Multi-Selection

This feature allows you to select several or all parameters. These parameters are processed sequentially by the function block. This simplifies the handling of the FB in the program code. The FB uses the IO-Link feature "Block Parameter" to write a sequence of device parameters. During the block parameter access, all parameters that should be written, are transferred as a single "block". It means that always all parameters are written consistently. In case of an error, the FB aborts the transmission without changing any parameter values.

### 2.3.2. Subindex access

The block allows for accessing single elements of nested IO-Link parameters (IO-Link records). The block allows access to nested IO-Link parameters (IO-Link records). It can be decided whether to read

/ write all or individual elements. The selection is done in the "Selection" structure (ST\_SICK\_CLV61x\_IOL.Selection).

### 2.3.3. Resetting all selection bits

The "De-Selection" function is part of the data structure (ST\_SICK\_CLV61x\_IOL.Selection) and can be activated via the bit AutoDeSelect . After a parameter request is done, all selection bits will be reseted automatically.

## 2.4. Behavior when error occurs

An error bit is set and an error code generated, if there is a spurious input value or an incorrect input connection of the FB. In this case, no further processing is carried out, until the input has been corrected.

## 2.5. Block parameter

Before each read/write request the function block must be configured using the following parameters.

Parameter name	Declaration	Data type	Description
Id	Input	UINT	Hardware IO-Address of the IO-Link master (see HW-Configuration).
Cap	Input	UINT	Client access point of the IO-Link function (IO-Link Master specific).  Siemens: 0xE3 (227) Weidmüller: 0xE3 (227) IOLM according PN/PB Integration Edition1 specification (e.g. SICK IOLG2PN): 0xFF (255) IOLM according PN Integration Edition2 specification (e.g. SICK SIG200)= 0xB400 (46080)
Port	Input	UINT	Number of the master port the IO-Link device is connected, starting with 1.
TimeOut	Input	TIME	Time, after a Timeout-Error is triggered.
Req	Input	BOOL	Positive trigger: Start data transfer
RW	Input	BOOL	Read or write the selected IO-Link parameter.  FALSE: Read parameter TRUE: Write Parameter
DeviceData	In/Out	ST_SICK_CLV61x_IOL	Source and destination area of the IO-Link data as well as selection of the IO-Link parameters to be read or written. If IO-Link parameters are read, the sub-structure (Data) contains the corresponding the values. When writing IO-Link parameters, the corresponding variables must be set.
Done	Output	BOOL	Indicates whether data is valid.
Busy	Output	BOOL	Request in process.  FALSE: Request is terminated TRUE: Request is being processed
Error	Output	BOOL	Error flag  FALSE: No error TRUE: Error detected

Parameter name	Declaration	Data type	Description
ErrorCode	Output	ST_IOL_Error	Error codes

### 2.5.1. Parameter selection (Selection)

Selection of the IO-Link device parameters. The selected parameters are read or written when the block is executed. There is a corresponding variable for each parameter in the "Data" structure. The following table shows an example of the parameter selection structure.

Parameter name	Data type	Description
AutoDeSelect	BOOL	If this bit is set, all selection bits are automatically reset after a parameter request.
Device Parameter 1	BOOL	Selection: TRUE = This parameter is read or written.
Device Parameter 2	STRUCT	This IO-Link parameter contains the following elements, which can be selected individually or completely.
All	BOOL	If this bit is set, all elements are automatically read or written when the block is executed. In this case, it is not necessary to select the individual elements.
Element 1	BOOL	Selection: TRUE = This parameter is read or written.
Element 2	BOOL	Selection: TRUE = This parameter is read or written.
Element n	BOOL	Selection: TRUE = This parameter is read or written.
Device Parameter n	BOOL	Selection: TRUE = This parameter is read or written.

### 2.5.2. Parameter data (Data)

The following data structure contains all IO-Link device parameters supported by the block. If a parameter is read out from the device, the corresponding value is updated in the data structure. If a parameter is written, the corresponding parameter value must be written before the block is executed.

Parameter name	Data type	Description
DirectParameters1	Struct	<b>DirectParameters1</b> Index: 0 Sub-Index: 0 Access: Read/Write
Reserved	USINT	<b>Reserved</b> Index: 0 Sub-Index: 1
MasterCycleTime	USINT	<b>MasterCycleTime</b> Index: 0 Sub-Index: 2

Parameter name	Data type	Description
MinCycleTime	USINT	<b>MinCycleTime</b> Index: 0 Sub-Index: 3
MSequenceCapability	USINT	<b>MSequenceCapability</b> Index: 0 Sub-Index: 4
IOLinkVersionID	USINT	<b>IOLinkVersionID</b> Index: 0 Sub-Index: 5
ProcessDataInputLeng	USINT	<b>ProcessDataInputLength</b> Index: 0 Sub-Index: 6
ProcessDataOutputLen	USINT	<b>ProcessDataOutputLength</b> Index: 0 Sub-Index: 7
VendorID1	USINT	<b>VendorID1</b> Index: 0 Sub-Index: 8
VendorID2	USINT	<b>VendorID2</b> Index: 0 Sub-Index: 9
DeviceID1	USINT	<b>DeviceID1</b> Index: 0 Sub-Index: 10
DeviceID2	USINT	<b>DeviceID2</b> Index: 0 Sub-Index: 11
DeviceID3	USINT	<b>DeviceID3</b> Index: 0 Sub-Index: 12
Reserved_1	USINT	<b>Reserved</b> Index: 0 Sub-Index: 13
Reserved_2	USINT	<b>Reserved</b> Index: 0 Sub-Index: 14

Parameter name	Data type	Description
Reserved_3	USINT	<b>Reserved</b> Index: 0 Sub-Index: 15
StandardCommand	USINT	<b>StandardCommand</b> Index: 0 Sub-Index: 16  <u>Valid parameter values (dec):</u> 0..63: Reserved 5: Start data storage 128: Device Reset 129: Application Reset 130: Restore Factory Settings 131..159: Reserved
DirectParameters2	Struct	<b>DirectParameters2</b> Index: 1 Sub-Index: 0 Access: Read/Write
DeviceSpecificParame	USINT	<b>DeviceSpecificParameter1</b> Index: 1 Sub-Index: 1
DeviceSpecificPara_1	USINT	<b>DeviceSpecificParameter2</b> Index: 1 Sub-Index: 2
DeviceSpecificPara_2	USINT	<b>DeviceSpecificParameter3</b> Index: 1 Sub-Index: 3
DeviceSpecificPara_3	USINT	<b>DeviceSpecificParameter4</b> Index: 1 Sub-Index: 4
DeviceSpecificPara_4	USINT	<b>DeviceSpecificParameter5</b> Index: 1 Sub-Index: 5
DeviceSpecificPara_5	USINT	<b>DeviceSpecificParameter6</b> Index: 1 Sub-Index: 6
DeviceSpecificPara_6	USINT	<b>DeviceSpecificParameter7</b> Index: 1 Sub-Index: 7

Parameter name	Data type	Description
DeviceSpecificPara_7	USINT	<b>DeviceSpecificParameter8</b> Index: 1 Sub-Index: 8
DeviceSpecificPara_8	USINT	<b>DeviceSpecificParameter9</b> Index: 1 Sub-Index: 9
DeviceSpecificPara_9	USINT	<b>DeviceSpecificParameter10</b> Index: 1 Sub-Index: 10
DeviceSpecificPar_10	USINT	<b>DeviceSpecificParameter11</b> Index: 1 Sub-Index: 11
DeviceSpecificPar_11	USINT	<b>DeviceSpecificParameter12</b> Index: 1 Sub-Index: 12
DeviceSpecificPar_12	USINT	<b>DeviceSpecificParameter13</b> Index: 1 Sub-Index: 13
DeviceSpecificPar_13	USINT	<b>DeviceSpecificParameter14</b> Index: 1 Sub-Index: 14
DeviceSpecificPar_14	USINT	<b>DeviceSpecificParameter15</b> Index: 1 Sub-Index: 15
DeviceSpecificPar_15	USINT	<b>DeviceSpecificParameter16</b> Index: 1 Sub-Index: 16

Parameter name	Data type	Description
StandardCommand	USINT	<b>StandardCommand</b> Index: 2 Sub-Index: 0 Access: Write only  Valid parameter values (dec): 5: Start data storage 128: Device Reset 129: Application Reset 130: Restore Factory Settings 160: Locate Device 170: Start Percentage Evaluation 171: Stop Percentage Evaluation
DeviceAccessLocks	Struct	<b>DeviceAccessLocks</b> Index: 12 Sub-Index: 0 Access: Read/Write  <i>This ISDU is only available, when the device is running in the IO-Link 1.1 mode.</i>
ParameterwriteAccess	BOOL	<b>ParameterwriteAccessLock</b> Index: 12 Sub-Index: 1
DataStorageLock	BOOL	<b>DataStorageLock</b> Index: 12 Sub-Index: 2
LocalParameterizatio	BOOL	<b>LocalParameterizationLock</b> Index: 12 Sub-Index: 3
LocalUserInterfaceLo	BOOL	<b>LocalUserInterfaceLock</b> Index: 12 Sub-Index: 4

Parameter name	Data type	Description
ProfileCharacteristi		<b>ProfileCharacteristic</b> Index: 13 Sub-Index: 0 Access: Read only  Valid parameter values (dec): 16384: Identification and Diagnosis (Common Profile) 32769: Device Identification 32771: Device Diagnosis  <i>This ISDU is only available, when the device is running in the IO-Link 1.1 mode.</i>
PDInputDescriptor		<b>PDInputDescriptor</b> Index: 14 Sub-Index: 0 Access: Read only  <i>This ISDU is only available, when the device is running in the IO-Link 1.1 mode.</i>
PDOOutputDescriptor		<b>PDOOutputDescriptor</b> Index: 15 Sub-Index: 0 Access: Read only  <i>This ISDU is only available, when the device is running in the IO-Link 1.1 mode.</i>
VendorName	STRING[16]	<b>VendorName</b> Index: 16 Sub-Index: 0 Access: Read only
VendorText	STRING[32]	<b>VendorText</b> Index: 17 Sub-Index: 0 Access: Read only

Parameter name	Data type	Description
ProductName	STRING[16]	<b>ProductName</b> Index: 18 Sub-Index: 0 Access: Read only
ProductID	STRING[13]	<b>ProductID</b> Index: 19 Sub-Index: 0 Access: Read only
ProductText	STRING[64]	<b>ProductText</b> Index: 20 Sub-Index: 0 Access: Read only
SerialNumber	STRING[8]	<b>SerialNumber</b> Index: 21 Sub-Index: 0 Access: Read only
HardwareVersion	STRING[12]	<b>HardwareVersion</b> Index: 22 Sub-Index: 0 Access: Read only
FirmwareVersion	STRING[16]	<b>FirmwareVersion</b> Index: 23 Sub-Index: 0 Access: Read only
ApplicationSpecificT	STRING[32]	<b>ApplicationSpecificTag</b> Index: 24 Sub-Index: 0 Access: Read/Write
FunctionTag	STRING[32]	<b>FunctionTag</b> Index: 25 Sub-Index: 0 Access: Read/Write
LocationTag	STRING[32]	<b>LocationTag</b> Index: 26 Sub-Index: 0 Access: Read/Write

Parameter name	Data type	Description
DeviceStatus	USINT	<b>DeviceStatus</b> Index: 36 Sub-Index: 0 Access: Read only  Valid parameter values (dec): 0: Device is OK 1: Maintenance required 2: Out of specification 3: Functional check 4: Failure 5..255: Reserved  <i>This ISDU is only available, when the device is running in the IO-Link 1.1 mode.</i>
DetailedDeviceStatus		<b>DetailedDeviceStatus</b> Index: 37 Sub-Index: 0 Access: Read only  <i>This ISDU is only available, when the device is running in the IO-Link 1.1 mode.</i>
DeviceType	STRING[18]	<b>DeviceType</b> Index: 65 Sub-Index: 0 Access: Read only
SystemStatus	Struct	<b>SystemStatus</b> Index: 73 Sub-Index: 0 Access: Read only
Message1	STRING[46]	<b>Message1</b> Index: 73 Sub-Index: 1
Message2	STRING[46]	<b>Message2</b> Index: 73 Sub-Index: 2

Parameter name	Data type	Description
Message3	STRING[46]	<b>Message3</b> Index: 73 Sub-Index: 3
Message4	STRING[46]	<b>Message4</b> Index: 73 Sub-Index: 4
Message5	STRING[46]	<b>Message5</b> Index: 73 Sub-Index: 5
IOLinkSpecInfos	Struct	<b>IOLinkSpecInfos</b> Index: 79 Sub-Index: 0 Access: Read only
IOLinkRevision	STRING[6]	<b>IOLinkRevision</b> Index: 79 Sub-Index: 1
MinCycleTime	STRING[3]	<b>MinCycleTime</b> Index: 79 Sub-Index: 2
Baudrate	STRING[4]	<b>Baudrate</b> Index: 79 Sub-Index: 3
SIOModeSupported	USINT	<b>SIOModeSupported</b> Index: 79 Sub-Index: 4  <u>Valid parameter values (dec):</u> 0: false 1: true
PDIFormat	USINT	<b>PDIFormat</b> Index: 79 Sub-Index: 5
PDOFormat	USINT	<b>PDOFormat</b> Index: 79 Sub-Index: 6

Parameter name	Data type	Description
DeviceState	USINT	<b>DeviceState</b> Index: 81 Sub-Index: 0 Access: Read only  Valid parameter values (dec): 0:     Device is not ready 1:     Device is ready 2:     Device has an error
SIOMode	BOOL	<b>SIOMode</b> Index: 89 Sub-Index: 0 Access: Read/Write
ReadingStatistics	Struct	<b>ReadingStatistics</b> Index: 90 Sub-Index: 0 Access: Read only
ReadingStatisticForm	STRING[11]	<b>ReadingStatisticFormat</b> Index: 90 Sub-Index: 1
Code1newest	STRING[44]	<b>Code1newest</b> Index: 90 Sub-Index: 2
Code2	STRING[44]	<b>Code2</b> Index: 90 Sub-Index: 3
Code3	STRING[44]	<b>Code3</b> Index: 90 Sub-Index: 4
Code4	STRING[44]	<b>Code4</b> Index: 90 Sub-Index: 5
Code5oldest	STRING[44]	<b>Code5oldest</b> Index: 90 Sub-Index: 6
DiagnosticsInfo	Struct	<b>DiagnosticsInfo</b> Index: 190 Sub-Index: 0 Access: Read only

Parameter name	Data type	Description
PowerOnCounter	UDINT	<b>PowerOnCounter</b> Index: 190 Sub-Index: 1
OperatingHours	UDINT	<b>OperatingHours</b> Index: 190 Sub-Index: 2
PowerOnHours	REAL	<b>PowerOnHours</b> Index: 190 Sub-Index: 3
FindMe	USINT	<b>FindMe</b> Index: 204 Sub-Index: 0 Access: Read/Write  <u>Valid parameter values (dec):</u> 0: Deactivated 1: Activated (LED flash)
ProductIDordernumber	STRING[7]	<b>ProductIDordernumber</b> Index: 219 Sub-Index: 0 Access: Read only
OutputSwitchOnIf	USINT	<b>OutputSwitchOnIf</b> Index: 300 Sub-Index: 0 Access: Read/Write  <u>Valid parameter values (dec):</u> 2: Device Ready 3: Good Read 4: No Read
OutputSwitchOffIf	USINT	<b>OutputSwitchOffIf</b> Index: 301 Sub-Index: 0 Access: Read/Write  <u>Valid parameter values (dec):</u> 0: Timer

Parameter name	Data type	Description
OutputDuration	UINT	<b>OutputDuration</b> Index: 302 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 10..10 000:
OutputLogic	USINT	<b>OutputLogic</b> Index: 303 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 0: Active high 1: Active low
InputSensitivity	USINT	<b>InputSensitivity</b> Index: 305 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 0: Edge 1: Level
InputLogic	USINT	<b>InputLogic</b> Index: 306 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 0: Active High 1: Active Low
InputDebounceTime	UINT	<b>InputDebounceTime</b> Index: 307 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 0..100 00:

Parameter name	Data type	Description
StartObjectTrigger	USINT	<b>StartObjectTrigger</b> Index: 310 Sub-Index: 0 Access: Read/Write . <u>Valid parameter values (dec):</u> 0:     Sensor / Input 1 5:     Auto cycle 10:    IO-Link (ProcessData Input)
StartTriggerDelay	UINT	<b>StartTriggerDelay</b> Index: 311 Sub-Index: 0 Access: Read/Write . <u>Valid parameter values (dec):</u> 0..100 00:
StopObjectTrigger	USINT	<b>StopObjectTrigger</b> Index: 312 Sub-Index: 0 Access: Read/Write . <u>Valid parameter values (dec):</u> 1:     Trigger Source 8:     Good Read
AutoCycleConfig	Struct	<b>AutoCycleConfig</b> Index: 313 Sub-Index: 0 Access: Read/Write
Pulse	UINT	<b>Pulse</b> Index: 313 Sub-Index: 1 . <u>Valid parameter values (dec):</u> 50..10 000:

Parameter name	Data type	Description
Pause	UINT	<b>Pause</b> Index: 313 Sub-Index: 2 . <u>Valid parameter values (dec):</u> 50..10 000:
ScanFrequency	USINT	<b>ScanFrequency</b> Index: 315 Sub-Index: 0 Access: Read/Write . <u>Valid parameter values (dec):</u> 0: 400 Hz 2: 500 Hz 4: 600 Hz 6: 700 Hz 8: 800 Hz 10: 900 Hz 12: 1000 Hz
CodeLabelQuality	USINT	<b>CodeLabelQuality</b> Index: 316 Sub-Index: 0 Access: Read/Write . <u>Valid parameter values (dec):</u> 0: Standard 1: Low Contrast 2: High Speckle 4: Very Low Contrast
OutputControl	USINT	<b>OutputControl</b> Index: 320 Sub-Index: 0 Access: Read/Write . <u>Valid parameter values (dec):</u> 0: End of Trigger 1: As soon as possible (Good Read)

Parameter name	Data type	Description
OutputCondition	USINT	<b>OutputCondition</b> Index: 321 Sub-Index: 0 Access: Read/Write  <u>Valid parameter values (dec):</u> 0:      Good Read
DataOutputMode	USINT	<b>DataOutputMode</b> Index: 322 Sub-Index: 0 Access: Read/Write  <u>Valid parameter values (dec):</u> 0:      Single
OutputFormatValues	Struct	<b>OutputFormatValues</b> Index: 324 Sub-Index: 0 Access: Read/Write
BCCodecontent	BOOL	<b>BCCodecontent</b> Index: 324 Sub-Index: 1
Maxbarcodelength	USINT	<b>maxbarcodelength</b> Index: 324 Sub-Index: 2  <u>Valid parameter values (dec):</u> 0..31:
IDCodetype	BOOL	<b>IDCodetype</b> Index: 324 Sub-Index: 3
CLCodelength	BOOL	<b>CLCodelength</b> Index: 324 Sub-Index: 4
CSCodesecurity	BOOL	<b>CSCodesecurity</b> Index: 324 Sub-Index: 5

Parameter name	Data type	Description
CGCodesecurity	BOOL	<b>CGCodesecurity</b> Index: 324 Sub-Index: 6
NCNumberofreadinggat	BOOL	<b>NCNumberofreadinggates</b> Index: 324 Sub-Index: 7
RAReadingAngle	BOOL	<b>RAReadingAngle</b> Index: 324 Sub-Index: 8
DecoderOptSpeed	BOOL	<b>DecoderOptSpeed</b> Index: 400 Sub-Index: 0 Access: Read/Write
DecoderOptPicketFenc	BOOL	<b>DecoderOptPicketFenceReading</b> Index: 401 Sub-Index: 0 Access: Read/Write
DecoderOptExtendedSe	BOOL	<b>DecoderOptExtendedSegmentation</b> Index: 402 Sub-Index: 0 Access: Read/Write
CodabarActive	BOOL	<b>CodabarActive</b> Index: 410 Sub-Index: 0 Access: Read/Write
CbarMultiread	UINT	<b>CbarMultiread</b> Index: 411 Sub-Index: 0 Access: Read/Write  <u>Valid parameter values (dec):</u> 1..100:
CbarStartStopIdentic	BOOL	<b>CbarStartStopIdentical</b> Index: 412 Sub-Index: 0 Access: Read/Write

Parameter name	Data type	Description
CbarTransmitStartSto	BOOL	<b>CbarTransmitStartStop</b> Index: 413 Sub-Index: 0 Access: Read/Write
CbarCheckDigitTest	USINT	<b>CbarCheckDigitTest</b> Index: 414 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 0:     None 1:     Modulo 10 2:     7DR 3:     Modulo 16
CbarTransmitCheckDig	BOOL	<b>CbarTransmitCheckDigit</b> Index: 415 Sub-Index: 0 Access: Read/Write
CbarCodeLengthMode	USINT	<b>CbarCodeLengthMode</b> Index: 416 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 0:     Free 1:     Interval 2:     Fixed
CbarCodeLengthInterv		<b>CbarCodeLengthInterval</b> Index: 417 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 0..31:

Parameter name	Data type	Description
CbarCodeLengthFixed		<b>CbarCodeLengthFixed</b> Index: 418 Sub-Index: 0 Access: Read/Write  <u>Valid parameter values (dec):</u> 0..31:
Code39Active	BOOL	<b>Code39Active</b> Index: 420 Sub-Index: 0 Access: Read/Write
C39Multiread	UINT	<b>C39Multiread</b> Index: 421 Sub-Index: 0 Access: Read/Write  <u>Valid parameter values (dec):</u> 1..100:
C39TransmitStartStop	BOOL	<b>C39TransmitStartStop</b> Index: 422 Sub-Index: 0 Access: Read/Write
C39FullASCII	BOOL	<b>C39FullASCII</b> Index: 423 Sub-Index: 0 Access: Read/Write
C39CheckDigitTest	USINT	<b>C39CheckDigitTest</b> Index: 424 Sub-Index: 0 Access: Read/Write  <u>Valid parameter values (dec):</u> 0:     None 1:     Modulo 10 2:     Modulo 43
C39TransmitCheckDigi	BOOL	<b>C39TransmitCheckDigit</b> Index: 425 Sub-Index: 0 Access: Read/Write

Parameter name	Data type	Description
C39C32Conversion	BOOL	<b>C39C32Conversion</b> Index: 426 Sub-Index: 0 Access: Read/Write
C39CodeLengthMode	USINT	<b>C39CodeLengthMode</b> Index: 427 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 0:     Free 1:     Interval 2:     Fixed
C39CodeLengthInterva		<b>C39CodeLengthInterval</b> Index: 428 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 0..31:
C39CodeLengthFixed		<b>C39CodeLengthFixed</b> Index: 429 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 0..31:
UPCGTINEANActive	BOOL	<b>UPCGTINEANActive</b> Index: 430 Sub-Index: 0 Access: Read/Write
UPCGTINEANMultiread	UINT	<b>UPCGTINEANMultiread</b> Index: 431 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 1..100:

Parameter name	Data type	Description
UPCGTINEANAddOn	USINT	<b>UPCGTINEANAddOn</b> Index: 432 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 0:     None 1:     Active 2:     Required
UPCGTINEANAddOnLengt	USINT	<b>UPCGTINEANAddOnLength</b> Index: 433 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 0:     2 digits 1:     5 digits 2:     2 or 5 digits
UPCGTINEANTransmitCh	BOOL	<b>UPCGTINEANTransmitCheckDigit</b> Index: 434 Sub-Index: 0 Access: Read/Write
UPCUPCA	BOOL	<b>UPCUPCA</b> Index: 435 Sub-Index: 0 Access: Read/Write
UPCUPCE	BOOL	<b>UPCUPCE</b> Index: 436 Sub-Index: 0 Access: Read/Write
UPCUPCEextended	BOOL	<b>UPCUPCEextended</b> Index: 437 Sub-Index: 0 Access: Read/Write
UPCTansmitUPCENumber	BOOL	<b>UPCTansmitUPCENumberSystem</b> Index: 438 Sub-Index: 0 Access: Read/Write

Parameter name	Data type	Description
GTINEANGTIN8EAN8	BOOL	<b>GTINEANGTIN8EAN8</b> Index: 439 Sub-Index: 0 Access: Read/Write
GTINEANGTIN13EAN13	BOOL	<b>GTINEANGTIN13EAN13</b> Index: 440 Sub-Index: 0 Access: Read/Write
Interleaved25Active	BOOL	<b>Interleaved25Active</b> Index: 450 Sub-Index: 0 Access: Read/Write
IL25Multiread	UINT	<b>IL25Multiread</b> Index: 451 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 1..100:
IL25CheckDigitTest1	USINT	<b>IL25CheckDigitTest1</b> Index: 452 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 0:     None 1:     Modulo 10 2:     1R18 3:     W49M10 5:     W12CSM10 6:     Modulo 11

Parameter name	Data type	Description
IL25CheckDigitTest2	USINT	<b>IL25CheckDigitTest2</b> Index: 453 Sub-Index: 0 Access: Read/Write . <u>Valid parameter values (dec):</u> 0:     None 1:     Modulo 10 2:     1R18 3:     W49M10 5:     W12CSM10 6:     Modulo 11
IL25CheckDigitTest3	USINT	<b>IL25CheckDigitTest3</b> Index: 454 Sub-Index: 0 Access: Read/Write . <u>Valid parameter values (dec):</u> 0:     None 1:     Modulo 10 2:     1R18 3:     W49M10 5:     W12CSM10 6:     Modulo 11
IL25CheckDigitTest4	USINT	<b>IL25CheckDigitTest4</b> Index: 455 Sub-Index: 0 Access: Read/Write . <u>Valid parameter values (dec):</u> 0:     None 1:     Modulo 10 2:     1R18 3:     W49M10 5:     W12CSM10 6:     Modulo 11

Parameter name	Data type	Description
IL25CheckDigitTest5	USINT	<b>IL25CheckDigitTest5</b> Index: 456 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 0:     None 1:     Modulo 10 2:     1R18 3:     W49M10 5:     W12CSM10 6:     Modulo 11
IL25TransmitCheckDig	BOOL	<b>IL25TransmitCheckDigit</b> Index: 457 Sub-Index: 0 Access: Read/Write
IL25ClassificationRe	UINT	<b>IL25ClassificationRestriction</b> Index: 458 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 0..100:
IL25CodeLengthMode	USINT	<b>IL25CodeLengthMode</b> Index: 459 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 0:     Free 1:     Interval 2:     Fixed
IL25CodeLengthInterv		<b>IL25CodeLengthInterval</b> Index: 460 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 0..31:

Parameter name	Data type	Description
IL25CodeLengthFixed		<b>IL25CodeLengthFixed</b> Index: 461 Sub-Index: 0 Access: Read/Write . <u>Valid parameter values (dec):</u> 0..31:
Code93Active	BOOL	<b>Code93Active</b> Index: 470 Sub-Index: 0 Access: Read/Write
C93Multiread	UINT	<b>C93Multiread</b> Index: 471 Sub-Index: 0 Access: Read/Write . <u>Valid parameter values (dec):</u> 1..100:
C93CodeLengthMode	USINT	<b>C93CodeLengthMode</b> Index: 472 Sub-Index: 0 Access: Read/Write . <u>Valid parameter values (dec):</u> 0:      Free 1:      Interval 2:      Fixed
C93CodeLengthInterva		<b>C93CodeLengthInterval</b> Index: 473 Sub-Index: 0 Access: Read/Write . <u>Valid parameter values (dec):</u> 0..31:

Parameter name	Data type	Description
C93CodeLengthFixed		<b>C93CodeLengthFixed</b> Index: 474 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 0..31:
Code128FamilyActive	BOOL	<b>Code128FamilyActive</b> Index: 480 Sub-Index: 0 Access: Read/Write
Code128Active	BOOL	<b>Code128Active</b> Index: 481 Sub-Index: 0 Access: Read/Write
GS1128EAN128Active	BOOL	<b>GS1128EAN128Active</b> Index: 482 Sub-Index: 0 Access: Read/Write
C128FamMultiread	UINT	<b>C128FamMultiread</b> Index: 483 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 1..100:
C128FamCodeLengthMod	USINT	<b>C128FamCodeLengthMode</b> Index: 484 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 0:      Free 1:      Interval 2:      Fixed

Parameter name	Data type	Description
C128FamCodeLengthInt		<b>C128FamCodeLengthInterval</b> Index: 485 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 0..31:
C128FamCodeLengthFix		<b>C128FamCodeLengthFixed</b> Index: 486 Sub-Index: 0 Access: Read/Write  Valid parameter values (dec): 0..31:
C128FamFNC1FirstPosi		<b>C128FamFNC1FirstPosition</b> Index: 487 Sub-Index: 0 Access: Read/Write
C128FamFNC1InsidePos		<b>C128FamFNC1InsidePosition</b> Index: 488 Sub-Index: 0 Access: Read/Write

## 2.6. Error description

### 2.6.1. Error code (ErrorCode)

The parameter "ErrorCode" can be interpreted using the PLC data type ST\_IOL\_Error . This data type contains the following error information:

Parameter name	Data type	Description
nCommunicationError	DWORD	Communication errors (see TIA-Portal help system about RDREC/WRREC)
nBlockError	DWORD	SICK Function block errors
nIOLMError	WORD	IO-Link Master error (see IO-Link specification)
nIOLError	WORD	IO-Link error. Contains the IOL Error_Code the IOL Add_Error_Code (see IO-Link specification) and the device specific error codes
iISDUIndex	UINT	IO-Link Index (ISDU) to which the error code refers.

Error code (nBlockError)	Error code
0x0000	No error
0x0001	Reserved
0x0002	No IO-Link parameter selected for reading/writing (Selection)

Error code (nBlockError)	Error code
0x0003	Selected parameter(s) not readable. There was at least one parameter selected with a write-only access (see ErrorCode.iISDUIndex).
0x0004	Selected parameter(s) not writable. There was at least one parameter selected with read-only access (see ErrorCode.iISDUIndex).
0x0005	At least one selected parameter, the input value is greater than the data type allows (see ErrorCode.iISDUIndex).
0x0006	At least one selected parameter, the input value is lower than the data type allows (see ErrorCode.iISDUIndex).
0x0007	Reserved
0x0008	Reserved
0x0009	Time out error occurred
0x000A	Block parameter transmission error. The device is in the block parameter mode. Please repeat a read- or write request to leave the block parameter mode.

Error code (nIOLMError)	Error code
0x0000	No error
0x0001 ... 0x06FF	Reserved / Master specific
0x7000	Unexpected Write request instead of read request / Invalid response PDU
0x7001	Decode error
0x7002	Port occupied by another task
0x7003 ... 0x7FFF	Reserved / Master specific
0x8000	Timeout when IOL-Devices or IOL-Master port are busy
0x8001	IO-Link index > 32767
0x8002	Port address beyond defined maximum
0x8003	Port function not supported
0x8004	Reserved / Master specific
0x8005	Invalid length of the data that should be written (>232 / <1)
0x8006	Reserved / Master specific
0x8007	IO-Link subindex > 255
0x8008 ... 0x8051	Reserved / Master specific
0x8052	Error during acyclic data access (FB RDREC error)
0x8053	Error during acyclic data access (FB WRREC error)
0x8054 ... 0x8FFFF	Reserved / Master specific

For additional information see the technical specification "IO-Link Integration Part 1" ([www.profibus.com](http://www.profibus.com)).

Error code (nIOLError)	Error code
0x0000	No error
0x1000	Master communication error
0x1100	ISDU time out / Device event error
0x5200	Device checksum error
0x5600	Device buffer overflow
0x5700	Master ISDU illegal service
0x5800	Device error: Byte length does not fit to the chosen parameter
0x8000	The requested service has been refused by the device application
0x8011	Read write access to a not existing Index

Error code (nIOLError)	Error code
0x8012	Read write access to a not existing sub index
0x8020	Parameter is not accessible for a read or write service due to the current state in the device
0x8021	Parameter is not accessible for a read or write service due to an ongoing local operation at the device
0x8022	Parameter is not accessible for a read or write service due to an remote triggered state of the device application
0x8023	Write service tries to access a read-only parameter
0x8030	Write service to a parameter outside its permitted range of values
0x8031	Write service to a parameter above its specified value range
0x8032	Write service to a parameter below its specified value range
0x8033	Write service to a parameter above its specified length
0x8034	Write service to a parameter below its predefined length
0x8035	Write service with a command value not supported by the device application
0x8036	Write service with a command value calling a device function not available due to the current state
0x8040	The value via single parameter transfer collide with other actual parameter settings
0x8041	Inconsistent parameter set (at least an ISDU cannot be written)
0x8042	Device application is not ready
0x8082	The read or write service is refused due to a temporarily unavailable application
0x8100	Unspecified
0x8101 ... 0x81FF	Device specific (see device description)

For additional information see the specification "IO-Link Communication" ([www.IO-Link.com](http://www.IO-Link.com)).

## 2.7. Including into the PLC project

The function block "FB\_SICK\_CLV61x\_IOL" is part of the library SICK\_IOL\_CLV61x\_IOL. To get all relevant blocks into your PLC project, please open the library as a "global" library. Afterwards, the library elements can be copied into the currently opened project. The library contains several helper functions that are required internally for interpreting the IO-Link data. The helper functions are identical for all SICK IO-Link function block libraries. Depending on the IO-Link device, only necessary functions are contained in the library.

### Integration step by step:

- Downloading the SICK\_IOL\_CLV61x\_IOL library
- Open the library in the "global" library tab
- Including the blocks of the SICK library into your project (code-blocks and data types)
- If helper functions / data type of already integrated IO-Link sensors are included in the project, these can be overwritten during the copying action
- Compiling the PLC project
- During the compilation process, TIA-Portal automatically adapts the block numbers in the project

**Attention!**

If several devices connect to the IO-Link Master, you can only exchange acyclic data (service data) with one device at the same time. Due this restriction, the service data communication blocks must to be blocked against each other.

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