



## PLC Integration of ODT3C\_2200

**IO-Link service data function block + process data parser function for Beckhoff (TwinCAT 3.x) PLC systems in combination with a EtherCAT IO-Link Master**

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# 1 Legal information

## 1.1 Disclaimer

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## **2 About this document**

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

### **2.1 Purpose of use**

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

These instructions are intended to provide support during the commissioning of a Leuze IO-Link sensor using standard software from Siemens. The described module is part of this standard software.

### **2.2 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.

## 3 General use of function block

### 3.1 Short description

The function block "FB\_Leuze\_IOL\_ ODT3C\_2200" simplifies the usage of Leuze IO-Link devices on Beckhoff (TwinCAT 3.x) PLC controls. This FB supports IO-Link Masters which can be connected via EtherCAT to the PLC system.

The function block is device type-specific and thus only suitable for the appropriate Leuze 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.

### 3.2 Calling and designation



Fig. 3.1: Example of module call

### 3.3 Configuration

Tab. 3.1: Parameter IN

Parameter	Data type	Description
bExecute	Bool	Positive trigger: Start data transfer
bRW	Bool	Read or write the selected IO-Link parameter. FALSE: Read parameter TRUE: Write Parameter
nPort	T_AmsPort	Port number of the ADS device.
sNetId	T_AmsNetID	String containing the AMS network identifier of the target device to which the ADS command is directed. Beckhoff EL6224/EP6224: AoeNetId of the IO-Link Master
nIdxGroup	UDInt	Index group number.
tTimeOut	Time	Time, after a Timeout-Error is triggered.

Tab. 3.2: Parameter INOUT

Parameter	Data type	Description
stDeviceData	ST_Leuze_IOL_ ODT3C_2200	Sensor data

See structure description of ST\_Leuze\_IOL\_ ODT3C\_2200 in chapter 7.

Tab. 3.3: Parameter OUT

Parameter	Data type	Description
bDone	Bool	Indicates whether data is valid.

Parameter	Data type	Description
bBusy	Bool	Request in process. FALSE: Request is terminated TRUE: Request is being processed
bError	Bool	Error flag FALSE: No error TRUE: Error detected
stErrorCode	ST_Leuze_IOL_Error	Status of the function block

See structure description of ST\_Leuze\_IOL\_Error in chapter 6.

### 3.4 Method of function

The function block uses the data structure "ST\_Leuze\_IOL\_ODT3C\_2200". The PLC data structure contains the values of all IO-Link variables. Before you can use it, the structure must be instantiated by a data block. Each IO-Link FB parameter has a data point representing it in this data structure. This data point will be actualized every time a read request was executed successfully.

The desired parameters can be selected via the input variables. Depending on the device definition, IO-Link parameters are read or writable. The input variable must be "bRW" = FALSE to read parameter. The value that should be written can be defined in the data structure, as soon as the input parameter "bRW" = TRUE. You start each transfer by calling up the "FB\_Leuze\_IOL\_ODT3C\_2200" with a positive trigger at the "bExecute" input. As long as there is no valid answer the output "bBusy" is TRUE. In the case that the chosen timeout period has elapsed a timeout error will be generated and the thread will be terminated. The "bDone" = TRUE output shows that the transmission was successful. The outputs retain there states as long as there is no new positive trigger at the "bExecute" input again.

The function block allows you to read or write multiple IO-Link parameters sequentially (multi-selection). Please note that it may happen, that a single parameter can not be written. The function block aborts at this point and it is possible, that the IO-Link device contains an inconsistent set of parameters.

### 3.5 Behavior when error occurs

An error bit (bError) is set and an error code (ST\_Leuze\_IOL\_Error) 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.

## 4 Integration into the PLC project

The function block "FB\_Leuze\_IOL\_ODT3C\_2200" is a part of the TwinCAT V3.x library. The library can be installed by using the Library Repository. Afterwards the library can be added to your project (References --> Add library...).

### Integration step by step:

- Download the library
- Open the Library repository in Library Manager tab in Beckhoff TwinCAT
- Click Install... and select downloaded library
- Open Add library in Library Manager tab
- Find installed library under Leuze electronic GmbH + Co. KG

NOTICE	
	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.



## 5 Process data parser function

The function F\_Leuze\_PD\_ODT3C\_2200 simplifies the interpretation of composed IO-Link process data. This data is provided as a data structure on the PLC side. Some sensors supports different process data output. User must select mode of PD according to the sensors settings.

The function is device type-specific and thus only suitable for the appropriated Leuze IO-Link devices.

### 5.1 Calling and designation



Fig. 5.1: Example of process data parsing function call

### 5.2 Configuration

Tab. 5.1: Parameters

Parameter name	Declaration	Data type	Description
aProcessData	INPUT	ARRAY OF BYTE	Raw process data of the IO-Link device.
nPDMODE	INPUT	INT	Mode of the PD. User must select mode of PD according to the sensors settings.
bError	OUTPUT	BOOL	Error flag FALSE: No error TRUE: Error detected
F_Leuze_PD_ODT3C_2200	OUTPUT	ST_Leuze_PD_ODT3C_2200	Reference to the instance of the data structure ST_Leuze_PD_ODT3C_2200. The structure includes the disaggregated values of the process data.

See structure description of ST\_Leuze\_PD\_ODT3C\_2200 in chapter 7.

## 6 Error description

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

Tab. 6.1: ST\_Leuze\_IOL\_Error description

Parameter name	Data type	Description
ErrorStatus.nBlockError	WORD	Error number representing FB where error occurred
ErrorStatus.nAdsReadError	UDINT	ADS read error code
ErrorStatus.nAdsWriteError	UDINT	ADS write error code
ErrorStatus.nIndex	INT	IO-Link index to which the error code refers
ErrorStatus.nSubIndex	INT	IO-Link sub-index to which the error code refers

Tab. 6.2: Error description for nBlockError

Error code (nBlockError)	Error description
0x0000	No error
0x8001	Time out error occurred
0x8002	No parameter selected
0x8003	Error in FB_Leuze_IOL_AdsReadWrite block

For additional information see the Beckhoff ADS Return Codes (<https://infosys.beckhoff.com>).

## 7 Data structures

Tab. 7.1: ST\_Leuze\_IOL\_ODT3C\_2200

Parameter name	Data type	Description
stDeviceData.stSelection.stCommands.bCmdDeviceReset	BOOL	[WRITE_ONLY] Device Reset
stDeviceData.stSelection.stCommands.bCmdApplicationReset	BOOL	[WRITE_ONLY] Application Reset
stDeviceData.stSelection.stCommands.bCmdRestoreFactorySettings	BOOL	[WRITE_ONLY] Restore Factory Settings
stDeviceData.stSelection.stCommands.bCmdTeachSp1	BOOL	[WRITE_ONLY] Teach SP1
stDeviceData.stSelection.stCommands.bCmdTeachSp2	BOOL	[WRITE_ONLY] Teach SP2
stDeviceData.stSelection.stCommands.bCmdActivationTakesPriorityOverPdout	BOOL	[WRITE_ONLY] Activation (Takes Priority over PDout)
stDeviceData.stSelection.stCommands.bCmdDeactivationTakesPriorityOverPdout	BOOL	[WRITE_ONLY] Deactivation (Takes Priority over PDout)
stDeviceData.stSelection.stCommands.bCmdResetPriorityPdoutWorking	BOOL	[WRITE_ONLY] Reset Priority (PDout working)
stDeviceData.stSelection.stDirectParameters1.bAll	BOOL	[READ_WRITE] all parameters of complex data type
stDeviceData.stSelection.stDirectParameters1.bAll	BOOL	[READ_WRITE] all parameters of complex data type
stDeviceData.stSelection.stDirectParameters1.bReserved_1	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bMasterCycleTime	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bMinCycleTime	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bMSequenceCapability	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bIoLinkVersionId	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bProcessDataInputLength	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bProcessDataOutputLength	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bVendorId1	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bVendorId2	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bDeviceId1	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bDeviceId2	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bDeviceId3	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bReserved_13	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bReserved_14	BOOL	[READ_ONLY]

Parameter name	Data type	Description
stDeviceData.stSelection.stDirectParameters1.bReserved_15	BOOL	[READ_ONLY]
stDeviceData.stSelection.bStandardCommand	BOOL	[WRITE_ONLY]
stDeviceData.stSelection.stDeviceAccessLocks.bAll	BOOL	[READ_WRITE] all parameters of complex data type
stDeviceData.stSelection.bVendorName	BOOL	[READ_ONLY]
stDeviceData.stSelection.bVendorText	BOOL	[READ_ONLY]
stDeviceData.stSelection.bProductName	BOOL	[READ_ONLY]
stDeviceData.stSelection.bProductId	BOOL	[READ_ONLY]
stDeviceData.stSelection.bProductText	BOOL	[READ_ONLY]
stDeviceData.stSelection.bSerialNumber	BOOL	[READ_ONLY]
stDeviceData.stSelection.bHardwareVersion	BOOL	[READ_ONLY]
stDeviceData.stSelection.bFirmwareVersion	BOOL	[READ_ONLY]
stDeviceData.stSelection.bApplicationSpecificTag	BOOL	[READ_WRITE]
stDeviceData.stSelection.bFunctionTag	BOOL	[READ_WRITE] Possibility to mark a device with function-specific information.
stDeviceData.stSelection.bLocationTag	BOOL	[READ_WRITE] Possibility to mark a device with location-specific information.
stDeviceData.stSelection.bDeviceStatus	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDetailedDeviceStatus.bAll	BOOL	[READ_ONLY] all parameters of complex data type
stDeviceData.stSelection.bTeachSelect	BOOL	[READ_WRITE] Selects the switching signal channel for which a teach procedure will be applied.
stDeviceData.stSelection.stTeachResult.bAll	BOOL	[READ_ONLY] all parameters of complex data type
stDeviceData.stSelection.stSsc1Param.bAll	BOOL	[READ_WRITE] all parameters of complex data type
stDeviceData.stSelection.stSsc1Param.bSp1	BOOL	[READ_WRITE] Defines the setpoint 1 value for the switching signal channel.
stDeviceData.stSelection.stSsc1Param.bSp2	BOOL	[READ_WRITE] Defines the setpoint 2 value for the switching signal channel.
stDeviceData.stSelection.stSsc1Config.bAll	BOOL	[READ_WRITE] all parameters of complex data type

Parameter name	Data type	Description
stDeviceData.stSelection.stSsc1Config.bLogic	BOOL	[READ_WRITE] Defines the logical representation of the switching signal SSC in the process data.
stDeviceData.stSelection.stSsc1Config.bMode	BOOL	[READ_WRITE] Defines the evaluation mode for the switching signal SSC.
stDeviceData.stSelection.stSsc1Config.bHyst	BOOL	[READ_WRITE] Defines the hysteresis at the switchpoint. A higher hysteresis may help to increase stability in critical applications.
stDeviceData.stSelection.stSsc2Param.bAll	BOOL	[READ_WRITE] all parameters of complex data type
stDeviceData.stSelection.stSsc2Param.bSp1	BOOL	[READ_WRITE] Defines the setpoint 1 value for the switching signal channel.
stDeviceData.stSelection.stSsc2Param.bSp2	BOOL	[READ_WRITE] Defines the setpoint 2 value for the switching signal channel.
stDeviceData.stSelection.stSsc2Config.bAll	BOOL	[READ_WRITE] all parameters of complex data type
stDeviceData.stSelection.stSsc2Config.bLogic	BOOL	[READ_WRITE] Defines the logical representation of the switching signal SSC in the process data.
stDeviceData.stSelection.stSsc2Config.bMode	BOOL	[READ_WRITE] Defines the evaluation mode for the switching signal SSC.
stDeviceData.stSelection.stSsc2Config.bHyst	BOOL	[READ_WRITE] Defines the hysteresis at the switchpoint. A higher hysteresis may help to increase stability in critical applications.
stDeviceData.stSelection.bSsc2TeachingReserveFactor	BOOL	[READ_WRITE] Adds an distinct amount on the TeachPoint to assure an active SSC.2. This only has an Effect for SP1 in Single Point Mode.
stDeviceData.stSelection.bSsc1TeachingReserveFactor	BOOL	[READ_WRITE] Adds an distinct amount on the TeachPoint to assure an active SSC.1. This only has an Effect for SP1 in Single Point Mode.
stDeviceData.stSelection.bDistanceValueAveraging	BOOL	[READ_WRITE] Adjustable size of sliding average buffer for a stable distance value.
stDeviceData.stSelection.bTemporaryCounter	BOOL	[READ_ONLY] Counter for Future Use.
stDeviceData.stSelection.bAnalysisDepthSsc2	BOOL	[READ_WRITE] Number of Scans considered for the Switching Output SSC.2 to toggle.

Parameter name	Data type	Description
stDeviceData.stSelection.bTimerUnitSsc2	BOOL	[READ_WRITE] Enable or Disable Timer Unit for SSC.2.
stDeviceData.stSelection.bFunctionOfTimerUnitSsc2	BOOL	[READ_WRITE] Function of Timer Unit SSC.2
stDeviceData.stSelection.bTimeSsc2	BOOL	[READ_WRITE] Timebase of Timer Unit SSC.2.
stDeviceData.stSelection.bNumberOfObjectsSsc2	BOOL	[READ_WRITE] Internal Object Counter SSC.2.
stDeviceData.stSelection.bAnalysisDepthSsc1	BOOL	[READ_WRITE] Number of Scans considered for the Switching Output SSC.1 to toggle.
stDeviceData.stSelection.bTimerUnitSsc1	BOOL	[READ_WRITE] Enable or Disable Timer Unit for SSC.1.
stDeviceData.stSelection.bFunctionOfTimerUnitSsc1	BOOL	[READ_WRITE] Function of Timer Unit SSC.1
stDeviceData.stSelection.bTimeSsc1	BOOL	[READ_WRITE] Timebase of Timer Unit SSC.1.
stDeviceData.stSelection.bNumberOfObjectsSsc1	BOOL	[READ_WRITE] Internal Object Counter SSC.1.
stDeviceData.stSelection.bTemperature	BOOL	[READ_ONLY] Temperature inside the Device.
stDeviceData.stSelection.bButtonFunctionLevel1	BOOL	[READ_WRITE] Selection of function being executed after Button pressed for 2 to 6 seconds.
stDeviceData.stSelection.bButtonFunctionLevel2	BOOL	[READ_WRITE] Selection of function being executed after Button pressed for 7 to 11 seconds.
stDeviceData.stSelection.bButtonFunctionLevel3	BOOL	[READ_WRITE] Selection of function being executed after Button pressed for 12 to 16 seconds.
stDeviceData.stSelection.bPin4Function	BOOL	[READ_WRITE] Modification of Pin 4 Function.
stDeviceData.stSelection.bPin2Function	BOOL	[READ_WRITE] Modification of Pin 2 Function.
stDeviceData.stSelection.stMdcDescriptor.bAll	BOOL	[READ_ONLY] all parameters of complex data type
stDeviceData.stSelection.stMdcDescriptor.bLowerValue	BOOL	[READ_ONLY] Shows the lower value of measurement range.
stDeviceData.stSelection.stMdcDescriptor.bUpperValue	BOOL	[READ_ONLY] Shows the upper value of measurement range.
stDeviceData.stSelection.stMdcDescriptor.bUnitCode	BOOL	[READ_ONLY] Shows the unique code for the physical unit.
stDeviceData.stSelection.stMdcDescriptor.bScale	BOOL	[READ_ONLY] Shows the multiplier for measurement value - 10exp(scale).

Parameter name	Data type	Description
stDeviceData.stData.stCommands.nCmdDeviceReset	UINT	[WRITE_ONLY] Device Reset
stDeviceData.stData.stCommands.nCmdApplicationReset	UINT	[WRITE_ONLY] Application Reset
stDeviceData.stData.stCommands.nCmdRestoreFactorySettings	UINT	[WRITE_ONLY] Restore Factory Settings
stDeviceData.stData.stCommands.nCmdTeachSp1	UINT	[WRITE_ONLY] Teach SP1
stDeviceData.stData.stCommands.nCmdTeachSp2	UINT	[WRITE_ONLY] Teach SP2
stDeviceData.stData.stCommands.nCmdActivationTakesPriorityOverPdout	UINT	[WRITE_ONLY] Activation (Takes Priority over PDout)
stDeviceData.stData.stCommands.nCmdDeactivationTakesPriorityOverPdout	UINT	[WRITE_ONLY] Deactivation (Takes Priority over PDout)
stDeviceData.stData.stCommands.nCmdResetPriorityPdoutWorking	UINT	[WRITE_ONLY] Reset Priority (PDout working)
stDeviceData.stData.stDirectParameters1.nReserved_1	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nMasterCycleTime	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nMinCycleTime	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nMSequenceCapability	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nIoLinkVersionId	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nProcessDataInputLength	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nProcessDataOutputLength	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nVendorId1	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nVendorId2	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nDeviceId1	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nDeviceId2	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nDeviceId3	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nReserved_13	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nReserved_14	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nReserved_15	UINT	[READ_ONLY]
stDeviceData.stData.nStandardCommand	UINT	[WRITE_ONLY]
stDeviceData.stData.stDeviceAccessLocks.bParameterWriteAccessLock	BOOL	[READ_WRITE]
stDeviceData.stData.stDeviceAccessLocks.bDataStorageLock	BOOL	[READ_WRITE]
stDeviceData.stData.stDeviceAccessLocks.bLocalParameterizationLock	BOOL	[READ_WRITE]

Parameter name	Data type	Description
stDeviceData.stData.stDeviceAccessLocks.bLocalUserInterfaceLock	BOOL	[READ_WRITE]
stDeviceData.stData.sVendorName	STRING	[READ_ONLY]
stDeviceData.stData.sVendorText	STRING	[READ_ONLY]
stDeviceData.stData.sProductName	STRING	[READ_ONLY]
stDeviceData.stData.sProductId	STRING	[READ_ONLY]
stDeviceData.stData.sProductText	STRING	[READ_ONLY]
stDeviceData.stData.sSerialNumber	STRING	[READ_ONLY]
stDeviceData.stData.sHardwareVersion	STRING	[READ_ONLY]
stDeviceData.stData.sFirmwareVersion	STRING	[READ_ONLY]
stDeviceData.stData.sApplicationSpecificTag	STRING	[READ_WRITE]
stDeviceData.stData.sFunctionTag	STRING	[READ_WRITE] Possibility to mark a device with function-specific information.
stDeviceData.stData.sLocationTag	STRING	[READ_WRITE] Possibility to mark a device with location-specific information.
stDeviceData.stData.nDeviceStatus	UINT	[READ_ONLY]
stDeviceData.stData.stDetailedDeviceStatus.sltem_1	STRING	[READ_ONLY]
stDeviceData.stData.stDetailedDeviceStatus.sltem_2	STRING	[READ_ONLY]
stDeviceData.stData.nTeachSelect	UINT	[READ_WRITE] Selects the switching signal channel for which a teach procedure will be applied.
stDeviceData.stData.stTeachResult.nState	UINT	[READ_ONLY] Indicates the current state of the teach procedure.
stDeviceData.stData.stTeachResult.bFlagSp1Tp1	BOOL	[READ_ONLY] Indicates the current teach result for the teach point.
stDeviceData.stData.stTeachResult.bFlagSp1Tp2	BOOL	[READ_ONLY] Indicates the current teach result for the teach point.
stDeviceData.stData.stTeachResult.bFlagSp2Tp1	BOOL	[READ_ONLY] Indicates the current teach result for the teach point.
stDeviceData.stData.stTeachResult.bFlagSp2Tp2	BOOL	[READ_ONLY] Indicates the current teach result for the teach point.
stDeviceData.stData.stSsc1Param.nSp1	INT	[READ_WRITE] Defines the setpoint 1 value for the switching signal channel.



Parameter name	Data type	Description
stDeviceData.stData.stSsc1Param.nSp2	INT	[READ_WRITE] Defines the setpoint 2 value for the switching signal channel.
stDeviceData.stData.stSsc1Config.nLogic	UINT	[READ_WRITE] Defines the logical representation of the switching signal SSC in the process data.
stDeviceData.stData.stSsc1Config.nMode	UINT	[READ_WRITE] Defines the evaluation mode for the switching signal SSC.
stDeviceData.stData.stSsc1Config.nHyst	INT	[READ_WRITE] Defines the hysteresis at the switchpoint. A higher hysteresis may help to increase stability in critical applications.
stDeviceData.stData.stSsc2Param.nSp1	INT	[READ_WRITE] Defines the setpoint 1 value for the switching signal channel.
stDeviceData.stData.stSsc2Param.nSp2	INT	[READ_WRITE] Defines the setpoint 2 value for the switching signal channel.
stDeviceData.stData.stSsc2Config.nLogic	UINT	[READ_WRITE] Defines the logical representation of the switching signal SSC in the process data.
stDeviceData.stData.stSsc2Config.nMode	UINT	[READ_WRITE] Defines the evaluation mode for the switching signal SSC.
stDeviceData.stData.stSsc2Config.nHyst	INT	[READ_WRITE] Defines the hysteresis at the switchpoint. A higher hysteresis may help to increase stability in critical applications.
stDeviceData.stData.nSsc2TeachingReserveFactor	INT	[READ_WRITE] Adds an distinct amount on the TeachPoint to assure an active SSC.2. This only has an Effect for SP1 in Single Point Mode.
stDeviceData.stData.nSsc1TeachingReserveFactor	INT	[READ_WRITE] Adds an distinct amount on the TeachPoint to assure an active SSC.1. This only has an Effect for SP1 in Single Point Mode.
stDeviceData.stData.nDistanceValueAveraging	UINT	[READ_WRITE] Adjustable size of sliding average buffer for a stable distance value.
stDeviceData.stData.nTemporaryCounter	UINT	[READ_ONLY] Counter for Future Use.
stDeviceData.stData.nAnalysisDepthSsc2	INT	[READ_WRITE] Number of Scans considered for the Switching Output SSC.2 to toggle.
stDeviceData.stData.nTimerUnitSsc2	UINT	[READ_WRITE] Enable or Disable Timer Unit for SSC.2.

Parameter name	Data type	Description
stDeviceData.stData.nFunctionOfTimerUnitSsc2	UINT	[READ_WRITE] Function of Timer Unit SSC.2
stDeviceData.stData.nTimeSsc2	UINT	[READ_WRITE] Timebase of Timer Unit SSC.2.
stDeviceData.stData.nNumberOfObjectsSsc2	UINT	[READ_WRITE] Internal Object Counter SSC.2.
stDeviceData.stData.nAnalysisDepthSsc1	INT	[READ_WRITE] Number of Scans considered for the Switching Output SSC.1 to toggle.
stDeviceData.stData.nTimerUnitSsc1	UINT	[READ_WRITE] Enable or Disable Timer Unit for SSC.1.
stDeviceData.stData.nFunctionOfTimerUnitSsc1	UINT	[READ_WRITE] Function of Timer Unit SSC.1
stDeviceData.stData.nTimeSsc1	UINT	[READ_WRITE] Timebase of Timer Unit SSC.1.
stDeviceData.stData.nNumberOfObjectsSsc1	UINT	[READ_WRITE] Internal Object Counter SSC.1.
stDeviceData.stData.nTemperature	INT	[READ_ONLY] Temperature inside the Device.
stDeviceData.stData.nButtonFunctionLevel1	INT	[READ_WRITE] Selection of function being executed after Button pressed for 2 to 6 seconds.
stDeviceData.stData.nButtonFunctionLevel2	INT	[READ_WRITE] Selection of function being executed after Button pressed for 7 to 11 seconds.
stDeviceData.stData.nButtonFunctionLevel3	INT	[READ_WRITE] Selection of function being executed after Button pressed for 12 to 16 seconds.
stDeviceData.stData.nPin4Function	UINT	[READ_WRITE] Modification of Pin 4 Function.
stDeviceData.stData.nPin2Function	UINT	[READ_WRITE] Modification of Pin 2 Function.
stDeviceData.stData.stMdcDescriptor.nLowerValue	INT	[READ_ONLY] Shows the lower value of measurement range.
stDeviceData.stData.stMdcDescriptor.nUpperValue	INT	[READ_ONLY] Shows the upper value of measurement range.
stDeviceData.stData.stMdcDescriptor.nUnitCode	UINT	[READ_ONLY] Shows the unique code for the physical unit.
stDeviceData.stData.stMdcDescriptor.nScale	INT	[READ_ONLY] Shows the multiplier for measurement value - $10^{\text{exp}(\text{scale})}$ .

Tab. 7.2: ST\_Leuze\_PD\_ODT3C\_2200

Parameter name	Data type	Description
ST_Leuze_PD_ODT3C_2200.nMdcMeasurementValue	INT	
ST_Leuze_PD_ODT3C_2200.nMdcScale	INT	
ST_Leuze_PD_ODT3C_2200.bSsc1SwitchingSignal	BOOL	
ST_Leuze_PD_ODT3C_2200.bSsc2SwitchingSignal	BOOL	
ST_Leuze_PD_ODT3C_2200.bMeasure	BOOL	
ST_Leuze_PD_ODT3C_2200.bSignal	BOOL	
ST_Leuze_PD_ODT3C_2200.bWarning	BOOL	
ST_Leuze_PD_ODT3C_2200.nQuality	UINT	

## 8 Parameter descriptions

Tab. 8.1: IODD parameter descriptions

(AR - Access Rights, R - Read only, W - Write only, RW - Read and Write, NS - Not specified)

Parameter	Index	Subindex	Data type	Default	AR	Description
Commands			RecordT		W	
Device Reset			UIntegerT	128	W	Device Reset
Application Reset			UIntegerT	129	W	Application Reset
Restore Factory Settings			UIntegerT	130	W	Restore Factory Settings
Teach SP1			UIntegerT	65	W	Teach SP1
Teach SP2			UIntegerT	66	W	Teach SP2
Activation (Takes Priority over PDout)			UIntegerT	176	W	Activation (Takes Priority over PDout)
Deactivation (Takes Priority over PDout)			UIntegerT	177	W	Deactivation (Takes Priority over PDout)
Reset Priority (PDout working)			UIntegerT	178	W	Reset Priority (PDout working)
Direct Parameters 1	0	0	RecordT		RW	
Reserved	0	1	UIntegerT		R	
Master Cycle Time	0	2	UIntegerT		R	
Min Cycle Time	0	3	UIntegerT		R	
M-Sequence Capability	0	4	UIntegerT		R	
IO-Link Version ID	0	5	UIntegerT	17	R	
Process Data Input Length	0	6	UIntegerT		R	
Process Data Output Length	0	7	UIntegerT		R	
Vendor ID 1	0	8	UIntegerT		R	
Vendor ID 2	0	9	UIntegerT		R	
Device ID 1	0	10	UIntegerT		R	
Device ID 2	0	11	UIntegerT		R	
Device ID 3	0	12	UIntegerT		R	
Reserved	0	13	UIntegerT		R	
Reserved	0	14	UIntegerT		R	

Parameter	Index	Subindex	Data type	Default	AR	Description
Reserved	0	15	UIntegerT		R	
Standard Command	0	16	UIntegerT		W	(0 ... 63): Reserved 128: Device Reset 129: Application Reset 130: Restore Factory Settings (131 ... 159): Reserved
Standard Command	2	0	UIntegerT		W	(0 ... 63): Reserved 128: Device Reset 129: Application Reset 130: Restore Factory Settings (131 ... 159): Reserved 65: Teach SP1 66: Teach SP2 176: Activation (Takes Priority over PDout) 177: Deactivation (Takes Priority over PDout) 178: Reset Priority (PDout working)
Device Access Locks	12	0	RecordT		RW	
Parameter (write) Access Lock	12	1	BooleanT		RW	
Data Storage Lock	12	2	BooleanT		RW	
Local Parameterization Lock	12	3	BooleanT		RW	
Local User Interface Lock	12	4	BooleanT		RW	
Vendor Name	16	0	StringT	Leuze electronic GmbH + Co. KG	R	
Vendor Text	17	0	StringT	The Sensor People	R	
Product Name	18	0	StringT	ODT3C.3/L6	R	
Product ID	19	0	StringT		R	
Product Text	20	0	StringT	Scanner with Distance Data	R	
Serial Number	21	0	StringT		R	
Hardware Version	22	0	StringT		R	
Firmware Version	23	0	StringT		R	
Application Specific Tag	24	0	StringT	***	RW	
Function Tag	25	0	StringT	***	RW	Possibility to mark a device with function-specific information.
Location Tag	26	0	StringT	***	RW	Possibility to mark a device with location-specific information.

Parameter	Index	Subindex	Data type	Default	AR	Description
Device Status	36	0	UIntegerT	0	R	0: Device is OK 1: Maintenance required 2: Out of specification 3: Functional check 4: Failure (5 ... 255): Reserved
Detailed Device Status	37	0	ArrayT		R	
	37	0	OctetStringT		R	
Teach Select	58	0	UIntegerT	1	RW	Selects the switching signal channel for which a teach procedure will be applied.  0: Default Channel (SSC.1) 1: SSC.1 2: SSC.2 255: All SSC
Teach Result	59	0	RecordT		R	Shows the complete result information of the teach procedure including current state and result flags.
State	59	1	UIntegerT	0	R	Indicates the current state of the teach procedure.  0: Idle 1: SP1 success 2: SP2 success 3: SP1, SP2 success 4: Wait for command 5: Busy 7: Error
Flag SP1 TP1	59	2	BooleanT	0	R	Indicates the current teach result for the teach point.  False: Initial or not ok True: Ok
Flag SP1 TP2	59	3	BooleanT	0	R	Indicates the current teach result for the teach point.  False: Initial or not ok True: Ok
Flag SP2 TP1	59	4	BooleanT	0	R	Indicates the current teach result for the teach point.  False: Initial or not ok True: Ok
Flag SP2 TP2	59	5	BooleanT	0	R	Indicates the current teach result for the teach point.  False: Initial or not ok True: Ok
SSC.1 Param	60	0	RecordT		RW	Defines the setpoint values for switching signal channel 1.
SP1	60	1	IntegerT	155	RW	Defines the setpoint 1 value for the switching signal channel.  (30 ... 165)
SP2	60	2	IntegerT	70	RW	Defines the setpoint 2 value for the switching signal channel.  (30 ... 165)
SSC.1 Config	61	0	RecordT		RW	Defines the configuration parameter for switching signal channel 1.

Parameter	Index	Subindex	Data type	Default	AR	Description
Logic	61	1	UIntegerT	0	RW	Defines the logical representation of the switching signal SSC in the process data. 0: High active 1: Low active
Mode	61	2	UIntegerT	1	RW	Defines the evaluation mode for the switching signal SSC. 0: Deactivated 1: Single point 2: Window 3: Two point
Hyst	61	3	IntegerT	0	RW	Defines the hysteresis at the switchpoint. A higher hysteresis may help to increase stability in critical applications. 0: Handled internally
SSC.2 Param	62	0	RecordT		RW	Defines the setpoint values for switching signal channel 2.
SP1	62	1	IntegerT	155	RW	Defines the setpoint 1 value for the switching signal channel. (30 ... 165)
SP2	62	2	IntegerT	70	RW	Defines the setpoint 2 value for the switching signal channel. (30 ... 165)
SSC.2 Config	63	0	RecordT		RW	Defines the configuration parameter for switching signal channel 2.
Logic	63	1	UIntegerT	0	RW	Defines the logical representation of the switching signal SSC in the process data. 0: High active 1: Low active
Mode	63	2	UIntegerT	1	RW	Defines the evaluation mode for the switching signal SSC. 0: Deactivated 1: Single point 2: Window 3: Two point
Hyst	63	3	IntegerT	0	RW	Defines the hysteresis at the switchpoint. A higher hysteresis may help to increase stability in critical applications. 0: Handled internally
SSC.2 Teaching Reserve Factor	82	0	IntegerT	0	RW	Adds an distinct amount on the TeachPoint to assure an active SSC.2. This only has an Effect for SP1 in Single Point Mode. -1: No Reserve 0: Minimum Reserve 1: Medium Reserve 2: Large Reserve

Parameter	Index	Subindex	Data type	Default	AR	Description
SSC.1 Teaching Reserve Factor	92	0	IntegerT	0	RW	Adds an distinct amount on the TeachPoint to assure an active SSC.1. This only has an Effect for SP1 in Single Point Mode.  -1: No Reserve 0: Minimum Reserve 1: Medium Reserve 2: Large Reserve
Distance value averaging	130	0	UIntegerT	30	RW	Adjustable size of sliding average buffer for a stable distance value.  0: Off  (1 ... 100)
Temporary Counter	156	0	UIntegerT		R	Counter for Future Use.
Analysis Depth SSC.2	180	0	IntegerT	2	RW	Number of Scans considered for the Switching Output SSC.2 to toggle.  (1 ... 100)
Timer Unit SSC.2	182	0	UIntegerT	0	RW	Enable or Disable Timer Unit for SSC.2.  0: Off 255: On
Function of Timer Unit SSC.2	183	0	UIntegerT	0	RW	Function of Timer Unit SSC.2  0: On Delay 1: Off Delay 2: Pulse Stretching 3: Pulse Suppression
Time SSC.2	184	0	UIntegerT	200	RW	Timebase of Timer Unit SSC.2.  (1 ... 50000)
Number of Objects SSC.2	185	0	UIntegerT		RW	Internal Object Counter SSC.2.
Analysis Depth SSC.1	190	0	IntegerT	2	RW	Number of Scans considered for the Switching Output SSC.1 to toggle.  (1 ... 100)
Timer Unit SSC.1	192	0	UIntegerT	0	RW	Enable or Disable Timer Unit for SSC.1.  0: Off 255: On
Function of Timer Unit SSC.1	193	0	UIntegerT	0	RW	Function of Timer Unit SSC.1  0: On Delay 1: Off Delay 2: Pulse Stretching 3: Pulse Suppression
Time SSC.1	194	0	UIntegerT	200	RW	Timebase of Timer Unit SSC.1.  (1 ... 50000)
Number of Objects SSC.1	195	0	UIntegerT		RW	Internal Object Counter SSC.1.
Temperature	220	0	IntegerT		R	Temperature inside the Device.



Parameter	Index	Subindex	Data type	Default	AR	Description
Button Function Level 1	241	0	IntegerT	2	RW	<p>Selection of function being executed after Button pressed for 2 to 6 seconds.</p> <p>0: No Button Function  2: Teach SP1 of SSC.1, minimum Reserve  3: Teach SP1 of SSC.2, minimum Reserve  4: Teach SP1 of SSC.1, medium Reserve  5: Teach SP1 of SSC.2, medium Reserve  6: Teach SP1 of SSC.1, large Reserve  7: Teach SP1 of SSC.2, large Reserve  19: Set SSC.1 Logic to Non-Inverted  20: Set SSC.1 Logic to Inverted  21: Toggle SSC.1 Logic  22: Enable SSC.1 Time Module  23: Disable SSC.1 Time Module  24: On/Off Toggle SSC.1 Time Module  31: Set SSC.2 Logic to Non-Inverted  32: Set SSC.2 Logic to Inverted  33: Toggle SSC.2 Logic  34: Enable SSC.2 Time Module  35: Disable SSC.2 Time Module  36: On/Off Toggle SSC.2 Time Module  43: Set SSC.1 and SSC.2 Logic to Non-Inverted  44: Set SSC.1 and SSC.2 Logic to inverted  45: Toggle SSC.1 and SSC.2 Logic</p>
Button Function Level 2	242	0	IntegerT	3	RW	<p>Selection of function being executed after Button pressed for 7 to 11 seconds.</p> <p>0: No Button Function  2: Teach SP1 of SSC.1, minimum Reserve  3: Teach SP1 of SSC.2, minimum Reserve  4: Teach SP1 of SSC.1, medium Reserve  5: Teach SP1 of SSC.2, medium Reserve  6: Teach SP1 of SSC.1, large Reserve  7: Teach SP1 of SSC.2, large Reserve  19: Set SSC.1 Logic to Non-Inverted  20: Set SSC.1 Logic to Inverted  21: Toggle SSC.1 Logic  22: Enable SSC.1 Time Module  23: Disable SSC.1 Time Module  24: On/Off Toggle SSC.1 Time Module  31: Set SSC.2 Logic to Non-Inverted  32: Set SSC.2 Logic to Inverted  33: Toggle SSC.2 Logic  34: Enable SSC.2 Time Module  35: Disable SSC.2 Time Module  36: On/Off Toggle SSC.2 Time Module  43: Set SSC.1 and SSC.2 Logic to Non-Inverted  44: Set SSC.1 and SSC.2 Logic to inverted  45: Toggle SSC.1 and SSC.2 Logic</p>

Parameter	Index	Subindex	Data type	Default	AR	Description
Button Function Level 3	243	0	IntegerT	45	RW	<p>Selection of function being executed after Button pressed for 12 to 16 seconds.</p> <p>0: No Button Function  2: Teach SP1 of SSC.1, minimum Reserve  3: Teach SP1 of SSC.2, minimum Reserve  4: Teach SP1 of SSC.1, medium Reserve  5: Teach SP1 of SSC.2, medium Reserve  6: Teach SP1 of SSC.1, large Reserve  7: Teach SP1 of SSC.2, large Reserve  19: Set SSC.1 Logic to Non-Inverted  20: Set SSC.1 Logic to Inverted  21: Toggle SSC.1 Logic  22: Enable SSC.1 Time Module  23: Disable SSC.1 Time Module  24: On/Off Toggle SSC.1 Time Module  31: Set SSC.2 Logic to Non-Inverted  32: Set SSC.2 Logic to Inverted  33: Toggle SSC.2 Logic  34: Enable SSC.2 Time Module  35: Disable SSC.2 Time Module  36: On/Off Toggle SSC.2 Time Module  43: Set SSC.1 and SSC.2 Logic to Non-Inverted  44: Set SSC.1 and SSC.2 Logic to inverted  45: Toggle SSC.1 and SSC.2 Logic</p>
Pin 4 Function	251	0	UIntegerT	1	RW	<p>Modification of Pin 4 Function.</p> <p>0: No Pin Function  1: Pin is SSC.1  2: Pin is not SSC.1  3: Pin is SSC.2  4: Pin is not SSC.2  7: Pin is Warning  8: Pin is not Warning</p>
Pin 2 Function	252	0	UIntegerT	3	RW	<p>Modification of Pin 2 Function.</p> <p>0: No Pin Function  1: Pin is SSC.1  2: Pin is not SSC.1  3: Pin is SSC.2  4: Pin is not SSC.2  7: Pin is Warning  8: Pin is not Warning</p>
MDC Descriptor	16512	0	RecordT		R	Descriptor for the characteristic of the measurement data channel (process data MV).
Lower Value	16512	1	IntegerT	30	R	Shows the lower value of measurement range.
Upper Value	16512	2	IntegerT	165	R	Shows the upper value of measurement range.
Unit Code	16512	3	UIntegerT	1010	R	Shows the unique code for the physical unit.
Scale	16512	4	IntegerT	-3	R	Shows the multiplier for measurement value - 10exp(scale).

## 9 Technical specifications

### 9.1 General data

Tab. 9.1: Sensor and IODD version

IODD version	V1.0
IODD release date	2021-11-30
Device family	Scanner with Distance Data
Device ID	2200
Device name	ODT3C.3/L6
Device variants	ODT3C.3/L6-M8 (50146591), ODT3C.3/L6-200-M12 (50146592), ODT3C.3/L6-200-M8 (50146593)