



PLC Integration ODT3C_2200

IO - Link service data function block + process data parser function for Siemens S7-1200 / S7 - 1500 (TIA - Portal V15.1 or higher) PLC systems in combination with a PROFIBUS / PROFINET IO - Link Master

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1 Legal information

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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_ODT3C_2200" simplifies the usage of Leuze IO-Link devices on Siemens S7-1200/S7-1500 (TIA-Portal V15.1 or higher) PLC controls. This FB supports IO-Link Masters which can be connected via PROFIBUS / PROFINET 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

The module can be called as a single-instance.



Fig. 3.1: Example of module call with single instance

3.3 Configuration

Tab. 3.1: Parameter IN

Parameter	Data type	Description
Execute	Bool	Positive trigger: Start data transfer
RW	Bool	Read or write the selected IO-Link parameter. FALSE: Read parameter TRUE: Write Parameter
Port	Int	Number of the master port the IO-Link device is connected, starting with 1.
HwID	HW_IO	Hardware IO-Address of the IO-Link master
Cap	DInt	Client access point of the IO-Link function (IO-LinkMaster specific). Siemens: 227 Weidmüller: 227 Other manufacturers: 255
TimeOut	Time	Time, after a Timeout-Error is triggered.

Tab. 3.2: Parameter INOUT

Parameter	Data type	Description
DeviceData	Leuze_type_ODT3C_2200	Sensor data

See structure description of Leuze_type_ODT3C_2200 in chapter 7.

Tab. 3.3: Parameter OUT

Parameter	Data type	Description
Done	Bool	Indicates whether data is valid.
Busy	Bool	Request in process. FALSE: Request is terminated TRUE: Request is being processed
Error	Bool	Error flag FALSE: No error TRUE: Error detected
ErrorCode	Leuze_type_lolError	Status of the function block
Diagnostics	LIOLink_typeDiagnostics	Detailed diagnostic information of the FB. See description of Siemens Library for IO-Link (LIOLink).

See structure description of Leuze_type_lolError in chapter 6.

3.4 Method of function

The function block uses the data structure "FB_Leuze_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 "RW" = FALSE to read parameter. The value that should be written can be defined in the data structure, as soon as the input parameter "RW" = TRUE. You start each transfer by calling up the "FB_Leuze_ODT3C_2200" with a positive trigger at the "Execute" input. As long as there is no valid answer the output "Busy" 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 "Done" = TRUE output shows that the transmission was successful. The outputs retain there states as long as there is no new positive trigger at the "Execute" input again.

The function block allows you to read or write multiple IO-Link parameters sequentially (multiselection). 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 (Error) is set and an error code (Leuze_type_lolError) 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_ODT3C_2200" is a part of the TIA-Portal library. 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.

Integration step by step:

- Downloading the library
- Open the library in the "global" library tab
- Including the blocks of the Leuze library into your project (code-blocks and data type)
- Compiling the PLC project

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 FC_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. Each sensor connected to Leuze IO-Link master has its own hardware ID. See Fig. 5.2.

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
HwID	INPUT	HW_IO	Hardware IO-Address of the IO-Link master (see HW-Configuration). For masters that do not use the Siemens PCT-Tool please use the HW IOAddress of the configured Master port.
RelByteOffset	INPUT	UINT	Relative start address of the IO-Link device on the IO-Link master port (see PCT-Tool -> Addresses -> Inputs Start). If the process date is mapped into a specified logical IO-Address, the relative byte offset = 0.
PDMode	INPUT	INT	Mode of the PD. User must select mode of PD according to the sensors settings.
ErrorCode	OUTPUT	WORD	Error code details see in the Siemens help system ("DPRD_DAT").
RET_VAL	OUTPUT	Leuze_type_PD_ODT3C_2200	Reference to the instance of the data structure Leuze_type_PD_ODT3C_2200. The structure includes the disaggregated values of the process data.

See structure description of Leuze_type_PD_ODT3C_2200 in chapter 7.



Fig. 5.2: Hardware ID for sensors connected to Leuze MD798 IO-Link master

6 Error description

The parameter "ErrorCode" can be interpreted using the PLC data type Leuze_type_IolError. This data type contains the following error information:

Tab. 6.1: Leuze_type_IolError description

Parameter name	Data type	Description
ErrorCode.status	Word	16#0000–16#7FFF: Status of the FB, 16#8000–16#FFFF: Error codes
ErrorCode.iolMError	Word	IO-Link Master error (see IO-Link specification)
ErrorCode.iolError	Word	IO-Link error. Contains the IOL_Error_Code the IOL_Add_Error_Code (see IO-Link specification) and the device specific error codes
ErrorCode.isduIndex	Int	IO-Link Index (ISDU) to which the error code refers

Tab. 6.2: Error description for status

Error code (status)	Error description
0x0000	Operation completed, no warning and no further details
0x7000	No operation in progress (initial value)
0x7001	First call after input of a new command (rising edge on "execute")
0x7002	Subsequent cal
0x8001	Time out error occurred
0x8002	No parameter selected
0x8201	Unsupported port
0x8202	Unsupported index
0x8203	Unsupported subindex
0x8205	The length at the "writeLen" parameter does not match the data record that will be written
0x8401	The IO-Link master has reported an error code, see "diagnostics"
0x8402	Received data record does not match operation
0x8403	Operation could not be completed in the specified time
0x8600	Internal state machine has reached an undefined state
0x8601	System function WRREC reports an error, see "diagnostics"
0x8602	System function RDREC reports an error, see "diagnostics"

Tab. 6.3: Error description for ioLError

Error code (ioLError)	Error description
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).

Tab. 6.4: Error description for ioLError

Error code (ioLError)	Error description
0x0000	No error
0x1000	Master communication error
0x1100	ISDU time out / Device event error
0x5200	Device checksum error
0x5600	Device checksum error

Error code (IoError)	Error description
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
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)
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).

7 Data structures

Tab. 7.1: Leuze_type_ ODT3C_2200

Parameter name	Data type	Description
DeviceData.Selection.Commands.CmdDeviceReset	Bool	[WRITE_ONLY] Device Reset
DeviceData.Selection.Commands.CmdApplicationReset	Bool	[WRITE_ONLY] Application Reset
DeviceData.Selection.Commands.CmdRestoreFactorySettings	Bool	[WRITE_ONLY] Restore Factory Settings
DeviceData.Selection.Commands.CmdTeachSp1	Bool	[WRITE_ONLY] Teach SP1
DeviceData.Selection.Commands.CmdTeachSp2	Bool	[WRITE_ONLY] Teach SP2
DeviceData.Selection.Commands.CmdActivationTakesPriorityOverPdout	Bool	[WRITE_ONLY] Activation (Takes Priority over PDout)
DeviceData.Selection.Commands.CmdDeactivationTakesPriorityOverPdout	Bool	[WRITE_ONLY] Deactivation (Takes Priority over PDout)
DeviceData.Selection.Commands.CmdResetPriorityPdoutWorking	Bool	[WRITE_ONLY] Reset Priority (PDout working)
DeviceData.Selection.DirectParameters1.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.DirectParameters1.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.DirectParameters1.Reserved_1	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.MasterCycleTime	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.MinCycleTime	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.MSequenceCapability	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.IoLinkVersionId	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.ProcessDataInputLength	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.ProcessDataOutputLength	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.VendorId1	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.VendorId2	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.DeviceId1	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.DeviceId2	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.DeviceId3	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.Reserved_13	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters1.Reserved_14	Bool	[READ_ONLY]

Parameter name	Data type	Description
DeviceData.Selection.DirectParameters1.Reserved_15	Bool	[READ_ONLY]
DeviceData.Selection.StandardCommand	Bool	[WRITE_ONLY]
DeviceData.Selection.DeviceAccessLocks.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.VendorName	Bool	[READ_ONLY]
DeviceData.Selection.VendorText	Bool	[READ_ONLY]
DeviceData.Selection.ProductName	Bool	[READ_ONLY]
DeviceData.Selection.ProductId	Bool	[READ_ONLY]
DeviceData.Selection.ProductText	Bool	[READ_ONLY]
DeviceData.Selection.SerialNumber	Bool	[READ_ONLY]
DeviceData.Selection.HardwareVersion	Bool	[READ_ONLY]
DeviceData.Selection.FirmwareVersion	Bool	[READ_ONLY]
DeviceData.Selection.ApplicationSpecificTag	Bool	[READ_WRITE]
DeviceData.Selection.FunctionTag	Bool	[READ_WRITE] Possibility to mark a device with function-specific information.
DeviceData.Selection.LocationTag	Bool	[READ_WRITE] Possibility to mark a device with location-specific information.
DeviceData.Selection.DeviceStatus	Bool	[READ_ONLY]
DeviceData.Selection.DetailedDeviceStatus.All	Bool	[READ_ONLY] all parameters of complex data type
DeviceData.Selection.TeachSelect	Bool	[READ_WRITE] Selects the switching signal channel for which a teach procedure will be applied.
DeviceData.Selection.TeachResult.All	Bool	[READ_ONLY] all parameters of complex data type
DeviceData.Selection.Ssc1Param.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.Ssc1Param.Sp1	Bool	[READ_WRITE] Defines the setpoint 1 value for the switching signal channel.
DeviceData.Selection.Ssc1Param.Sp2	Bool	[READ_WRITE] Defines the setpoint 2 value for the switching signal channel.
DeviceData.Selection.Ssc1Config.All	Bool	[READ_WRITE] all parameters of complex data type

Parameter name	Data type	Description
DeviceData.Selection.Ssc1Config.Logic	Bool	[READ_WRITE] Defines the logical representation of the switching signal SSC in the process data.
DeviceData.Selection.Ssc1Config.Mode	Bool	[READ_WRITE] Defines the evaluation mode for the switching signal SSC.
DeviceData.Selection.Ssc1Config.Hyst	Bool	[READ_WRITE] Defines the hysteresis at the switchpoint. A higher hysteresis may help to increase stability in critical applications.
DeviceData.Selection.Ssc2Param.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.Ssc2Param.Sp1	Bool	[READ_WRITE] Defines the setpoint 1 value for the switching signal channel.
DeviceData.Selection.Ssc2Param.Sp2	Bool	[READ_WRITE] Defines the setpoint 2 value for the switching signal channel.
DeviceData.Selection.Ssc2Config.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.Ssc2Config.Logic	Bool	[READ_WRITE] Defines the logical representation of the switching signal SSC in the process data.
DeviceData.Selection.Ssc2Config.Mode	Bool	[READ_WRITE] Defines the evaluation mode for the switching signal SSC.
DeviceData.Selection.Ssc2Config.Hyst	Bool	[READ_WRITE] Defines the hysteresis at the switchpoint. A higher hysteresis may help to increase stability in critical applications.
DeviceData.Selection.Ssc2TeachingReserveFactor	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.
DeviceData.Selection.Ssc1TeachingReserveFactor	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.
DeviceData.Selection.DistanceValueAveraging	Bool	[READ_WRITE] Adjustable size of sliding average buffer for a stable distance value.
DeviceData.Selection.TemporaryCounter	Bool	[READ_ONLY] Counter for Future Use.
DeviceData.Selection.AnalysisDepthSsc2	Bool	[READ_WRITE] Number of Scans considered for the Switching Output SSC.2 to toggle.

Parameter name	Data type	Description
DeviceData.Selection.TimerUnitSsc2	Bool	[READ_WRITE] Enable or Disable Timer Unit for SSC.2.
DeviceData.Selection.FunctionOfTimerUnitSsc2	Bool	[READ_WRITE] Function of Timer Unit SSC.2
DeviceData.Selection.TimeSsc2	Bool	[READ_WRITE] Timebase of Timer Unit SSC.2.
DeviceData.Selection.NumberOfObjectsSsc2	Bool	[READ_WRITE] Internal Object Counter SSC.2.
DeviceData.Selection.AnalysisDepthSsc1	Bool	[READ_WRITE] Number of Scans considered for the Switching Output SSC.1 to toggle.
DeviceData.Selection.TimerUnitSsc1	Bool	[READ_WRITE] Enable or Disable Timer Unit for SSC.1.
DeviceData.Selection.FunctionOfTimerUnitSsc1	Bool	[READ_WRITE] Function of Timer Unit SSC.1
DeviceData.Selection.TimeSsc1	Bool	[READ_WRITE] Timebase of Timer Unit SSC.1.
DeviceData.Selection.NumberOfObjectsSsc1	Bool	[READ_WRITE] Internal Object Counter SSC.1.
DeviceData.Selection.Temperature	Bool	[READ_ONLY] Temperature inside the Device.
DeviceData.Selection.ButtonFunctionLevel1	Bool	[READ_WRITE] Selection of function being executed after Button pressed for 2 to 6 seconds.
DeviceData.Selection.ButtonFunctionLevel2	Bool	[READ_WRITE] Selection of function being executed after Button pressed for 7 to 11 seconds.
DeviceData.Selection.ButtonFunctionLevel3	Bool	[READ_WRITE] Selection of function being executed after Button pressed for 12 to 16 seconds.
DeviceData.Selection.Pin4Function	Bool	[READ_WRITE] Modification of Pin 4 Function.
DeviceData.Selection.Pin2Function	Bool	[READ_WRITE] Modification of Pin 2 Function.
DeviceData.Selection.MdcDescriptor.All	Bool	[READ_ONLY] all parameters of complex data type
DeviceData.Selection.MdcDescriptor.LowerValue	Bool	[READ_ONLY] Shows the lower value of measurement range.
DeviceData.Selection.MdcDescriptor.UpperValue	Bool	[READ_ONLY] Shows the upper value of measurement range.
DeviceData.Selection.MdcDescriptor.UnitCode	Bool	[READ_ONLY] Shows the unique code for the physical unit.
DeviceData.Selection.MdcDescriptor.Scale	Bool	[READ_ONLY] Shows the multiplier for measurement value - $10^{\text{exp}(\text{scale})}$.

Parameter name	Data type	Description
DeviceData.Data.Commands.CmdDeviceReset	UInt	[WRITE_ONLY] Device Reset
DeviceData.Data.Commands.CmdApplicationReset	UInt	[WRITE_ONLY] Application Reset
DeviceData.Data.Commands.CmdRestoreFactorySettings	UInt	[WRITE_ONLY] Restore Factory Settings
DeviceData.Data.Commands.CmdTeachSp1	UInt	[WRITE_ONLY] Teach SP1
DeviceData.Data.Commands.CmdTeachSp2	UInt	[WRITE_ONLY] Teach SP2
DeviceData.Data.Commands.CmdActivationTakesPriorityOverPdout	UInt	[WRITE_ONLY] Activation (Takes Priority over PDout)
DeviceData.Data.Commands.CmdDeactivationTakesPriorityOverPdout	UInt	[WRITE_ONLY] Deactivation (Takes Priority over PDout)
DeviceData.Data.Commands.CmdResetPriorityPdoutWorking	UInt	[WRITE_ONLY] Reset Priority (PDout working)
DeviceData.Data.DirectParameters1.Reserved_1	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.MasterCycleTime	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.MinCycleTime	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.MSequenceCapability	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.IoLinkVersionId	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.ProcessDataInputLength	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.ProcessDataOutputLength	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.VendorId1	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.VendorId2	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.DeviceId1	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.DeviceId2	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.DeviceId3	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.Reserved_13	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.Reserved_14	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.Reserved_15	UInt	[READ_ONLY]
DeviceData.Data.StandardCommand	UInt	[WRITE_ONLY]
DeviceData.Data.DeviceAccessLocks.ParameterWriteAccessLock	Bool	[READ_WRITE]
DeviceData.Data.DeviceAccessLocks.DataStorageLock	Bool	[READ_WRITE]
DeviceData.Data.DeviceAccessLocks.LocalParameterizationLock	Bool	[READ_WRITE]

Parameter name	Data type	Description
DeviceData.Data.DeviceAccessLocks.LocalUserInterfaceLock	Bool	[READ_WRITE]
DeviceData.Data.VendorName	String	[READ_ONLY]
DeviceData.Data.VendorText	String	[READ_ONLY]
DeviceData.Data.ProductName	String	[READ_ONLY]
DeviceData.Data.ProductId	String	[READ_ONLY]
DeviceData.Data.ProductText	String	[READ_ONLY]
DeviceData.Data.SerialNumber	String	[READ_ONLY]
DeviceData.Data.HardwareVersion	String	[READ_ONLY]
DeviceData.Data.FirmwareVersion	String	[READ_ONLY]
DeviceData.Data.ApplicationSpecificTag	String	[READ_WRITE]
DeviceData.Data.FunctionTag	String	[READ_WRITE] Possibility to mark a device with function-specific information.
DeviceData.Data.LocationTag	String	[READ_WRITE] Possibility to mark a device with location-specific information.
DeviceData.Data.DeviceStatus	UInt	[READ_ONLY]
DeviceData.Data.DetailedDeviceStatus.Item_1	String	[READ_ONLY]
DeviceData.Data.DetailedDeviceStatus.Item_2	String	[READ_ONLY]
DeviceData.Data.TeachSelect	UInt	[READ_WRITE] Selects the switching signal channel for which a teach procedure will be applied.
DeviceData.Data.TeachResult.State	UInt	[READ_ONLY] Indicates the current state of the teach procedure.
DeviceData.Data.TeachResult.FlagSp1Tp1	Bool	[READ_ONLY] Indicates the current teach result for the teach point.
DeviceData.Data.TeachResult.FlagSp1Tp2	Bool	[READ_ONLY] Indicates the current teach result for the teach point.
DeviceData.Data.TeachResult.FlagSp2Tp1	Bool	[READ_ONLY] Indicates the current teach result for the teach point.
DeviceData.Data.TeachResult.FlagSp2Tp2	Bool	[READ_ONLY] Indicates the current teach result for the teach point.
DeviceData.Data.Ssc1Param.Sp1	Int	[READ_WRITE] Defines the setpoint 1 value for the switching signal channel.

Parameter name	Data type	Description
DeviceData.Data.Ssc1Param.Sp2	Int	[READ_WRITE] Defines the setpoint 2 value for the switching signal channel.
DeviceData.Data.Ssc1Config.Logic	UInt	[READ_WRITE] Defines the logical representation of the switching signal SSC in the process data.
DeviceData.Data.Ssc1Config.Mode	UInt	[READ_WRITE] Defines the evaluation mode for the switching signal SSC.
DeviceData.Data.Ssc1Config.Hyst	Int	[READ_WRITE] Defines the hysteresis at the switchpoint. A higher hysteresis may help to increase stability in critical applications.
DeviceData.Data.Ssc2Param.Sp1	Int	[READ_WRITE] Defines the setpoint 1 value for the switching signal channel.
DeviceData.Data.Ssc2Param.Sp2	Int	[READ_WRITE] Defines the setpoint 2 value for the switching signal channel.
DeviceData.Data.Ssc2Config.Logic	UInt	[READ_WRITE] Defines the logical representation of the switching signal SSC in the process data.
DeviceData.Data.Ssc2Config.Mode	UInt	[READ_WRITE] Defines the evaluation mode for the switching signal SSC.
DeviceData.Data.Ssc2Config.Hyst	Int	[READ_WRITE] Defines the hysteresis at the switchpoint. A higher hysteresis may help to increase stability in critical applications.
DeviceData.Data.Ssc2TeachingReserveFactor	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.
DeviceData.Data.Ssc1TeachingReserveFactor	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.
DeviceData.Data.DistanceValueAveraging	UInt	[READ_WRITE] Adjustable size of sliding average buffer for a stable distance value.
DeviceData.Data.TemporaryCounter	UInt	[READ_ONLY] Counter for Future Use.
DeviceData.Data.AnalysisDepthSsc2	Int	[READ_WRITE] Number of Scans considered for the Switching Output SSC.2 to toggle.
DeviceData.Data.TimerUnitSsc2	UInt	[READ_WRITE] Enable or Disable Timer Unit for SSC.2.

Parameter name	Data type	Description
DeviceData.Data.FunctionOfTimerUnitSsc2	UInt	[READ_WRITE] Function of Timer Unit SSC.2
DeviceData.Data.TimeSsc2	UInt	[READ_WRITE] Timebase of Timer Unit SSC.2.
DeviceData.Data.NumberOfObjectsSsc2	UInt	[READ_WRITE] Internal Object Counter SSC.2.
DeviceData.Data.AnalysisDepthSsc1	Int	[READ_WRITE] Number of Scans considered for the Switching Output SSC.1 to toggle.
DeviceData.Data.TimerUnitSsc1	UInt	[READ_WRITE] Enable or Disable Timer Unit for SSC.1.
DeviceData.Data.FunctionOfTimerUnitSsc1	UInt	[READ_WRITE] Function of Timer Unit SSC.1
DeviceData.Data.TimeSsc1	UInt	[READ_WRITE] Timebase of Timer Unit SSC.1.
DeviceData.Data.NumberOfObjectsSsc1	UInt	[READ_WRITE] Internal Object Counter SSC.1.
DeviceData.Data.Temperature	Int	[READ_ONLY] Temperature inside the Device.
DeviceData.Data.ButtonFunctionLevel1	Int	[READ_WRITE] Selection of function being executed after Button pressed for 2 to 6 seconds.
DeviceData.Data.ButtonFunctionLevel2	Int	[READ_WRITE] Selection of function being executed after Button pressed for 7 to 11 seconds.
DeviceData.Data.ButtonFunctionLevel3	Int	[READ_WRITE] Selection of function being executed after Button pressed for 12 to 16 seconds.
DeviceData.Data.Pin4Function	UInt	[READ_WRITE] Modification of Pin 4 Function.
DeviceData.Data.Pin2Function	UInt	[READ_WRITE] Modification of Pin 2 Function.
DeviceData.Data.MdcDescriptor.LowerValue	Int	[READ_ONLY] Shows the lower value of measurement range.
DeviceData.Data.MdcDescriptor.UpperValue	Int	[READ_ONLY] Shows the upper value of measurement range.
DeviceData.Data.MdcDescriptor.UnitCode	UInt	[READ_ONLY] Shows the unique code for the physical unit.
DeviceData.Data.MdcDescriptor.Scale	Int	[READ_ONLY] Shows the multiplier for measurement value - $10^{\text{exp}(\text{scale})}$.

Tab. 7.2: Leuze_type_PD_ODT3C_2200

Parameter name	Data type	Description
FC_Leuze_PD_ODT3C_2200.MdcMeasurementValue	Int	
FC_Leuze_PD_ODT3C_2200.MdcScale	Int	
FC_Leuze_PD_ODT3C_2200.Ssc1SwitchingSignal	Bool	
FC_Leuze_PD_ODT3C_2200.Ssc2SwitchingSignal	Bool	
FC_Leuze_PD_ODT3C_2200.Measure	Bool	
FC_Leuze_PD_ODT3C_2200.Signal	Bool	
FC_Leuze_PD_ODT3C_2200.Warning	Bool	
FC_Leuze_PD_ODT3C_2200.Quality	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)