



PLC Integration HT3C_2150

**IO - Link service data function block + process data parser function for
Module 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

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_HT3C_2150" 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_HT3C_2150	Sensor data

See structure description of Leuze_type_HT3C_2150 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_HT3C_2150". 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_HT3C_2150" 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_ HT3C_2150" 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_HT3C_2150 simplifies the interpretation of composed IO-Link process data. This data is provided as a data structure on the PLC side. 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.
ErrorCode	OUTPUT	WORD	Error code details see in the Siemens help system ("DPRD_DAT").
RET_VAL	OUTPUT	Leuze_type_PD_HT3C_2150	Reference to the instance of the data structure Leuze_type_PD_HT3C_2150. The structure includes the disaggregated values of the process data.

See structure description of Leuze_type_PD_HT3C_2150 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_HT3C_2150

Parameter name	Data type	Description
DeviceData.Selection.Commands.DeviceReset	Bool	[WRITE_ONLY] Device Reset
DeviceData.Selection.Commands.ApplicationReset	Bool	[WRITE_ONLY] Application Reset
DeviceData.Selection.Commands.RestoreFactorySettings	Bool	[WRITE_ONLY] Restore Factory Settings
DeviceData.Selection.Commands.TeachSp	Bool	[WRITE_ONLY] Teach SP
DeviceData.Selection.Commands.ActivationTakesPriorityOverPdout	Bool	[WRITE_ONLY] Activation (Takes Priority over PDout)
DeviceData.Selection.Commands.DeactivationTakesPriorityOverPdout	Bool	[WRITE_ONLY] Deactivation (Takes Priority over PDout)
DeviceData.Selection.Commands.ResetPriorityPdoutWorking	Bool	[WRITE_ONLY] Reset Priority (PDout working)
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]
DeviceData.Selection.DirectParameters1.Reserved_15	Bool	[READ_ONLY]
DeviceData.Selection.DirectParameters2.All	Bool	[READ_WRITE] all parameters of complex data type

Parameter name	Data type	Description
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter1	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter2	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter3	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter4	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter5	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter6	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter7	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter8	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter9	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter10	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter11	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter12	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter13	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter14	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter15	Bool	[READ_WRITE]
DeviceData.Selection.DirectParameters2.DeviceSpecificParameter16	Bool	[READ_WRITE]
DeviceData.Selection.StandardCommand	Bool	[WRITE_ONLY]
DeviceData.Selection.DeviceAccessLocks.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.ProfileCharacteristic.All	Bool	[READ_ONLY] 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]

Parameter name	Data type	Description
DeviceData.Selection.ApplicationSpecificTag	Bool	[READ_WRITE]
DeviceData.Selection.FunctionTag	Bool	[READ_WRITE]
DeviceData.Selection.LocationTag	Bool	[READ_WRITE]
DeviceData.Selection.DeviceStatus	Bool	[READ_ONLY]
DeviceData.Selection.DetailedDeviceStatus.All	Bool	[READ_ONLY] all parameters of complex data type
DeviceData.Selection.SscParamSp	Bool	[READ_WRITE] SSC1 Param - SP
DeviceData.Selection.SscConfigLogic_57	Bool	[READ_WRITE] SSC1 Logic
DeviceData.Selection.TeachInSelect	Bool	[READ_WRITE] Selection of Teaching Target
DeviceData.Selection.TiResult.All	Bool	[READ_ONLY] all parameters of complex data type
DeviceData.Selection.Ssc2TeachingReserveFactor	Bool	[READ_WRITE] This three-step Addition Setting only has an Effect on Teaching Operations
DeviceData.Selection.Ssc1TeachingReserveFactor	Bool	[READ_WRITE] This three-step Addition Setting only has an Effect on Teaching Operations
DeviceData.Selection.TemporaryCounter	Bool	[READ_ONLY] Counter for Future Use
DeviceData.Selection.AnalysisDepthSsc2	Bool	[READ_WRITE] Number of Scans considered for the Switching Output SSC2 to toggle
DeviceData.Selection.TimerUnitSsc2	Bool	[READ_WRITE] Timer Unit SSC2
DeviceData.Selection.FunctionOfTimerUnitSsc2	Bool	[READ_WRITE] Function of Timer Unit SSC2
DeviceData.Selection.TimeSsc2	Bool	[READ_WRITE] Time SSC2
DeviceData.Selection.NumberOfObjectsSsc2	Bool	[READ_WRITE] Internal Object Counter SSC2
DeviceData.Selection.Ssc2ParamSp	Bool	[READ_WRITE] SSC2 Param - SP
DeviceData.Selection.Ssc2ConfigLogic_187	Bool	[READ_WRITE] SSC2 Logic
DeviceData.Selection.AnalysisDepthSsc1	Bool	[READ_WRITE] Number of Scans considered for the Switching Output SSC1 to toggle
DeviceData.Selection.TimerUnitSsc1	Bool	[READ_WRITE] Timer Unit SSC1
DeviceData.Selection.FunctionOfTimerUnitSsc1	Bool	[READ_WRITE] Function of Timer Unit SSC1
DeviceData.Selection.TimeSsc1	Bool	[READ_WRITE] Time SSC1
DeviceData.Selection.NumberOfObjectsSsc1	Bool	[READ_WRITE] Internal Object Counter SSC1

Parameter name	Data type	Description
DeviceData.Selection.Temperature	Bool	[READ_ONLY] Temperature inside the Device
DeviceData.Selection.ButtonFunctionLevel1	Bool	[READ_WRITE] Button Function Level 1
DeviceData.Selection.ButtonFunctionLevel2	Bool	[READ_WRITE] Button Function Level 2
DeviceData.Selection.ButtonFunctionLevel3	Bool	[READ_WRITE] Button Function Level 3
DeviceData.Selection.Pin4Function	Bool	[READ_WRITE] Pin 4 Function
DeviceData.Selection.Pin2Function	Bool	[READ_WRITE] Pin 2 Function
DeviceData.Data.Commands.DeviceReset	UInt	[WRITE_ONLY] Device Reset
DeviceData.Data.Commands.ApplicationReset	UInt	[WRITE_ONLY] Application Reset
DeviceData.Data.Commands.RestoreFactorySettings	UInt	[WRITE_ONLY] Restore Factory Settings
DeviceData.Data.Commands.TeachSp	UInt	[WRITE_ONLY] Teach SP
DeviceData.Data.Commands.ActivationTakesPriorityOverPdout	UInt	[WRITE_ONLY] Activation (Takes Priority over PDout)
DeviceData.Data.Commands.DeactivationTakesPriorityOverPdout	UInt	[WRITE_ONLY] Deactivation (Takes Priority over PDout)
DeviceData.Data.Commands.ResetPriorityPdoutWorking	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]

Parameter name	Data type	Description
DeviceData.Data.DirectParameters1.Reserved_14	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters1.Reserved_15	UInt	[READ_ONLY]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter1	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter2	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter3	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter4	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter5	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter6	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter7	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter8	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter9	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter10	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter11	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter12	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter13	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter14	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter15	UInt	[READ_WRITE]
DeviceData.Data.DirectParameters2.DeviceSpecificParameter16	UInt	[READ_WRITE]
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]
DeviceData.Data.DeviceAccessLocks.LocalUserInterfaceLock	Bool	[READ_WRITE]
DeviceData.Data.ProfileCharacteristic.DeviceProfile1	UInt	[READ_ONLY] 0x0007: Adjustable Switching Sensor, Single Value Teach, Disable Function
DeviceData.Data.ProfileCharacteristic.ApplicationProfile	UInt	[READ_ONLY] 0x4000: Identification and Diagnosis
DeviceData.Data.VendorName	String	[READ_ONLY]

Parameter name	Data type	Description
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]
DeviceData.Data.LocationTag	String	[READ_WRITE]
DeviceData.Data.DeviceStatus	UInt	[READ_ONLY]
DeviceData.Data.DetailedDeviceStatus.Item_1	String	[READ_ONLY]
DeviceData.Data.DetailedDeviceStatus.Item_2	String	[READ_ONLY]
DeviceData.Data.SscParamSp	Int	[READ_WRITE] SSC1 Param - SP
DeviceData.Data.SscConfigLogic_57	UInt	[READ_WRITE] SSC1 Logic
DeviceData.Data.TeachInSelect	UInt	[READ_WRITE] Selection of Teaching Target
DeviceData.Data.TiResult.State	UInt	[READ_ONLY]
DeviceData.Data.TiResult.FlagSpTp1	Bool	[READ_ONLY]
DeviceData.Data.Ssc2TeachingReserveFactor	Int	[READ_WRITE] This three-step Addition Setting only has an Effect on Teaching Operations
DeviceData.Data.Ssc1TeachingReserveFactor	Int	[READ_WRITE] This three-step Addition Setting only has an Effect on Teaching Operations
DeviceData.Data.TemporaryCounter	UInt	[READ_ONLY] Counter for Future Use
DeviceData.Data.AnalysisDepthSsc2	Int	[READ_WRITE] Number of Scans considered for the Switching Output SSC2 to toggle
DeviceData.Data.TimerUnitSsc2	UInt	[READ_WRITE] Timer Unit SSC2
DeviceData.Data.FunctionOfTimerUnitSsc2	UInt	[READ_WRITE] Function of Timer Unit SSC2
DeviceData.Data.TimeSsc2	UInt	[READ_WRITE] Time SSC2

Parameter name	Data type	Description
DeviceData.Data.NumberOfObjectsSsc2	UInt	[READ_WRITE] Internal Object Counter SSC2
DeviceData.Data.Ssc2ParamSp	Int	[READ_WRITE] SSC2 Param - SP
DeviceData.Data.Ssc2ConfigLogic_187	UInt	[READ_WRITE] SSC2 Logic
DeviceData.Data.AnalysisDepthSsc1	Int	[READ_WRITE] Number of Scans considered for the Switching Output SSC1 to toggle
DeviceData.Data.TimerUnitSsc1	UInt	[READ_WRITE] Timer Unit SSC1
DeviceData.Data.FunctionOfTimerUnitSsc1	UInt	[READ_WRITE] Function of Timer Unit SSC1
DeviceData.Data.TimeSsc1	UInt	[READ_WRITE] Time SSC1
DeviceData.Data.NumberOfObjectsSsc1	UInt	[READ_WRITE] Internal Object Counter SSC1
DeviceData.Data.Temperature	Int	[READ_ONLY] Temperature inside the Device
DeviceData.Data.ButtonFunctionLevel1	Int	[READ_WRITE] Button Function Level 1
DeviceData.Data.ButtonFunctionLevel2	Int	[READ_WRITE] Button Function Level 2
DeviceData.Data.ButtonFunctionLevel3	Int	[READ_WRITE] Button Function Level 3
DeviceData.Data.Pin4Function	UInt	[READ_WRITE] Pin 4 Function
DeviceData.Data.Pin2Function	UInt	[READ_WRITE] Pin 2 Function

Tab. 7.2: Leuze_type_PD_HT3C_2150

Parameter name	Data type	Description
FC_Leuze_PD_HT3C_2150.Ssc1	Bool	
FC_Leuze_PD_HT3C_2150.Ssc2	Bool	
FC_Leuze_PD_HT3C_2150.Measure	Bool	
FC_Leuze_PD_HT3C_2150.Signal	Bool	
FC_Leuze_PD_HT3C_2150.Warning	Bool	
FC_Leuze_PD_HT3C_2150.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 SP			UIntegerT	65	W	Teach SP
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	
Reserved	0	15	UIntegerT		R	

Parameter	Index	Subindex	Data type	Default	AR	Description
Standard Command	0	16	UIntegerT		W	(0 ... 63): Reserved 128: Device Reset 129: Application Reset 130: Restore Factory Settings (131 ... 159): Reserved
Direct Parameters 2	1	0	RecordT		RW	
Device Specific Parameter 1	1	1	UIntegerT		RW	
Device Specific Parameter 2	1	2	UIntegerT		RW	
Device Specific Parameter 3	1	3	UIntegerT		RW	
Device Specific Parameter 4	1	4	UIntegerT		RW	
Device Specific Parameter 5	1	5	UIntegerT		RW	
Device Specific Parameter 6	1	6	UIntegerT		RW	
Device Specific Parameter 7	1	7	UIntegerT		RW	
Device Specific Parameter 8	1	8	UIntegerT		RW	
Device Specific Parameter 9	1	9	UIntegerT		RW	
Device Specific Parameter 10	1	10	UIntegerT		RW	
Device Specific Parameter 11	1	11	UIntegerT		RW	
Device Specific Parameter 12	1	12	UIntegerT		RW	
Device Specific Parameter 13	1	13	UIntegerT		RW	
Device Specific Parameter 14	1	14	UIntegerT		RW	
Device Specific Parameter 15	1	15	UIntegerT		RW	
Device Specific Parameter 16	1	16	UIntegerT		RW	
Standard Command	2	0	UIntegerT		W	(0 ... 63): Reserved 128: Device Reset 129: Application Reset 130: Restore Factory Settings (131 ... 159): Reserved 65: Teach SP 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	

Parameter	Index	Subindex	Data type	Default	AR	Description
Local Parameterization Lock	12	3	BooleanT		RW	
Local User Interface Lock	12	4	BooleanT		RW	
Profile Characteristic	13	0	RecordT		R	Collection of Profile Identifiers
Device Profile 1	13	1	UIntegerT	7	R	0x0007: Adjustable Switching Sensor, Single Value Teach, Disable Function 7: 0x0007: Adjustable Switching Sensor, Single Value Teach, Disable Function (SSP 2.4) 16384: 0x4000: Identification and Diagnosis
Application Profile	13	2	UIntegerT	16384	R	0x4000: Identification and Diagnosis 7: 0x0007: Adjustable Switching Sensor, Single Value Teach, Disable Function (SSP 2.4) 16384: 0x4000: Identification and Diagnosis
Vendor Name	16	0	StringT	Leuze electronic GmbH + Co. KG	R	
Vendor Text	17	0	StringT	Leuze electronic - the sensor people	R	
Product Name	18	0	StringT		R	
Product ID	19	0	StringT		R	
Product Text	20	0	StringT	Scanner with Background Suppression	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	
Location Tag	26	0	StringT	***	RW	
Device Status	36	0	UIntegerT		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	

Parameter	Index	Subindex	Data type	Default	AR	Description
SSC Param - SP	56	0	IntegerT	155	RW	SSC1 Param - SP (30 ... 165)
SSC Config - Logic	57	0	UIntegerT	0	RW	SSC1 Logic 0: High active 1: Low active
Teach-In Select	58	0	UIntegerT		RW	Selection of Teaching Target 0: Teaching of Default SSC, that is SSC1 1: Teaching of SSC1 2: Teaching of SSC2 255: Teaching of all SSCs: SSC1 and SSC2
TI Result	59	0	RecordT		R	Teach-In Result (Teach State and Success Flags)
State	59	1	UIntegerT		R	0: Idle. No Teach since Power-On 1: Teach of SP succeeded 5: Busy. Teach is running 7: Teach Error
Flag SP TP1	59	2	BooleanT		R	False: No Teach of SP TP1 since Power-On or Teach Error True: Teach of SP TP1 was successful
SSC2 Teaching Reserve Factor	82	0	IntegerT	0	RW	This three-step Addition Setting only has an Effect on Teaching Operations 0: Minimum Reserve 1: Medium Reserve 2: Large Reserve
SSC1 Teaching Reserve Factor	92	0	IntegerT	0	RW	This three-step Addition Setting only has an Effect on Teaching Operations 0: Minimum Reserve 1: Medium Reserve 2: Large Reserve
Temporary Counter	156	0	UIntegerT		R	Counter for Future Use
Analysis Depth SSC2	180	0	IntegerT	2	RW	Number of Scans considered for the Switching Output SSC2 to toggle (1 ... 100)
Timer Unit SSC2	182	0	UIntegerT	0	RW	Timer Unit SSC2 0: Off 255: On
Function of Timer Unit SSC2	183	0	UIntegerT	0	RW	Function of Timer Unit SSC2 0: On Delay 1: Off Delay 2: Pulse Stretching 3: Pulse Suppression
Time SSC2	184	0	UIntegerT	200	RW	Time SSC2 (1 ... 50000)
Number of Objects SSC2	185	0	UIntegerT		RW	Internal Object Counter SSC2
SSC2 Param - SP	186	0	IntegerT	155	RW	SSC2 Param - SP (30 ... 165)

Parameter	Index	Subindex	Data type	Default	AR	Description
SSC2 Config - Logic	187	0	UIntegerT	0	RW	SSC2 Logic 0: High active 1: Low active
Analysis Depth SSC1	190	0	IntegerT	2	RW	Number of Scans considered for the Switching Output SSC1 to toggle (1 ... 100)
Timer Unit SSC1	192	0	UIntegerT	0	RW	Timer Unit SSC1 0: Off 255: On
Function of Timer Unit SSC1	193	0	UIntegerT	0	RW	Function of Timer Unit SSC1 0: On Delay 1: Off Delay 2: Pulse Stretching 3: Pulse Suppression
Time SSC1	194	0	UIntegerT	200	RW	Time SSC1 (1 ... 50000)
Number of Objects SSC1	195	0	UIntegerT		RW	Internal Object Counter SSC1
Temperature	220	0	IntegerT		R	Temperature inside the Device
Button Function Level 1	241	0	IntegerT	2	RW	Button Function Level 1 0: No Button Function 2: Teach SP of SSC1, minimum Reserve 3: Teach SP of SSC2, minimum Reserve 4: Teach SP of SSC1, medium Reserve 5: Teach SP of SSC2, medium Reserve 6: Teach SP of SSC1, large Reserve 7: Teach SP of SSC2, large Reserve 19: Set SSC1 Logic to Non-Inverted 20: Set SSC1 Logic to Inverted 21: Toggle SSC1 Logic 22: Enable SSC1 Time Module 23: Disable SSC1 Time Module 24: On/Off Toggle SSC1 Time Module 31: Set SSC2 Logic to Non-Inverted 32: Set SSC2 Logic to Inverted 33: Toggle SSC2 Logic 34: Enable SSC2 Time Module 35: Disable SSC2 Time Module 36: On/Off Toggle SSC2 Time Module 43: Set SSC1 and SSC2 Logic to Non-Inverted 44: Set SSC1 and SSC2 Logic to inverted 45: Toggle SSC1 and SSC2 Logic

Parameter	Index	Subindex	Data type	Default	AR	Description
Button Function Level 2	242	0	IntegerT	3	RW	Button Function Level 2 0: No Button Function 2: Teach SP of SSC1, minimum Reserve 3: Teach SP of SSC2, minimum Reserve 4: Teach SP of SSC1, medium Reserve 5: Teach SP of SSC2, medium Reserve 6: Teach SP of SSC1, large Reserve 7: Teach SP of SSC2, large Reserve 19: Set SSC1 Logic to Non-Inverted 20: Set SSC1 Logic to Inverted 21: Toggle SSC1 Logic 22: Enable SSC1 Time Module 23: Disable SSC1 Time Module 24: On/Off Toggle SSC1 Time Module 31: Set SSC2 Logic to Non-Inverted 32: Set SSC2 Logic to Inverted 33: Toggle SSC2 Logic 34: Enable SSC2 Time Module 35: Disable SSC2 Time Module 36: On/Off Toggle SSC2 Time Module 43: Set SSC1 and SSC2 Logic to Non-Inverted 44: Set SSC1 and SSC2 Logic to inverted 45: Toggle SSC1 and SSC2 Logic
Button Function Level 3	243	0	IntegerT	45	RW	Button Function Level 3 0: No Button Function 2: Teach SP of SSC1, minimum Reserve 3: Teach SP of SSC2, minimum Reserve 4: Teach SP of SSC1, medium Reserve 5: Teach SP of SSC2, medium Reserve 6: Teach SP of SSC1, large Reserve 7: Teach SP of SSC2, large Reserve 19: Set SSC1 Logic to Non-Inverted 20: Set SSC1 Logic to Inverted 21: Toggle SSC1 Logic 22: Enable SSC1 Time Module 23: Disable SSC1 Time Module 24: On/Off Toggle SSC1 Time Module 31: Set SSC2 Logic to Non-Inverted 32: Set SSC2 Logic to Inverted 33: Toggle SSC2 Logic 34: Enable SSC2 Time Module 35: Disable SSC2 Time Module 36: On/Off Toggle SSC2 Time Module 43: Set SSC1 and SSC2 Logic to Non-Inverted 44: Set SSC1 and SSC2 Logic to inverted 45: Toggle SSC1 and SSC2 Logic
Pin 4 Function	251	0	UIntegerT	1	RW	Pin 4 Function 0: No Pin Function 1: Pin is SSC1 2: Pin is not SSC1 3: Pin is SSC2 4: Pin is not SSC2 7: Pin is Warning 8: Pin is not Warning

Parameter	Index	Subindex	Data type	Default	AR	Description
Pin 2 Function	252	0	UIntegerT	3	RW	Pin 2 Function 0: No Pin Function 1: Pin is SSC1 2: Pin is not SSC1 3: Pin is SSC2 4: Pin is not SSC2 7: Pin is Warning 8: Pin is not Warning

9 Technical specifications

9.1 General data

Tab. 9.1: Sensor and IODD version

IODD version	V1.7
IODD release date	2020-8-10
Device family	Scanner with Background Suppression
Device ID	2150
Device name	HT3C.3/L6
Device variants	HT3C.3/L6-M8 (50141695), HT3C.B3/L6-M8 (50141700)