



PLC Integration HT110_2173

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


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_HT110_2173" 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_HT110_2173	Sensor data

See structure description of Leuze_type_HT110_2173 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_HT110_2173". 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_HT110_2173" 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_ HT110_2173" 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_HT110_2173 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_HT110_2173	Reference to the instance of the data structure Leuze_type_PD_HT110_2173. The structure includes the disaggregated values of the process data.

See structure description of Leuze_type_PD_HT110_2173 in chapter 7.

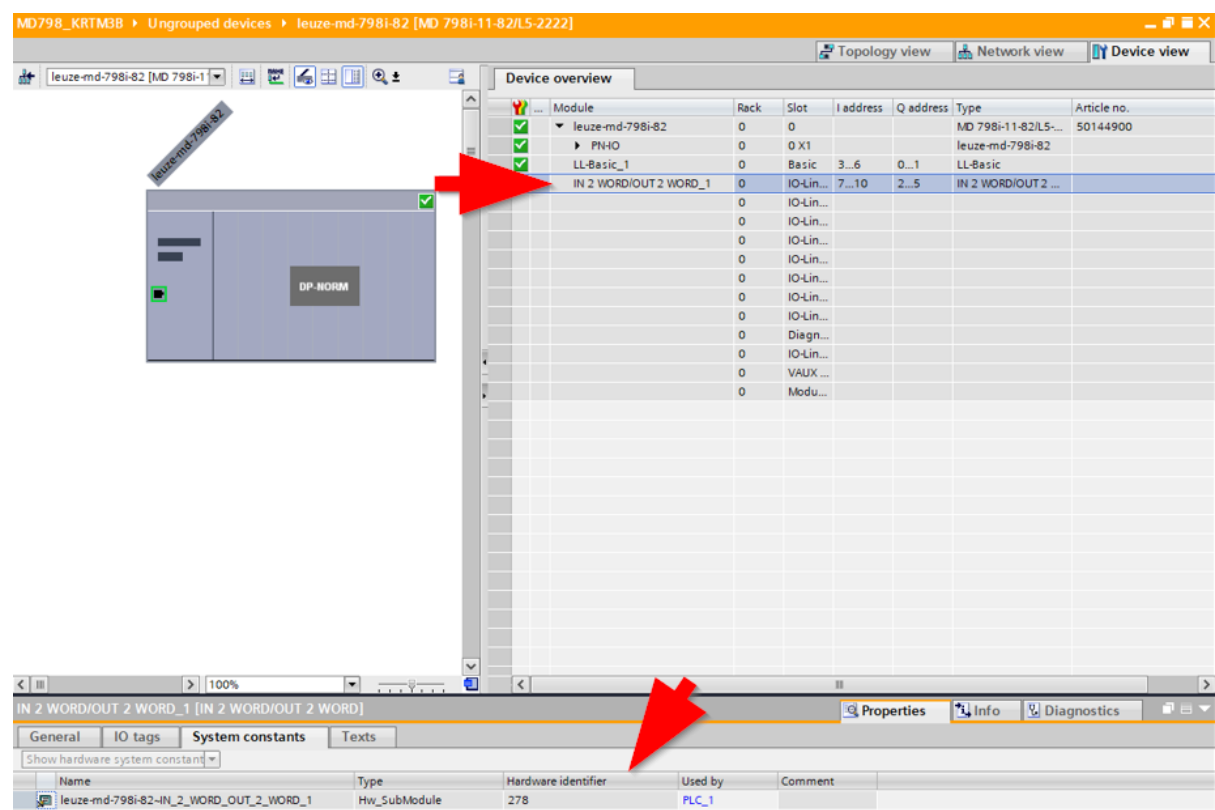


Fig. 5.2: Hardware ID for sensors connected to Leuze MD798 IO-Link master

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 (ioLError)	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_HT110_2173

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.EmitterOff	Bool	[WRITE_ONLY] Emitter OFF
DeviceData.Selection.Commands.EmitterOn	Bool	[WRITE_ONLY] Emitter ON
DeviceData.Selection.Commands.ResetSwitchingChannel	Bool	[WRITE_ONLY] Reset switching-channel
DeviceData.Selection.Commands.DetectSensor	Bool	[WRITE_ONLY] Detect Sensor
DeviceData.Selection.Commands.TeachApply	Bool	[WRITE_ONLY] Teach Apply
DeviceData.Selection.Commands.SingleValueTeachSwitchpoint1	Bool	[WRITE_ONLY] Single value teach - switchpoint 1
DeviceData.Selection.Commands.SingleValueTeachSwitchpoint2	Bool	[WRITE_ONLY] Single value teach - switchpoint 2
DeviceData.Selection.Commands.TwoValueTeachTeachpoint1ForSwitchpoint1	Bool	[WRITE_ONLY] Two value teach - teachpoint 1 for switchpoint 1
DeviceData.Selection.Commands.TwoValueTeachTeachpoint2ForSwitchpoint1	Bool	[WRITE_ONLY] Two value teach - teachpoint 2 for switchpoint 1
DeviceData.Selection.Commands.TwoValueTeachTeachpoint1ForSwitchpoint2	Bool	[WRITE_ONLY] Two value teach - teachpoint 1 for switchpoint 2
DeviceData.Selection.Commands.TwoValueTeachTeachpoint2ForSwitchpoint2	Bool	[WRITE_ONLY] Two value teach - teachpoint 2 for switchpoint 2
DeviceData.Selection.Commands.DynamicTeachSwitchpoint1Start	Bool	[WRITE_ONLY] Dynamic teach - switchpoint 1 - start
DeviceData.Selection.Commands.DynamicTeachSwitchpoint1Stop	Bool	[WRITE_ONLY] Dynamic teach - switchpoint 1 - stop
DeviceData.Selection.Commands.DynamicTeachSwitchpoint2Start	Bool	[WRITE_ONLY] Dynamic teach - switchpoint 2 - start
DeviceData.Selection.Commands.DynamicTeachSwitchpoint2Stop	Bool	[WRITE_ONLY] Dynamic teach - switchpoint 2 - stop
DeviceData.Selection.Commands.TeachInCancel	Bool	[WRITE_ONLY] Teach-in cancel
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]

Parameter name	Data type	Description
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
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]

Parameter name	Data type	Description
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.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.FirmwareVersion	Bool	[READ_ONLY]
DeviceData.Selection.ApplicationSpecificTag	Bool	[READ_WRITE]
DeviceData.Selection.SwitchingOutputTeachIn.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.SwitchingOutputTeachIn.TeachChannel	Bool	[READ_WRITE]
DeviceData.Selection.TeachInStatus.All	Bool	[READ_ONLY] all parameters of complex data type
DeviceData.Selection.TeachInStatus.TeachStatus	Bool	[READ_ONLY]
DeviceData.Selection.DefineSwitchingOutputQ1.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.DefineSwitchingOutputQ1.Switchpoint1	Bool	[READ_WRITE]
DeviceData.Selection.DefineSwitchingOutputQ1.Switchpoint2	Bool	[READ_WRITE]
DeviceData.Selection.SetUpSwitchingOutputQ1.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.SetUpSwitchingOutputQ1.NoNc	Bool	[READ_WRITE]
DeviceData.Selection.SetUpSwitchingOutputQ1.SwitchingMode	Bool	[READ_WRITE]
DeviceData.Selection.SetUpSwitchingOutputQ1.Hysteresis	Bool	[READ_WRITE]

Parameter name	Data type	Description
DeviceData.Selection.DefineSwitchingOutputQ2.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.DefineSwitchingOutputQ2.Switchpoint1	Bool	[READ_WRITE]
DeviceData.Selection.DefineSwitchingOutputQ2.Switchpoint2	Bool	[READ_WRITE]
DeviceData.Selection.SetUpSwitchingOutputQ2.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.SetUpSwitchingOutputQ2.NoNc	Bool	[READ_WRITE]
DeviceData.Selection.SetUpSwitchingOutputQ2.SwitchingMode	Bool	[READ_WRITE]
DeviceData.Selection.SetUpSwitchingOutputQ2.Hysteresis	Bool	[READ_WRITE]
DeviceData.Selection.EventOnOff.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.EventOnOff.EventOnOff	Bool	[READ_WRITE]
DeviceData.Selection.Temperature.All	Bool	[READ_ONLY] all parameters of complex data type
DeviceData.Selection.Temperature.OperatingTemperature	Bool	[READ_ONLY]
DeviceData.Selection.Temperature.MaxOperatingTemperatureSinceRestart	Bool	[READ_ONLY]
DeviceData.Selection.Temperature.MinOperatingTemperatureSinceRestart	Bool	[READ_ONLY]
DeviceData.Selection.Temperature.MaxLifetimeTemperature	Bool	[READ_ONLY]
DeviceData.Selection.Temperature.MinLifetimeTemperature	Bool	[READ_ONLY]
DeviceData.Selection.Temperature_Event_Level.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.Temperature_Event_Level.LimitTemperatureMin	Bool	[READ_WRITE]
DeviceData.Selection.Temperature_Event_Level.LimitTemperatureMax	Bool	[READ_WRITE]
DeviceData.Selection.OperatingData.All	Bool	[READ_ONLY] all parameters of complex data type
DeviceData.Selection.OperatingData.CounterOperatingHours	Bool	[READ_ONLY]
DeviceData.Selection.OperatingData.CounterSwitchCycle	Bool	[READ_ONLY]
DeviceData.Selection.Typelabel.All	Bool	[READ_ONLY] all parameters of complex data type
DeviceData.Selection.Typelabel.MeasurementRange	Bool	[READ_ONLY]
DeviceData.Selection.Typelabel.Resolution	Bool	[READ_ONLY]
DeviceData.Selection.Typelabel.Linearity	Bool	[READ_ONLY]

Parameter name	Data type	Description
DeviceData.Selection.TypeLabel.Hysteresis	Bool	[READ_ONLY]
DeviceData.Selection.TypeLabel.TypeOfLightAndLaserClass	Bool	[READ_ONLY]
DeviceData.Selection.TypeLabel.NoLoadCurrent	Bool	[READ_ONLY]
DeviceData.Selection.TypeLabel.SwitchingFrequency	Bool	[READ_ONLY]
DeviceData.Selection.TypeLabel.WarmUpTime	Bool	[READ_ONLY]
DeviceData.Selection.TypeLabel.AmbientTemperature	Bool	[READ_ONLY]
DeviceData.Selection.TypeLabel.OutputSignal	Bool	[READ_ONLY]
DeviceData.Selection.TypeLabel.Repeatability	Bool	[READ_ONLY]
DeviceData.Selection.SignalQualityLevel	Bool	[READ_WRITE]
DeviceData.Selection.SmartfunctionsSwitchingQ1.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.SmartfunctionsSwitchingQ1.Counter_208	Bool	[READ_WRITE]
DeviceData.Selection.SmartfunctionsSwitchingQ1.OnDelay	Bool	[READ_WRITE]
DeviceData.Selection.SmartfunctionsSwitchingQ1.OffDelay	Bool	[READ_WRITE]
DeviceData.Selection.SmartfunctionsSwitchingQ1.Impulse	Bool	[READ_WRITE]
DeviceData.Selection.SmartfunctionsSwitchingQ1.MonitoringFrequency	Bool	[READ_WRITE]
DeviceData.Selection.SmartfunctionsSwitchingQ2.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.SmartfunctionsSwitchingQ2.Counter_209	Bool	[READ_WRITE]
DeviceData.Selection.SmartfunctionsSwitchingQ2.OnDelay	Bool	[READ_WRITE]
DeviceData.Selection.SmartfunctionsSwitchingQ2.OffDelay	Bool	[READ_WRITE]
DeviceData.Selection.SmartfunctionsSwitchingQ2.Impulse	Bool	[READ_WRITE]
DeviceData.Selection.SmartfunctionsSwitchingQ2.MonitoringFrequency	Bool	[READ_WRITE]
DeviceData.Selection.FunctionQ1.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.FunctionQ1.PnpNpn	Bool	[READ_WRITE]
DeviceData.Selection.FunctionSwitchingOutputQ2.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.FunctionSwitchingOutputQ2.PnpNpn	Bool	[READ_WRITE]
DeviceData.Selection.FunctionSwitchingOutputQ2.FunctionQ2	Bool	[READ_WRITE]

Parameter name	Data type	Description
DeviceData.Selection.FunctionControlInput.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.FunctionControlInput.ControlInput	Bool	[READ_WRITE]
DeviceData.Selection.Test_252	Bool	[READ_WRITE] Event generation
DeviceData.Selection.Test_253	Bool	[READ_WRITE] Test parameter
DeviceData.Selection.Test_254	Bool	[READ_WRITE] Test Parameter
DeviceData.Selection.Test_16382	Bool	[READ_WRITE] Teste Parameter
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.EmitterOff	UInt	[WRITE_ONLY] Emitter OFF
DeviceData.Data.Commands.EmitterOn	UInt	[WRITE_ONLY] Emitter ON
DeviceData.Data.Commands.ResetSwitchingChannel	UInt	[WRITE_ONLY] Reset switching-channel
DeviceData.Data.Commands.DetectSensor	UInt	[WRITE_ONLY] Detect Sensor
DeviceData.Data.Commands.TeachApply	UInt	[WRITE_ONLY] Teach Apply
DeviceData.Data.Commands.SingleValueTeachSwitchpoint1	UInt	[WRITE_ONLY] Single value teach - switchpoint 1
DeviceData.Data.Commands.SingleValueTeachSwitchpoint2	UInt	[WRITE_ONLY] Single value teach - switchpoint 2
DeviceData.Data.Commands.TwoValueTeachTeachpoint1ForSwitchpoint1	UInt	[WRITE_ONLY] Two value teach - teachpoint 1 for switchpoint 1
DeviceData.Data.Commands.TwoValueTeachTeachpoint2ForSwitchpoint1	UInt	[WRITE_ONLY] Two value teach - teachpoint 2 for switchpoint 1
DeviceData.Data.Commands.TwoValueTeachTeachpoint1ForSwitchpoint2	UInt	[WRITE_ONLY] Two value teach - teachpoint 1 for switchpoint 2
DeviceData.Data.Commands.TwoValueTeachTeachpoint2ForSwitchpoint2	UInt	[WRITE_ONLY] Two value teach - teachpoint 2 for switchpoint 2
DeviceData.Data.Commands.DynamicTeachSwitchpoint1Start	UInt	[WRITE_ONLY] Dynamic teach - switchpoint 1 - start
DeviceData.Data.Commands.DynamicTeachSwitchpoint1Stop	UInt	[WRITE_ONLY] Dynamic teach - switchpoint 1 - stop
DeviceData.Data.Commands.DynamicTeachSwitchpoint2Start	UInt	[WRITE_ONLY] Dynamic teach - switchpoint 2 - start
DeviceData.Data.Commands.DynamicTeachSwitchpoint2Stop	UInt	[WRITE_ONLY] Dynamic teach - switchpoint 2 - stop

Parameter name	Data type	Description
DeviceData.Data.Commands.TeachInCancel	UInt	[WRITE_ONLY] Teach-in cancel
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.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]

Parameter name	Data type	Description
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.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.FirmwareVersion	String	[READ_ONLY]
DeviceData.Data.ApplicationSpecificTag	String	[READ_WRITE]
DeviceData.Data.SwitchingOutputTeachIn.TeachChannel	UInt	[READ_WRITE]
DeviceData.Data.TeachInStatus.TeachStatus	UInt	[READ_ONLY]
DeviceData.Data.DefineSwitchingOutputQ1.Switchpoint1	UInt	[READ_WRITE]
DeviceData.Data.DefineSwitchingOutputQ1.Switchpoint2	UInt	[READ_WRITE]
DeviceData.Data.SetUpSwitchingOutputQ1.NoNc	UInt	[READ_WRITE]
DeviceData.Data.SetUpSwitchingOutputQ1.SwitchingMode	UInt	[READ_WRITE]
DeviceData.Data.SetUpSwitchingOutputQ1.Hysteresis	UInt	[READ_WRITE]
DeviceData.Data.DefineSwitchingOutputQ2.Switchpoint1	UInt	[READ_WRITE]
DeviceData.Data.DefineSwitchingOutputQ2.Switchpoint2	UInt	[READ_WRITE]

Parameter name	Data type	Description
DeviceData.Data.SetUpSwitchingOutputQ2.NoNc	UInt	[READ_WRITE]
DeviceData.Data.SetUpSwitchingOutputQ2.SwitchingMode	UInt	[READ_WRITE]
DeviceData.Data.SetUpSwitchingOutputQ2.Hysteresis	UInt	[READ_WRITE]
DeviceData.Data.EventOnOff.EventOnOff	Int	[READ_WRITE]
DeviceData.Data.Temperature.OperatingTemperature	Int	[READ_ONLY]
DeviceData.Data.Temperature. MaxOperatingTemperatureSinceRestart	Int	[READ_ONLY]
DeviceData.Data.Temperature. MinOperatingTemperatureSinceRestart	Int	[READ_ONLY]
DeviceData.Data.Temperature.MaxLifetimeTemperature	Int	[READ_ONLY]
DeviceData.Data.Temperature.MinLifetimeTemperature	Int	[READ_ONLY]
DeviceData.Data.Temperature_Event_Level. LimitTemperatureMin	Int	[READ_WRITE]
DeviceData.Data.Temperature_Event_Level. LimitTemperatureMax	Int	[READ_WRITE]
DeviceData.Data.OperatingData.CounterOperatingHours	UInt	[READ_ONLY]
DeviceData.Data.OperatingData.CounterSwitchCycle	UInt	[READ_ONLY]
DeviceData.Data.Typelabel.MeasurementRange	String	[READ_ONLY]
DeviceData.Data.Typelabel.Resolution	String	[READ_ONLY]
DeviceData.Data.Typelabel.Linearity	String	[READ_ONLY]
DeviceData.Data.Typelabel.Hysteresis	String	[READ_ONLY]
DeviceData.Data.Typelabel.TypeOfLightAndLaserClass	String	[READ_ONLY]
DeviceData.Data.Typelabel.NoLoadCurrent	String	[READ_ONLY]
DeviceData.Data.Typelabel.SwitchingFrequency	String	[READ_ONLY]
DeviceData.Data.Typelabel.WarmUpTime	String	[READ_ONLY]
DeviceData.Data.Typelabel.AmbientTemperature	String	[READ_ONLY]
DeviceData.Data.Typelabel.OutputSignal	String	[READ_ONLY]
DeviceData.Data.Typelabel.Repeatability	String	[READ_ONLY]
DeviceData.Data.SignalQualityLevel	UInt	[READ_WRITE]
DeviceData.Data.SmartfunctionsSwitchingQ1.Counter_208	UInt	[READ_WRITE]
DeviceData.Data.SmartfunctionsSwitchingQ1.OnDelay	UInt	[READ_WRITE]

Parameter name	Data type	Description
DeviceData.Data.SmartfunctionsSwitchingQ1.OffDelay	UInt	[READ_WRITE]
DeviceData.Data.SmartfunctionsSwitchingQ1.Impulse	UInt	[READ_WRITE]
DeviceData.Data.SmartfunctionsSwitchingQ1.MonitoringFrequency	UInt	[READ_WRITE]
DeviceData.Data.SmartfunctionsSwitchingQ2.Counter_209	UInt	[READ_WRITE]
DeviceData.Data.SmartfunctionsSwitchingQ2.OnDelay	UInt	[READ_WRITE]
DeviceData.Data.SmartfunctionsSwitchingQ2.OffDelay	UInt	[READ_WRITE]
DeviceData.Data.SmartfunctionsSwitchingQ2.Impulse	UInt	[READ_WRITE]
DeviceData.Data.SmartfunctionsSwitchingQ2.MonitoringFrequency	UInt	[READ_WRITE]
DeviceData.Data.FunctionQ1.PnpNpn	UInt	[READ_WRITE]
DeviceData.Data.FunctionSwitchingOutputQ2.PnpNpn	UInt	[READ_WRITE]
DeviceData.Data.FunctionSwitchingOutputQ2.FunctionQ2	UInt	[READ_WRITE]
DeviceData.Data.FunctionControlInput.ControlInput	UInt	[READ_WRITE]
DeviceData.Data.Test_252	UInt	[READ_WRITE] Event generation
DeviceData.Data.Test_253	UInt	[READ_WRITE] Test parameter
DeviceData.Data.Test_254	String	[READ_WRITE] Test Parameter
DeviceData.Data.Test_16382	String	[READ_WRITE] Teste Parameter

Tab. 7.2: Leuze_type_PD_HT110_2173

Parameter name	Data type	Description
FC_Leuze_PD_HT110_2173.SignalQuality	Int	
FC_Leuze_PD_HT110_2173.SignalValid	Bool	
FC_Leuze_PD_HT110_2173.SwitchingQ2	Bool	
FC_Leuze_PD_HT110_2173.SwitchingQ1	Bool	

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
Emitter OFF			UIntegerT	160	W	Emitter OFF
Emitter ON			UIntegerT	161	W	Emitter ON
Reset switching-channel			UIntegerT	162	W	Reset switching-channel
Detect Sensor			UIntegerT	175	W	Detect Sensor
Teach Apply			UIntegerT	64	W	Teach Apply
Single value teach - switchpoint 1			UIntegerT	65	W	Single value teach - switchpoint 1
Single value teach - switchpoint 2			UIntegerT	66	W	Single value teach - switchpoint 2
Two value teach - teachpoint 1 for switchpoint 1			UIntegerT	67	W	Two value teach - teachpoint 1 for switchpoint 1
Two value teach - teachpoint 2 for switchpoint 1			UIntegerT	68	W	Two value teach - teachpoint 2 for switchpoint 1
Two value teach - teachpoint 1 for switchpoint 2			UIntegerT	69	W	Two value teach - teachpoint 1 for switchpoint 2
Two value teach - teachpoint 2 for switchpoint 2			UIntegerT	70	W	Two value teach - teachpoint 2 for switchpoint 2
Dynamic teach - switchpoint 1 - start			UIntegerT	71	W	Dynamic teach - switchpoint 1 - start
Dynamic teach - switchpoint 1 - stop			UIntegerT	72	W	Dynamic teach - switchpoint 1 - stop
Dynamic teach - switchpoint 2 - start			UIntegerT	73	W	Dynamic teach - switchpoint 2 - start
Dynamic teach - switchpoint 2 - stop			UIntegerT	74	W	Dynamic teach - switchpoint 2 - stop
Teach-in cancel			UIntegerT	79	W	Teach-in cancel
Direct Parameters 1	0	0	RecordT		RW	
Reserved	0	1	UIntegerT		R	
Master Cycle Time	0	2	UIntegerT		R	

Parameter	Index	Subindex	Data type	Default	AR	Description
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	
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	

Parameter	Index	Subindex	Data type	Default	AR	Description
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 160: Emitter OFF 161: Emitter ON 162: Reset switching-channel 175: Detect Sensor 64: Teach Apply 65: Single value teach - switchpoint 1 66: Single value teach - switchpoint 2 67: Two value teach - teachpoint 1 for switchpoint 1 68: Two value teach - teachpoint 2 for switchpoint 1 69: Two value teach - teachpoint 1 for switchpoint 2 70: Two value teach - teachpoint 2 for switchpoint 2 71: Dynamic teach - switchpoint 1 - start 72: Dynamic teach - switchpoint 1 - stop 73: Dynamic teach - switchpoint 2 - start 74: Dynamic teach - switchpoint 2 - stop 79: Teach-in cancel
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	www.leuze.com	R	
Product Name	18	0	StringT	HT110L1.3/L6T-M12	R	
Product ID	19	0	StringT	50138062	R	

Parameter	Index	Subindex	Data type	Default	AR	Description
Product Text	20	0	StringT	distance sensor	R	
Serial Number	21	0	StringT	Ser.-No	R	
Firmware Version	23	0	StringT	1.0	R	
Application Specific Tag	24	0	StringT	***** ***** *****	RW	
Switching output Teach-In	58	0	RecordT		RW	
Teach channel	58	1	UIntegerT	0	RW	(0 ... 2): 0...2
Teach-in-status	59	0	RecordT		R	
Teach status	59	1	UIntegerT		R	0: Idle 1: Teach successful 2: Teach successful 3: Teach successful 4: Wait for command 5: Busy 7: Error
Define switching output Q1	60	0	RecordT		RW	
Switchpoint 1	60	1	UIntegerT	3000	RW	(60 ... 5000): 60...5000
Switchpoint 2	60	2	UIntegerT	3100	RW	(60 ... 5000): 60...5000
Set-Up switching output Q1	61	0	RecordT		RW	
NO / NC	61	1	UIntegerT	0	RW	0: NO 1: NC
Switching mode	61	2	UIntegerT	1	RW	0: Off 1: Single Point Mode 2: Window Mode 3: Two Point Mode
Hysteresis	61	3	UIntegerT	0	RW	0: not adjustable
Define switching output Q2	62	0	RecordT		RW	
Switchpoint 1	62	1	UIntegerT	3000	RW	(60 ... 5000): 60...5000
Switchpoint 2	62	2	UIntegerT	3100	RW	(60 ... 5000): 60...5000
Set-Up switching output Q2	63	0	RecordT		RW	
NO / NC	63	1	UIntegerT	0	RW	0: NO 1: NC
Switching mode	63	2	UIntegerT	1	RW	0: Off 1: Single Point Mode 2: Window Mode 3: Two Point Mode
Hysteresis	63	3	UIntegerT	0	RW	0: not adjustable
Event ON / OFF	81	0	RecordT		RW	

Parameter	Index	Subindex	Data type	Default	AR	Description
Event ON / OFF	81	1	IntegerT	31	RW	(0 ... 31)
Temperature	82	0	RecordT		R	
Operating temperature	82	1	IntegerT		R	
Max. operating temperature since restart	82	2	IntegerT		R	
Min. operating temperature since restart	82	3	IntegerT		R	
Max. lifetime temperature	82	4	IntegerT		R	
Min. lifetime temperature	82	5	IntegerT		R	
Temperature_Event_Level	83	0	RecordT		RW	
Limit Temperature min	83	1	IntegerT	-20	RW	(-40 ... 100)
Limit Temperature max	83	2	IntegerT	80	RW	(-40 ... 100)
Operating data	88	0	RecordT		R	
Counter operating hours	88	1	UIntegerT		R	
Counter switch cycle	88	2	UIntegerT		R	
Typelabel	95	0	RecordT		R	
Measurement range	95	1	StringT		R	
Resolution	95	2	StringT		R	
Linearity	95	3	StringT		R	
Hysteresis	95	4	StringT		R	
Type of light and laser class	95	5	StringT		R	
No-load current	95	6	StringT		R	
Switching frequency	95	7	StringT		R	
Warm-up time	95	8	StringT		R	
Ambient temperature	95	9	StringT		R	
Output signal	95	10	StringT		R	
Repeatability	95	11	StringT		R	
Signal quality level	196	0	UIntegerT	10	RW	(10 ... 90)
Smartfunctions switching Q1	208	0	RecordT		RW	

Parameter	Index	Subindex	Data type	Default	AR	Description
Counter	208	1	UIntegerT	0	RW	(0 ... 65535): 0...65535
On-delay	208	2	UIntegerT	0	RW	(0 ... 65535): 0...65535
Off-delay	208	3	UIntegerT	0	RW	(0 ... 65535): 0...65535
Impulse	208	4	UIntegerT	0	RW	(0 ... 65535): 0...65535
Monitoring frequency	208	5	UIntegerT	0	RW	(0 ... 500): 0...50.0
Smartfunctions switching Q2	209	0	RecordT		RW	
Counter	209	1	UIntegerT	0	RW	(0 ... 65535): 0...65535
On-delay	209	2	UIntegerT	0	RW	(0 ... 65535): 0...65535
Off-delay	209	3	UIntegerT	0	RW	(0 ... 65535): 0...65535
Impulse	209	4	UIntegerT	0	RW	(0 ... 65535): 0...65535
Monitoring frequency	209	5	UIntegerT	0	RW	(0 ... 500): 0...50.0
Function Q1	213	0	RecordT		RW	
PNP / NPN	213	1	UIntegerT	2	RW	0: NPN 1: PNP 2: Autodetect
Function switching output Q2	214	0	RecordT		RW	
PNP / NPN	214	1	UIntegerT	2	RW	0: NPN 1: PNP 2: Autodetect
Function Q2	214	2	UIntegerT	0	RW	0: Switching output Q2 1: Antivalent
Function control input	221	0	RecordT		RW	
Control input	221	1	UIntegerT	1	RW	0: Control input disable 1: Control input enable
Test_252	252	0	UIntegerT		RW	Event generation 0: A_Appear 1: A_Disappear 2: B_Appear 3: B_Disappear
Test_253	253	0	UIntegerT		RW	Test parameter
Test_254	254	0	OctetStringT		RW	Test Parameter
Test_16382	16382	0	OctetStringT		RW	Teste Parameter

9 Technical specifications

9.1 General data

Tab. 9.1: Sensor and IODD version

IODD version	V1.0
IODD release date	2018-5-7
Device family	Distance sensors
Device ID	2173
Device name	HT110L1.3/L6T-M12
Device variants	HT110L1.3/L6T-M12 (50138062)