



PLC Integration HTU218_3068

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_HTU218_3068" 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_HTU218_3068	Sensor data

See structure description of Leuze_type_HTU218_3068 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_HTU218_3068". 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_HTU218_3068" 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_HTU218_3068" 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_HTU218_3068 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 data 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. The PD Mode parameter only appears for some sensors.
Error	OUTPUT	BOOL	Error flag FALSE: No error TRUE: Error detected
ErrorCode	OUTPUT	WORD	Error code details see in the Siemens help system ("DPRD_DAT").
RET_VAL	OUTPUT	Leuze_type_PD_HTU218_3068	Reference to the instance of the data structure Leuze_type_PD_HTU218_3068. The structure includes the disaggregated values of the process data.

See structure description of Leuze_type_PD_HTU218_3068 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).

Tab. 6.5: Description of device specific errors.

Error code	Error name	Description
0x800	Device application error - no details	Service was denied by the technology-specific application. No detailed root-cause information is available.
0x8011	Index not available	Read or write access attempt to a non-existing index.
0x8012	Subindex not available	Read or write access attempt to a non-existing subindex of an existing index.

Error code	Error name	Description
0x8020	Service temporarily not available	Parameter not accessible due to the current state of the technology-specific application.
0x8023	Access denied	Write access to a read-only parameter or read access to write-only parameter.
0x8030	Parameter value out of range	Written parameter value is outside of the permitted value range.
0x8031	Parameter value above limit	Written parameter value is above its specified value range.
0x8032	Parameter value below limit	Written parameter value is below its specified value range.
0x8033	Parameter length overrun	Written parameter is longer than specified.
0x8034	Parameter length underrun	Written parameter is shorter than specified.
0x8035	Function unavailable	Written command is not supported by the technology-specific application.
0x8036	Function temporarily unavailable	Written command is unavailable due to the current state of the technology-specific application.
0x8040	Invalid parameter set	Written single parameter value collides with other existing parameter settings.
0x8041	Inconsistent parameter set	Parameter set inconsistencies at the end of block parameter transfer. Device plausibility check failed.
0x8082	Application not ready	Read or write access denied. The technology-specific application is temporarily unavailable.

7 Data structures

Tab. 7.1: Leuze_type_HTU218_3068

Parameter name	Data type	Description
DeviceData.Selection.Commands.CmdRestoreFactorySettings	Bool	[WRITE_ONLY] Restore Factory Settings
DeviceData.Selection.Commands.CmdTeachApply	Bool	[WRITE_ONLY] Teach Apply
DeviceData.Selection.Commands.CmdSetpoint1SingleValueTeach	Bool	[WRITE_ONLY] Setpoint 1 Single Value Teach
DeviceData.Selection.Commands.CmdSetpoint2SingleValueTeach	Bool	[WRITE_ONLY] Setpoint 2 Single Value Teach
DeviceData.Selection.Commands.CmdTwoValueTeachTp1Sp1	Bool	[WRITE_ONLY] Two Value Teach TP1 SP1
DeviceData.Selection.Commands.CmdTwoValueTeachTp2Sp1	Bool	[WRITE_ONLY] Two Value Teach TP2 SP1
DeviceData.Selection.Commands.CmdTwoValueTeachTp1Sp2	Bool	[WRITE_ONLY] Two Value Teach TP1 SP2
DeviceData.Selection.Commands.CmdTwoValueTeachTp2Sp2	Bool	[WRITE_ONLY] Two Value Teach TP2 SP2
DeviceData.Selection.Commands.CmdSetpoint1DynamicTeachStart	Bool	[WRITE_ONLY] Setpoint 1 Dynamic Teach Start
DeviceData.Selection.Commands.CmdSetpoint1DynamicTeachStop	Bool	[WRITE_ONLY] Setpoint 1 Dynamic Teach Stop
DeviceData.Selection.Commands.CmdSetpoint2DynamicTeachStart	Bool	[WRITE_ONLY] Setpoint 2 Dynamic Teach Start
DeviceData.Selection.Commands.CmdSetpoint2DynamicTeachStop	Bool	[WRITE_ONLY] Setpoint 2 Dynamic Teach Stop
DeviceData.Selection.Commands.CmdTeachCancel	Bool	[WRITE_ONLY] Teach Cancel
DeviceData.Selection.Commands.CmdResetDiagnosisInformation	Bool	[WRITE_ONLY] Reset Diagnosis Information
DeviceData.Selection.Commands.CmdStopMeasurement	Bool	[WRITE_ONLY] Stop measurement
DeviceData.Selection.Commands.CmdStartMeasurement	Bool	[WRITE_ONLY] Start measurement
DeviceData.Selection.Commands.CmdSingleMeasurement	Bool	[WRITE_ONLY] Single measurement
DeviceData.Selection.Commands.CmdIoLink11SystemTestCommand240Event8DfeAppears	Bool	[WRITE_ONLY] IO-Link 1.1 system test command 240, Event 8DFE appears
DeviceData.Selection.Commands.CmdIoLink11SystemTestCommand241Event8DfeDisappears	Bool	[WRITE_ONLY] IO-Link 1.1 system test command 241, Event 8DFE disappears
DeviceData.Selection.Commands.CmdIoLink11SystemTestCommand242Event8DffAppears	Bool	[WRITE_ONLY] IO-Link 1.1 system test command 242, Event 8DFF appears
DeviceData.Selection.Commands.CmdIoLink11SystemTestCommand243Event8DffDisappears	Bool	[WRITE_ONLY] IO-Link 1.1 system test command 243, Event 8DFF disappears
DeviceData.Selection.DirectParametersPage1.All	Bool	[READ_WRITE] all parameters of complex data type

Parameter name	Data type	Description
DeviceData.Selection.DirectParametersPage1.Reserved_1	Bool	[READ_ONLY] ; Suffix "_1" (parameter index or subindex) added because of duplicate parameter names.
DeviceData.Selection.DirectParametersPage1.MasterCycleTime	Bool	[READ_ONLY] Communication: Current communication cycle duration used by the master. This value defines the process data cycle.
DeviceData.Selection.DirectParametersPage1.MinCycleTime	Bool	[READ_ONLY] Communication: Minimum communication cycle duration supported by the device. This value defines the lowest possible process data cycle.
DeviceData.Selection.DirectParametersPage1.MSequenceCapability	Bool	[READ_ONLY] Communication: Information on the structure and the supported features of the communication messages.
DeviceData.Selection.DirectParametersPage1.IoLinkRevisionId	Bool	[READ_ONLY] Communication: Identifier for the currently used communication protocol revision.
DeviceData.Selection.DirectParametersPage1.ProcessDataInputLength	Bool	[READ_ONLY] Communication: Information on width and features of the process input data (Process Data from Device to Master).
DeviceData.Selection.DirectParametersPage1.ProcessDataOutputLength	Bool	[READ_ONLY] Communication: Information on width of the process output data (Process Data from Master to Device).
DeviceData.Selection.DirectParametersPage1.VendorId1	Bool	[READ_ONLY] Identification: Highest octet of the Vendor ID. Combined with the parameter Vendor ID 2, this parameter defines the 16-bit value of the unique Vendor ID as assigned by the IO-Link Community.
DeviceData.Selection.DirectParametersPage1.VendorId2	Bool	[READ_ONLY] Identification: Lowest octet of the Vendor ID. Combined with the parameter Vendor ID 1, this parameter defines the 16-bit value of the unique Vendor ID as assigned by the IO-Link Community.

Parameter name	Data type	Description
DeviceData.Selection.DirectParametersPage1.DeviceId1	Bool	[READ_ONLY] Identification: Highest octet of the Device ID. Combined with the parameters Device ID 2 and 3, this parameter defines the 24-bit value of the vendor-specific Device ID.
DeviceData.Selection.DirectParametersPage1.DeviceId2	Bool	[READ_ONLY] Identification: Middle octet of the Device ID. Combined with the parameters Device ID 1 and 3, this parameter defines the 24-bit value of the vendor-specific Device ID.
DeviceData.Selection.DirectParametersPage1.DeviceId3	Bool	[READ_ONLY] Identification: Lowest octet of the Device ID. Combined with the parameters Device ID 1 and 2, this parameter defines the 24-bit value of the vendor-specific Device ID.
DeviceData.Selection.DirectParametersPage1.Reserved_13	Bool	[READ_ONLY] ; Suffix "_13" (parameter index or subindex) added because of duplicate parameter names.
DeviceData.Selection.DirectParametersPage1.Reserved_14	Bool	[READ_ONLY] ; Suffix "_14" (parameter index or subindex) added because of duplicate parameter names.
DeviceData.Selection.DirectParametersPage1.Reserved_15	Bool	[READ_ONLY] ; Suffix "_15" (parameter index or subindex) added because of duplicate parameter names.
DeviceData.Selection.DirectParametersPage1.SystemCommand	Bool	[WRITE_ONLY] Application: Command interface for devices without ISDU support. Validity and execution of commands are not confirmed.
DeviceData.Selection.DirectParametersPage2.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.DirectParametersPage2.DeviceSpecificParameter1	Bool	[READ_WRITE]
DeviceData.Selection.DirectParametersPage2.DeviceSpecificParameter2	Bool	[READ_WRITE]
DeviceData.Selection.DirectParametersPage2.DeviceSpecificParameter3	Bool	[READ_WRITE]
DeviceData.Selection.DirectParametersPage2.DeviceSpecificParameter4	Bool	[READ_WRITE]
DeviceData.Selection.DirectParametersPage2.DeviceSpecificParameter5	Bool	[READ_WRITE]

Parameter name	Data type	Description
DeviceData.Selection.DirectParametersPage2.DeviceSpecificParameter6	Bool	[READ_WRITE]
DeviceData.Selection.DirectParametersPage2.DeviceSpecificParameter7	Bool	[READ_WRITE]
DeviceData.Selection.DirectParametersPage2.DeviceSpecificParameter8	Bool	[READ_WRITE]
DeviceData.Selection.DirectParametersPage2.DeviceSpecificParameter9	Bool	[READ_WRITE]
DeviceData.Selection.DirectParametersPage2.DeviceSpecificParameter10	Bool	[READ_WRITE]
DeviceData.Selection.DirectParametersPage2.DeviceSpecificParameter11	Bool	[READ_WRITE]
DeviceData.Selection.DirectParametersPage2.DeviceSpecificParameter12	Bool	[READ_WRITE]
DeviceData.Selection.DirectParametersPage2.DeviceSpecificParameter13	Bool	[READ_WRITE]
DeviceData.Selection.DirectParametersPage2.DeviceSpecificParameter14	Bool	[READ_WRITE]
DeviceData.Selection.DirectParametersPage2.DeviceSpecificParameter15	Bool	[READ_WRITE]
DeviceData.Selection.DirectParametersPage2.DeviceSpecificParameter16	Bool	[READ_WRITE]
DeviceData.Selection.SystemCommand	Bool	[WRITE_ONLY] Command interface for applications. A positive acknowledge indicates the complete and correct finalization of the requested function.
DeviceData.Selection.DeviceAccessLocks.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.VendorName	Bool	[READ_ONLY] The vendor name that is assigned to a Vendor ID.
DeviceData.Selection.VendorText	Bool	[READ_ONLY] Additional information about the vendor.
DeviceData.Selection.ProductName	Bool	[READ_ONLY] Complete product name.
DeviceData.Selection.ProductId	Bool	[READ_ONLY] Vendor-specific product or type identification (e.g., item number or model number).
DeviceData.Selection.ProductText	Bool	[READ_ONLY] Additional product information for the device.
DeviceData.Selection.FirmwareRevision	Bool	[READ_ONLY] Unique, vendor-specific identifier of the firmware revision of the individual device.
DeviceData.Selection.ApplicationSpecificTag	Bool	[READ_WRITE] Possibility to mark a device with user- or application-specific information.
DeviceData.Selection.ErrorCount	Bool	[READ_ONLY] Number of errors that occurred in the technology-specific application since power on or restart.

Parameter name	Data type	Description
DeviceData.Selection.DeviceStatus	Bool	[READ_ONLY] Indicator for the current device condition and diagnosis state.
DeviceData.Selection.TeachState.All	Bool	[READ_ONLY] all parameters of complex data type
DeviceData.Selection.Setpoints.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.Setpoints.Param1Bdc1Q1	Bool	[READ_WRITE] threshold measurement value
DeviceData.Selection.Setpoints.Param2Bdc1Q1	Bool	[READ_WRITE] threshold measurement value
DeviceData.Selection.SwitchpointBdc1.All	Bool	[READ_WRITE] all parameters of complex data type
DeviceData.Selection.SwitchpointBdc1.Logic	Bool	[READ_WRITE] switching information is transmitted in inverted or not inverted manner
DeviceData.Selection.SwitchpointBdc1.Mode	Bool	[READ_WRITE] operation mode for binary signal
DeviceData.Selection.SwitchpointBdc1.Hysteresis	Bool	[READ_WRITE]
DeviceData.Selection.Lot	Bool	[READ_ONLY] production lot
DeviceData.Selection.OnDelaySwitchingOutput	Bool	[READ_WRITE] on delay for the binary data channel
DeviceData.Selection.OffDelaySwitchingOutput	Bool	[READ_WRITE] off delay for the binary data channel
DeviceData.Selection.MultilOPin4	Bool	[READ_WRITE] polarity of the switching output
DeviceData.Selection.TemperatureCompensation	Bool	[READ_WRITE]
DeviceData.Selection.TeachpointSp1.All	Bool	[READ_ONLY] all parameters of complex data type
DeviceData.Selection.TeachpointSp1.Tp1	Bool	[READ_ONLY] detected lower limit during teach-in procedure
DeviceData.Selection.TeachpointSp1.Tp2	Bool	[READ_ONLY] detected upper limit during teach-in procedure
DeviceData.Selection.TeachpointSp2.All	Bool	[READ_ONLY] all parameters of complex data type
DeviceData.Selection.TeachpointSp2.Tp1	Bool	[READ_ONLY] detected lower limit during teach-in procedure
DeviceData.Selection.TeachpointSp2.Tp2	Bool	[READ_ONLY] detected upper limit during teach-in procedure
DeviceData.Selection.ProcessDataLimits.All	Bool	[READ_ONLY] all parameters of complex data type
DeviceData.Selection.ProcessDataLimits.Lower	Bool	[READ_ONLY] lower limit after power-up or reset

Parameter name	Data type	Description
DeviceData.Selection.ProcessDataLimits.Upper	Bool	[READ_ONLY] upper limit after power-up or reset
DeviceData.Selection.SwitchCounter	Bool	[READ_ONLY] number of switching after power-up or reset
DeviceData.Selection.TemperatureInternal	Bool	[READ_ONLY] Sensor temperature
DeviceData.Data.Commands.CmdRestoreFactorySettings	UInt	[WRITE_ONLY] Restore Factory Settings
DeviceData.Data.Commands.CmdTeachApply	UInt	[WRITE_ONLY] Teach Apply
DeviceData.Data.Commands.CmdSetpoint1SingleValueTeach	UInt	[WRITE_ONLY] Setpoint 1 Single Value Teach
DeviceData.Data.Commands.CmdSetpoint2SingleValueTeach	UInt	[WRITE_ONLY] Setpoint 2 Single Value Teach
DeviceData.Data.Commands.CmdTwoValueTeachTp1Sp1	UInt	[WRITE_ONLY] Two Value Teach TP1 SP1
DeviceData.Data.Commands.CmdTwoValueTeachTp2Sp1	UInt	[WRITE_ONLY] Two Value Teach TP2 SP1
DeviceData.Data.Commands.CmdTwoValueTeachTp1Sp2	UInt	[WRITE_ONLY] Two Value Teach TP1 SP2
DeviceData.Data.Commands.CmdTwoValueTeachTp2Sp2	UInt	[WRITE_ONLY] Two Value Teach TP2 SP2
DeviceData.Data.Commands.CmdSetpoint1DynamicTeachStart	UInt	[WRITE_ONLY] Setpoint 1 Dynamic Teach Start
DeviceData.Data.Commands.CmdSetpoint1DynamicTeachStop	UInt	[WRITE_ONLY] Setpoint 1 Dynamic Teach Stop
DeviceData.Data.Commands.CmdSetpoint2DynamicTeachStart	UInt	[WRITE_ONLY] Setpoint 2 Dynamic Teach Start
DeviceData.Data.Commands.CmdSetpoint2DynamicTeachStop	UInt	[WRITE_ONLY] Setpoint 2 Dynamic Teach Stop
DeviceData.Data.Commands.CmdTeachCancel	UInt	[WRITE_ONLY] Teach Cancel
DeviceData.Data.Commands.CmdResetDiagnosisInformation	UInt	[WRITE_ONLY] Reset Diagnosis Information
DeviceData.Data.Commands.CmdStopMeasurement	UInt	[WRITE_ONLY] Stop measurement
DeviceData.Data.Commands.CmdStartMeasurement	UInt	[WRITE_ONLY] Start measurement
DeviceData.Data.Commands.CmdSingleMeasurement	UInt	[WRITE_ONLY] Single measurement
DeviceData.Data.Commands.CmdIoLink11SystemTestCommand240Event8DfeAppears	UInt	[WRITE_ONLY] IO-Link 1.1 system test command 240, Event 8DFE appears
DeviceData.Data.Commands.CmdIoLink11SystemTestCommand241Event8DfeDisappears	UInt	[WRITE_ONLY] IO-Link 1.1 system test command 241, Event 8DFE disappears
DeviceData.Data.Commands.CmdIoLink11SystemTestCommand242Event8DffAppears	UInt	[WRITE_ONLY] IO-Link 1.1 system test command 242, Event 8DFF appears
DeviceData.Data.Commands.CmdIoLink11SystemTestCommand243Event8DffDisappears	UInt	[WRITE_ONLY] IO-Link 1.1 system test command 243, Event 8DFF disappears

Parameter name	Data type	Description
DeviceData.Data.DirectParametersPage1.Reserved_1	UInt	[READ_ONLY] ; Suffix "_1" (parameter index or subindex) added because of duplicate parameter names.
DeviceData.Data.DirectParametersPage1.MasterCycleTime	UInt	[READ_ONLY] Communication: Current communication cycle duration used by the master. This value defines the process data cycle.
DeviceData.Data.DirectParametersPage1.MinCycleTime	UInt	[READ_ONLY] Communication: Minimum communication cycle duration supported by the device. This value defines the lowest possible process data cycle.
DeviceData.Data.DirectParametersPage1.MSequenceCapability	UInt	[READ_ONLY] Communication: Information on the structure and the supported features of the communication messages.
DeviceData.Data.DirectParametersPage1.IoLinkRevisionId	UInt	[READ_ONLY] Communication: Identifier for the currently used communication protocol revision.
DeviceData.Data.DirectParametersPage1.ProcessDataInputLength	UInt	[READ_ONLY] Communication: Information on width and features of the process input data (Process Data from Device to Master).
DeviceData.Data.DirectParametersPage1.ProcessDataOutputLength	UInt	[READ_ONLY] Communication: Information on width of the process output data (Process Data from Master to Device).
DeviceData.Data.DirectParametersPage1.VendorId1	UInt	[READ_ONLY] Identification: Highest octet of the Vendor ID. Combined with the parameter Vendor ID 2, this parameter defines the 16-bit value of the unique Vendor ID as assigned by the IO-Link Community.
DeviceData.Data.DirectParametersPage1.VendorId2	UInt	[READ_ONLY] Identification: Lowest octet of the Vendor ID. Combined with the parameter Vendor ID 1, this parameter defines the 16-bit value of the unique Vendor ID as assigned by the IO-Link Community.

Parameter name	Data type	Description
DeviceData.Data.DirectParametersPage1.DeviceId1	UInt	[READ_ONLY] Identification: Highest octet of the Device ID. Combined with the parameters Device ID 2 and 3, this parameter defines the 24-bit value of the vendor-specific Device ID.
DeviceData.Data.DirectParametersPage1.DeviceId2	UInt	[READ_ONLY] Identification: Middle octet of the Device ID. Combined with the parameters Device ID 1 and 3, this parameter defines the 24-bit value of the vendor-specific Device ID.
DeviceData.Data.DirectParametersPage1.DeviceId3	UInt	[READ_ONLY] Identification: Lowest octet of the Device ID. Combined with the parameters Device ID 1 and 2, this parameter defines the 24-bit value of the vendor-specific Device ID.
DeviceData.Data.DirectParametersPage1.Reserved_13	UInt	[READ_ONLY] ; Suffix "_13" (parameter index or subindex) added because of duplicate parameter names.
DeviceData.Data.DirectParametersPage1.Reserved_14	UInt	[READ_ONLY] ; Suffix "_14" (parameter index or subindex) added because of duplicate parameter names.
DeviceData.Data.DirectParametersPage1.Reserved_15	UInt	[READ_ONLY] ; Suffix "_15" (parameter index or subindex) added because of duplicate parameter names.
DeviceData.Data.DirectParametersPage1.SystemCommand	UInt	[WRITE_ONLY] Application: Command interface for devices without ISDU support. Validity and execution of commands are not confirmed.
DeviceData.Data.DirectParametersPage2.DeviceSpecificParameter1	UInt	[READ_WRITE]
DeviceData.Data.DirectParametersPage2.DeviceSpecificParameter2	UInt	[READ_WRITE]
DeviceData.Data.DirectParametersPage2.DeviceSpecificParameter3	UInt	[READ_WRITE]
DeviceData.Data.DirectParametersPage2.DeviceSpecificParameter4	UInt	[READ_WRITE]
DeviceData.Data.DirectParametersPage2.DeviceSpecificParameter5	UInt	[READ_WRITE]
DeviceData.Data.DirectParametersPage2.DeviceSpecificParameter6	UInt	[READ_WRITE]

Parameter name	Data type	Description
DeviceData.Data.DirectParametersPage2. DeviceSpecificParameter7	UInt	[READ_WRITE]
DeviceData.Data.DirectParametersPage2. DeviceSpecificParameter8	UInt	[READ_WRITE]
DeviceData.Data.DirectParametersPage2. DeviceSpecificParameter9	UInt	[READ_WRITE]
DeviceData.Data.DirectParametersPage2. DeviceSpecificParameter10	UInt	[READ_WRITE]
DeviceData.Data.DirectParametersPage2. DeviceSpecificParameter11	UInt	[READ_WRITE]
DeviceData.Data.DirectParametersPage2. DeviceSpecificParameter12	UInt	[READ_WRITE]
DeviceData.Data.DirectParametersPage2. DeviceSpecificParameter13	UInt	[READ_WRITE]
DeviceData.Data.DirectParametersPage2. DeviceSpecificParameter14	UInt	[READ_WRITE]
DeviceData.Data.DirectParametersPage2. DeviceSpecificParameter15	UInt	[READ_WRITE]
DeviceData.Data.DirectParametersPage2. DeviceSpecificParameter16	UInt	[READ_WRITE]
DeviceData.Data.SystemCommand	UInt	[WRITE_ONLY] Command interface for applications. A positive acknowledge indicates the complete and correct finalization of the requested function.
DeviceData.Data.DeviceAccessLocks.ParameterWriteAccess	Bool	[READ_WRITE] This lock prevents the write access to all read/write parameters of the device except for the parameter 'Device Access Locks'.
DeviceData.Data.DeviceAccessLocks.DataStorage	Bool	[READ_WRITE] This lock prevents the write access to the device parameters via the data storage mechanism.
DeviceData.Data.DeviceAccessLocks.LocalParameterization	Bool	[READ_WRITE] This lock prevents the device settings from being changed via local operating elements on the device.
DeviceData.Data.DeviceAccessLocks.LocalUserInterface	Bool	[READ_WRITE] This lock prevents the access to the device settings and display via a local user interface. The user interface is disabled.
DeviceData.Data.VendorName	String	[READ_ONLY] The vendor name that is assigned to a Vendor ID.
DeviceData.Data.VendorText	String	[READ_ONLY] Additional information about the vendor.
DeviceData.Data.ProductName	String	[READ_ONLY] Complete product name.

Parameter name	Data type	Description
DeviceData.Data.ProductId	String	[READ_ONLY] Vendor-specific product or type identification (e.g., item number or model number).
DeviceData.Data.ProductText	String	[READ_ONLY] Additional product information for the device.
DeviceData.Data.FirmwareRevision	String	[READ_ONLY] Unique, vendor-specific identifier of the firmware revision of the individual device.
DeviceData.Data.ApplicationSpecificTag	String	[READ_WRITE] Possibility to mark a device with user- or application-specific information.
DeviceData.Data.ErrorCount	UInt	[READ_ONLY] Number of errors that occurred in the technology-specific application since power on or restart.
DeviceData.Data.DeviceStatus	UInt	[READ_ONLY] Indicator for the current device condition and diagnosis state.
DeviceData.Data.TeachState.TeachState	UInt	[READ_ONLY] indication of the current state of the teach-in procedure
DeviceData.Data.Setpoints.Param1Bdc1Q1	UInt	[READ_WRITE] threshold measurement value
DeviceData.Data.Setpoints.Param2Bdc1Q1	UInt	[READ_WRITE] threshold measurement value
DeviceData.Data.SwitchpointBdc1.Logic	UInt	[READ_WRITE] switching information is transmitted in inverted or not inverted manner
DeviceData.Data.SwitchpointBdc1.Mode	UInt	[READ_WRITE] operation mode for binary signal
DeviceData.Data.SwitchpointBdc1.Hysteresis	UInt	[READ_WRITE]
DeviceData.Data.Lot	String	[READ_ONLY] production lot
DeviceData.Data.OnDelaySwitchingOutput	UInt	[READ_WRITE] on delay for the binary data channel
DeviceData.Data.OffDelaySwitchingOutput	UInt	[READ_WRITE] off delay for the binary data channel
DeviceData.Data.MultilOPin4	UInt	[READ_WRITE] polarity of the switching output
DeviceData.Data.TemperatureCompensation	UInt	[READ_WRITE]
DeviceData.Data.TeachpointSp1.Tp1	UInt	[READ_ONLY] detected lower limit during teach-in procedure
DeviceData.Data.TeachpointSp1.Tp2	UInt	[READ_ONLY] detected upper limit during teach-in procedure
DeviceData.Data.TeachpointSp2.Tp1	UInt	[READ_ONLY] detected lower limit during teach-in procedure

Parameter name	Data type	Description
DeviceData.Data.TeachpointSp2.Tp2	UInt	[READ_ONLY] detected upper limit during teach-in procedure
DeviceData.Data.ProcessDataLimits.Lower	UInt	[READ_ONLY] lower limit after power-up or reset
DeviceData.Data.ProcessDataLimits.Upper	UInt	[READ_ONLY] upper limit after power-up or reset
DeviceData.Data.SwitchCounter	UInt	[READ_ONLY] number of switching after power-up or reset
DeviceData.Data.TemperatureInternal	Int	[READ_ONLY] Sensor temperature

Tab. 7.2: Leuze_type_PD_HTU218_3068

Parameter name	Data type	Description
FC_Leuze_PD_HTU218_3068.MeasuredValue	UInt	
FC_Leuze_PD_HTU218_3068.SwitchStateBdc1Q1	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	Command interface for applications. A positive acknowledge indicates the complete and correct finalization of the requested function.
Restore Factory Settings			UIntegerT	130	W	Restore Factory Settings
Teach Apply			UIntegerT	64	W	Teach Apply
Setpoint 1 Single Value Teach			UIntegerT	65	W	Setpoint 1 Single Value Teach
Setpoint 2 Single Value Teach			UIntegerT	66	W	Setpoint 2 Single Value Teach
Two Value Teach TP1 SP1			UIntegerT	67	W	Two Value Teach TP1 SP1
Two Value Teach TP2 SP1			UIntegerT	68	W	Two Value Teach TP2 SP1
Two Value Teach TP1 SP2			UIntegerT	69	W	Two Value Teach TP1 SP2
Two Value Teach TP2 SP2			UIntegerT	70	W	Two Value Teach TP2 SP2
Setpoint 1 Dynamic Teach Start			UIntegerT	71	W	Setpoint 1 Dynamic Teach Start
Setpoint 1 Dynamic Teach Stop			UIntegerT	72	W	Setpoint 1 Dynamic Teach Stop
Setpoint 2 Dynamic Teach Start			UIntegerT	73	W	Setpoint 2 Dynamic Teach Start
Setpoint 2 Dynamic Teach Stop			UIntegerT	74	W	Setpoint 2 Dynamic Teach Stop
Teach Cancel			UIntegerT	79	W	Teach Cancel
Reset Diagnosis Information			UIntegerT	163	W	Reset Diagnosis Information
Stop measurement			UIntegerT	164	W	Stop measurement
Start measurement			UIntegerT	165	W	Start measurement
Single measurement			UIntegerT	166	W	Single measurement
IO-Link 1.1 system test command 240, Event 8DFE appears			UIntegerT	240	W	IO-Link 1.1 system test command 240, Event 8DFE appears
IO-Link 1.1 system test command 241, Event 8DFE disappears			UIntegerT	241	W	IO-Link 1.1 system test command 241, Event 8DFE disappears
IO-Link 1.1 system test command 242, Event 8DFF appears			UIntegerT	242	W	IO-Link 1.1 system test command 242, Event 8DFF appears
IO-Link 1.1 system test command 243, Event 8DFF disappears			UIntegerT	243	W	IO-Link 1.1 system test command 243, Event 8DFF disappears

Parameter	Index	Subindex	Data type	Default	AR	Description
Direct Parameters - Page 1	0	0	RecordT		RW	Comprises the required parameters defining the communication characteristics and identifiers for device validation.
Reserved	0	1	UIntegerT		R	
Master Cycle Time	0	2	UIntegerT		R	Communication: Current communication cycle duration used by the master. This value defines the process data cycle.
Min Cycle Time	0	3	UIntegerT		R	Communication: Minimum communication cycle duration supported by the device. This value defines the lowest possible process data cycle.
M-Sequence Capability	0	4	UIntegerT		R	Communication: Information on the structure and the supported features of the communication messages.
IO-Link Revision ID	0	5	UIntegerT	17	R	Communication: Identifier for the currently used communication protocol revision.
Process Data Input Length	0	6	UIntegerT		R	Communication: Information on width and features of the process input data (Process Data from Device to Master).
Process Data Output Length	0	7	UIntegerT		R	Communication: Information on width of the process output data (Process Data from Master to Device).
Vendor ID 1	0	8	UIntegerT		R	Identification: Highest octet of the Vendor ID. Combined with the parameter Vendor ID 2, this parameter defines the 16-bit value of the unique Vendor ID as assigned by the IO-Link Community.
Vendor ID 2	0	9	UIntegerT		R	Identification: Lowest octet of the Vendor ID. Combined with the parameter Vendor ID 1, this parameter defines the 16-bit value of the unique Vendor ID as assigned by the IO-Link Community.
Device ID 1	0	10	UIntegerT		R	Identification: Highest octet of the Device ID. Combined with the parameters Device ID 2 and 3, this parameter defines the 24-bit value of the vendor-specific Device ID.
Device ID 2	0	11	UIntegerT		R	Identification: Middle octet of the Device ID. Combined with the parameters Device ID 1 and 3, this parameter defines the 24-bit value of the vendor-specific Device ID.
Device ID 3	0	12	UIntegerT		R	Identification: Lowest octet of the Device ID. Combined with the parameters Device ID 1 and 2, this parameter defines the 24-bit value of the vendor-specific Device ID.
Reserved	0	13	UIntegerT		R	
Reserved	0	14	UIntegerT		R	
Reserved	0	15	UIntegerT		R	

Parameter	Index	Subindex	Data type	Default	AR	Description
System Command	0	16	UIntegerT		W	Application: Command interface for devices without ISDU support. Validity and execution of commands are not confirmed. (0 ... 63): Reserved 128: Device Reset 129: Application Reset 130: Restore Factory Settings 131: Back-to-box (132 ... 159): Reserved
Direct Parameters - Page 2	1	0	RecordT		RW	A set of parameters for devices without ISDU support.
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	

Parameter	Index	Subindex	Data type	Default	AR	Description
System Command	2	0	UIntegerT		W	<p>Command interface for applications. A positive acknowledge indicates the complete and correct finalization of the requested function.</p> <p>130: Restore Factory Settings (0 ... 63): Reserved (132 ... 159): Reserved 64: Teach Apply 65: Setpoint 1 Single Value Teach 66: Setpoint 2 Single Value Teach 67: Two Value Teach TP1 SP1 68: Two Value Teach TP2 SP1 69: Two Value Teach TP1 SP2 70: Two Value Teach TP2 SP2 71: Setpoint 1 Dynamic Teach Start 72: Setpoint 1 Dynamic Teach Stop 73: Setpoint 2 Dynamic Teach Start 74: Setpoint 2 Dynamic Teach Stop 79: Teach Cancel 163: Reset Diagnosis Information 164: Stop measurement 165: Start measurement 166: Single measurement 240: IO-Link 1.1 system test command 240, Event 8DFE appears 241: IO-Link 1.1 system test command 241, Event 8DFE disappears 242: IO-Link 1.1 system test command 242, Event 8DFF appears 243: IO-Link 1.1 system test command 243, Event 8DFF disappears</p>
Device Access Locks	12	0	RecordT		RW	The access to the device parameters can be restricted by setting appropriate flags within this parameter.
Parameter Write Access	12	1	BooleanT	0	RW	<p>This lock prevents the write access to all read/write parameters of the device except for the parameter 'Device Access Locks'.</p> <p>True: Locked False: Unlocked</p>
Data Storage	12	2	BooleanT		RW	<p>This lock prevents the write access to the device parameters via the data storage mechanism.</p> <p>True: Locked False: Unlocked</p>
Local Parameterization	12	3	BooleanT	0	RW	<p>This lock prevents the device settings from being changed via local operating elements on the device.</p> <p>True: Locked False: Unlocked</p>
Local User Interface	12	4	BooleanT		RW	<p>This lock prevents the access to the device settings and display via a local user interface. The user interface is disabled.</p> <p>True: Locked False: Unlocked</p>

Parameter	Index	Subindex	Data type	Default	AR	Description
Vendor Name	16	0	StringT	Leuze electronic GmbH + Co. KG	R	The vendor name that is assigned to a Vendor ID.
Vendor Text	17	0	StringT	The Sensor People	R	Additional information about the vendor.
Product Name	18	0	StringT		R	Complete product name.
Product ID	19	0	StringT		R	Vendor-specific product or type identification (e.g., item number or model number).
Product Text	20	0	StringT		R	Additional product information for the device.
Firmware Revision	23	0	StringT		R	Unique, vendor-specific identifier of the firmware revision of the individual device.
Application-specific Tag	24	0	StringT		RW	Possibility to mark a device with user- or application-specific information.
Error Count	32	0	UIntegerT		R	Number of errors that occurred in the technology-specific application since power on or restart.
Device Status	36	0	UIntegerT		R	Indicator for the current device condition and diagnosis state.
Teach State	59	0	RecordT		R	indication of the current state of the teach-in procedure and teach point setting
Teach State	59	3	UIntegerT	0	R	indication of the current state of the teach-in procedure 0: Idle 1: Switchpoint Set 2: Switchpoint 2 Set 3: Switchpoint 1+2 Set 4: Wait for Command 5: Busy 6: Reserved 7: Error
Setpoints	60	0	RecordT		RW	threshold measurement value of a sensor for the edge of a binary output signal 1
(1) (BDC1, Q1)	60	1	UIntegerT	80	RW	threshold measurement value (80 ... 800)
(2) (BDC1, Q1)	60	2	UIntegerT	800	RW	threshold measurement value (80 ... 800)
Switchpoint BDC1	61	0	RecordT		RW	mode, logic and hysteresis for binary data channel 1
Logic	61	1	UIntegerT	0	RW	switching information is transmitted in inverted or not inverted manner 0: NO 1: NC
Mode	61	2	UIntegerT	2	RW	operation mode for binary signal 0: Deactivated 1: Single point mode 2: Window mode 3: Two point mode 128: Reflex mode

Parameter	Index	Subindex	Data type	Default	AR	Description
Hysteresis	61	3	UIntegerT	2	RW	(2 ... 20)
Lot	64	0	StringT		R	production lot
On delay switching output	66	0	UIntegerT	0	RW	on delay for the binary data channel (0 ... 10000)
Off delay switching output	67	0	UIntegerT	0	RW	off delay for the binary data channel (0 ... 10000)
Multi I/O (Pin 4)	70	0	UIntegerT	0	RW	polarity of the switching output 0: PP 1: NPN 2: PNP
Temperature Compensation	74	0	UIntegerT	0	RW	0: Off 1: On
Teachpoint SP1	80	0	RecordT		R	Values detected during teach
TP1	80	1	UIntegerT		R	detected lower limit during teach-in procedure
TP2	80	2	UIntegerT		R	detected upper limit during teach-in procedure
Teachpoint SP2	81	0	RecordT		R	Values detected during teach
TP1	81	1	UIntegerT		R	detected lower limit during teach-in procedure
TP2	81	2	UIntegerT		R	detected upper limit during teach-in procedure
Process data limits	84	0	RecordT		R	Process data limit values
lower	84	1	UIntegerT		R	lower limit after power-up or reset
upper	84	2	UIntegerT		R	upper limit after power-up or reset
Switch counter	85	0	UIntegerT	0	R	number of switching after power-up or reset
Temperature internal	86	0	IntegerT		R	Sensor temperature

9 Technical specifications

9.1 General data

Tab. 9.1: Sensor and IODD version

IODD version	V1.2
IODD release date	2023-08-01
Device family	HTU... series
Device ID	3068
Device name	HTU218-800/LT-M12
Device variants	HTU218-800/LT-M12 (50149537)