



PLC Integration HTU230_3070

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_HTU230_3070" 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_HTU230_3070 | Sensor data |

See structure description of Leuze_type_HTU230_3070 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_HTU230_3070". 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_HTU230_3070" 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_HTU230_3070" 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_HTU230_3070 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. 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_HTU230_3070 | Reference to the instance of the data structure Leuze_type_PD_HTU230_3070. The structure includes the disaggregated values of the process data. |

See structure description of Leuze_type_PD_HTU230_3070 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_HTU230_3070

| 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.TeachInSelect | Bool | [READ_WRITE] Addressing of particular BDC for which teach-in commands apply |
| DeviceData.Selection.TeachState.All | Bool | [READ_ONLY] all parameters of complex data type |
| DeviceData.Selection.Setpoints_60.All | Bool | [READ_WRITE] all parameters of complex data type |
| DeviceData.Selection.Setpoints_60.Param1Bdc1Q1 | Bool | [READ_WRITE] threshold measurement value |
| DeviceData.Selection.Setpoints_60.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.Setpoints_62.All | Bool | [READ_WRITE] all parameters of complex data type |
| DeviceData.Selection.Setpoints_62.Param1Bdc2Q2 | Bool | [READ_WRITE] threshold measurement value |
| DeviceData.Selection.Setpoints_62.Param2Bdc2Q2 | Bool | [READ_WRITE] threshold measurement value |
| DeviceData.Selection.SwitchpointBdc2.All | Bool | [READ_WRITE] all parameters of complex data type |
| DeviceData.Selection.SwitchpointBdc2.Logic | Bool | [READ_WRITE] switching information is transmitted in inverted or not inverted manner |
| DeviceData.Selection.SwitchpointBdc2.Mode | Bool | [READ_WRITE] operation mode for binary signal |
| DeviceData.Selection.SwitchpointBdc2.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.MultiIOPin4 | Bool | [READ_WRITE] polarity of the switching output |
| DeviceData.Selection.TemperatureCompensation | Bool | [READ_WRITE] |

| Parameter name | Data type | Description |
|---|-----------|--|
| DeviceData.Selection.TeachpointSp1_80.All | Bool | [READ_ONLY] all parameters of complex data type |
| DeviceData.Selection.TeachpointSp1_80.Tp1 | Bool | [READ_ONLY] detected lower limit during teach-in procedure |
| DeviceData.Selection.TeachpointSp1_80.Tp2 | Bool | [READ_ONLY] detected upper limit during teach-in procedure |
| DeviceData.Selection.TeachpointSp2_81.All | Bool | [READ_ONLY] all parameters of complex data type |
| DeviceData.Selection.TeachpointSp2_81.Tp1 | Bool | [READ_ONLY] detected lower limit during teach-in procedure |
| DeviceData.Selection.TeachpointSp2_81.Tp2 | Bool | [READ_ONLY] detected upper limit during teach-in procedure |
| DeviceData.Selection.TeachpointSp1_82.All | Bool | [READ_ONLY] all parameters of complex data type |
| DeviceData.Selection.TeachpointSp1_82.Tp1 | Bool | [READ_ONLY] detected lower limit during teach-in procedure |
| DeviceData.Selection.TeachpointSp1_82.Tp2 | Bool | [READ_ONLY] detected upper limit during teach-in procedure |
| DeviceData.Selection.TeachpointSp2_83.All | Bool | [READ_ONLY] all parameters of complex data type |
| DeviceData.Selection.TeachpointSp2_83.Tp1 | Bool | [READ_ONLY] detected lower limit during teach-in procedure |
| DeviceData.Selection.TeachpointSp2_83.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 |
| 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 |

| Parameter name | Data type | Description |
|---|-----------|---|
| 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 |
| 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. |

| Parameter name | Data type | Description |
|---|-----------|---|
| 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. |
| 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. |

| Parameter name | Data type | Description |
|---|-----------|---|
| DeviceData.Data.DirectParametersPage1.Deviceld3 | 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] |
| 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] |

| Parameter name | Data type | Description |
|---|-----------|--|
| 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. |
| 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. |

| Parameter name | Data type | Description |
|--|-----------|--|
| DeviceData.Data.DeviceStatus | UInt | [READ_ONLY] Indicator for the current device condition and diagnosis state. |
| DeviceData.Data.TeachInSelect | UInt | [READ_WRITE] Addressing of particular BDC for which teach-in commands apply |
| DeviceData.Data.TeachState.TeachState | UInt | [READ_ONLY] indication of the current state of the teach-in procedure |
| DeviceData.Data.Setpoints_60.Param1Bdc1Q1 | UInt | [READ_WRITE] threshold measurement value |
| DeviceData.Data.Setpoints_60.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.Setpoints_62.Param1Bdc2Q2 | UInt | [READ_WRITE] threshold measurement value |
| DeviceData.Data.Setpoints_62.Param2Bdc2Q2 | UInt | [READ_WRITE] threshold measurement value |
| DeviceData.Data.SwitchpointBdc2.Logic | UInt | [READ_WRITE] switching information is transmitted in inverted or not inverted manner |
| DeviceData.Data.SwitchpointBdc2.Mode | UInt | [READ_WRITE] operation mode for binary signal |
| DeviceData.Data.SwitchpointBdc2.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.MultiOPin4 | UInt | [READ_WRITE] polarity of the switching output |
| DeviceData.Data.TemperatureCompensation | UInt | [READ_WRITE] |
| DeviceData.Data.TeachpointSp1_80.Tp1 | UInt | [READ_ONLY] detected lower limit during teach-in procedure |
| DeviceData.Data.TeachpointSp1_80.Tp2 | UInt | [READ_ONLY] detected upper limit during teach-in procedure |
| DeviceData.Data.TeachpointSp2_81.Tp1 | UInt | [READ_ONLY] detected lower limit during teach-in procedure |
| DeviceData.Data.TeachpointSp2_81.Tp2 | UInt | [READ_ONLY] detected upper limit during teach-in procedure |

| Parameter name | Data type | Description |
|---|-----------|--|
| DeviceData.Data.TeachpointSp1_82.Tp1 | UInt | [READ_ONLY] detected lower limit during teach-in procedure |
| DeviceData.Data.TeachpointSp1_82.Tp2 | UInt | [READ_ONLY] detected upper limit during teach-in procedure |
| DeviceData.Data.TeachpointSp2_83.Tp1 | UInt | [READ_ONLY] detected lower limit during teach-in procedure |
| DeviceData.Data.TeachpointSp2_83.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_HTU230_3070

| Parameter name | Data type | Description |
|---|-----------|-------------|
| FC_Leuze_PD_HTU230_3070.MeasuredValue | UInt | |
| FC_Leuze_PD_HTU230_3070.SwitchStateBdc1Q1 | Bool | |
| FC_Leuze_PD_HTU230_3070.SwitchStateBdc2Q2 | 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-in Select | 58 | 0 | UIntegerT | 1 | RW | Addressing of particular BDC for which teach-in commands apply 1: (BDC1, Q1) 2: (BDC2, Q2) |
| 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 | 300 | RW | threshold measurement value (300 ... 3000) |
| (2) (BDC1, Q1) | 60 | 2 | UIntegerT | 3000 | RW | threshold measurement value (300 ... 3000) |
| 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 |

| Parameter | Index | Subindex | Data type | Default | AR | Description |
|----------------------------|-------|----------|-----------|---------|----|---|
| 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 |
| Hysteresis | 61 | 3 | UIntegerT | 15 | RW | (5 ... 50) |
| Setpoints | 62 | 0 | RecordT | | RW | threshold measurement value of a sensor for the edge of a binary output signal 2 |
| (1) (BDC2, Q2) | 62 | 1 | UIntegerT | 300 | RW | threshold measurement value (300 ... 3000) |
| (2) (BDC2, Q2) | 62 | 2 | UIntegerT | 3000 | RW | threshold measurement value (300 ... 3000) |
| Switchpoint BDC2 | 63 | 0 | RecordT | | RW | mode, logic and hysteresis for binary data channel 2 |
| Logic | 63 | 1 | UIntegerT | 0 | RW | switching information is transmitted in inverted or not inverted manner 0: NO 1: NC |
| Mode | 63 | 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 |
| Hysteresis | 63 | 3 | UIntegerT | 15 | RW | (5 ... 50) |
| 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 3: Reserved3 4: Reserved4 5: Reserved5 |
| 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 |

| Parameter | Index | Subindex | Data type | Default | AR | Description |
|----------------------|-------|----------|-----------|---------|----|--|
| TP1 | 81 | 1 | UIntegerT | | R | detected lower limit during teach-in procedure |
| TP2 | 81 | 2 | UIntegerT | | R | detected upper limit during teach-in procedure |
| Teachpoint SP1 | 82 | 0 | RecordT | | R | Values detected during teach |
| TP1 | 82 | 1 | UIntegerT | | R | detected lower limit during teach-in procedure |
| TP2 | 82 | 2 | UIntegerT | | R | detected upper limit during teach-in procedure |
| Teachpoint SP2 | 83 | 0 | RecordT | | R | Values detected during teach |
| TP1 | 83 | 1 | UIntegerT | | R | detected lower limit during teach-in procedure |
| TP2 | 83 | 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 | V1.3 |
| IODD release date | 2023-09-22 |
| Device family | HTU... series |
| Device ID | 3070 |
| Device name | HTU230-3000/L4-M12 |
| Device variants | HTU230-3000/L4-M12 (50149547) |