



## PLC Integration of HT10\_2098

**IO-Link service data function block + process data parser function for Beckhoff (TwinCAT 3.x) PLC systems in combination with a EtherCAT IO-Link Master**

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# 1 Legal information

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## **2 About this document**

Please read this chapter carefully before working with this documentation and the Leuze IO-Link device.

### **2.1 Purpose of use**

These instructions have been designed for the technical personnel for the use of the IO-Link PLC blocks.

These instructions are intended to provide support during the commissioning of a Leuze IO-Link sensor using standard software from Siemens. The described module is part of this standard software.

### **2.2 Target group**

These instructions are addressed to programming engineers and the operators of machines and systems, which are operated by one or several IO-Link devices. They also address people, who connect the IO-Link device via an IO-Link-Master-Gateway to a PLC-Control for data exchange.

## 3 General use of function block

### 3.1 Short description

The function block "FB\_Leuze\_IOL\_ HT10\_2098" simplifies the usage of Leuze IO-Link devices on Beckhoff (TwinCAT 3.x) PLC controls. This FB supports IO-Link Masters which can be connected via EtherCAT 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



Fig. 3.1: Example of module call

### 3.3 Configuration

Tab. 3.1: Parameter IN

Parameter	Data type	Description
bExecute	Bool	Positive trigger: Start data transfer
bRW	Bool	Read or write the selected IO-Link parameter. FALSE: Read parameter TRUE: Write Parameter
nPort	T_AmsPort	Port number of the ADS device.
sNetId	T_AmsNetID	String containing the AMS network identifier of the target device to which the ADS command is directed. Beckhoff EL6224/EP6224: AoeNetId of the IO-Link Master
nIdxGroup	UDInt	Index group number.
tTimeOut	Time	Time, after a Timeout-Error is triggered.

Tab. 3.2: Parameter INOUT

Parameter	Data type	Description
stDeviceData	ST_Leuze_IOL_ HT10_2098	Sensor data

See structure description of ST\_Leuze\_IOL\_ HT10\_2098 in chapter 7.

Tab. 3.3: Parameter OUT

Parameter	Data type	Description
bDone	Bool	Indicates whether data is valid.

Parameter	Data type	Description
bBusy	Bool	Request in process. FALSE: Request is terminated TRUE: Request is being processed
bError	Bool	Error flag FALSE: No error TRUE: Error detected
stErrorCode	ST_Leuze_IOL_Error	Status of the function block

See structure description of ST\_Leuze\_IOL\_Error in chapter 6.

### 3.4 Method of function

The function block uses the data structure "ST\_Leuze\_IOL\_HT10\_2098". 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 "bRW" = FALSE to read parameter. The value that should be written can be defined in the data structure, as soon as the input parameter "bRW" = TRUE. You start each transfer by calling up the "FB\_Leuze\_IOL\_HT10\_2098" with a positive trigger at the "bExecute" input. As long as there is no valid answer the output "bBusy" 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 "bDone" = TRUE output shows that the transmission was successful. The outputs retain there states as long as there is no new positive trigger at the "bExecute" input again.

The function block allows you to read or write multiple IO-Link parameters sequentially (multi-selection). 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 (bError) is set and an error code (ST\_Leuze\_IOL\_Error) 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\_IOL\_ HT10\_2098" is a part of the TwinCAT V3.x library. The library can be installed by using the Library Repository. Afterwards the library can be added to your project (References --> Add library...).

### Integration step by step:

- Download the library
- Open the Library repository in Library Manager tab in Beckhoff TwinCAT
- Click Install... and select downloaded library
- Open Add library in Library Manager tab
- Find installed library under Leuze electronic GmbH + Co. KG

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 F\_Leuze\_PD\_HT10\_2098 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.

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
aProcessData	INPUT	ARRAY OF BYTE	Raw process data of the IO-Link device.
nPDMode	INPUT	INT	Mode of the PD. User must select mode of PD according to the sensors settings.
bError	OUTPUT	BOOL	Error flag FALSE: No error TRUE: Error detected
F_Leuze_PD_HT10_2098	OUTPUT	ST_Leuze_PD_HT10_2098	Reference to the instance of the data structure ST_Leuze_PD_HT10_2098. The structure includes the disaggregated values of the process data.

See structure description of ST\_Leuze\_PD\_HT10\_2098 in chapter 7.

## 6 Error description

The parameter "ErrorCode" can be interpreted using the PLC data type ST\_Leuze\_IOL\_Error. This data type contains the following error information:

Tab. 6.1: ST\_Leuze\_IOL\_Error description

Parameter name	Data type	Description
ErrorStatus.nBlockError	WORD	Error number representing FB where error occurred
ErrorStatus.nAdsReadError	UDINT	ADS read error code
ErrorStatus.nAdsWriteError	UDINT	ADS write error code
ErrorStatus.nIndex	INT	IO-Link index to which the error code refers
ErrorStatus.nSubIndex	INT	IO-Link sub-index to which the error code refers

Tab. 6.2: Error description for nBlockError

Error code (nBlockError)	Error description
0x0000	No error
0x8001	Time out error occurred
0x8002	No parameter selected
0x8003	Error in FB_Leuze_IOL_AdsReadWrite block

For additional information see the Beckhoff ADS Return Codes (<https://infosys.beckhoff.com>).

## 7 Data structures

Tab. 7.1: ST\_Leuze\_IOL\_HT10\_2098

Parameter name	Data type	Description
stDeviceData.stSelection.stCommands.bDeviceReset	BOOL	[WRITE_ONLY] Device Reset
stDeviceData.stSelection.stCommands.bApplicationReset	BOOL	[WRITE_ONLY] Application Reset
stDeviceData.stSelection.stCommands.bRestoreFactorySettings	BOOL	[WRITE_ONLY] Restore Factory Settings
stDeviceData.stSelection.stCommands.bClearConfigurationReservationClearDsuploadflag	BOOL	[WRITE_ONLY] Clear Configuration Reservation (Clear DsUploadFlag)
stDeviceData.stSelection.stCommands.bReserveConfigurationForDsSetDsuploadflag	BOOL	[WRITE_ONLY] Reserve Configuration for DS (Set DsUploadFlag)
stDeviceData.stSelection.stCommands.bActivation	BOOL	[WRITE_ONLY] Activation
stDeviceData.stSelection.stCommands.bDeactivation	BOOL	[WRITE_ONLY] Deactivation
stDeviceData.stSelection.stCommands.bTeachInOfQ1InObjectMode	BOOL	[WRITE_ONLY] Teach-In of Q1 in Object Mode
stDeviceData.stSelection.stCommands.bTeachInOfQ2InObjectMode	BOOL	[WRITE_ONLY] Teach-In of Q2 in Object Mode
stDeviceData.stSelection.stCommands.bTeachInOfQ3InObjectMode	BOOL	[WRITE_ONLY] Teach-In of Q3 in Object Mode
stDeviceData.stSelection.stCommands.bTeachInOfQ1InBackgroundMode	BOOL	[WRITE_ONLY] Teach-In of Q1 in Background Mode
stDeviceData.stSelection.stCommands.bTeachInOfQ2InBackgroundMode	BOOL	[WRITE_ONLY] Teach-In of Q2 in Background Mode
stDeviceData.stSelection.stCommands.bTeachInOfQ3InBackgroundMode	BOOL	[WRITE_ONLY] Teach-In of Q3 in Background Mode
stDeviceData.stSelection.stCommands.bTeachInOfQ1InWindowMode	BOOL	[WRITE_ONLY] Teach-In of Q1 in Window Mode
stDeviceData.stSelection.stCommands.bTeachInOfQ2InWindowMode	BOOL	[WRITE_ONLY] Teach-In of Q2 in Window Mode
stDeviceData.stSelection.stCommands.bTeachInOfQ3InWindowMode	BOOL	[WRITE_ONLY] Teach-In of Q3 in Window Mode
stDeviceData.stSelection.stCommands.bTeachInOfQ1UpperSwitchingPointSp1	BOOL	[WRITE_ONLY] Teach-In of Q1 Upper Switching Point (SP1)
stDeviceData.stSelection.stCommands.bTeachInOfQ2UpperSwitchingPointSp1	BOOL	[WRITE_ONLY] Teach-In of Q2 Upper Switching Point (SP1)
stDeviceData.stSelection.stCommands.bTeachInOfQ3UpperSwitchingPointSp1	BOOL	[WRITE_ONLY] Teach-In of Q3 Upper Switching Point (SP1)
stDeviceData.stSelection.stCommands.bTeachInOfQ1LowerSwitchingPointSp2	BOOL	[WRITE_ONLY] Teach-In of Q1 Lower Switching Point (SP2)
stDeviceData.stSelection.stCommands.bTeachInOfQ2LowerSwitchingPointSp2	BOOL	[WRITE_ONLY] Teach-In of Q2 Lower Switching Point (SP2)
stDeviceData.stSelection.stCommands.bTeachInOfQ3LowerSwitchingPointSp2	BOOL	[WRITE_ONLY] Teach-In of Q3 Lower Switching Point (SP2)

Parameter name	Data type	Description
stDeviceData.stSelection.stDirectParameters1.bAll	BOOL	[READ_WRITE] all parameters of complex data type
stDeviceData.stSelection.stDirectParameters1.bAll	BOOL	[READ_WRITE] all parameters of complex data type
stDeviceData.stSelection.stDirectParameters1.bReserved_1	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bMasterCycleTime	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bMinCycleTime	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bMSequenceCapability	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bIoLinkVersionId	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bProcessDataInputLength	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bProcessDataOutputLength	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bVendorId1	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bVendorId2	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bDeviceId1	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bDeviceId2	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bDeviceId3	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bReserved_13	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bReserved_14	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters1.bReserved_15	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDirectParameters2.bAll	BOOL	[READ_WRITE] all parameters of complex data type
stDeviceData.stSelection.stDirectParameters2.bDeviceSpecificParameter1	BOOL	[READ_WRITE]
stDeviceData.stSelection.stDirectParameters2.bDeviceSpecificParameter2	BOOL	[READ_WRITE]
stDeviceData.stSelection.stDirectParameters2.bDeviceSpecificParameter3	BOOL	[READ_WRITE]
stDeviceData.stSelection.stDirectParameters2.bDeviceSpecificParameter4	BOOL	[READ_WRITE]
stDeviceData.stSelection.stDirectParameters2.bDeviceSpecificParameter5	BOOL	[READ_WRITE]
stDeviceData.stSelection.stDirectParameters2.bDeviceSpecificParameter6	BOOL	[READ_WRITE]
stDeviceData.stSelection.stDirectParameters2.bDeviceSpecificParameter7	BOOL	[READ_WRITE]
stDeviceData.stSelection.stDirectParameters2.bDeviceSpecificParameter8	BOOL	[READ_WRITE]

Parameter name	Data type	Description
stDeviceData.stSelection.stDirectParameters2.bDeviceSpecificParameter9	BOOL	[READ_WRITE]
stDeviceData.stSelection.stDirectParameters2.bDeviceSpecificParameter10	BOOL	[READ_WRITE]
stDeviceData.stSelection.stDirectParameters2.bDeviceSpecificParameter11	BOOL	[READ_WRITE]
stDeviceData.stSelection.stDirectParameters2.bDeviceSpecificParameter12	BOOL	[READ_WRITE]
stDeviceData.stSelection.stDirectParameters2.bDeviceSpecificParameter13	BOOL	[READ_WRITE]
stDeviceData.stSelection.stDirectParameters2.bDeviceSpecificParameter14	BOOL	[READ_WRITE]
stDeviceData.stSelection.stDirectParameters2.bDeviceSpecificParameter15	BOOL	[READ_WRITE]
stDeviceData.stSelection.stDirectParameters2.bDeviceSpecificParameter16	BOOL	[READ_WRITE]
stDeviceData.stSelection.bStandardCommand	BOOL	[WRITE_ONLY]
stDeviceData.stSelection.stDeviceAccessLocks.bAll	BOOL	[READ_WRITE] all parameters of complex data type
stDeviceData.stSelection.bVendorName	BOOL	[READ_ONLY]
stDeviceData.stSelection.bVendorText	BOOL	[READ_ONLY]
stDeviceData.stSelection.bProductName	BOOL	[READ_ONLY]
stDeviceData.stSelection.bProductId	BOOL	[READ_ONLY]
stDeviceData.stSelection.bProductText	BOOL	[READ_ONLY]
stDeviceData.stSelection.bSerialNumber	BOOL	[READ_ONLY]
stDeviceData.stSelection.bHardwareVersion	BOOL	[READ_ONLY]
stDeviceData.stSelection.bFirmwareVersion	BOOL	[READ_ONLY]
stDeviceData.stSelection.bApplicationSpecificTag	BOOL	[READ_WRITE]
stDeviceData.stSelection.bDeviceStatus	BOOL	[READ_ONLY]
stDeviceData.stSelection.stStatusInformation.bAll	BOOL	[READ_ONLY] all parameters of complex data type
stDeviceData.stSelection.stExtendedStatus.bAll	BOOL	[READ_ONLY] all parameters of complex data type
stDeviceData.stSelection.bDataStorageUploadFlag	BOOL	[READ_ONLY] Priority of local changes according to configuration data stored in master DS
stDeviceData.stSelection.bGain	BOOL	[READ_ONLY] Current Gain Control Output Value
stDeviceData.stSelection.bReserved01	BOOL	[READ_ONLY] Reserved For Future Use; Read Only Access

Parameter name	Data type	Description
stDeviceData.stSelection.bSwitchingOutputProperty	BOOL	[READ_WRITE] General Behaviour of All Switching Outputs with No Available Measure Value
stDeviceData.stSelection.bQ1LightDark	BOOL	[READ_WRITE] Output Q1: Light or Dark Switching Selection: Light=Output Active (On) between SP1 and SP2
stDeviceData.stSelection.bQ1EvaluationDepth	BOOL	[READ_WRITE] Q1 Output Changes are Delayed By This Number of Unchanged Measurement Results
stDeviceData.stSelection.bQ1HysteresisClass	BOOL	[READ_WRITE] Q1 Hysteresis Adjustment (Raw, Medium or Fine)
stDeviceData.stSelection.bQ1ReserveClass	BOOL	[READ_WRITE] Q1 Reserve Adjustment (Raw, Medium or Fine)
stDeviceData.stSelection.bQ2LightDark	BOOL	[READ_WRITE] Output Q2: Light or Dark Switching Selection: Light=Output Active (On) between SP1 and SP2
stDeviceData.stSelection.bQ2EvaluationDepth	BOOL	[READ_WRITE] Q2 Output Changes are Delayed By This Number of Unchanged Measurement Results
stDeviceData.stSelection.bQ2HysteresisClass	BOOL	[READ_WRITE] Q2 Hysteresis Adjustment (Raw, Medium or Fine)
stDeviceData.stSelection.bQ2ReserveClass	BOOL	[READ_WRITE] Q2 Reserve Adjustment (Raw, Medium or Fine)
stDeviceData.stSelection.bMinimumGain	BOOL	[READ_WRITE] Sets Lower Limit Of Gain Control (if Min less than Max)
stDeviceData.stSelection.bMaximumGain	BOOL	[READ_WRITE] Sets Upper Limit Of Gain Control (if Min less than Max)
stDeviceData.stSelection.bXdrExtendedDynamicRange	BOOL	[READ_WRITE] Improves the measurement behavior in case of extreme contrast differences.
stDeviceData.stSelection.bReserved03	BOOL	[READ_WRITE] Reserved For Future Use; Read/Write Access
stDeviceData.stSelection.bReserved04	BOOL	[READ_WRITE] Reserved For Future Use; Read/Write Access
stDeviceData.stSelection.bReserved05	BOOL	[READ_WRITE] Reserved For Future Use; Read/Write Access
stDeviceData.stSelection.bReserved06	BOOL	[READ_WRITE] Reserved For Future Use; Read/Write Access
stDeviceData.stSelection.bReserved07	BOOL	[READ_WRITE] Reserved For Future Use; Read/Write Access

Parameter name	Data type	Description
stDeviceData.stSelection.bReserved08	BOOL	[READ_WRITE] Reserved For Future Use; Read/Write Access
stDeviceData.stSelection.bReserved09	BOOL	[READ_WRITE] Reserved For Future Use; Read/Write Access
stDeviceData.stSelection.bReserved10	BOOL	[READ_WRITE] Reserved For Future Use; Read/Write Access
stDeviceData.stSelection.bReserved11	BOOL	[READ_WRITE] Reserved For Future Use; Read/Write Access
stDeviceData.stSelection.bFunctionButton1Level1	BOOL	[READ_ONLY] Function Being Called When Button #1 Is Released After 2..7 Seconds
stDeviceData.stSelection.bFunctionButton1Level2	BOOL	[READ_ONLY] Function Being Called When Button #1 Is Released After 7..12 Seconds
stDeviceData.stSelection.bFunctionButton1Level3	BOOL	[READ_ONLY] Function Being Called When Button #1 Is Released After 12..17 Seconds
stDeviceData.stSelection.bFunctionButton2Level1	BOOL	[READ_ONLY] Function Being Called When Button #2 Is Released After 2..7 Seconds
stDeviceData.stSelection.bFunctionButton2Level2	BOOL	[READ_ONLY] Function Being Called When Button #2 Is Released After 7..12 Seconds
stDeviceData.stSelection.bFunctionButton2Level3	BOOL	[READ_ONLY] Function Being Called When Button #2 Is Released After 12..17 Seconds
stDeviceData.stSelection.bFunctionButton3Level1	BOOL	[READ_ONLY] Function Being Called When Both Buttons Together Are Released After 2..7 Seconds
stDeviceData.stSelection.bFunctionButton3Level2	BOOL	[READ_ONLY] Function Being Called When Both Buttons Together Are Released After 7..12 Seconds
stDeviceData.stSelection.bFunctionButton3Level3	BOOL	[READ_ONLY] Function Being Called When Both Buttons Together Are Released After 12..17 Seconds
stDeviceData.stSelection.bFunctionWireLevel1	BOOL	[READ_ONLY] Function Being Called With Selection Width of 20..80 ms On Input Wire
stDeviceData.stSelection.bFunctionWireLevel2	BOOL	[READ_ONLY] Function Being Called With Low Pulse Width of 120..180 ms On Wire Input
stDeviceData.stSelection.bFunctionWireLevel3	BOOL	[READ_ONLY] Function Being Called With Low Pulse Width of 220..280 ms On Wire Input

Parameter name	Data type	Description
stDeviceData.stSelection.bFunctionWireLevel4	BOOL	[READ_ONLY] Function Being Called With Low Pulse Width of 320..380 ms On Wire Input
stDeviceData.stSelection.bFunctionWireLevel5	BOOL	[READ_ONLY] Function Being Called With Low Pulse Width of 420..480 ms On Wire Input
stDeviceData.stSelection.bFunctionWireLevel6	BOOL	[READ_ONLY] Function Being Called With Low Pulse Width of 520..580 ms On Wire Input
stDeviceData.stSelection.bFunctionWireLevel7	BOOL	[READ_ONLY] Function Being Called With Low Pulse Width of 620..680 ms On Wire Input
stDeviceData.stSelection.bFunctionWireLevel8	BOOL	[READ_ONLY] Function Being Called With Low Pulse Width of 720..780 ms On Wire Input
stDeviceData.stSelection.bFunctionWireLevel9	BOOL	[READ_ONLY] Function Being Called With Low Pulse Width of 820..880 ms On Wire Input
stDeviceData.stSelection.bFunctionWireLevel10	BOOL	[READ_ONLY] Function Being Called With Low Pulse Width of 920..980 ms On Wire Input
stDeviceData.stSelection.bFunctionWireLevel11	BOOL	[READ_ONLY] Function Being Called With Low Pulse Width of 1020..1080 ms On Wire Input
stDeviceData.stSelection.bFunctionWireLevel12	BOOL	[READ_ONLY] Function Being Called With Low Pulse Width of 1120..1180 ms On Wire Input
stDeviceData.stSelection.bDefaultValueTest	BOOL	[READ_WRITE] Default Value Test
stDeviceData.stData.stCommands.nDeviceReset	UINT	[WRITE_ONLY] Device Reset
stDeviceData.stData.stCommands.nApplicationReset	UINT	[WRITE_ONLY] Application Reset
stDeviceData.stData.stCommands.nRestoreFactorySettings	UINT	[WRITE_ONLY] Restore Factory Settings
stDeviceData.stData.stCommands.nClearConfigurationReservationClearDsuploadflag	UINT	[WRITE_ONLY] Clear Configuration Reservation (Clear DsUploadFlag)
stDeviceData.stData.stCommands.nReserveConfigurationForDsSetDsuploadflag	UINT	[WRITE_ONLY] Reserve Configuration for DS (Set DsUploadFlag)
stDeviceData.stData.stCommands.nActivation	UINT	[WRITE_ONLY] Activation
stDeviceData.stData.stCommands.nDeactivation	UINT	[WRITE_ONLY] Deactivation
stDeviceData.stData.stCommands.nTeachInOfQ1InObjectMode	UINT	[WRITE_ONLY] Teach-In of Q1 in Object Mode
stDeviceData.stData.stCommands.nTeachInOfQ2InObjectMode	UINT	[WRITE_ONLY] Teach-In of Q2 in Object Mode
stDeviceData.stData.stCommands.nTeachInOfQ3InObjectMode	UINT	[WRITE_ONLY] Teach-In of Q3 in Object Mode



Parameter name	Data type	Description
stDeviceData.stData.stCommands.nTeachInOfQ1InBackgroundMode	UINT	[WRITE_ONLY] Teach-In of Q1 in Background Mode
stDeviceData.stData.stCommands.nTeachInOfQ2InBackgroundMode	UINT	[WRITE_ONLY] Teach-In of Q2 in Background Mode
stDeviceData.stData.stCommands.nTeachInOfQ3InBackgroundMode	UINT	[WRITE_ONLY] Teach-In of Q3 in Background Mode
stDeviceData.stData.stCommands.nTeachInOfQ1InWindowMode	UINT	[WRITE_ONLY] Teach-In of Q1 in Window Mode
stDeviceData.stData.stCommands.nTeachInOfQ2InWindowMode	UINT	[WRITE_ONLY] Teach-In of Q2 in Window Mode
stDeviceData.stData.stCommands.nTeachInOfQ3InWindowMode	UINT	[WRITE_ONLY] Teach-In of Q3 in Window Mode
stDeviceData.stData.stCommands.nTeachInOfQ1UpperSwitchingPointSp1	UINT	[WRITE_ONLY] Teach-In of Q1 Upper Switching Point (SP1)
stDeviceData.stData.stCommands.nTeachInOfQ2UpperSwitchingPointSp1	UINT	[WRITE_ONLY] Teach-In of Q2 Upper Switching Point (SP1)
stDeviceData.stData.stCommands.nTeachInOfQ3UpperSwitchingPointSp1	UINT	[WRITE_ONLY] Teach-In of Q3 Upper Switching Point (SP1)
stDeviceData.stData.stCommands.nTeachInOfQ1LowerSwitchingPointSp2	UINT	[WRITE_ONLY] Teach-In of Q1 Lower Switching Point (SP2)
stDeviceData.stData.stCommands.nTeachInOfQ2LowerSwitchingPointSp2	UINT	[WRITE_ONLY] Teach-In of Q2 Lower Switching Point (SP2)
stDeviceData.stData.stCommands.nTeachInOfQ3LowerSwitchingPointSp2	UINT	[WRITE_ONLY] Teach-In of Q3 Lower Switching Point (SP2)
stDeviceData.stData.stDirectParameters1.nReserved_1	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nMasterCycleTime	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nMinCycleTime	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nMSequenceCapability	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nIoLinkVersionId	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nProcessDataInputLength	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nProcessDataOutputLength	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nVendorId1	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nVendorId2	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nDeviceId1	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nDeviceId2	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nDeviceId3	UINT	[READ_ONLY]

Parameter name	Data type	Description
stDeviceData.stData.stDirectParameters1.nReserved_13	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nReserved_14	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1.nReserved_15	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters2.nDeviceSpecificParameter1	UINT	[READ_WRITE]
stDeviceData.stData.stDirectParameters2.nDeviceSpecificParameter2	UINT	[READ_WRITE]
stDeviceData.stData.stDirectParameters2.nDeviceSpecificParameter3	UINT	[READ_WRITE]
stDeviceData.stData.stDirectParameters2.nDeviceSpecificParameter4	UINT	[READ_WRITE]
stDeviceData.stData.stDirectParameters2.nDeviceSpecificParameter5	UINT	[READ_WRITE]
stDeviceData.stData.stDirectParameters2.nDeviceSpecificParameter6	UINT	[READ_WRITE]
stDeviceData.stData.stDirectParameters2.nDeviceSpecificParameter7	UINT	[READ_WRITE]
stDeviceData.stData.stDirectParameters2.nDeviceSpecificParameter8	UINT	[READ_WRITE]
stDeviceData.stData.stDirectParameters2.nDeviceSpecificParameter9	UINT	[READ_WRITE]
stDeviceData.stData.stDirectParameters2.nDeviceSpecificParameter10	UINT	[READ_WRITE]
stDeviceData.stData.stDirectParameters2.nDeviceSpecificParameter11	UINT	[READ_WRITE]
stDeviceData.stData.stDirectParameters2.nDeviceSpecificParameter12	UINT	[READ_WRITE]
stDeviceData.stData.stDirectParameters2.nDeviceSpecificParameter13	UINT	[READ_WRITE]
stDeviceData.stData.stDirectParameters2.nDeviceSpecificParameter14	UINT	[READ_WRITE]
stDeviceData.stData.stDirectParameters2.nDeviceSpecificParameter15	UINT	[READ_WRITE]
stDeviceData.stData.stDirectParameters2.nDeviceSpecificParameter16	UINT	[READ_WRITE]
stDeviceData.stData.nStandardCommand	UINT	[WRITE_ONLY]
stDeviceData.stData.stDeviceAccessLocks.bParameterWriteAccessLock	BOOL	[READ_WRITE]
stDeviceData.stData.stDeviceAccessLocks.bDataStorageLock	BOOL	[READ_WRITE]
stDeviceData.stData.stDeviceAccessLocks.bLocalParameterizationLock	BOOL	[READ_WRITE]
stDeviceData.stData.stDeviceAccessLocks.bLocalUserInterfaceLock	BOOL	[READ_WRITE]
stDeviceData.stData.sVendorName	STRING	[READ_ONLY]
stDeviceData.stData.sVendorText	STRING	[READ_ONLY]
stDeviceData.stData.sProductName	STRING	[READ_ONLY]

Parameter name	Data type	Description
stDeviceData.stData.sProductId	STRING	[READ_ONLY]
stDeviceData.stData.sProductText	STRING	[READ_ONLY]
stDeviceData.stData.sSerialNumber	STRING	[READ_ONLY]
stDeviceData.stData.sHardwareVersion	STRING	[READ_ONLY]
stDeviceData.stData.sFirmwareVersion	STRING	[READ_ONLY]
stDeviceData.stData.sApplicationSpecificTag	STRING	[READ_WRITE]
stDeviceData.stData.nDeviceStatus	UINT	[READ_ONLY]
stDeviceData.stData.stStatusInformation.bQ1OutputState	BOOL	[READ_ONLY]
stDeviceData.stData.stStatusInformation.bQ2OutputState	BOOL	[READ_ONLY]
stDeviceData.stData.stStatusInformation.bQ3OutputState	BOOL	[READ_ONLY]
stDeviceData.stData.stStatusInformation.bMeasureState	BOOL	[READ_ONLY]
stDeviceData.stData.stStatusInformation.bReceivedSignal	BOOL	[READ_ONLY]
stDeviceData.stData.stStatusInformation.bWarningReducedAccuracy	BOOL	[READ_ONLY]
stDeviceData.stData.stExtendedStatus.bDeactivationFlag	BOOL	[READ_ONLY]
stDeviceData.stData.stExtendedStatus.bLaserErrorFlag	BOOL	[READ_ONLY]
stDeviceData.stData.stExtendedStatus.bSignalAmplitudeFlag	BOOL	[READ_ONLY]
stDeviceData.stData.stExtendedStatus.nTargetBrightness	UINT	[READ_ONLY]
stDeviceData.stData.stExtendedStatus.nTeachState	UINT	[READ_ONLY]
stDeviceData.stData.nDataStorageUploadFlag	UINT	[READ_ONLY] Priority of local changes according to configuration data stored in master DS
stDeviceData.stData.nGain	UINT	[READ_ONLY] Current Gain Control Output Value
stDeviceData.stData.nReserved01	UINT	[READ_ONLY] Reserved For Future Use; Read Only Access
stDeviceData.stData.nSwitchingOutputProperty	UINT	[READ_WRITE] General Behaviour of All Switching Outputs with No Available Measure Value
stDeviceData.stData.nQ1LightDark	UINT	[READ_WRITE] Output Q1: Light or Dark Switching Selection: Light=Output Active (On) between SP1 and SP2

Parameter name	Data type	Description
stDeviceData.stData.nQ1EvaluationDepth	UINT	[READ_WRITE] Q1 Output Changes are Delayed By This Number of Unchanged Measurement Results
stDeviceData.stData.nQ1HysteresisClass	UINT	[READ_WRITE] Q1 Hysteresis Adjustment (Raw, Medium or Fine)
stDeviceData.stData.nQ1ReserveClass	UINT	[READ_WRITE] Q1 Reserve Adjustment (Raw, Medium or Fine)
stDeviceData.stData.nQ2LightDark	UINT	[READ_WRITE] Output Q2: Light or Dark Switching Selection: Light=Output Active (On) between SP1 and SP2
stDeviceData.stData.nQ2EvaluationDepth	UINT	[READ_WRITE] Q2 Output Changes are Delayed By This Number of Unchanged Measurement Results
stDeviceData.stData.nQ2HysteresisClass	UINT	[READ_WRITE] Q2 Hysteresis Adjustment (Raw, Medium or Fine)
stDeviceData.stData.nQ2ReserveClass	UINT	[READ_WRITE] Q2 Reserve Adjustment (Raw, Medium or Fine)
stDeviceData.stData.nMinimumGain	UINT	[READ_WRITE] Sets Lower Limit Of Gain Control (if Min less than Max)
stDeviceData.stData.nMaximumGain	UINT	[READ_WRITE] Sets Upper Limit Of Gain Control (if Min less than Max)
stDeviceData.stData.nXdrExtendedDynamicRange	UINT	[READ_WRITE] Improves the measurement behavior in case of extreme contrast differences.
stDeviceData.stData.nReserved03	UINT	[READ_WRITE] Reserved For Future Use; Read/Write Access
stDeviceData.stData.nReserved04	UINT	[READ_WRITE] Reserved For Future Use; Read/Write Access
stDeviceData.stData.nReserved05	UINT	[READ_WRITE] Reserved For Future Use; Read/Write Access
stDeviceData.stData.nReserved06	UINT	[READ_WRITE] Reserved For Future Use; Read/Write Access
stDeviceData.stData.nReserved07	UINT	[READ_WRITE] Reserved For Future Use; Read/Write Access
stDeviceData.stData.nReserved08	UINT	[READ_WRITE] Reserved For Future Use; Read/Write Access
stDeviceData.stData.nReserved09	UINT	[READ_WRITE] Reserved For Future Use; Read/Write Access
stDeviceData.stData.nReserved10	UINT	[READ_WRITE] Reserved For Future Use; Read/Write Access

Parameter name	Data type	Description
stDeviceData.stData.nReserved11	UINT	[READ_WRITE] Reserved For Future Use; Read/Write Access
stDeviceData.stData.nFunctionButton1Level1	UINT	[READ_ONLY] Function Being Called When Button #1 Is Released After 2..7 Seconds
stDeviceData.stData.nFunctionButton1Level2	UINT	[READ_ONLY] Function Being Called When Button #1 Is Released After 7..12 Seconds
stDeviceData.stData.nFunctionButton1Level3	UINT	[READ_ONLY] Function Being Called When Button #1 Is Released After 12..17 Seconds
stDeviceData.stData.nFunctionButton2Level1	UINT	[READ_ONLY] Function Being Called When Button #2 Is Released After 2..7 Seconds
stDeviceData.stData.nFunctionButton2Level2	UINT	[READ_ONLY] Function Being Called When Button #2 Is Released After 7..12 Seconds
stDeviceData.stData.nFunctionButton2Level3	UINT	[READ_ONLY] Function Being Called When Button #2 Is Released After 12..17 Seconds
stDeviceData.stData.nFunctionButton3Level1	UINT	[READ_ONLY] Function Being Called When Both Buttons Together Are Released After 2..7 Seconds
stDeviceData.stData.nFunctionButton3Level2	UINT	[READ_ONLY] Function Being Called When Both Buttons Together Are Released After 7..12 Seconds
stDeviceData.stData.nFunctionButton3Level3	UINT	[READ_ONLY] Function Being Called When Both Buttons Together Are Released After 12..17 Seconds
stDeviceData.stData.nFunctionWireLevel1	UINT	[READ_ONLY] Function Being Called With Selection Width of 20..80 ms On Input Wire
stDeviceData.stData.nFunctionWireLevel2	UINT	[READ_ONLY] Function Being Called With Low Pulse Width of 120..180 ms On Wire Input
stDeviceData.stData.nFunctionWireLevel3	UINT	[READ_ONLY] Function Being Called With Low Pulse Width of 220..280 ms On Wire Input
stDeviceData.stData.nFunctionWireLevel4	UINT	[READ_ONLY] Function Being Called With Low Pulse Width of 320..380 ms On Wire Input
stDeviceData.stData.nFunctionWireLevel5	UINT	[READ_ONLY] Function Being Called With Low Pulse Width of 420..480 ms On Wire Input

Parameter name	Data type	Description
stDeviceData.stData.nFunctionWireLevel6	UINT	[READ_ONLY] Function Being Called With Low Pulse Width of 520..580 ms On Wire Input
stDeviceData.stData.nFunctionWireLevel7	UINT	[READ_ONLY] Function Being Called With Low Pulse Width of 620..680 ms On Wire Input
stDeviceData.stData.nFunctionWireLevel8	UINT	[READ_ONLY] Function Being Called With Low Pulse Width of 720..780 ms On Wire Input
stDeviceData.stData.nFunctionWireLevel9	UINT	[READ_ONLY] Function Being Called With Low Pulse Width of 820..880 ms On Wire Input
stDeviceData.stData.nFunctionWireLevel10	UINT	[READ_ONLY] Function Being Called With Low Pulse Width of 920..980 ms On Wire Input
stDeviceData.stData.nFunctionWireLevel11	UINT	[READ_ONLY] Function Being Called With Low Pulse Width of 1020..1080 ms On Wire Input
stDeviceData.stData.nFunctionWireLevel12	UINT	[READ_ONLY] Function Being Called With Low Pulse Width of 1120..1180 ms On Wire Input
stDeviceData.stData.nDefaultValueTest	UINT	[READ_WRITE] Default Value Test

Tab. 7.2: ST\_Leuze\_PD\_HT10\_2098

Parameter name	Data type	Description
ST_Leuze_PD_HT10_2098.bQ1OutputState	BOOL	
ST_Leuze_PD_HT10_2098.bQ2OutputState	BOOL	
ST_Leuze_PD_HT10_2098.bQ3OutputState	BOOL	
ST_Leuze_PD_HT10_2098.bMeasureState	BOOL	
ST_Leuze_PD_HT10_2098.bReceivedSignal	BOOL	
ST_Leuze_PD_HT10_2098.bWarningReducedAccuracy	BOOL	

## 8 Parameter descriptions

Tab. 8.1: IODD parameter descriptions

(AR - Access Rights, R - Read only, W - Write only, RW - Read and Write, NS - Not specified)

Parameter	Index	Subindex	Data type	Default	AR	Description
Commands			RecordT		W	
Device Reset			UIntegerT	128	W	Device Reset
Application Reset			UIntegerT	129	W	Application Reset
Restore Factory Settings			UIntegerT	130	W	Restore Factory Settings
Clear Configuration Reservation (Clear DsUploadFlag)			UIntegerT	160	W	Clear Configuration Reservation (Clear DsUploadFlag)
Reserve Configuration for DS (Set DsUploadFlag)			UIntegerT	161	W	Reserve Configuration for DS (Set DsUploadFlag)
Activation			UIntegerT	176	W	Activation
Deactivation			UIntegerT	177	W	Deactivation
Teach-In of Q1 in Object Mode			UIntegerT	197	W	Teach-In of Q1 in Object Mode
Teach-In of Q2 in Object Mode			UIntegerT	198	W	Teach-In of Q2 in Object Mode
Teach-In of Q3 in Object Mode			UIntegerT	199	W	Teach-In of Q3 in Object Mode
Teach-In of Q1 in Background Mode			UIntegerT	200	W	Teach-In of Q1 in Background Mode
Teach-In of Q2 in Background Mode			UIntegerT	201	W	Teach-In of Q2 in Background Mode
Teach-In of Q3 in Background Mode			UIntegerT	202	W	Teach-In of Q3 in Background Mode
Teach-In of Q1 in Window Mode			UIntegerT	203	W	Teach-In of Q1 in Window Mode
Teach-In of Q2 in Window Mode			UIntegerT	204	W	Teach-In of Q2 in Window Mode
Teach-In of Q3 in Window Mode			UIntegerT	205	W	Teach-In of Q3 in Window Mode
Teach-In of Q1 Upper Switching Point (SP1)			UIntegerT	206	W	Teach-In of Q1 Upper Switching Point (SP1)
Teach-In of Q2 Upper Switching Point (SP1)			UIntegerT	207	W	Teach-In of Q2 Upper Switching Point (SP1)
Teach-In of Q3 Upper Switching Point (SP1)			UIntegerT	208	W	Teach-In of Q3 Upper Switching Point (SP1)
Teach-In of Q1 Lower Switching Point (SP2)			UIntegerT	209	W	Teach-In of Q1 Lower Switching Point (SP2)
Teach-In of Q2 Lower Switching Point (SP2)			UIntegerT	210	W	Teach-In of Q2 Lower Switching Point (SP2)
Teach-In of Q3 Lower Switching Point (SP2)			UIntegerT	211	W	Teach-In of Q3 Lower Switching Point (SP2)
Direct Parameters 1	0	0	RecordT		RW	

Parameter	Index	Subindex	Data type	Default	AR	Description
Reserved	0	1	UIntegerT		R	
Master Cycle Time	0	2	UIntegerT		R	
Min Cycle Time	0	3	UIntegerT		R	
M-Sequence Capability	0	4	UIntegerT		R	
IO-Link Version ID	0	5	UIntegerT	17	R	
Process Data Input Length	0	6	UIntegerT		R	
Process Data Output Length	0	7	UIntegerT		R	
Vendor ID 1	0	8	UIntegerT		R	
Vendor ID 2	0	9	UIntegerT		R	
Device ID 1	0	10	UIntegerT		R	
Device ID 2	0	11	UIntegerT		R	
Device ID 3	0	12	UIntegerT		R	
Reserved	0	13	UIntegerT		R	
Reserved	0	14	UIntegerT		R	
Reserved	0	15	UIntegerT		R	
Standard Command	0	16	UIntegerT	128	W	(0 ... 63): Reserved 128: Device Reset 129: Application Reset 130: Restore Factory Settings (131 ... 159): Reserved
Direct Parameters 2	1	0	RecordT		RW	
Device Specific Parameter 1	1	1	UIntegerT		RW	
Device Specific Parameter 2	1	2	UIntegerT		RW	
Device Specific Parameter 3	1	3	UIntegerT		RW	
Device Specific Parameter 4	1	4	UIntegerT		RW	
Device Specific Parameter 5	1	5	UIntegerT		RW	
Device Specific Parameter 6	1	6	UIntegerT		RW	
Device Specific Parameter 7	1	7	UIntegerT		RW	
Device Specific Parameter 8	1	8	UIntegerT		RW	
Device Specific Parameter 9	1	9	UIntegerT		RW	



Parameter	Index	Subindex	Data type	Default	AR	Description
Device Specific Parameter 10	1	10	UIntegerT		RW	
Device Specific Parameter 11	1	11	UIntegerT		RW	
Device Specific Parameter 12	1	12	UIntegerT		RW	
Device Specific Parameter 13	1	13	UIntegerT		RW	
Device Specific Parameter 14	1	14	UIntegerT		RW	
Device Specific Parameter 15	1	15	UIntegerT		RW	
Device Specific Parameter 16	1	16	UIntegerT		RW	
Standard Command	2	0	UIntegerT	128	W	(0 ... 63): Reserved 128: Device Reset 129: Application Reset 130: Restore Factory Settings (131 ... 159): Reserved 160: Clear Configuration Reservation (Clear DsUploadFlag) 161: Reserve Configuration for DS (Set DsUploadFlag) 176: Activation 177: Deactivation 197: Teach-In of Q1 in Object Mode 198: Teach-In of Q2 in Object Mode 199: Teach-In of Q3 in Object Mode 200: Teach-In of Q1 in Background Mode 201: Teach-In of Q2 in Background Mode 202: Teach-In of Q3 in Background Mode 203: Teach-In of Q1 in Window Mode 204: Teach-In of Q2 in Window Mode 205: Teach-In of Q3 in Window Mode 206: Teach-In of Q1 Upper Switching Point (SP1) 207: Teach-In of Q2 Upper Switching Point (SP1) 208: Teach-In of Q3 Upper Switching Point (SP1) 209: Teach-In of Q1 Lower Switching Point (SP2) 210: Teach-In of Q2 Lower Switching Point (SP2) 211: Teach-In of Q3 Lower Switching Point (SP2)
Device Access Locks	12	0	RecordT		RW	
Parameter (write) Access Lock	12	1	BooleanT		RW	
Data Storage Lock	12	2	BooleanT		RW	
Local Parameterization Lock	12	3	BooleanT		RW	
Local User Interface Lock	12	4	BooleanT		RW	

Parameter	Index	Subindex	Data type	Default	AR	Description
Vendor Name	16	0	StringT		R	
Vendor Text	17	0	StringT		R	
Product Name	18	0	StringT		R	
Product ID	19	0	StringT		R	
Product Text	20	0	StringT		R	
Serial Number	21	0	StringT		R	
Hardware Version	22	0	StringT		R	
Firmware Version	23	0	StringT		R	
Application Specific Tag	24	0	StringT		RW	
Device Status	36	0	UIntegerT		R	0: Device is OK 1: Maintenance required 2: Out of specification 3: Functional check 4: Failure (5 ... 255): Reserved
Status Information	71	0	RecordT		R	Process Input Data with Status Information
Q1 Output State	71	1	BooleanT		R	False: Q1 Off True: Q1 On
Q2 Output State	71	2	BooleanT		R	False: Q2 Off True: Q2 On
Q3 Output State	71	3	BooleanT		R	False: Q3 Off True: Q3 On
Measure State	71	4	BooleanT		R	False: No Measure (Startup, Teach or Deactivated) True: Measure is Running
Received Signal	71	5	BooleanT		R	False: No Signal: no measure value available True: Signal and measurement value available
Warning: reduced accuracy	71	6	BooleanT		R	False: No Warning True: Warning
Extended Status	72	0	RecordT		R	Deactivation and Error Status, Warning Details, Teach State
Deactivation Flag	72	1	BooleanT		R	False: Laser is On, Measure is Running True: Laser is Off, No Measure
Laser Error Flag	72	2	BooleanT		R	False: No Laser Error True: Laser Error
Signal Amplitude Flag	72	3	BooleanT		R	False: Amplitude out of Range True: Amplitude in Range
Target Brightness	72	4	UIntegerT		R	0: In Range 1: Too Light 2: Too Dark
Teach State	72	5	UIntegerT		R	0: Idle, No Teach Since Power Up 5: Busy, Teach is Running 7: Idle, Last Teach Failed 13: Idle, Last Teach Succeeded

Parameter	Index	Subindex	Data type	Default	AR	Description
Data Storage Upload Flag	73	0	UIntegerT		R	Priority of local changes according to configuration data stored in master DS 0: clear (No Upload Request for local Sensor Data) 128: set (Upload Request for local Sensor Data is set)
Gain	74	0	UIntegerT		R	Current Gain Control Output Value
Reserved01	75	0	UIntegerT		R	Reserved For Future Use; Read Only Access
Switching Output Property	82	0	UIntegerT		RW	General Behaviour of All Switching Outputs with No Available Measure Value 0: Switching Off 1: Switching On 2: Unchanged
Q1 Light/Dark	85	0	UIntegerT		RW	Output Q1: Light or Dark Switching Selection: Light=Output Active (On) between SP1 and SP2 0: Light Switching 1: Dark Switching
Q1 Evaluation Depth	89	0	UIntegerT		RW	Q1 Output Changes are Delayed By This Number of Unchanged Measurement Results
Q1 Hysteresis Class	90	0	UIntegerT		RW	Q1 Hysteresis Adjustment (Raw, Medium or Fine) 0: Raw 1: Medium 2: Fine
Q1 Reserve Class	91	0	UIntegerT		RW	Q1 Reserve Adjustment (Raw, Medium or Fine) 0: Raw 1: Medium 2: Fine
Q2 Light/Dark	94	0	UIntegerT		RW	Output Q2: Light or Dark Switching Selection: Light=Output Active (On) between SP1 and SP2 0: Light Switching 1: Dark Switching
Q2 Evaluation Depth	98	0	UIntegerT		RW	Q2 Output Changes are Delayed By This Number of Unchanged Measurement Results
Q2 Hysteresis Class	99	0	UIntegerT		RW	Q2 Hysteresis Adjustment (Raw, Medium or Fine) 0: Raw 1: Medium 2: Fine
Q2 Reserve Class	100	0	UIntegerT		RW	Q2 Reserve Adjustment (Raw, Medium or Fine) 0: Raw 1: Medium 2: Fine

Parameter	Index	Subindex	Data type	Default	AR	Description
Minimum Gain	123	0	UIntegerT		RW	Sets Lower Limit Of Gain Control (if Min less than Max) (0 ... 4095)
Maximum Gain	124	0	UIntegerT		RW	Sets Upper Limit Of Gain Control (if Min less than Max) (0 ... 4095)
XDR - Extended Dynamic Range	125	0	UIntegerT		RW	Improves the measurement behavior in case of extreme contrast differences. 0: XDR Off 3: XDR On
Reserved03	126	0	UIntegerT		RW	Reserved For Future Use; Read/Write Access
Reserved04	127	0	UIntegerT		RW	Reserved For Future Use; Read/Write Access
Reserved05	128	0	UIntegerT		RW	Reserved For Future Use; Read/Write Access
Reserved06	129	0	UIntegerT		RW	Reserved For Future Use; Read/Write Access
Reserved07	136	0	UIntegerT		RW	Reserved For Future Use; Read/Write Access
Reserved08	137	0	UIntegerT		RW	Reserved For Future Use; Read/Write Access
Reserved09	138	0	UIntegerT		RW	Reserved For Future Use; Read/Write Access
Reserved10	139	0	UIntegerT		RW	Reserved For Future Use; Read/Write Access
Reserved11	140	0	UIntegerT		RW	Reserved For Future Use; Read/Write Access

Parameter	Index	Subindex	Data type	Default	AR	Description
Function Button #1 Level #1	187	0	UIntegerT		R	<p>Function Being Called When Button #1 Is Released After 2..7 Seconds</p> <p>0: No Function  1: Teach-In of Q1 in ODS Auto Mode  2: Teach-In of Q2 in ODS Auto Mode  3: Teach-In of Q3 in ODS Auto Mode  4: Teach-In of Analog Minimum Value  5: Teach-In of Analog Maximum Value  6: Teach-In of Q1 in Object Mode  7: Teach-In of Q2 in Object Mode  8: Teach-In of Q3 in Object Mode  9: Teach-In of Q1 in Background Mode  10: Teach-In of Q2 in Background Mode  11: Teach-In of Q3 in Background Mode  12: Teach-In of Q1 in Window Mode  13: Teach-In of Q2 in Window Mode  14: Teach-In of Q3 in Window Mode  15: Teach-In of Q1 Upper Switching Point (SP1)  16: Teach-In of Q2 Upper Switching Point (SP1)  17: Teach-In of Q3 Upper Switching Point (SP1)  18: Teach-In of Q1 Lower Switching Point (SP2)  19: Teach-In of Q2 Lower Switching Point (SP2)  20: Teach-In of Q3 Lower Switching Point (SP2)  21: Toggle Q1 Light/Dark Switching  22: Toggle Q2 Light/Dark Switching  23: Toggle Q3 Light/Dark Switching  24: Set Q1 Light Switching  25: Set Q1 Dark Switching  26: Set Q2 Light Switching  27: Set Q3 Dark Switching  28: Set Q3 Light Switching  29: Set Q3 Dark Switching  30: No Function</p>

Parameter	Index	Subindex	Data type	Default	AR	Description
Function Button #1 Level #2	188	0	UIntegerT		R	<p>Function Being Called When Button #1 Is Released After 7..12 Seconds</p> <p>0: No Function  1: Teach-In of Q1 in ODS Auto Mode  2: Teach-In of Q2 in ODS Auto Mode  3: Teach-In of Q3 in ODS Auto Mode  4: Teach-In of Analog Minimum Value  5: Teach-In of Analog Maximum Value  6: Teach-In of Q1 in Object Mode  7: Teach-In of Q2 in Object Mode  8: Teach-In of Q3 in Object Mode  9: Teach-In of Q1 in Background Mode  10: Teach-In of Q2 in Background Mode  11: Teach-In of Q3 in Background Mode  12: Teach-In of Q1 in Window Mode  13: Teach-In of Q2 in Window Mode  14: Teach-In of Q3 in Window Mode  15: Teach-In of Q1 Upper Switching Point (SP1)  16: Teach-In of Q2 Upper Switching Point (SP1)  17: Teach-In of Q3 Upper Switching Point (SP1)  18: Teach-In of Q1 Lower Switching Point (SP2)  19: Teach-In of Q2 Lower Switching Point (SP2)  20: Teach-In of Q3 Lower Switching Point (SP2)  21: Toggle Q1 Light/Dark Switching  22: Toggle Q2 Light/Dark Switching  23: Toggle Q3 Light/Dark Switching  24: Set Q1 Light Switching  25: Set Q1 Dark Switching  26: Set Q2 Light Switching  27: Set Q3 Dark Switching  28: Set Q3 Light Switching  29: Set Q3 Dark Switching  30: No Function</p>

Parameter	Index	Subindex	Data type	Default	AR	Description
Function Button #1 Level #3	189	0	UIntegerT		R	<p>Function Being Called When Button #1 Is Released After 12..17 Seconds</p> <p>0: No Function  1: Teach-In of Q1 in ODS Auto Mode  2: Teach-In of Q2 in ODS Auto Mode  3: Teach-In of Q3 in ODS Auto Mode  4: Teach-In of Analog Minimum Value  5: Teach-In of Analog Maximum Value  6: Teach-In of Q1 in Object Mode  7: Teach-In of Q2 in Object Mode  8: Teach-In of Q3 in Object Mode  9: Teach-In of Q1 in Background Mode  10: Teach-In of Q2 in Background Mode  11: Teach-In of Q3 in Background Mode  12: Teach-In of Q1 in Window Mode  13: Teach-In of Q2 in Window Mode  14: Teach-In of Q3 in Window Mode  15: Teach-In of Q1 Upper Switching Point (SP1)  16: Teach-In of Q2 Upper Switching Point (SP1)  17: Teach-In of Q3 Upper Switching Point (SP1)  18: Teach-In of Q1 Lower Switching Point (SP2)  19: Teach-In of Q2 Lower Switching Point (SP2)  20: Teach-In of Q3 Lower Switching Point (SP2)  21: Toggle Q1 Light/Dark Switching  22: Toggle Q2 Light/Dark Switching  23: Toggle Q3 Light/Dark Switching  24: Set Q1 Light Switching  25: Set Q1 Dark Switching  26: Set Q2 Light Switching  27: Set Q3 Dark Switching  28: Set Q3 Light Switching  29: Set Q3 Dark Switching  30: No Function</p>

Parameter	Index	Subindex	Data type	Default	AR	Description
Function Button #2 Level #1	192	0	UIntegerT		R	<p>Function Being Called When Button #2 Is Released After 2..7 Seconds</p> <p>0: No Function  1: Teach-In of Q1 in ODS Auto Mode  2: Teach-In of Q2 in ODS Auto Mode  3: Teach-In of Q3 in ODS Auto Mode  4: Teach-In of Analog Minimum Value  5: Teach-In of Analog Maximum Value  6: Teach-In of Q1 in Object Mode  7: Teach-In of Q2 in Object Mode  8: Teach-In of Q3 in Object Mode  9: Teach-In of Q1 in Background Mode  10: Teach-In of Q2 in Background Mode  11: Teach-In of Q3 in Background Mode  12: Teach-In of Q1 in Window Mode  13: Teach-In of Q2 in Window Mode  14: Teach-In of Q3 in Window Mode  15: Teach-In of Q1 Upper Switching Point (SP1)  16: Teach-In of Q2 Upper Switching Point (SP1)  17: Teach-In of Q3 Upper Switching Point (SP1)  18: Teach-In of Q1 Lower Switching Point (SP2)  19: Teach-In of Q2 Lower Switching Point (SP2)  20: Teach-In of Q3 Lower Switching Point (SP2)  21: Toggle Q1 Light/Dark Switching  22: Toggle Q2 Light/Dark Switching  23: Toggle Q3 Light/Dark Switching  24: Set Q1 Light Switching  25: Set Q1 Dark Switching  26: Set Q2 Light Switching  27: Set Q3 Dark Switching  28: Set Q3 Light Switching  29: Set Q3 Dark Switching  30: No Function</p>



Parameter	Index	Subindex	Data type	Default	AR	Description
Function Button #2 Level #2	193	0	UIntegerT		R	<p>Function Being Called When Button #2 Is Released After 7..12 Seconds</p> <p>0: No Function  1: Teach-In of Q1 in ODS Auto Mode  2: Teach-In of Q2 in ODS Auto Mode  3: Teach-In of Q3 in ODS Auto Mode  4: Teach-In of Analog Minimum Value  5: Teach-In of Analog Maximum Value  6: Teach-In of Q1 in Object Mode  7: Teach-In of Q2 in Object Mode  8: Teach-In of Q3 in Object Mode  9: Teach-In of Q1 in Background Mode  10: Teach-In of Q2 in Background Mode  11: Teach-In of Q3 in Background Mode  12: Teach-In of Q1 in Window Mode  13: Teach-In of Q2 in Window Mode  14: Teach-In of Q3 in Window Mode  15: Teach-In of Q1 Upper Switching Point (SP1)  16: Teach-In of Q2 Upper Switching Point (SP1)  17: Teach-In of Q3 Upper Switching Point (SP1)  18: Teach-In of Q1 Lower Switching Point (SP2)  19: Teach-In of Q2 Lower Switching Point (SP2)  20: Teach-In of Q3 Lower Switching Point (SP2)  21: Toggle Q1 Light/Dark Switching  22: Toggle Q2 Light/Dark Switching  23: Toggle Q3 Light/Dark Switching  24: Set Q1 Light Switching  25: Set Q1 Dark Switching  26: Set Q2 Light Switching  27: Set Q3 Dark Switching  28: Set Q3 Light Switching  29: Set Q3 Dark Switching  30: No Function</p>

Parameter	Index	Subindex	Data type	Default	AR	Description
Function Button #2 Level #3	194	0	UIntegerT		R	<p>Function Being Called When Button #2 Is Released After 12..17 Seconds</p> <p>0: No Function  1: Teach-In of Q1 in ODS Auto Mode  2: Teach-In of Q2 in ODS Auto Mode  3: Teach-In of Q3 in ODS Auto Mode  4: Teach-In of Analog Minimum Value  5: Teach-In of Analog Maximum Value  6: Teach-In of Q1 in Object Mode  7: Teach-In of Q2 in Object Mode  8: Teach-In of Q3 in Object Mode  9: Teach-In of Q1 in Background Mode  10: Teach-In of Q2 in Background Mode  11: Teach-In of Q3 in Background Mode  12: Teach-In of Q1 in Window Mode  13: Teach-In of Q2 in Window Mode  14: Teach-In of Q3 in Window Mode  15: Teach-In of Q1 Upper Switching Point (SP1)  16: Teach-In of Q2 Upper Switching Point (SP1)  17: Teach-In of Q3 Upper Switching Point (SP1)  18: Teach-In of Q1 Lower Switching Point (SP2)  19: Teach-In of Q2 Lower Switching Point (SP2)  20: Teach-In of Q3 Lower Switching Point (SP2)  21: Toggle Q1 Light/Dark Switching  22: Toggle Q2 Light/Dark Switching  23: Toggle Q3 Light/Dark Switching  24: Set Q1 Light Switching  25: Set Q1 Dark Switching  26: Set Q2 Light Switching  27: Set Q3 Dark Switching  28: Set Q3 Light Switching  29: Set Q3 Dark Switching  30: No Function</p>

Parameter	Index	Subindex	Data type	Default	AR	Description
Function Button #3 Level #1	197	0	UIntegerT		R	<p>Function Being Called When Both Buttons Together Are Released After 2..7 Seconds</p> <p>0: No Function  1: Teach-In of Q1 in ODS Auto Mode  2: Teach-In of Q2 in ODS Auto Mode  3: Teach-In of Q3 in ODS Auto Mode  4: Teach-In of Analog Minimum Value  5: Teach-In of Analog Maximum Value  6: Teach-In of Q1 in Object Mode  7: Teach-In of Q2 in Object Mode  8: Teach-In of Q3 in Object Mode  9: Teach-In of Q1 in Background Mode  10: Teach-In of Q2 in Background Mode  11: Teach-In of Q3 in Background Mode  12: Teach-In of Q1 in Window Mode  13: Teach-In of Q2 in Window Mode  14: Teach-In of Q3 in Window Mode  15: Teach-In of Q1 Upper Switching Point (SP1)  16: Teach-In of Q2 Upper Switching Point (SP1)  17: Teach-In of Q3 Upper Switching Point (SP1)  18: Teach-In of Q1 Lower Switching Point (SP2)  19: Teach-In of Q2 Lower Switching Point (SP2)  20: Teach-In of Q3 Lower Switching Point (SP2)  21: Toggle Q1 Light/Dark Switching  22: Toggle Q2 Light/Dark Switching  23: Toggle Q3 Light/Dark Switching  24: Set Q1 Light Switching  25: Set Q1 Dark Switching  26: Set Q2 Light Switching  27: Set Q3 Dark Switching  28: Set Q3 Light Switching  29: Set Q3 Dark Switching  30: No Function</p>

Parameter	Index	Subindex	Data type	Default	AR	Description
Function Button #3 Level #2	198	0	UIntegerT		R	<p>Function Being Called When Both Buttons Together Are Released After 7..12 Seconds</p> <p>0: No Function  1: Teach-In of Q1 in ODS Auto Mode  2: Teach-In of Q2 in ODS Auto Mode  3: Teach-In of Q3 in ODS Auto Mode  4: Teach-In of Analog Minimum Value  5: Teach-In of Analog Maximum Value  6: Teach-In of Q1 in Object Mode  7: Teach-In of Q2 in Object Mode  8: Teach-In of Q3 in Object Mode  9: Teach-In of Q1 in Background Mode  10: Teach-In of Q2 in Background Mode  11: Teach-In of Q3 in Background Mode  12: Teach-In of Q1 in Window Mode  13: Teach-In of Q2 in Window Mode  14: Teach-In of Q3 in Window Mode  15: Teach-In of Q1 Upper Switching Point (SP1)  16: Teach-In of Q2 Upper Switching Point (SP1)  17: Teach-In of Q3 Upper Switching Point (SP1)  18: Teach-In of Q1 Lower Switching Point (SP2)  19: Teach-In of Q2 Lower Switching Point (SP2)  20: Teach-In of Q3 Lower Switching Point (SP2)  21: Toggle Q1 Light/Dark Switching  22: Toggle Q2 Light/Dark Switching  23: Toggle Q3 Light/Dark Switching  24: Set Q1 Light Switching  25: Set Q1 Dark Switching  26: Set Q2 Light Switching  27: Set Q3 Dark Switching  28: Set Q3 Light Switching  29: Set Q3 Dark Switching  30: No Function</p>

Parameter	Index	Subindex	Data type	Default	AR	Description
Function Button #3 Level #3	199	0	UIntegerT		R	<p>Function Being Called When Both Buttons Together Are Released After 12..17 Seconds</p> <p>0: No Function  1: Teach-In of Q1 in ODS Auto Mode  2: Teach-In of Q2 in ODS Auto Mode  3: Teach-In of Q3 in ODS Auto Mode  4: Teach-In of Analog Minimum Value  5: Teach-In of Analog Maximum Value  6: Teach-In of Q1 in Object Mode  7: Teach-In of Q2 in Object Mode  8: Teach-In of Q3 in Object Mode  9: Teach-In of Q1 in Background Mode  10: Teach-In of Q2 in Background Mode  11: Teach-In of Q3 in Background Mode  12: Teach-In of Q1 in Window Mode  13: Teach-In of Q2 in Window Mode  14: Teach-In of Q3 in Window Mode  15: Teach-In of Q1 Upper Switching Point (SP1)  16: Teach-In of Q2 Upper Switching Point (SP1)  17: Teach-In of Q3 Upper Switching Point (SP1)  18: Teach-In of Q1 Lower Switching Point (SP2)  19: Teach-In of Q2 Lower Switching Point (SP2)  20: Teach-In of Q3 Lower Switching Point (SP2)  21: Toggle Q1 Light/Dark Switching  22: Toggle Q2 Light/Dark Switching  23: Toggle Q3 Light/Dark Switching  24: Set Q1 Light Switching  25: Set Q1 Dark Switching  26: Set Q2 Light Switching  27: Set Q3 Dark Switching  28: Set Q3 Light Switching  29: Set Q3 Dark Switching  30: No Function</p>

Parameter	Index	Subindex	Data type	Default	AR	Description
Function Wire Level #1	200	0	UIntegerT		R	<p>Function Being Called With Selection Width of 20..80 ms On Input Wire</p> <p>0: No Function  1: Teach-In of Q1 in ODS Auto Mode  2: Teach-In of Q2 in ODS Auto Mode  3: Teach-In of Q3 in ODS Auto Mode  4: Teach-In of Analog Minimum Value  5: Teach-In of Analog Maximum Value  6: Teach-In of Q1 in Object Mode  7: Teach-In of Q2 in Object Mode  8: Teach-In of Q3 in Object Mode  9: Teach-In of Q1 in Background Mode  10: Teach-In of Q2 in Background Mode  11: Teach-In of Q3 in Background Mode  12: Teach-In of Q1 in Window Mode  13: Teach-In of Q2 in Window Mode  14: Teach-In of Q3 in Window Mode  15: Teach-In of Q1 Upper Switching Point (SP1)  16: Teach-In of Q2 Upper Switching Point (SP1)  17: Teach-In of Q3 Upper Switching Point (SP1)  18: Teach-In of Q1 Lower Switching Point (SP2)  19: Teach-In of Q2 Lower Switching Point (SP2)  20: Teach-In of Q3 Lower Switching Point (SP2)  21: Toggle Q1 Light/Dark Switching  22: Toggle Q2 Light/Dark Switching  23: Toggle Q3 Light/Dark Switching  24: Set Q1 Light Switching  25: Set Q1 Dark Switching  26: Set Q2 Light Switching  27: Set Q3 Dark Switching  28: Set Q3 Light Switching  29: Set Q3 Dark Switching  30: No Function</p>

Parameter	Index	Subindex	Data type	Default	AR	Description
Function Wire Level #2	201	0	UIntegerT		R	<p>Function Being Called With Low Pulse Width of 120..180 ms On Wire Input</p> <p>0: No Function  1: Teach-In of Q1 in ODS Auto Mode  2: Teach-In of Q2 in ODS Auto Mode  3: Teach-In of Q3 in ODS Auto Mode  4: Teach-In of Analog Minimum Value  5: Teach-In of Analog Maximum Value  6: Teach-In of Q1 in Object Mode  7: Teach-In of Q2 in Object Mode  8: Teach-In of Q3 in Object Mode  9: Teach-In of Q1 in Background Mode  10: Teach-In of Q2 in Background Mode  11: Teach-In of Q3 in Background Mode  12: Teach-In of Q1 in Window Mode  13: Teach-In of Q2 in Window Mode  14: Teach-In of Q3 in Window Mode  15: Teach-In of Q1 Upper Switching Point (SP1)  16: Teach-In of Q2 Upper Switching Point (SP1)  17: Teach-In of Q3 Upper Switching Point (SP1)  18: Teach-In of Q1 Lower Switching Point (SP2)  19: Teach-In of Q2 Lower Switching Point (SP2)  20: Teach-In of Q3 Lower Switching Point (SP2)  21: Toggle Q1 Light/Dark Switching  22: Toggle Q2 Light/Dark Switching  23: Toggle Q3 Light/Dark Switching  24: Set Q1 Light Switching  25: Set Q1 Dark Switching  26: Set Q2 Light Switching  27: Set Q3 Dark Switching  28: Set Q3 Light Switching  29: Set Q3 Dark Switching  30: No Function</p>

Parameter	Index	Subindex	Data type	Default	AR	Description
Function Wire Level #3	202	0	UIntegerT		R	<p>Function Being Called With Low Pulse Width of 220..280 ms On Wire Input</p> <p>0: No Function  1: Teach-In of Q1 in ODS Auto Mode  2: Teach-In of Q2 in ODS Auto Mode  3: Teach-In of Q3 in ODS Auto Mode  4: Teach-In of Analog Minimum Value  5: Teach-In of Analog Maximum Value  6: Teach-In of Q1 in Object Mode  7: Teach-In of Q2 in Object Mode  8: Teach-In of Q3 in Object Mode  9: Teach-In of Q1 in Background Mode  10: Teach-In of Q2 in Background Mode  11: Teach-In of Q3 in Background Mode  12: Teach-In of Q1 in Window Mode  13: Teach-In of Q2 in Window Mode  14: Teach-In of Q3 in Window Mode  15: Teach-In of Q1 Upper Switching Point (SP1)  16: Teach-In of Q2 Upper Switching Point (SP1)  17: Teach-In of Q3 Upper Switching Point (SP1)  18: Teach-In of Q1 Lower Switching Point (SP2)  19: Teach-In of Q2 Lower Switching Point (SP2)  20: Teach-In of Q3 Lower Switching Point (SP2)  21: Toggle Q1 Light/Dark Switching  22: Toggle Q2 Light/Dark Switching  23: Toggle Q3 Light/Dark Switching  24: Set Q1 Light Switching  25: Set Q1 Dark Switching  26: Set Q2 Light Switching  27: Set Q3 Dark Switching  28: Set Q3 Light Switching  29: Set Q3 Dark Switching  30: No Function</p>



Parameter	Index	Subindex	Data type	Default	AR	Description
Function Wire Level #4	203	0	UIntegerT		R	<p>Function Being Called With Low Pulse Width of 320..380 ms On Wire Input</p> <p>0: No Function  1: Teach-In of Q1 in ODS Auto Mode  2: Teach-In of Q2 in ODS Auto Mode  3: Teach-In of Q3 in ODS Auto Mode  4: Teach-In of Analog Minimum Value  5: Teach-In of Analog Maximum Value  6: Teach-In of Q1 in Object Mode  7: Teach-In of Q2 in Object Mode  8: Teach-In of Q3 in Object Mode  9: Teach-In of Q1 in Background Mode  10: Teach-In of Q2 in Background Mode  11: Teach-In of Q3 in Background Mode  12: Teach-In of Q1 in Window Mode  13: Teach-In of Q2 in Window Mode  14: Teach-In of Q3 in Window Mode  15: Teach-In of Q1 Upper Switching Point (SP1)  16: Teach-In of Q2 Upper Switching Point (SP1)  17: Teach-In of Q3 Upper Switching Point (SP1)  18: Teach-In of Q1 Lower Switching Point (SP2)  19: Teach-In of Q2 Lower Switching Point (SP2)  20: Teach-In of Q3 Lower Switching Point (SP2)  21: Toggle Q1 Light/Dark Switching  22: Toggle Q2 Light/Dark Switching  23: Toggle Q3 Light/Dark Switching  24: Set Q1 Light Switching  25: Set Q1 Dark Switching  26: Set Q2 Light Switching  27: Set Q3 Dark Switching  28: Set Q3 Light Switching  29: Set Q3 Dark Switching  30: No Function</p>

Parameter	Index	Subindex	Data type	Default	AR	Description
Function Wire Level #5	204	0	UIntegerT		R	<p>Function Being Called With Low Pulse Width of 420..480 ms On Wire Input</p> <p>0: No Function  1: Teach-In of Q1 in ODS Auto Mode  2: Teach-In of Q2 in ODS Auto Mode  3: Teach-In of Q3 in ODS Auto Mode  4: Teach-In of Analog Minimum Value  5: Teach-In of Analog Maximum Value  6: Teach-In of Q1 in Object Mode  7: Teach-In of Q2 in Object Mode  8: Teach-In of Q3 in Object Mode  9: Teach-In of Q1 in Background Mode  10: Teach-In of Q2 in Background Mode  11: Teach-In of Q3 in Background Mode  12: Teach-In of Q1 in Window Mode  13: Teach-In of Q2 in Window Mode  14: Teach-In of Q3 in Window Mode  15: Teach-In of Q1 Upper Switching Point (SP1)  16: Teach-In of Q2 Upper Switching Point (SP1)  17: Teach-In of Q3 Upper Switching Point (SP1)  18: Teach-In of Q1 Lower Switching Point (SP2)  19: Teach-In of Q2 Lower Switching Point (SP2)  20: Teach-In of Q3 Lower Switching Point (SP2)  21: Toggle Q1 Light/Dark Switching  22: Toggle Q2 Light/Dark Switching  23: Toggle Q3 Light/Dark Switching  24: Set Q1 Light Switching  25: Set Q1 Dark Switching  26: Set Q2 Light Switching  27: Set Q3 Dark Switching  28: Set Q3 Light Switching  29: Set Q3 Dark Switching  30: No Function</p>

Parameter	Index	Subindex	Data type	Default	AR	Description
Function Wire Level #6	205	0	UIntegerT		R	<p>Function Being Called With Low Pulse Width of 520..580 ms On Wire Input</p> <p>0: No Function  1: Teach-In of Q1 in ODS Auto Mode  2: Teach-In of Q2 in ODS Auto Mode  3: Teach-In of Q3 in ODS Auto Mode  4: Teach-In of Analog Minimum Value  5: Teach-In of Analog Maximum Value  6: Teach-In of Q1 in Object Mode  7: Teach-In of Q2 in Object Mode  8: Teach-In of Q3 in Object Mode  9: Teach-In of Q1 in Background Mode  10: Teach-In of Q2 in Background Mode  11: Teach-In of Q3 in Background Mode  12: Teach-In of Q1 in Window Mode  13: Teach-In of Q2 in Window Mode  14: Teach-In of Q3 in Window Mode  15: Teach-In of Q1 Upper Switching Point (SP1)  16: Teach-In of Q2 Upper Switching Point (SP1)  17: Teach-In of Q3 Upper Switching Point (SP1)  18: Teach-In of Q1 Lower Switching Point (SP2)  19: Teach-In of Q2 Lower Switching Point (SP2)  20: Teach-In of Q3 Lower Switching Point (SP2)  21: Toggle Q1 Light/Dark Switching  22: Toggle Q2 Light/Dark Switching  23: Toggle Q3 Light/Dark Switching  24: Set Q1 Light Switching  25: Set Q1 Dark Switching  26: Set Q2 Light Switching  27: Set Q3 Dark Switching  28: Set Q3 Light Switching  29: Set Q3 Dark Switching  30: No Function</p>

Parameter	Index	Subindex	Data type	Default	AR	Description
Function Wire Level #7	206	0	UIntegerT		R	<p>Function Being Called With Low Pulse Width of 620..680 ms On Wire Input</p> <p>0: No Function  1: Teach-In of Q1 in ODS Auto Mode  2: Teach-In of Q2 in ODS Auto Mode  3: Teach-In of Q3 in ODS Auto Mode  4: Teach-In of Analog Minimum Value  5: Teach-In of Analog Maximum Value  6: Teach-In of Q1 in Object Mode  7: Teach-In of Q2 in Object Mode  8: Teach-In of Q3 in Object Mode  9: Teach-In of Q1 in Background Mode  10: Teach-In of Q2 in Background Mode  11: Teach-In of Q3 in Background Mode  12: Teach-In of Q1 in Window Mode  13: Teach-In of Q2 in Window Mode  14: Teach-In of Q3 in Window Mode  15: Teach-In of Q1 Upper Switching Point (SP1)  16: Teach-In of Q2 Upper Switching Point (SP1)  17: Teach-In of Q3 Upper Switching Point (SP1)  18: Teach-In of Q1 Lower Switching Point (SP2)  19: Teach-In of Q2 Lower Switching Point (SP2)  20: Teach-In of Q3 Lower Switching Point (SP2)  21: Toggle Q1 Light/Dark Switching  22: Toggle Q2 Light/Dark Switching  23: Toggle Q3 Light/Dark Switching  24: Set Q1 Light Switching  25: Set Q1 Dark Switching  26: Set Q2 Light Switching  27: Set Q3 Dark Switching  28: Set Q3 Light Switching  29: Set Q3 Dark Switching  30: No Function</p>

Parameter	Index	Subindex	Data type	Default	AR	Description
Function Wire Level #8	207	0	UIntegerT		R	<p>Function Being Called With Low Pulse Width of 720..780 ms On Wire Input</p> <p>0: No Function  1: Teach-In of Q1 in ODS Auto Mode  2: Teach-In of Q2 in ODS Auto Mode  3: Teach-In of Q3 in ODS Auto Mode  4: Teach-In of Analog Minimum Value  5: Teach-In of Analog Maximum Value  6: Teach-In of Q1 in Object Mode  7: Teach-In of Q2 in Object Mode  8: Teach-In of Q3 in Object Mode  9: Teach-In of Q1 in Background Mode  10: Teach-In of Q2 in Background Mode  11: Teach-In of Q3 in Background Mode  12: Teach-In of Q1 in Window Mode  13: Teach-In of Q2 in Window Mode  14: Teach-In of Q3 in Window Mode  15: Teach-In of Q1 Upper Switching Point (SP1)  16: Teach-In of Q2 Upper Switching Point (SP1)  17: Teach-In of Q3 Upper Switching Point (SP1)  18: Teach-In of Q1 Lower Switching Point (SP2)  19: Teach-In of Q2 Lower Switching Point (SP2)  20: Teach-In of Q3 Lower Switching Point (SP2)  21: Toggle Q1 Light/Dark Switching  22: Toggle Q2 Light/Dark Switching  23: Toggle Q3 Light/Dark Switching  24: Set Q1 Light Switching  25: Set Q1 Dark Switching  26: Set Q2 Light Switching  27: Set Q3 Dark Switching  28: Set Q3 Light Switching  29: Set Q3 Dark Switching  30: No Function</p>

Parameter	Index	Subindex	Data type	Default	AR	Description
Function Wire Level #9	208	0	UIntegerT		R	<p>Function Being Called With Low Pulse Width of 820..880 ms On Wire Input</p> <p>0: No Function  1: Teach-In of Q1 in ODS Auto Mode  2: Teach-In of Q2 in ODS Auto Mode  3: Teach-In of Q3 in ODS Auto Mode  4: Teach-In of Analog Minimum Value  5: Teach-In of Analog Maximum Value  6: Teach-In of Q1 in Object Mode  7: Teach-In of Q2 in Object Mode  8: Teach-In of Q3 in Object Mode  9: Teach-In of Q1 in Background Mode  10: Teach-In of Q2 in Background Mode  11: Teach-In of Q3 in Background Mode  12: Teach-In of Q1 in Window Mode  13: Teach-In of Q2 in Window Mode  14: Teach-In of Q3 in Window Mode  15: Teach-In of Q1 Upper Switching Point (SP1)  16: Teach-In of Q2 Upper Switching Point (SP1)  17: Teach-In of Q3 Upper Switching Point (SP1)  18: Teach-In of Q1 Lower Switching Point (SP2)  19: Teach-In of Q2 Lower Switching Point (SP2)  20: Teach-In of Q3 Lower Switching Point (SP2)  21: Toggle Q1 Light/Dark Switching  22: Toggle Q2 Light/Dark Switching  23: Toggle Q3 Light/Dark Switching  24: Set Q1 Light Switching  25: Set Q1 Dark Switching  26: Set Q2 Light Switching  27: Set Q3 Dark Switching  28: Set Q3 Light Switching  29: Set Q3 Dark Switching  30: No Function</p>

Parameter	Index	Subindex	Data type	Default	AR	Description
Function Wire Level #10	209	0	UIntegerT		R	<p>Function Being Called With Low Pulse Width of 920..980 ms On Wire Input</p> <p>0: No Function  1: Teach-In of Q1 in ODS Auto Mode  2: Teach-In of Q2 in ODS Auto Mode  3: Teach-In of Q3 in ODS Auto Mode  4: Teach-In of Analog Minimum Value  5: Teach-In of Analog Maximum Value  6: Teach-In of Q1 in Object Mode  7: Teach-In of Q2 in Object Mode  8: Teach-In of Q3 in Object Mode  9: Teach-In of Q1 in Background Mode  10: Teach-In of Q2 in Background Mode  11: Teach-In of Q3 in Background Mode  12: Teach-In of Q1 in Window Mode  13: Teach-In of Q2 in Window Mode  14: Teach-In of Q3 in Window Mode  15: Teach-In of Q1 Upper Switching Point (SP1)  16: Teach-In of Q2 Upper Switching Point (SP1)  17: Teach-In of Q3 Upper Switching Point (SP1)  18: Teach-In of Q1 Lower Switching Point (SP2)  19: Teach-In of Q2 Lower Switching Point (SP2)  20: Teach-In of Q3 Lower Switching Point (SP2)  21: Toggle Q1 Light/Dark Switching  22: Toggle Q2 Light/Dark Switching  23: Toggle Q3 Light/Dark Switching  24: Set Q1 Light Switching  25: Set Q1 Dark Switching  26: Set Q2 Light Switching  27: Set Q3 Dark Switching  28: Set Q3 Light Switching  29: Set Q3 Dark Switching  30: No Function</p>

Parameter	Index	Subindex	Data type	Default	AR	Description
Function Wire Level #11	210	0	UIntegerT		R	<p>Function Being Called With Low Pulse Width of 1020..1080 ms On Wire Input</p> <p>0: No Function  1: Teach-In of Q1 in ODS Auto Mode  2: Teach-In of Q2 in ODS Auto Mode  3: Teach-In of Q3 in ODS Auto Mode  4: Teach-In of Analog Minimum Value  5: Teach-In of Analog Maximum Value  6: Teach-In of Q1 in Object Mode  7: Teach-In of Q2 in Object Mode  8: Teach-In of Q3 in Object Mode  9: Teach-In of Q1 in Background Mode  10: Teach-In of Q2 in Background Mode  11: Teach-In of Q3 in Background Mode  12: Teach-In of Q1 in Window Mode  13: Teach-In of Q2 in Window Mode  14: Teach-In of Q3 in Window Mode  15: Teach-In of Q1 Upper Switching Point (SP1)  16: Teach-In of Q2 Upper Switching Point (SP1)  17: Teach-In of Q3 Upper Switching Point (SP1)  18: Teach-In of Q1 Lower Switching Point (SP2)  19: Teach-In of Q2 Lower Switching Point (SP2)  20: Teach-In of Q3 Lower Switching Point (SP2)  21: Toggle Q1 Light/Dark Switching  22: Toggle Q2 Light/Dark Switching  23: Toggle Q3 Light/Dark Switching  24: Set Q1 Light Switching  25: Set Q1 Dark Switching  26: Set Q2 Light Switching  27: Set Q3 Dark Switching  28: Set Q3 Light Switching  29: Set Q3 Dark Switching  30: No Function</p>



Parameter	Index	Subindex	Data type	Default	AR	Description
Function Wire Level #12	211	0	UIntegerT		R	<p>Function Being Called With Low Pulse Width of 1120..1180 ms On Wire Input</p> <p>0: No Function  1: Teach-In of Q1 in ODS Auto Mode  2: Teach-In of Q2 in ODS Auto Mode  3: Teach-In of Q3 in ODS Auto Mode  4: Teach-In of Analog Minimum Value  5: Teach-In of Analog Maximum Value  6: Teach-In of Q1 in Object Mode  7: Teach-In of Q2 in Object Mode  8: Teach-In of Q3 in Object Mode  9: Teach-In of Q1 in Background Mode  10: Teach-In of Q2 in Background Mode  11: Teach-In of Q3 in Background Mode  12: Teach-In of Q1 in Window Mode  13: Teach-In of Q2 in Window Mode  14: Teach-In of Q3 in Window Mode  15: Teach-In of Q1 Upper Switching Point (SP1)  16: Teach-In of Q2 Upper Switching Point (SP1)  17: Teach-In of Q3 Upper Switching Point (SP1)  18: Teach-In of Q1 Lower Switching Point (SP2)  19: Teach-In of Q2 Lower Switching Point (SP2)  20: Teach-In of Q3 Lower Switching Point (SP2)  21: Toggle Q1 Light/Dark Switching  22: Toggle Q2 Light/Dark Switching  23: Toggle Q3 Light/Dark Switching  24: Set Q1 Light Switching  25: Set Q1 Dark Switching  26: Set Q2 Light Switching  27: Set Q3 Dark Switching  28: Set Q3 Light Switching  29: Set Q3 Dark Switching  30: No Function</p>
Default value Test	253	0	UIntegerT	0	RW	<p>Default Value Test</p> <p>0: Default Value Test 0  1: Default Value Test 1</p>

## 9 Technical specifications

### 9.1 General data

Tab. 9.1: Sensor and IODD version

IODD version	V1.3
IODD release date	2017-5-22
Device family	Scanner with Background Suppression
Device ID	2098
Device name	HT10L1 Q1,Q2
Device variants	HT10L1.3/L6X-M12 (50128388), HT10L1.3/L6X (50129543), HT10L1.3/L6X,200-M12 (50129548), HT10L1.3/L69-M12 (50129537), HT10L1.3/L69 (50129542), HT10L1.3/L69,200-M12 (50129549), HT10L1.3/L6T-M12 (50129538), HT10L1.3/L6T (50129545), HT10L1.3/L6T,200-M12 (50129550), HT10L1.3/L6T.P1-M12 (50129539), HT10L2.3/L6T-M12 (50136145), HT10L1-25M.3/L69-M12 (50129541), HT10L1-25M.3/L69-M12 (50129547), HT10L1-25M.3/L69-M12 (50129552)