Leuze

IO-Link

PLC Integration of LV463_512

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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Leuze

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_IOL_ LV463_512" 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

```
                    FB_Leuze_IOL_xxx
— bExecute    BOOL                        BOOL  bDone —
— sNetID      T_AmsNetID                  BOOL  bBusy —
— nPort       T_AmsPort                   BOOL  bError —
— nIdxGroup   UDINT          ST_Leuze_IOL_Error  stErrorCode —
— bRW         BOOL
— tTimeOut    TIME
— stDeviceData ST_Leuze_IOL_xxx
```

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_ LV463_512	Sensor data

See structure description of ST_Leuze_IOL_ LV463_512 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_ LV463_512". 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_ LV463_512" 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_ LV463_512" 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_ LV463_512 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.
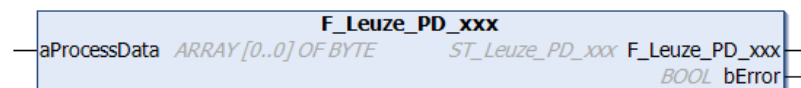
5.1 Calling and designation

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_ LV463_512	OUTPUT	ST_Leuze_PD_ LV463_512	Reference to the instance of the data structure ST_Leuze_PD_ LV463_512. The structure includes the disaggregated values of the process data.

See structure description of ST_Leuze_PD_ LV463_512 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_ LV463_512

Parameter name	Data type	Description
stDeviceData.stSelection.stCommands. bCmdDeviceReset	BOOL	[WRITE_ONLY] Device Reset
stDeviceData.stSelection.stCommands. bCmdApplicationReset	BOOL	[WRITE_ONLY] Application Reset
stDeviceData.stSelection.stCommands. bCmdRestoreFactorySettings	BOOL	[WRITE_ONLY] Restore Factory Settings
stDeviceData.stSelection.stCommands. bCmdSp1SingleValueTeach	BOOL	[WRITE_ONLY] SP1 Single Value Teach
stDeviceData.stSelection.stCommands. bCmd2PointTeachSwitchingPoint1	BOOL	[WRITE_ONLY] 2-Point Teach Switching Point 1
stDeviceData.stSelection.stCommands. bCmd2PointTeachSwitchingPoint2	BOOL	[WRITE_ONLY] 2-Point Teach Switching Point 2
stDeviceData.stSelection.stCommands. bCmdDynamicalTeachStart	BOOL	[WRITE_ONLY] Dynamical Teach Start
stDeviceData.stSelection.stCommands. bCmdDynamicalTeachStop	BOOL	[WRITE_ONLY] Dynamical Teach Stop
stDeviceData.stSelection.stCommands. bCmdStopTeach	BOOL	[WRITE_ONLY] Stop Teach
stDeviceData.stSelection.stCommands. bCmdStopSensorSearch	BOOL	[WRITE_ONLY] Stop Sensor Search
stDeviceData.stSelection.stCommands. bCmdStartSensorSearch	BOOL	[WRITE_ONLY] Start Sensor Search
stDeviceData.stSelection.stCommands. bCmdBaselineNull	BOOL	[WRITE_ONLY] Baseline Null
stDeviceData.stSelection.stCommands. bCmdBaselineDisable	BOOL	[WRITE_ONLY] Baseline Disable
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]

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Parameter name	Data type	Description
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]
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.stStopTeach.bAll	BOOL	[READ_ONLY] all parameters of complex data type

Parameter name	Data type	Description
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.bFirmwareVersion	BOOL	[READ_ONLY]
stDeviceData.stSelection.bApplicationSpecificTag	BOOL	[READ_WRITE]
stDeviceData.stSelection.bDeviceStatus	BOOL	[READ_ONLY]
stDeviceData.stSelection.stDetailedDeviceStatus.bAll	BOOL	[READ_ONLY] all parameters of complex data type
stDeviceData.stSelection.stTeachStatus.bAll	BOOL	[READ_ONLY] all parameters of complex data type
stDeviceData.stSelection.stBdc1Setpoints.bAll	BOOL	[READ_WRITE] all parameters of complex data type
stDeviceData.stSelection.stBdc1Configuration.bAll	BOOL	[READ_WRITE] all parameters of complex data type
stDeviceData.stSelection.stConfiguration.bAll	BOOL	[READ_WRITE] all parameters of complex data type
stDeviceData.stSelection.stConfiguration. bDisplayOrientation	BOOL	[READ_WRITE] The display orientation can be reversed to accomidate any mounting orientation.
stDeviceData.stSelection.stConfiguration.bGainLevel	BOOL	[READ_WRITE] Current gain setting. In auto-gain this will be changed to reflect the optimal gain found during the TEACH/SET method.
stDeviceData.stSelection.stConfiguration.bGainMode	BOOL	[READ_WRITE] In Auto Gain, the DF-G1 optimizes the gain during a TEACH/SET method for the presented condition(s).
stDeviceData.stSelection.stConfiguration. bResponseSpeed	BOOL	[READ_WRITE] The smallest sensing event the sensor is guaranteed to register.
stDeviceData.stSelection.stConfiguration. bTeachSelection	BOOL	[READ_WRITE] The teach method to be used for teaches/sets originating from the front panel

Parameter name	Data type	Description
stDeviceData.stSelection.stConfiguration. bAutoThreshold	BOOL	[READ_WRITE] The Auto Thresholds algorithm continuously tracks slow changes in the taught condition(s), and optimizes the threshold(s) to provide for reliable sensing.
stDeviceData.stSelection.stConfiguration. bProcessDataFilterUpdateTime	BOOL	[READ_WRITE] Amount of time to collect averaged sample for process data (defaults to 2.6 ms - min cycle time)
stDeviceData.stSelection.stConfiguration. bDelayMode	BOOL	[READ_WRITE] Select the type of delay to be used. Controls the meaning of the On and Off Delay values.
stDeviceData.stSelection.stConfiguration. bOnDelayOffOneshotTime	BOOL	[READ_WRITE] This value controls the Off Oneshot Time if Delay Mode = Off Oneshot, otherwise it controls the On Delay
stDeviceData.stSelection.stConfiguration. bOffDelayOnOneshotTime	BOOL	[READ_WRITE] This value controls the On Oneshot Time if Delay Mode = On Oneshot, otherwise it controls the Off Delay
stDeviceData.stSelection.stMicroStatus.bAll	BOOL	[READ_ONLY] all parameters of complex data type
stDeviceData.stSelection.stMicroStatus. bUpperThreshold	BOOL	[READ_ONLY]
stDeviceData.stSelection.stMicroStatus. bUpperHysteresis	BOOL	[READ_ONLY]
stDeviceData.stSelection.stMicroStatus. bReference_65	BOOL	[READ_ONLY]
stDeviceData.stSelection.stMicroStatus.bOutputMode	BOOL	[READ_ONLY]
stDeviceData.stSelection.stStatistics.bAll	BOOL	[READ_ONLY] all parameters of complex data type
stDeviceData.stSelection.stTeachableLimits.bAll	BOOL	[READ_ONLY] all parameters of complex data type
stDeviceData.stSelection.stTeachableLimits. bMinTeachableReference	BOOL	[READ_ONLY]
stDeviceData.stSelection.stTeachableLimits. bMaxTeachableReference	BOOL	[READ_ONLY]
stDeviceData.stSelection.stTeachableLimits. bMinAdjustableReference	BOOL	[READ_ONLY]
stDeviceData.stSelection.stTeachableLimits. bMaxAdjustableReference	BOOL	[READ_ONLY]
stDeviceData.stSelection. stObjectCounterDarkToLight.bAll	BOOL	[READ_WRITE] all parameters of complex data type
stDeviceData.stSelection. stObjectCounterLightToDark.bAll	BOOL	[READ_WRITE] all parameters of complex data type
stDeviceData.stData.stCommands. nCmdDeviceReset	UINT	[WRITE_ONLY] Device Reset

Parameter name	Data type	Description
stDeviceData.stData.stCommands. nCmdApplicationReset	UINT	[WRITE_ONLY] Application Reset
stDeviceData.stData.stCommands. nCmdRestoreFactorySettings	UINT	[WRITE_ONLY] Restore Factory Settings
stDeviceData.stData.stCommands. nCmdSp1SingleValueTeach	UINT	[WRITE_ONLY] SP1 Single Value Teach
stDeviceData.stData.stCommands. nCmd2PointTeachSwitchingPoint1	UINT	[WRITE_ONLY] 2-Point Teach Switching Point 1
stDeviceData.stData.stCommands. nCmd2PointTeachSwitchingPoint2	UINT	[WRITE_ONLY] 2-Point Teach Switching Point 2
stDeviceData.stData.stCommands. nCmdDynamicalTeachStart	UINT	[WRITE_ONLY] Dynamical Teach Start
stDeviceData.stData.stCommands. nCmdDynamicalTeachStop	UINT	[WRITE_ONLY] Dynamical Teach Stop
stDeviceData.stData.stCommands.nCmdStopTeach	UINT	[WRITE_ONLY] Stop Teach
stDeviceData.stData.stCommands. nCmdStopSensorSearch	UINT	[WRITE_ONLY] Stop Sensor Search
stDeviceData.stData.stCommands. nCmdStartSensorSearch	UINT	[WRITE_ONLY] Start Sensor Search
stDeviceData.stData.stCommands.nCmdBaselineNull	UINT	[WRITE_ONLY] Baseline Null
stDeviceData.stData.stCommands. nCmdBaselineDisable	UINT	[WRITE_ONLY] Baseline Disable
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]
stDeviceData.stData.stDirectParameters1. nReserved_13	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1. nReserved_14	UINT	[READ_ONLY]
stDeviceData.stData.stDirectParameters1. nReserved_15	UINT	[READ_ONLY]

Parameter name	Data type	Description
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.stStopTeach.nItem_1	UINT	[READ_ONLY]
stDeviceData.stData.stStopTeach.nItem_2	UINT	[READ_ONLY]
stDeviceData.stData.stStopTeach.nItem_3	UINT	[READ_ONLY]
stDeviceData.stData.stStopTeach.nItem_4	UINT	[READ_ONLY]
stDeviceData.stData.stStopTeach.nItem_5	UINT	[READ_ONLY]
stDeviceData.stData.stStopTeach.nItem_6	UINT	[READ_ONLY]

Parameter name	Data type	Description
stDeviceData.stData.sVendorName	STRING	[READ_ONLY]
stDeviceData.stData.sVendorText	STRING	[READ_ONLY]
stDeviceData.stData.sProductName	STRING	[READ_ONLY]
stDeviceData.stData.sProductId	STRING	[READ_ONLY]
stDeviceData.stData.sProductText	STRING	[READ_ONLY]
stDeviceData.stData.sSerialNumber	STRING	[READ_ONLY]
stDeviceData.stData.sFirmwareVersion	STRING	[READ_ONLY]
stDeviceData.stData.sApplicationSpecificTag	STRING	[READ_WRITE]
stDeviceData.stData.nDeviceStatus	UINT	[READ_ONLY]
stDeviceData.stData.stDetailedDeviceStatus.sItem_1	STRING	[READ_ONLY]
stDeviceData.stData.stDetailedDeviceStatus.sItem_2	STRING	[READ_ONLY]
stDeviceData.stData.stDetailedDeviceStatus.sItem_3	STRING	[READ_ONLY]
stDeviceData.stData.stDetailedDeviceStatus.sItem_4	STRING	[READ_ONLY]
stDeviceData.stData.stDetailedDeviceStatus.sItem_5	STRING	[READ_ONLY]
stDeviceData.stData.stDetailedDeviceStatus.sItem_6	STRING	[READ_ONLY]
stDeviceData.stData.stTeachStatus.nTeachState	UINT	[READ_ONLY] Provides feedback on the status and the results of the teach-in activities
stDeviceData.stData.stTeachStatus.bSp1Tp1Flag	BOOL	[READ_ONLY]
stDeviceData.stData.stTeachStatus.bSp1Tp2Flag	BOOL	[READ_ONLY]
stDeviceData.stData.stTeachStatus.bSp2Tp2Flag_4	BOOL	[READ_ONLY]
stDeviceData.stData.stTeachStatus.bSp2Tp2Flag_6	BOOL	[READ_ONLY]
stDeviceData.stData.stBdc1Setpoints.nSp1	INT	[READ_WRITE] Switch point.
stDeviceData.stData.stBdc1Setpoints.nSp2	INT	[READ_WRITE] Unused
stDeviceData.stData.stBdc1Configuration. nOutputBehavior	UINT	[READ_WRITE] Override behavior of LO/DO Switch
stDeviceData.stData.stBdc1Configuration.nBdcMode	UINT	[READ_WRITE] Defines how the binary switching information is created depending on Setpoint parameters (SP1, SP2) and the current measurement value.

Parameter name	Data type	Description
stDeviceData.stData.stBdc1Configuration.nHysteresis	UINT	[READ_WRITE] User selectable hysteresis. Selectable as a multiple of the minimum possible hysteresis level
stDeviceData.stData.stConfiguration. bDisplayOrientation	BOOL	[READ_WRITE] The display orientation can be reversed to accomidate any mounting orientation.
stDeviceData.stData.stConfiguration.nGainLevel	UINT	[READ_WRITE] Current gain setting. In auto-gain this will be changed to reflect the optimal gain found during the TEACH/SET method.
stDeviceData.stData.stConfiguration.nGainMode	UINT	[READ_WRITE] In Auto Gain, the DF-G1 optimizes the gain during a TEACH/SET method for the presented condition(s).
stDeviceData.stData.stConfiguration. nResponseSpeed	UINT	[READ_WRITE] The smallest sensing event the sensor is guaranteed to register.
stDeviceData.stData.stConfiguration.nTeachSelection	UINT	[READ_WRITE] The teach method to be used for teaches/sets originating from the front panel
stDeviceData.stData.stConfiguration.nAutoThreshold	UINT	[READ_WRITE] The Auto Thresholds algorithm continuously tracks slow changes in the taught condition(s), and optimizes the threshold(s) to provide for reliable sensing.
stDeviceData.stData.stConfiguration. nProcessDataFilterUpdateTime	UINT	[READ_WRITE] Amount of time to collect averaged sample for process data (defaults to 2.6 ms - min cycle time)
stDeviceData.stData.stConfiguration.nDelayMode	UINT	[READ_WRITE] Select the type of delay to be used. Controls the meaning of the On and Off Delay values.
stDeviceData.stData.stConfiguration. nOnDelayOffOneshotTime	UINT	[READ_WRITE] This value controls the Off Oneshot Time if Delay Mode = Off Oneshot, otherwise it controls the On Delay
stDeviceData.stData.stConfiguration. nOffDelayOnOneshotTime	UINT	[READ_WRITE] This value controls the On Oneshot Time if Delay Mode = On Oneshot, otherwise it controls the Off Delay
stDeviceData.stData.stMicroStatus.nUpperThreshold	INT	[READ_ONLY]
stDeviceData.stData.stMicroStatus.nUpperHysteresis	INT	[READ_ONLY]
stDeviceData.stData.stMicroStatus.nReference_65	INT	[READ_ONLY]

Parameter name	Data type	Description
stDeviceData.stData.stMicroStatus.bOutputMode	BOOL	[READ_ONLY]
stDeviceData.stData.stStatistics.nNumberOfSamples	INT	[READ_ONLY] Number of samples present in Sum and Sum-Squared
stDeviceData.stData.stStatistics.nSum	INT	[READ_ONLY] Sum of Signals in Counts
stDeviceData.stData.stStatistics.nSumSquared	INT	[READ_ONLY] Sum of Signals Squared in Counts
stDeviceData.stData.stStatistics.nMin_66	INT	[READ_ONLY] Minimal signal measured since last read
stDeviceData.stData.stStatistics.nMax_66	INT	[READ_ONLY] Maximum signal measured since last read
stDeviceData.stData.stTeachableLimits. nMinTeachableReference	UINT	[READ_ONLY]
stDeviceData.stData.stTeachableLimits. nMaxTeachableReference	UINT	[READ_ONLY]
stDeviceData.stData.stTeachableLimits. nMinAdjustableReference	UINT	[READ_ONLY]
stDeviceData.stData.stTeachableLimits. nMaxAdjustableReference	INT	[READ_ONLY]
stDeviceData.stData.stObjectCounterDarkToLight. nObjectCounterDarkToLight	UINT	[READ_WRITE] Object Counter - Dark to Light
stDeviceData.stData.stObjectCounterLightToDark. nObjectCounterLightToDark	UINT	[READ_WRITE]

Tab. 7.2:   ST_Leuze_PD_ LV463_512

Parameter name	Data type	Description
ST_Leuze_PD_LV463_512.bOutputStateQ	BOOL	
ST_Leuze_PD_LV463_512.bHardAlarmState	BOOL	
ST_Leuze_PD_LV463_512.nMeasurement	UINT	

8 Parameter descriptions

Tab. 8.1:   IODD parameter descriptions

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

Parameter	Index	Subindex	Data type	Default	AR	Description
Commands			RecordT		W	
Device Reset			UIntegerT	128	W	Device Reset
Application Reset			UIntegerT	129	W	Application Reset
Restore Factory Settings			UIntegerT	130	W	Restore Factory Settings
SP1 Single Value Teach			UIntegerT	65	W	SP1 Single Value Teach
2-Point Teach Switching Point 1			UIntegerT	67	W	2-Point Teach Switching Point 1
2-Point Teach Switching Point 2			UIntegerT	68	W	2-Point Teach Switching Point 2
Dynamical Teach Start			UIntegerT	71	W	Dynamical Teach Start
Dynamical Teach Stop			UIntegerT	72	W	Dynamical Teach Stop
Stop Teach			UIntegerT	79	W	Stop Teach
Stop Sensor Search			UIntegerT	176	W	Stop Sensor Search
Start Sensor Search			UIntegerT	177	W	Start Sensor Search
Baseline Null			UIntegerT	178	W	Baseline Null
Baseline Disable			UIntegerT	179	W	Baseline Disable
Direct Parameters 1	0	0	RecordT		RW	
Reserved	0	1	UIntegerT		R	
Master Cycle Time	0	2	UIntegerT		R	
Min Cycle Time	0	3	UIntegerT		R	
M-Sequence Capability	0	4	UIntegerT		R	
IO-Link Version ID	0	5	UIntegerT	17	R	
Process Data Input Length	0	6	UIntegerT		R	
Process Data Output Length	0	7	UIntegerT		R	
Vendor ID 1	0	8	UIntegerT		R	
Vendor ID 2	0	9	UIntegerT		R	

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

Parameter	Index	Subindex	Data type	Default	AR	Description
Standard Command	2	0	UIntegerT		W	(0 ... 63): Reserved 128: Device Reset 129: Application Reset 130: Restore Factory Settings (131 ... 159): Reserved 65: SP1 Single Value Teach 67: 2-Point Teach Switching Point 1 68: 2-Point Teach Switching Point 2 71: Dynamical Teach Start 72: Dynamical Teach Stop 79: Stop Teach 176: Stop Sensor Search 177: Start Sensor Search 178: Baseline Null 179: Baseline Disable
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	
Stop Teach	13	0	ArrayT		R	
	13	0	UIntegerT		R	
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	
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
Detailed Device Status	37	0	ArrayT		R	
	37	0	OctetStringT		R	
Teach Status	59	0	RecordT		R	

Parameter	Index	Subindex	Data type	Default	AR	Description
Teach State	59	1	UIntegerT		R	Provides feedback on the status and the results of the teach-in activities 0: Idle 1: SP1 Success 2: SP2 Success 3: SP12 Success 4: Wait for Command 5: Busy 7: Error
SP1 TP1 Flag	59	2	BooleanT		R	
SP1 TP2 Flag	59	3	BooleanT		R	
SP2 TP2 Flag	59	4	BooleanT		R	
SP2 TP2 Flag	59	6	BooleanT		R	
BDC1 Setpoints	60	0	RecordT		RW	
SP1	60	1	IntegerT	2000	RW	Switch point.
SP2	60	2	IntegerT	2000	RW	Unused
BDC1 Configuration	61	0	RecordT		RW	
Output Behavior	61	1	UIntegerT		RW	Override behavior of LO/DO Switch 0: Light Operate 1: Dark Operate 128: Switch Select
BDC Mode	61	2	UIntegerT	1	RW	Defines how the binary switching information is created depending on Setpoint parameters (SP1, SP2) and the current measurement value. 1: Single-Point
Hysteresis	61	3	UIntegerT		RW	User selectable hysteresis. Selectable as a multiple of the minimum possible hysteresis level 0: 1.0x 1: 1.5x 2: 2.5x
Configuration	64	0	RecordT		RW	
Display Orientation	64	21	BooleanT		RW	The display orientation can be reversed to accomidate any mounting orientation. False: Normal True: Flipped

Parameter	Index	Subindex	Data type	Default	AR	Description
Gain Level	64	24	UIntegerT		RW	Current gain setting. In auto-gain this will be changed to reflect the optimal gain found during the TEACH/SET method. 0: Gain 1 1: Gain 2 2: Gain 3 3: Gain 4 4: Gain 5 5: Gain 6 6: Gain 7 7: Gain 8
Gain Mode	64	25	UIntegerT		RW	In Auto Gain, the DF-G1 optimizes the gain during a TEACH/SET method for the presented condition(s). 0: Fixed Gain 2: Auto Gain
Response Speed	64	26	UIntegerT		RW	The smallest sensing event the sensor is guaranteed to register. 0: 200 µS 1: 500 µS 2: 2000 µS 3: 5000 µS
Teach Selection	64	27	UIntegerT		RW	The teach method to be used for teaches/sets originating from the front panel 0: Single Point Set 1: Two-Point Teach 2: Dynamic Teach
Auto Threshold	64	38	UIntegerT		RW	The Auto Thresholds algorithm continuously tracks slow changes in the taught condition(s), and optimizes the threshold(s) to provide for reliable sensing. 0: Disabled 3: Enabled
Process Data Filter Update Time	64	44	UIntegerT		RW	Amount of time to collect averaged sample for process data (defaults to 2.6 ms - min cycle time)
Delay Mode	64	60	UIntegerT		RW	Select the type of delay to be used. Controls the meaning of the On and Off Delay values. 0: Off-On Delay 3: Off Oneshot 12: On Oneshot
On Delay/Off Oneshot Time	64	62	UIntegerT		RW	This value controls the Off Oneshot Time if Delay Mode = Off Oneshot, otherwise it controls the On Delay (0 ... 9999)
Off Delay/On Oneshot Time	64	63	UIntegerT		RW	This value controls the On Oneshot Time if Delay Mode = On Oneshot, otherwise it controls the Off Delay (0 ... 9999)
Micro Status	65	0	RecordT		R	

Parameter	Index	Subindex	Data type	Default	AR	Description
Upper Threshold	65	2	IntegerT		R	
Upper Hysteresis	65	3	IntegerT		R	
Reference	65	5	IntegerT		R	
Output Mode	65	17	BooleanT		R	False: Dark Operate True: Light Operate
Statistics	66	0	RecordT		R	- All statistics are reset on every read
Number of Samples	66	1	IntegerT		R	Number of samples present in Sum and Sum-Squared
Sum	66	2	IntegerT		R	Sum of Signals in Counts
Sum Squared	66	3	IntegerT		R	Sum of Signals Squared in Counts
Min	66	4	IntegerT		R	Minimal signal measured since last read
Max	66	5	IntegerT		R	Maximum signal measured since last read
Teachable Limits	68	0	RecordT		R	
Min Teachable Reference	68	1	UIntegerT		R	
Max Teachable Reference	68	2	UIntegerT		R	
Min Adjustable Reference	68	3	UIntegerT		R	
Max Adjustable Reference	68	4	IntegerT		R	
Object Counter - Dark to Light	207	0	RecordT		RW	Number of light to dark sensing transitions seen by the sensor (reset on power ON).
Object Counter - Dark to Light	207	1	UIntegerT		RW	Object Counter - Dark to Light
Object Counter - Light to Dark	208	0	RecordT		RW	Number of dark to light sensing transitions seen by the sensor (reset on power ON).
Object Counter - Light to Dark	208	1	UIntegerT		RW	

Leuze

9 Technical specifications

9.1 General data

Tab. 9.1:   Sensor and IODD version

IODD version	V1.4
IODD release date	2015-11-16
Device family	Fiber Optic Amplifier
Device ID	512
Device name	LV463
Device variants	LV463.7/L4 (50122460), LV463.7/L4-M8 (50122456), LV463.7/L4-150-M8 (50122659), LV463.7/L4-150-M12 (50122457)